



# FEED THE FUTURE

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



# ETHIOPIA

Pastoralist Areas Resilience Improvement and Market Expansion (PRIME) Project Impact Evaluation

Endline Survey Report

September 2019



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Resilience Evaluation,  
Analysis and Learning

**Prepared for:**

Center for Resilience (C4R), USAID's Office of Food for Peace (FFP), the Feed the Future FEEDBACK Project, and the USAID Ethiopia Mission.

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**Recommended Citation:**

Smith, L, Frankenberger, Fox, K., T, Nelson, S., and Griffin, T. (2019). *Ethiopia Pastoralist Areas Resilience Improvement and Market Expansion (PRIME) Project Impact Evaluation: Endline Survey Report*. Washington, DC: Resilience Evaluation, Analysis and Learning (REAL) Associate Award.

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This report was made possible by the generous support and contribution of the American people through the United States Agency for International Development (USAID). The contents are the responsibility of the REAL Associate Award and do not necessarily reflect the views of USAID or the United States Government.

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## ACKNOWLEDGEMENTS

Technical Assistance for Non-Governmental Organizations (TANGO) International would like to thank numerous individuals for the support they provided to this PRIME endline resilience analysis. They include Greg Collins (USAID), Tiffany Griffin (USAID), Ato Biratu Yigezu (Director General, Central Statistical Agency of Ethiopia), and Amin Yusef (Vice President of Development Affairs, Somali Regional State). We also want to thank Nathaniel Scott and Dubale Admasu for their insightful comments regarding the program implications of the findings and the future research questions that should be addressed in follow-up work. We are indebted to the staff from Mercy Corps Ethiopia, including Michael Jacobs, Diana Picón, Tilahun Asmare and Fekadu Wolde. We are also grateful to Karyn Fox, Victoria Brown, Niloy Chowdhury, Padraic Finan, Elizabeth Mubanga Chishimba, Robin Al-haddad and Carrie Presnall from TANGO for assistance in analysis and report formatting. In addition, we wish to give great thanks to Ato Zenagebril Degu and his staff at Green Professionals Services for their tireless work in collecting the data and supporting the logistics for the baseline survey, the two Recurrent Monitoring Surveys, and the endline survey that are all used for the impact evaluation of this report. Lastly, we are grateful to all of the gracious people in the kebeles of Borena and Jijiga who took the time to be interviewed for the four surveys.

Tim Frankenberger

President

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## LIST OF ACRONYMS

AFDM	Africa Flood and Drought Monitor
ATT	Average treatment effect on the treated
AWD	Acute watery diarrhea
CAHW	Community animal health workers
CCA	Climate change adaptation
CRP	Comprehensive resilience programming
DID-PSM	Difference-in-Difference Propensity Score Matching
DPM	Disaster preparedness and mitigation
EA	Enumeration areas
ETB	Ethiopian Birr
FFW/CFS	Food-for-work or cash-for-work
FG	Focus group
FGD	Focus group discussion
GIS	Geographical Information System
HFIAS	Household Food Insecurity Access Scale
HI	High intensity
IE	Impact Evaluation
IOD	Indian Ocean Dipole
JESH	Jijiga export slaughter house
KI	Key informant
KII	Key informant interview
LI	Low intensity
MFI	Microfinance institution
NGO	Non-governmental organization
PC	Pastoral clusters
PNRM	Pastoral Natural Resource Management
PPP	Purchasing power parity
PPS	Probability proportional to size
PRIME	Pastoralist Areas Resilience Improvement and Market Expansion
PSM	Propensity Score Matching
PSNP	Productive safety net program

PVP	Private veterinary pharmacies
RMS	Recurrent Monitoring Surveys
RUSACO	Rural Saving and Credit Organizations
SPI	Standardized Precipitation Index
TANGO	Technical Assistance for Non-Governmental Organizations (as in TANGO International)
TVET	Technical and vocational education and training
UNESCO	United Nations Educational, Scientific and Cultural Organization
USAID	United States Agency for International Development
USD	United States dollar
VSLA	Village savings and loan association
WASH	Water, sanitation and hygiene
WFP	World Food Programme
WHO	World Health Organization

## EXECUTIVE SUMMARY

The Pastoralist Areas Resilience Improvement and Market Expansion (PRIME) project was implemented from October 2012 to September 2017 in one of the most shock-prone areas of the world, the drylands of Ethiopia. A key project goal was to enhance the resilience of households to shocks. In particular, it aimed to enable households to withstand and recover from the recurrent climate-related shocks—mainly drought—to which they are exposed.

This report has drawn on the data collected as part of the PRIME Impact Evaluation (IE) Baseline and Endline Surveys, as well as two Recurrent Monitoring Surveys, to meet three objectives:

- (1) Document the changes that have taken place over the project's implementation period in key resilience-related variables (shock exposure, livelihoods, resilience capacities, coping strategies, well-being outcomes, and resilience);
- (2) Determine whether the project's resilience-strengthening interventions served to strengthen households' resilience to shocks;
- (3) Identify which resilience capacities—including specific absorptive, adaptive, and transformative capacities—were strengthened, and by which types of interventions, in order to inform and enhance the effectiveness of future resilience-strengthening projects.

The PRIME impact evaluation was conducted in two of the three project areas: Borena in the regional state of Oromiya and Jijiga in Somali, for a sample of 2,750 panel households. It draws on both quantitative and qualitative data, the latter collected through key informant interviews and focus group discussions.

### **Shock Exposure**

During the PRIME project's implementation period, households in both Borena and Jijiga experienced a continuous cycle of multiple, back-to-back droughts. Annual rainfall deficits were the highest since 1950 and resulted in extremely dry soil moisture conditions. The quantitative and qualitative data show that households experienced numerous downstream shocks. Problems of insufficient fodder and water for livestock and consequent livestock disease, emaciation and unplanned deaths, as well as crop disease and failures, were widespread. The catastrophic loss of livestock not only negatively affected household income and consumption of highly nutritious foods (e.g., milk), it had cascading impacts on local economies, leading to unemployment and business failures. The declining terms of trade associated with concurrent food price inflation and falling livestock and crop prices exacerbated households' ability to meet their needs for food and non-food items like school fees, and to repay loans. Many households also faced conflict shocks, such as thefts of livestock and crops, destruction of homes and loss of land due to conflict, as well as violence against household members. Human illness and malnutrition among children were a rising problem over the project period.

According to satellite remote sensing data, cumulative drought in terms of rainfall and soil moisture deficits was more severe in Borena than Jijiga. Self-reported shock exposure data, including both drought and its numerous downstream impacts, confirm that Borena households and pastoralists (compared to agro-pastoralists and non-pastoralists) experienced the greatest increase in shock exposure over the

project period. Women, the elderly, children and the poor were particularly vulnerable to the negative impacts of drought.

## **Livelihoods and Livelihood Environment**

Despite the extraordinarily severe shocks they experienced, households in the IE area saw a modest increase in their wealth, as measured by ownership of assets. Households' real expenditures have declined, however. They have thus not been able to translate increased wealth into a better ability to meet their basic needs, such as food, from their current resources, including food assistance. The prevalence of poverty (based on the USD 1.90 per day line) rose from 63.5 to 71.8 percent, a total of 8.3 percentage points. It rose the most in Jijiga and among pastoralists.

The project area saw some changes in its basic socio-demographic makeup. In Borena there has been a shift of households out of the agro-pastoralist group and into the non-pastoralist group, perhaps related to the devastation wrought on agricultural production. The percentage of households with a disabled member has increased project area -wide, and the percent of female-adult-only households has increased in Jijiga. Positive trends are increases in the quality of dwellings and in women's decision-making power.

In terms of sources of households' livelihood, there has been a large increase in reliance on assistance from others, including humanitarian assistance for people and animals. A notable reduction in farming among Jijiga households has taken place. With regards specifically to livestock production and marketing, there has been a shift from reliance on communal pasture browse for fodder towards private pastures and market sources, such as livestock feed services. The length of time needed to get to fodder has increased dramatically. While the quantitative data indicate an increase in livestock market participation, the qualitative data tell a story of reduced engagement, especially for women, due to drought-induced losses of livestock. Livestock marketing is increasingly spreading out from localized areas to woreda towns and other regions within Ethiopia where stocks are higher and prices better.

## **Resilience Capacity**

The analysis shows some positive and some negative trends in households' resilience capacities, which are the underlying determinants of resilience.

**The three dimensions of resilience capacity.** Trends in indexes of the three dimensions of resilience capacity—absorptive capacity (minimizing exposure to shocks and recovering quickly), adaptive capacity (making proactive and informed choices about alternative livelihood strategies), and transformative capacity (system-level factors sustaining more lasting resilience)—differ greatly for the two project areas. All three have increased among Jijiga households. However, among Borena households both adaptive and transformative capacity have declined, and absorptive capacity has seen no change.

**Individual resilience capacities.** The individual capacities making up the three dimensions, 20 in all, are the actionable programming and policy levers for enhancing households' ability to recover from shocks. Three have seen definite improvements in both project areas: aspirations and confidence to adapt, asset ownership, and support for disaster preparation and mitigation. As for the overall indexes, however, trends for most of the individual capacities differ between the project areas. A common pattern is for a

capacity to be at a higher level in Borena at baseline but then to increase in Jijiga more than in Borena, thus closing the initial gap between the areas.

The changes found by project area are summarized in the following table, with green shading indicating a positive trend and red shading a negative trend.

**Trends in the resilience capacities in Borena and Jijiga**

	Borena	Jijiga
<b>Social capital</b>		
Bonding social capital	-	+
Bridging social capital	-	+
Linking social capital	-	-
<b>Aspirations/confidence to adapt</b>	+	+
<b>Economic sources of resilience capacity</b>		
Asset ownership	+	+
Livelihood diversity		+
Access to financial resources		+
Cash savings	+	
<b>Human capital and exposure to information</b>		
Human capital	+	
Exposure to information	-	+
<b>Disaster risk reduction</b>		
Disaster preparedness & mitigation	+	+
Availability of hazard insurance	-	+
Conflict mitigation support		
<b>Access to safety nets</b>		
Access to informal safety nets	-	
Access to formal safety nets	-	+
<b>Access to markets, services, infrastructure, and</b>		
Access to markets		
Access to basic services		+
Access to livestock services		+
Access to infrastructure		+
Access to communal natural resources		

Note: Positive trends are in green; negative trends are in red.

Borena saw increases in five capacities, but reductions in seven. By contrast, Jijiga fared far better, seeing increases in 13 capacities and a decline in only one, linking social capital.

## Coping Strategies

Coping strategies are households' responses to the shocks they face and mediate the influence of their resilience capacities on their well-being. The most commonly employed strategy for coping with the droughts and their many downstream impacts was to reduce food consumption, a negative coping strategy that undermines human health. The percent of households doing so increased substantially over the project period in both areas, although more so in Borena (from 71.7 to 93.1 percent), a strong indication that the shocks households were exposed to had a negative effect on their food security.

Relying on informal and formal assistance was also a widely employed coping strategy. Borrowing from or relying on gifts of food or money from friends and relatives decreased in Borena and increased in Jijiga. Reliance on food aid, and food/cash-for-work as coping strategies has increased dramatically in both areas.

The large majority of households, a full 70 percent, sold their livestock to cope with shocks. The use of this strategy has increased among Borena households and declined among Jijiga households since the baseline. Taking up new wage labor was also a common strategy that declined among Jijiga households, perhaps due to increasingly limited opportunities. Migration as a coping strategy has been on the decline.

Resilience marks the ability of households to recover from shocks while not undermining their ability to recover from future shocks. Besides reducing food consumption, the only negative coping strategy to increase over the project period was purchasing food on credit (in Jijiga). Borrowing from money lenders, taking children out of school, and consuming seed stock held for the next season all declined, whether due to less need or depleted options.

### ***Well-being Outcomes and Resilience to Shocks***

The well-being outcomes of focus in this report are food security and wasting among children under five. As for livelihoods, resilience capacities, and many coping strategies, trends in these outcomes differ greatly across the project areas. The Borena area experienced a strong reduction in food security over the project period, accompanied by a very large increase in the prevalence of severe food insecurity, from 31.9 to 64.6 percent. By contrast, food security held steady in Jijiga, and the prevalence of severe food insecurity dropped (from 46.3 to 39.4 percent).

In contrast to these regional differences in food security trends, the prevalence of child wasting (a measure of acute malnutrition) almost doubled in Jijiga, rising from 6.1 to 11.0 percent, but declined in Borena (from 14.5 to 7.0 percent). The qualitative data point to increasing scarcities of clean water due to successive droughts as a cause of the increase in wasting in Jijiga. Access to health services also fell markedly in Jijiga but not Borena.

Two indicators of resilience are used in the report. The first, following directly from the operational definition of resilience—the “ability to recover from shocks”—is measured as the change in food security in the face of shocks between the PRIME baseline (December 2013) and endline surveys (December 2017). The second, subjective measure of resilience, is the perceived ability of households to recover from the shocks of the previous year. By both indicators, Jijiga households as a group were more resilient to the shocks they faced over the project period than Borena households. Trends in the perceived ability to recover index show that not only have Jijiga households been more resilient, their resilience has improved over the project period while that of Borena households has declined considerably.

### ***Engagement in Resilience-strengthening Interventions and Receipts of Humanitarian Assistance***

The PRIME project was implemented using a multi-sectoral, systems-strengthening approach. Most of its resilience-strengthening interventions were implemented at a broader, systems level, and households could be indirectly exposed to them. However, households could also make decisions to take advantage of them, and some were specifically targeted to them. Because indirect exposure and direct participation

could have differing impacts, for this impact evaluation households' engagement in resilience-strengthening interventions is measured using separate indicators for each.

To construct overall measures of exposure and participation, the project's interventions were first divided into four categories—livestock productivity and competitiveness, pastoral natural resource management (PNRM), financial services, and climate change adaptation(CCA)—and indexes of each were calculated. Then, recognizing the multi-sectoral nature of the PRIME project's approach (multiple systems were strengthened simultaneously to better strengthen resilience), a dichotomous measure of “Comprehensive Resilience Programming” (CRP) was calculated. Households engaged in at least three out of four of the intervention sets were classified into the CRP group.

Using this threshold, forty-four percent of households residing in the project area as a whole were exposed to CRP, and thirty percent directly participated in it. Borena households were more likely to be both exposed to and participate in CRP.

With respect to differences in engagement in the four intervention sets, exposure to livestock productivity interventions was higher among Jijiga than Borena households (49.3 versus 21.9 percent). On the other hand, PNRM interventions were more heavily concentrated in Borena (44.2 versus none in Jijiga). Exposure to financial services and CCA interventions was roughly equal across the two areas. Participation in interventions was generally higher among Borena than Jijiga households.

As seen above, the baseline and endline data reveal the dramatic rise over the project period in access to food aid and reliance on it as a coping strategy. Humanitarian assistance data collected from households at endline show that a full 87.3 percent received some form of assistance over the project period. Food aid was the most commonly received, followed by food-for-work, cash-for-work, and cash assistance. Borena and Jijiga were equally likely to have received assistance, although the types differ across the areas. Jijiga households were far more likely to receive cash assistance or engage in cash-for-work.

## ***Impact of PRIME on Households' Resilience and Resilience Capacities***

The impact of the PRIME project is evaluated using a rigorous impact evaluation technique, Difference-in-Difference Propensity Score Matching. All DID-PSM models employed are carefully tested to ensure they meet the two criteria for applying this method (common support and adequate balancing). The results indicate a largely positive impact of resilience-strengthening interventions on households' ability to recover from shocks and their resilience capacities.

### **Impact of Comprehensive Resilience Programming**

**Impact on resilience.** Households' exposure to and direct participation in resilience-strengthening interventions did indeed strengthen their resilience to shocks. The impact was stronger when households participated directly in interventions than if they were just exposed to them. Households exposed to CRP experienced an 18 percent lower decline in their food security over the project period than their unexposed counterparts. Households that directly participated in CRP experienced a full 40 percent lower decline than those that did not, evidence that they were much more resilient. The positive impact of direct participation was greater for Borena than Jijiga households, roughly double. Note that these results hold even after controlling for receipts of food aid.

Households' engagement in CRP had a strong preventative effect on severe food insecurity. Exposure to CRP led to a 15.6 percentage-point drop in severe food insecurity at endline. In the absence of exposure to the variety of resilience-strengthening interventions made available, the prevalence would have risen to 72.1 percent (versus 56.5 for the exposed households). Direct participation in CRP had a further preventative effect.

**Impact on the three dimensions of resilience capacity.** CRP strengthened all three dimensions of resilience capacity—absorptive capacity, adaptive capacity, and transformative capacity. In the absence of households' engagement in CRP, the average household in the PRIME area would have experienced a reduction in their resilience capacities during this period of extreme drought. However, the resilience capacities of those engaged in multiple, cross-sectoral resilience-strengthening interventions were strengthened, enabling them to recover and preparing them to cope with future shocks. Similar to resilience itself, participation in CRP had a stronger positive impact on the capacities for Borena than Jijiga.

**Impact on the 20 individual resilience capacities.** The impacts on the individual resilience capacities are summarized in the following table, with green shading indicating a positive impact and red shading a negative impact. As can be seen, where resilience-strengthening interventions have had an impact, it has been positive with a few exceptions. The capacities strengthened by CRP span beyond the economic capacities of traditional focus to include human and social capital, psycho-social capabilities, safety nets, disaster risk reduction, and access to markets, services, and infrastructure.

***Impact of Comprehensive Resilience Programming on Resilience Capacities***

	All	Borena	Jijiga (Participation only)
<b>Social capital</b>			
Bonding social capital			
Bridging social capital	+		+
Linking social capital		+	
<b>Aspirations/confidence to adapt</b>	+	+	
<b>Economic sources of resilience capacity</b>			
Asset ownership	+	+	+
Livelihood diversity	+		+
Access to financial resources	+		
Cash savings			
<b>Human capital and exposure to information</b>			
Human capital	+	+	
Exposure to information	+	+	+
<b>Disaster risk reduction</b>			
Disaster preparedness & mitigation	+		
Availability of hazard insurance	+		
Conflict mitigation support		-	
<b>Access to safety nets</b>			
Access to informal safety nets	+		
Access to formal safety nets	+		
<b>Access to markets, services, infrastructure, and communal natural resources</b>			
Access to markets	+		
Access to basic services		+	
Access to livestock services	+		+
Access to infrastructure	+	+	
Access to communal natural resources	-		

Note: Positive impacts are in green; negative impacts are in red.  
The results for the project area as a whole summarize those for exposure and participation

## What Worked? Impact of the Four Types of Interventions

Which sets of interventions served to strengthen households' resilience and resilience capacities?

Focusing on the project-area-wide results for resilience itself and the three dimensions of resilience capacity, the following are the main findings.

**Impact on resilience:** The evaluation found that the livestock productivity and competitiveness interventions, followed by the CCA interventions, had the strongest impacts on households' resilience. The financial services interventions had no impact on resilience itself. The PNRM interventions had mixed impacts: they had a negative impact on the small minority of households that were only exposed to them with no active participation. Those that did participate in them experienced induced improvements in their resilience to shocks.

**Impact on resilience capacity:** Despite not independently improving households' resilience over the short time span of the project, the financial services interventions had the most powerful, positive impact on the three dimensions of resilience capacity. They had a particularly strong effect on households' absorptive capacity. In all, they served to strengthen 14 out of the 20 individual capacities. The livestock productivity & competitiveness interventions had the second-strongest impact on the three dimensions of resilience capacity, strengthening a full 17 of the individual capacities. The CCA interventions had the third-strongest impact on the capacity dimensions, having a positive (though lower) impact on all three, and strengthening 12 of the capacities. Finally, the PNRM interventions strengthened only adaptive capacity. They had a positive impact on 7 individual capacities.

The CCA and PNRM interventions did not independently strengthen households' resilience as much as they could have because they had negative effects on some capacities (4 for CCA and 5 for PNRM). The evaluation also found that CRP itself, and financial services and CCA interventions in particular, had a negative impact on access to communal natural resources, including rangeland, water, and firewood. Avoiding such negative impacts on resilience capacities is obviously important for leveraging the greatest resilience impacts. To do so, efforts should be made to understand why they are occurring and who is being affected so that appropriate shifts in programming can take place.

## Program Implications

The following are the implications for programming based on the findings of this report:

- Greater impacts are achieved when interventions from multiple sectors are combined than when they are implemented separately. **Comprehensive, multi-sectoral programming optimizes resilience impacts.**
- Participation of households in the PRIME project's interventions had a greater impact than only indirect exposure. **Projects with “system-level” interventions should proactively plan for direct household participation.**
- Important knowledge was gained from this impact evaluation: livestock productivity, financial services, and CCA interventions had the strongest impact on households' resilience and resilience capacities. **Projects can leverage the greatest impact by determining early on which interventions bolster resilience and resilience capacities the most and focusing on them.**

- The positive resilience impacts were brought about by strengthening a wide range of resilience capacities spanning beyond the economic to include human and social capital, psycho-social capacities, safety nets, disaster risk reduction, and access to markets, services, and infrastructure. **Shocks are not going away: continue to strengthen a wide range of capacities to protect households' well-being and development investments.**
- The CCA and PNRM interventions had negative impacts on some resilience capacities, hindering resilience progress. **Avoid negative impacts through understanding why they occur, who they affect, and shifting programming accordingly.**
- The sharp deterioration of food security and resilience capacities seen in Borena could have been prevented with earlier information on food security trends, where interventions were concentrated, and which are likely to have the greatest impact. **To leverage optimal impacts in shock contexts, conduct interim monitoring and evaluation and use the information gained for adaptive management.**



# I INTRODUCTION

The Pastoralist Areas Resilience Improvement and Market Expansion (PRIME) project, funded under the United States Government's Feed the Future initiative,<sup>1</sup> was implemented from October 2012 to September 2017 in one of the most shock-prone areas of the world, the drylands of Ethiopia. A key objective of the project was to enhance the resilience of households to shocks. In particular, it aimed to enable households to withstand and recover from the recurrent climate-related shocks—mainly drought—to which they are subjected.

This report presents analysis of new data collected as part of the PRIME IE Endline Survey in December 2017, while also making use of data collected in three previous PRIME IE surveys. These are the Baseline Survey (December 2013) and two Recurrent Monitoring Surveys (RMSs) collected between the baseline and endline: RMS-1 (2014/2015) and RMS-2 (2015/2016). As will become clear in the report, the period of implementation of the project was marked by extreme climatic variability, with households enduring multiple, back-to-back droughts that induced a series of downstream shocks to agriculture and livestock rearing, producer and consumer prices, human health and social relations between population groups. The purpose of the RMS's was to collect real-time data during these actual shocks in progression in order to provide more in-depth understanding of how they affected households' well-being and their coping strategies. Exploratory analysis was undertaken to understand what can help them recover.

The purpose of this endline report is to determine whether and how the PRIME project's resilience-strengthening interventions enhanced households' resilience. Did the interventions help them recover from the multiple shocks they faced over the project period? What can we learn to enhance the effectiveness of future resilience-strengthening projects? In addition to providing a detailed accounting of the shocks households were exposed to over the project period, the report presents data on the changes in households' resilience capacities (that is, the underlying factors affecting their resilience), coping strategies, and well-being outcomes over the period. It then presents the results of an impact evaluation documenting how households' resilience was affected by interventions falling into four categories—livestock productivity and competitiveness, pastoral natural resource management, financial services, and climate change adaptation—as well as their combined impacts. As will be seen, the panel data collected at baseline and endline, along with specialized data collected on the factors affecting participation in interventions, allow the use of rigorous impact evaluation techniques that give more definitive evidence on what can be done to help households recover from future shocks.

## I.1 The PRIME Project

The PRIME project's overall goal was to reduce poverty and hunger by enhancing resilience to climate change through market linkages in the drylands of the Somali, Afar, and Oromiya regional states of Ethiopia.

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<sup>1</sup> Feed the Future seeks to address global food insecurity in 19 focus countries by accelerating growth of the agricultural sector, addressing the root causes of undernutrition, and reducing gender inequality. USAID is responsible for leading the government-wide effort to implement the Feed the Future initiative, whose high-level target is: "to reduce by 20 percent the prevalence of poverty and the prevalence of stunted children under 5 years of age in the areas where we work." (USAID 2013).

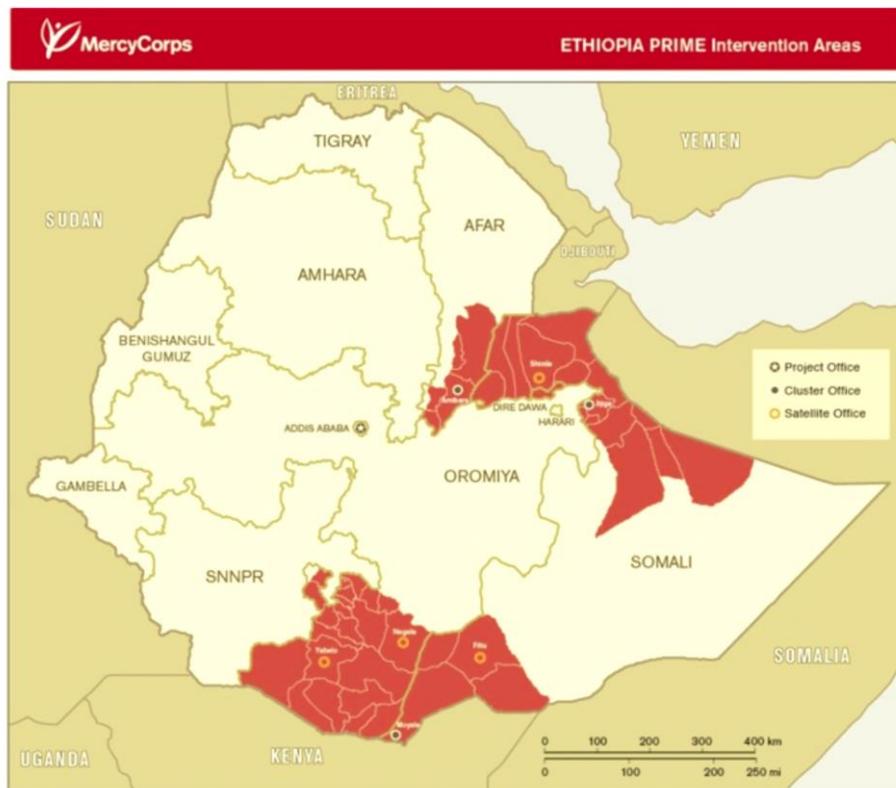
To achieve this goal, the project strove to meet the following five “Intermediate Results”:

1. Improve productivity and competitiveness of livestock and livestock products;
2. Enhance pastoralists’ adaptation to climate change;
3. Strengthen alternative livelihoods for households transitioning out of pastoralism;
4. Ensure enhanced innovation, learning and knowledge management;
5. Improve nutritional status of targeted households through targeted, sustained, and evidence-based interventions.

The project’s interventions were implemented following an integrated approach based on “the theory that a number of systems, including financial, market, health, agriculture and environmental, act in synergy, not isolation. By merging and strengthening these systems simultaneously, more resilient households and communities should result” (Mercy Corps 2018, p. 5). More specific information about the project interventions is given in Chapter 8 on “Households’ engagement in resilience-strengthening interventions and receipts of humanitarian assistance.”

The project sought to assist not only pastoralists, but also agro-pastoralists, non-pastoralists, and those transitioning between these different categories. Its implementation area covered 54 woredas (districts) within three pastoral clusters (PC) in Ethiopia: the Southern PC, the Somali PC, and the Afar PC (see Figure I.1).

**Figure I.1: PRIME Project intervention areas**



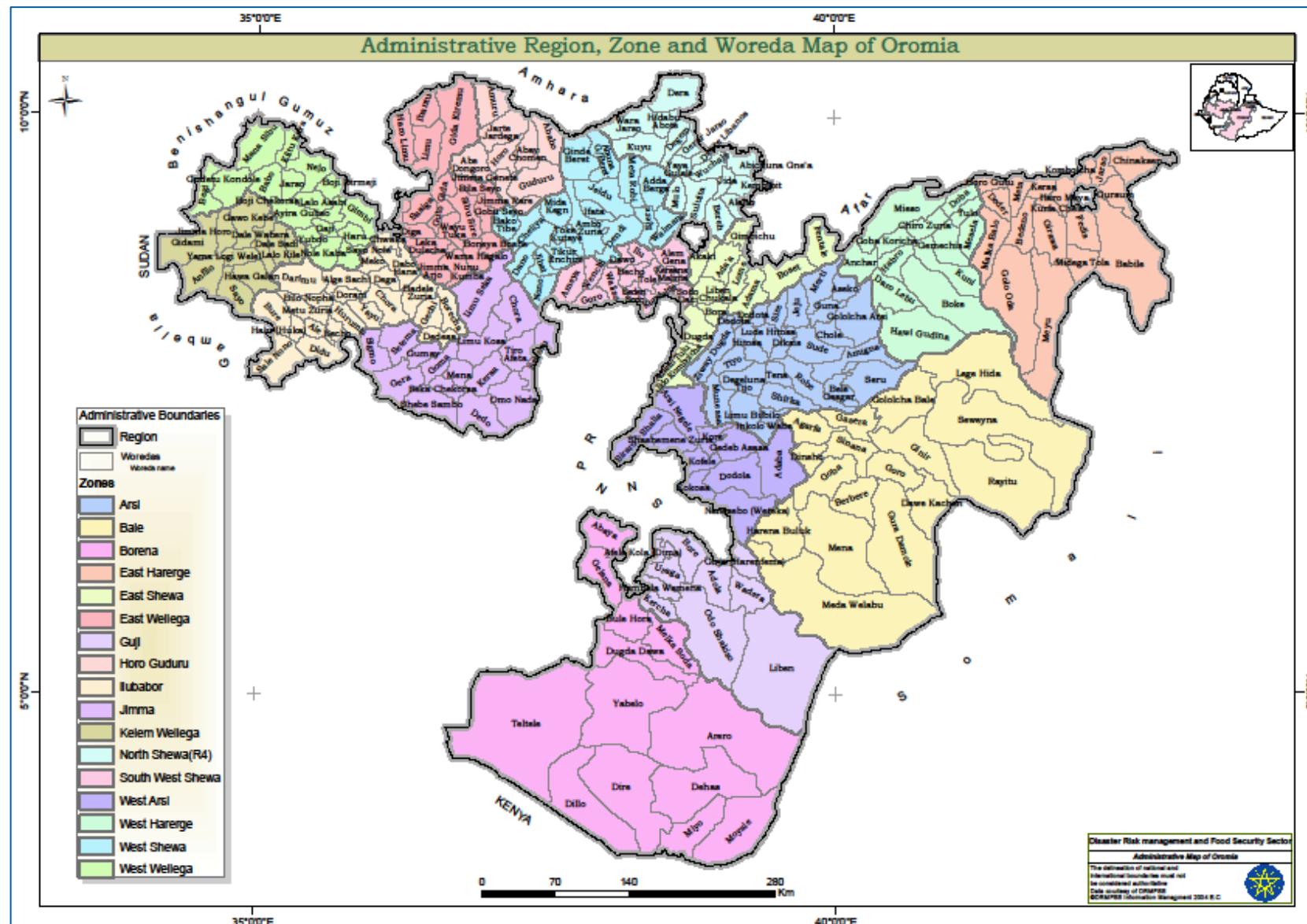
The Southern PC includes the Borena/Guji zones of Oromiya Region and the Liban Zone of Somali Region. The Somali PC includes the Jijiga and Shinile<sup>2</sup> zones of the Somali Region, and the Afar PC is comprised of Zone 3 of the Afar Region.

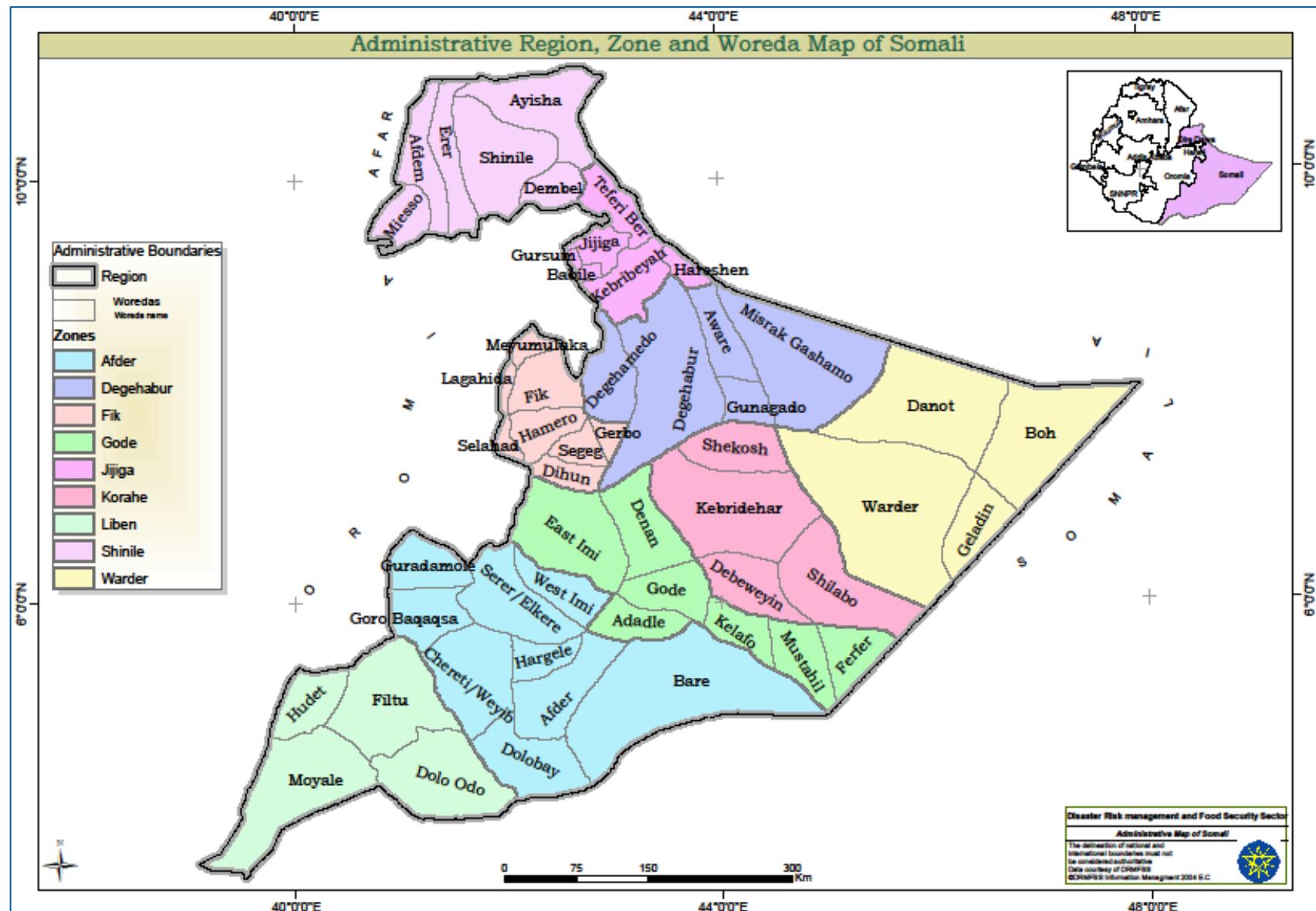
Expected to benefit 250,000 individuals, the project was implemented by Mercy Corps in partnership with CARE International, Kimetrica, Haramaya University, Action for Integrated Sustainable Development, Ethiopian Center for Disability and Development, Horn of Africa Voluntary Youth Committee, Aged and Children Pastoralists Association, and SOS Sahel Ethiopia.

The PRIME impact evaluation that is the main subject of this report was focused on two areas within the broader PRIME project area that have traditionally had a high concentration of pastoralists and agro-pastoralists: Borena in Oromiya and Jijiga in Somali. Figure 1.2 shows the location of Borena within the broader Oromiya region (see the pink area in the south). Figure 1.3 shows the same for Jijiga within Somali (see the dark pink area in the north).

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<sup>2</sup> The Jijiga zone is now called Fafan.

**Figure 1.2: Location of Borena within Oromiya region**

**Figure 1.3: Location of Jijiga within Somali region**

## 1.2 Resilience and Resilience Capacity

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

The PRIME IE conceptualizes resilience according to the United States Agency for International Development (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.”<sup>3</sup> This report focuses on resilience at the household level. From a practical measurement standpoint, it defines resilience as the ability of a household to manage or recover from shocks and stresses and takes into account whether that recovery took place with the use of negative coping strategies that undermine the ability to recover from future 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. These determinants of resilience 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*).<sup>4</sup>
- *Adaptive capacity* involves making proactive and informed choices about alternative livelihood strategies based on changing conditions.
- *Transformative capacity* relates to governance mechanisms, policies/regulations, infrastructure, community networks, and formal safety nets that are part of the wider system in which households and communities are embedded. Transformative capacity refers to system-level changes that enable more lasting resilience.

Given their complexity, measuring the resilience capacities requires combining a variety of indicators of the underlying concepts relevant in a particular setting into one overall indicator. The measurement of absorptive, adaptive, and transformative capacity for the PRIME IE is described in Chapter 5.

## 1.3 Description of the PRIME Project IE Areas: Borena and Jijiga

The PRIME IE was undertaken in a sub-set of the project's overall implementation area comprising two zones: Borena and Jijiga. Borena is located in the southern lowlands of Ethiopia, bordering on northern Kenya. It is one of 17 zones within the region of Oromiya. Jijiga, also known as “Fafan,” borders Somalia (the country) and is located in the northern part of the Somali region. Both areas have arid and semi-arid climates and are situated in the drylands of Ethiopia, where pastoralism has traditionally prevailed. They are characterized by erratic and unpredictable rainfall and patchy vegetation.<sup>5</sup> The scope for sedentary,

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<sup>3</sup> USAID 2012.

<sup>4</sup> The descriptions in the paragraph of absorptive, adaptive, and transformative capacity are from Frankenberger et al. (2012b).

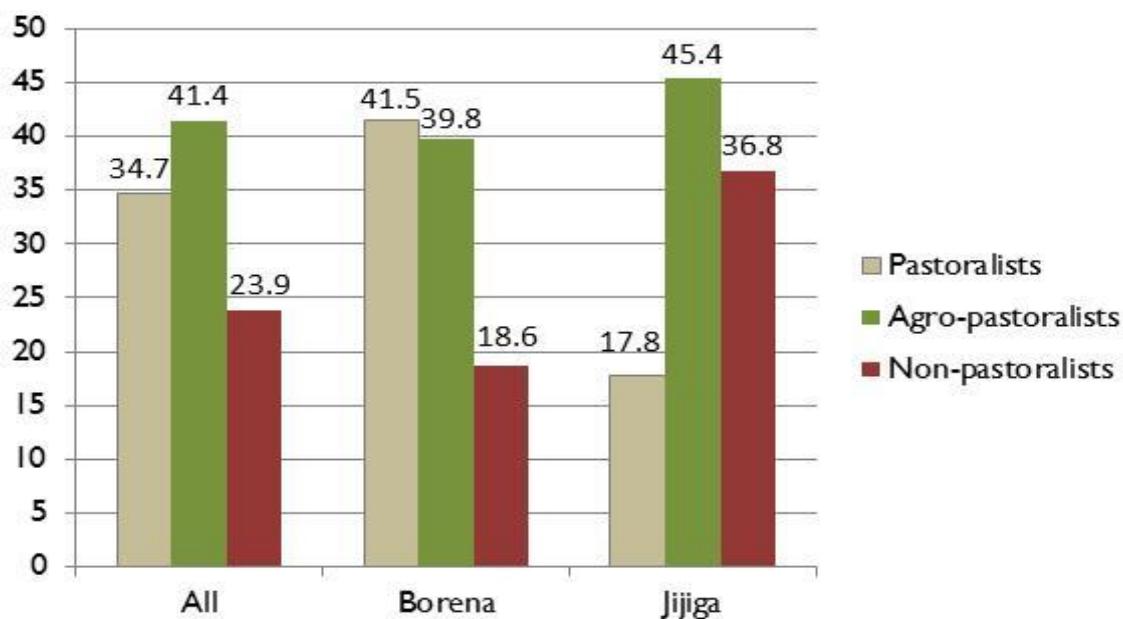
<sup>5</sup> This overview of the PRIME project area is summarized from Mercy Corps (No date).

arable farming is limited in many parts of these zones. Nomadic and semi-nomadic pastoralists have traditionally made efficient use of scarce natural resources to access food and earn income through the sale and consumption of livestock and livestock products (meat, milk, and hides).

A sustainable balance of human populations, livestock populations, water, and rangeland resources are required for pastoralism to thrive over the long term. However, in Borena and Jijiga, as in pastoral areas across Ethiopia, pastoral systems are under increasing pressures due to natural and man-made shocks that are leading to imbalances between these populations and the resources they depend on to sustain themselves. Ongoing climate change is expected to increase the unpredictability of rainfall, leading to more frequent droughts and floods, as aptly born out over the five-year implementation period of PRIME. A diminishing natural resource base due to overgrazing, increased sedentarization, and the increased presence of agriculture has reduced pastoralists' mobility. Yet mobility is a key foundation of traditional risk management strategies, and its reduction has made them increasingly vulnerable to shocks. An additional challenge is that increased competition for pasture and water has led to conflict in a number of places, including locations within the PRIME project's operational area. These pressures have spurred many pastoralists to transition out of pastoralism and seek alternative livelihoods.

Figure 1.4 shows the percentage of households that were classified as pastoralist, agro-pastoralist, and non-pastoralist in Borena and Jijiga at the time of the PRIME baseline. As can be seen, the transition out of pastoralism is well under way in both areas, being furthest along in Jijiga. At baseline, pastoralism was far more prevalent in Borena than Jijiga, and non-pastoralism far more prevalent in Jijiga than Borena. Accordingly, the baseline data show that crop production is much more likely to be households' main source of income and food in Jijiga. Poverty and food insecurity were roughly equal across the two areas at the start of the PRIME project. However, Jijiga households started out with far less resilience capacity, especially absorptive and adaptive capacity, than Borena households (Smith et al. 2015).

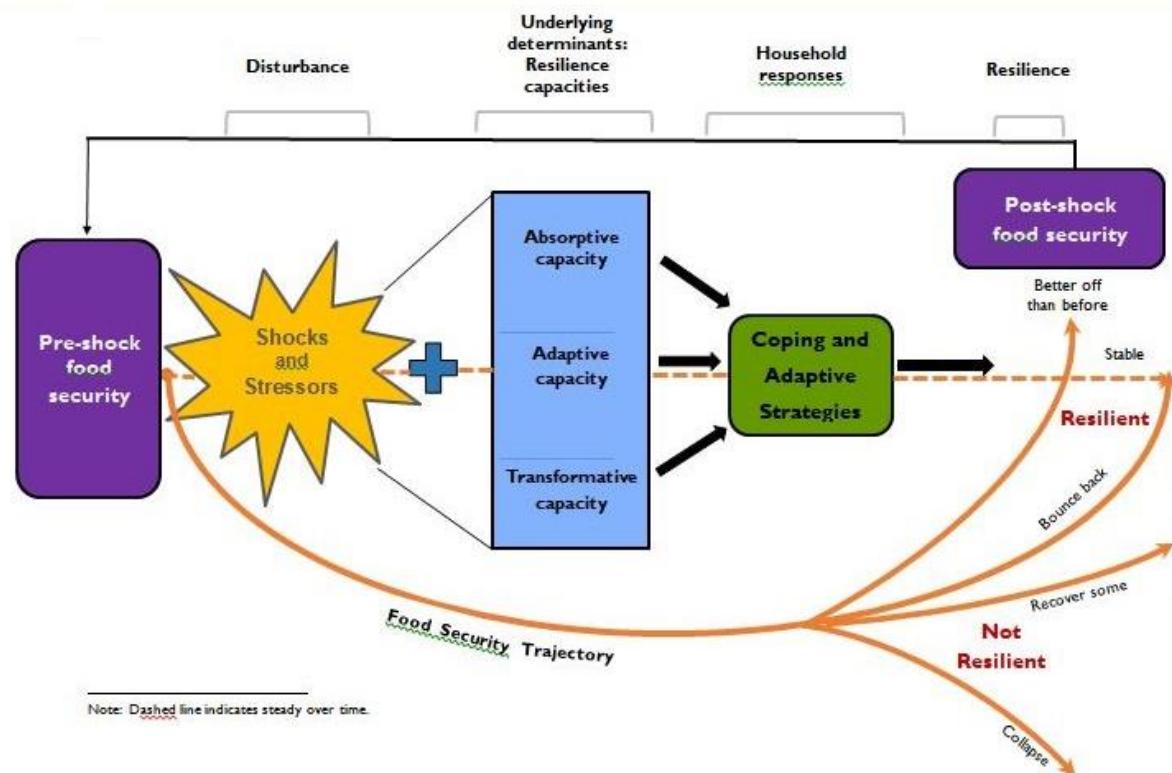
**Figure 1.4: Percent of pastoralists, agro-pastoralists, and non-pastoralist, by project area**



## 1.4 Objective of this Report and Research Questions

The overall objective of this report is to determine whether the PRIME project's resilience-strengthening interventions served to increase households' resilience to shocks, that is, enhanced their ability to recover from shocks. Figure 1.5 is TANGO's conceptual framework for resilience measurement and analysis. Following this framework, households' resilience, as measured by changes in well-being outcomes (in this example, food security) over the course of a period of shocks and stressors, is determined by their resilience capacities. Their resilience capacities in turn govern their coping strategies, and ultimately whether they are able to bounce back to their previous well-being or better. Resilience-strengthening interventions alter households' well-being trajectories in the face of shocks through impacting their resilience capacities and, thus, coping strategies. This framework guides the variables measured and specific research questions of the report.

**Figure 1.5: TANGO Conceptual Framework for Resilience Measurement and Analysis**



## Research Questions

### Context

1. How did household shock exposure evolve over the course of the project in the PRIME IE areas? How severe was their exposure and what specific types of shocks did they experience?
2. What changes have taken place in households' livelihoods and livelihood environments, including their pastoral status, socio-demographic characteristics, economic status, and main livelihood activities?
3. What changes have taken place in households' resilience capacities and coping strategies over the course of the project?
4. How have households' well-being outcomes, including food security and nutritional status, changed over the course of the project. Have they experienced any increase in their resilience to shocks?

### Impact Evaluation

5. Did household exposure to and direct participation in resilience-strengthening interventions increase their resilience capacities and resilience to shocks?
6. Which resilience capacities were strengthened due to households' engagement in the interventions?
7. Which specific types of interventions enhanced households' resilience capacities and resilience?

## 1.5 Organization of the Report

Chapter 2 of this report presents the data collection and analysis methodologies. Chapters 3, 4 and 5 set the context by documenting the changes in households' shock exposure, livelihood environments and resilience capacities, respectively, over the project period. Chapter 6 describes the shifts in households' coping strategies that have taken place. Chapter 7 then examines the data to determine what changes there have been in household well-being outcomes (food security and nutritional status) and resilience itself. In Chapter 8 a descriptive analysis of households' exposure to and participation in resilience-strengthening interventions as well as their receipts of humanitarian assistance is undertaken. The impact evaluation results are presented in Chapter 9, followed by conclusions, implications for programming, and questions for future research in Chapter 10.

## 2 METHODOLOGY

This chapter first describes the methodology used for collecting the data in the PRIME IE baseline and endline surveys. It then describes the methods for analyzing both the quantitative and qualitative data collected.

### 2.1 Quantitative Survey: Data Collection

#### 2.1.1 Survey Logistics

The suite of surveys collected as part of the PRIME Impact Evaluation include the baseline, Recurrent Monitoring Survey-1 (RMS-1), Recurrent Monitoring Survey-2 (RMS-2), and the endline. The dates of these surveys as well as analysis data set (post-cleaning) sample sizes are given in Table 2.1. All four included both household and community surveys.

**Table 2.1 PRIME Data Sets: Dates of data collection and sample sizes**

Survey	Start date	End date	Number of households
Baseline	November 2013	December 2013	3,142
RMS-1	October 2014	March 2015	414
RMS-2	October 2015	November 2016	400
Endline (panel)	December 2017	January 2018	2,750

Note: The sample sizes are for the "analysis data set", giving the number of households after data cleaning.

The endline quantitative household survey was administered using the same sampling design as the baseline. The questionnaires differ only in that additional data were collected at endline to enable implementation of the main impact evaluation method, Difference-in-Difference Propensity Score Matching (DID-PSM). These additional data are for measuring households' exposure to and participation in PRIME activities, factors affecting their exposure and participation, and humanitarian assistance received. Data collection for the two Recurrent Monitoring Surveys, which are used in descriptive analyses documenting changes in key variables over the life of the project, is described in detail in Frankenberger and Smith (2015) and Smith, Frankenberger and Nelson (2018).

All PRIME IE data were collected by Green Professional Services, and survey administration was preceded by enumerator trainings including review of questionnaires, use of the Nexus 7 tablets with which the data were collected, human subjects research training, data checking for quality control, creating backup copies of data, and data archiving and transfer. Trainers included staff members from Green Professional Services and TANGO International.

## 2.1.2 Sampling Design

In order to facilitate this final impact evaluation of the PRIME project, the baseline sampling design was planned with the need to collect data for two groups—a treatment group and a control group—within each of the two project areas, Borena and Jijiga. Consultation with PRIME project staff regarding how the project would be implemented led to the decision to define these groups around the intensity with which interventions would be implemented in *kebeles*. As such, each of the 112 *kebeles* in the IE area were assigned to a high or low intensity group<sup>6</sup> and, subsequently, the sample was drawn from the following four strata:

- Borena high intensity (Borena HI);
- Borena low intensity (Borena LI);
- Jijiga high intensity (Jijiga HI); and
- Jijiga low intensity (Jijiga LI).

Selection of sample households was based on a two-stage, stratified random sampling design. In stage one, sample enumeration areas (EAs)<sup>7</sup> were selected within each stratum using probability proportional to size (PPS) sampling. In the second stage, households within each EA were selected randomly from household listings. The planned DID-PSM -based empirical technique for the impact evaluation necessitated that within each of the two project areas, one-third of the households be selected from the HI stratum and two-thirds from the LI stratum. The purpose of having a greater number in the low intensity group is to have sufficient matches for HI households (the treatment group) chosen from among potential LI control group households.

## 2.1.3 Sample Size Calculation

The sample size was chosen to be able to detect a 20 percent reduction between the baseline and endline surveys in one outcome variable of interest, the prevalence of poverty (a change from 50 to 40 percent). To do so, the minimum sample size required for each of six equally sized cells was calculated: the two HI groups and two each within the LI groups (to maintain the 1/3 to 2/3 balance). The target number of households was chosen with the parameters of 90 percent confidence ( $Z_{\alpha}=1.282$ ), 80 percent power ( $Z_{\beta}=0.840$ ), and a design effect of 2.0. The calculated minimum was 441 households for each cell. A 10 percent upward adjustment was made to account for the possibility of drop-out communities and household-level non-response. Given that the survey was to be a panel survey, an additional 10 percent upward adjustment (for a total 20 percent upward adjustment) was added to accommodate possible attrition between the baseline and endline surveys. The minimum total target sample size per stratum was thus 529 households. The final target for the HI groups within Borena and Jijiga was 485; for the LI groups it was 970, for a total of 2,910 households.

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<sup>6</sup> See the baseline report (Smith et al. 2015) for details of this assignment process.

<sup>7</sup> Enumeration areas are the smallest geographical unit for which population data were collected in the 2007 census, which provided the sample frame for the baseline. There may be several enumeration areas in each *kebele*.

## 2.1.4 Panel Data Set for Endline Impact Evaluation Analysis

Table 2.2 gives the number of *kebeles*, enumeration areas, and households in each of the seven sample woredas in the baseline-endline panel data set. A community survey was administered in each of the 73 *kebeles*.

**Table 2.2 The PRIME Impact Evaluation Sample**

Project area	Woreda	Number of kebeles	Number of enumeration areas	Number of households
Borena	Yabelo	15	30	567
	Teltele	13	25	538
	Dugdadawa	2	4	88
	Miyo	11	16	343
Jijiga	Gursum	6	16	326
	Jijiga	5	5	86
	Kebrebeyah	21	43	802
Total		73	139	2,750

**Attrition.** The baseline analysis data set contains 3,142 households. The cleaned endline data set contains 2,750 panel households, giving an attrition rate of 12.5 percent. Table 2.3 compares the panel households with the 392 non-panel households, showing that these groups are largely the same with the exception that the panel data set contains a lower percentage of female adult-only households and higher percentage of agro-pastoralists. Because of the former, the number of adult equivalents is slightly higher and the percent of adult females slightly lower in the panel than non-panel sample. Absorptive capacity and the ownership of agricultural productive assets are slightly higher in the panel sample. Taken together, these differences mean that the panel sample is likely to be slightly better off than the PRIME IE area population as a whole.

**Table 2.3 PRIME Impact Evaluation data set: Comparison of baseline characteristics of panel and non-panel households**

Characteristic	Non-panel	Panel	Percent difference
<b>Food security</b>	19.84	19.72	-0.6
<b>Resilience capacity</b>			
Absorptive capacity	55.8	59.2	6.1 **
Adaptive capacity	45.8	46.2	0.9
Transformative capacity	47.3	46.4	-1.9
<b>Shock exposure</b>			
Household shock exposure	11.6	11.5	-0.9
Number of shocks in last 5 yrs	30.4	30.4	0.0
<b>Socio-demographic characteristics</b>			
Project area: Borena	68.7	71.8	4.5
Female-adult-only household	15.5	10.9	-29.7 *
Number of adult equivalents	59.0	62.1	5.2 ***
Percent males 0-16	3.9	4.2	7.3
Percent males 16-30	11.1	10.1	-9.1
Percent males 30 plus	13.6	13.5	-0.2
Percent females 0-16	24.0	25.4	6.2
Percent females 16-30	13.5	12.0	-11.3 *
Percent females 30 plus	13.8	13.3	-3.7
Percent with formal education	59.0	62.1	5.2
Percent pastoralist	39.0	34.1	-12.6 *
Percent agro-pastoralist	32.4	42.8	31.9 ***
Percent non-pastoralist	28.6	23.2	-18.9 **
<b>Economic status</b>			
Consumption asset index	1.27	1.31	2.8
Agricultural productive asset index	6.12	7.50	22.6 ***
Tropical Livestock Units	6.31	6.44	2.1
Total pc daily expenditures	17.70	16.50	-6.8
<b>Pre-existing government and NGO programs</b>			
Number of government programs	2.4	2.5	4.6
Number of NGO programs	1.9	1.8	-3.6
Number of households	392	2,750	

Stars indicate the difference is statistically significant at the 10%(\*), 5%(\*\*), and 1%(\*\*\*) levels.

**Comparison of planned versus actual treatment and control groups.** The data collected in the endline household and community surveys on households' engagement in resilience-strengthening interventions over the project period indicate that the planned intensity of implementation on which the sampling design was based, was not in accordance with the actual intensity. For this reason, the original treatment and control groups were not used for this evaluation. Rather, the data collected at endline

were used to create groups of households that were exposed to or participated in interventions based on the concept of “Comprehensive Resilience Programming” to serve as the treatment groups (see Chapter 8). Table 2.4 gives the number of sample households falling into the planned intervention and control groups versus the actual groups used in this report. The number of households in the treatment and control groups differ, and in some cases the 1/3 – 2/3 targets are not met. However, as will be seen in Chapter 9, in most cases an adequate number of control group households is available to be able to implement DID-PSM and thus perform a rigorous impact evaluation.

**Table 2.4 The PRIME Impact Evaluation panel sample: Actual versus planned treatment and control group sizes**

Stratum	Actual					
	Planned		Exposure to Comprehensive Resilience Programming		Participation in Comprehensive Resilience Programming	
	Number of kebeles	Number of hholds	Number of kebeles	Number of hholds	Number of kebeles	Number of hholds
All						
Treatment	25	858	31	1,164	70	773
		(31.2%)		(42.3%)		(28.1%)
Control	48	1,892	42	1,586	73	1,977
		(68.8%)		(57.7%)		(71.9%)
Borena						
Treatment	14	534	22	775	41	510
		(34.8%)		(50.5%)		(33.2%)
Control	27	1,002	19	761	41	1,026
		(65.2%)		(49.5%)		(66.8%)
Jijiga						
Treatment	11	324	9	389	29	263
		(26.7%)		(32.0%)		(21.7%)
Control	21	890	23	825	32	951
		(73.3%)		(68.0%)		(78.3%)
Total	73	<b>2,750</b>	73	<b>2,750</b>	73	<b>2,750</b>

**Sample weights.** For each of the four strata, the household-level sample weights are calculated as the inverse of the selection probability of a household. They are a ratio of the proportion of the entire population of households in the stratum to the proportion of sample households in the stratum. The

community-level sampling weights are calculated in the same manner.<sup>8</sup> The sample weights correspond to the planned sampling design at baseline as modified to account for the 2,750 household panel data set.

## 2.2 Quantitative Survey: Data Analysis

The quantitative data analysis was conducted in STATA using descriptive analysis along with Difference-in-Difference Propensity Score Matching and regression techniques to conduct the impact evaluation.

### 2.2.1 Descriptive Analysis of Trends

The baseline and endline household and community survey data (and in some cases RMS survey data) are used to conduct descriptive analysis of changes between the baseline and endline in key variables needed for conducting resilience analysis. These are: households' shock exposure (Chapter 3), livelihoods and livelihood environments (Chapter 4), resilience capacities (Chapter 5), coping strategies (Chapter 6), and well-being outcomes and resilience to shocks (Chapter 7). Indicator values are presented as percentages and means. In addition to the overall IE area, the changes over time are compared for two population sub-groups:

- PRIME IE project area: Borena or Jijiga;
- Pastoralist status: Pastoralist, agro-pastoralist or non-pastoralist.

As noted above, representativeness of the PRIME IE area is maintained by weighting any statistics that apply to the survey population as a whole by survey sampling weights.

Classification of households into the pastoralist status groups is based on (1) baseline data on self-reports of the main sources of households' food and income in the last year; and (2) rankings of these sources in terms of the proportion of food/income they provide. The groups are defined as follows:

- **Pastoralist:** Livestock production and sales is the primary livelihood activity;
- **Agro-pastoralist:** Crop production and sales is the primary livelihood activity. Livestock production and sales is also a livelihood activity; and
- **Non-pastoralist:** Livestock production and sales is not a source of food or income. Also included in this category are households for which livestock production and sales is declared as a livelihood activity, but the primary source of food and income is wage labor, self-employment unrelated to crop or livestock production, remittances, gifts or inheritances or, lastly, assistance from friends, neighbors, relatives, or an outside organization.

Some important variables of interest (e.g., resilience capacities) are composite measures based on multiple other measures. The technique used to calculate these indexes and ensure comparability over time is detailed in Appendix 4 "TANGO method for calculating and updating resilience capacity indexes".

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<sup>8</sup> For one survey module data were collected for children under 5 (on anthropometry and children's milk consumption). The weights applied to these data are the household-level weights for each stratum divided by the child-level non-response rate.

## 2.2.2 Impact of Resilience-strengthening Interventions

An impact evaluation is a study conducted in order to determine whether changes in outcomes can be attributed to a project or intervention. Evaluating such attribution requires comparing what happened to the outcome *with* an intervention or “treatment” (the factual) to what would have happened to the outcome *without* it, the latter referred as the counterfactual. The counterfactual is never known with certainty because the exact same households engaged in an intervention are not able to **not** engage in it at the same time. Given this issue, two necessary conditions for an impact evaluation to be conducted in a rigorous manner are that (1) a non-treatment control group be available so that a counterfactual can be identified; and (2) that the problem of selection bias be addressed. This latter problem can arise because of purposeful targeting of project interventions to specific populations (e.g., the most poor) and/or self-selection of households into interventions. This renders the control group and the treatment group fundamentally different from one another prior to the commencement of project activities (Gertler et al. 2016; Khandker, Koolwal & Samad, 2010).

### 2.2.2.1 Difference-in-Difference Propensity Score Matching (DID-PSM)

As noted above, the main impact evaluation method employed for this study is difference-in-difference propensity score matching to create comparable control groups from among groups of households not engaged in resilience-strengthening interventions to serve as the counterfactual. The matching process in PSM takes place using measured indicators of characteristics that are believed to influence engagement — whether exposure or direct participation—in an intervention as well as additional indicators of variables potentially influencing the outcome of interest. If these *observed* characteristics are the only ones influencing participation, the estimates are deemed unbiased and the important “conditional independence” condition is met. However, if *unobserved* characteristics also influence participation, then the estimates will be biased (Khandker, et al., 2010). The challenge then, is to collect data on the entire universe of such characteristics so that none can be deemed unobserved.

Households’ engagement in PRIME resilience-strengthening interventions was influenced by two broad factors: (1) targeting conducted by project administrators; and (2) households’ and individuals’ own decisions (on whether to participate). The variables employed for matching are listed in Table 2.5. They include baseline food security, resilience capacity and shock exposure, various household socio-demographic characteristics, variables representing households’ economic status, village characteristics and the number of government and non-governmental organization (NGO) programs at baseline.

Additional matching variables for the participation (but not exposure) model including ownership of a radio and telephone, variables affecting households’ aspirations and confidence to adapt, social capital, women’s decision making power and leisure time, the latter representing time constraints influencing households’ ability to participate.<sup>9</sup>

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<sup>9</sup> Data for measuring men’s leisure time were also collected, but were missing for one-third of households. Thus it was not possible to include men’s leisure time as a matching variable.

Note that this list of variables goes far beyond those typically included in PSM impact evaluations to include many that are considered “unobservables,” for example, resilience capacities, shock exposure, aspirations, social capital, decision making power, and time constraints.

Panel data also greatly increase the validity of the resulting impact estimates. They were collected expressly for two purposes: 1) Ensuring that the characteristics affecting participation used for matching are not affected by project activities themselves (a requirement for implementing PSM), which is implemented by only using *baseline* values for matching; and 2) Controlling for all unobservable (that is, unmeasured) factors that do not change over time. The latter is implemented as part of the “difference-in-difference” portion of the PSM by using the difference in the *change* between baseline and endline for all outcome variables evaluated rather than differences in levels. Examples of relevant factors that do not change over time might be cultural traditions, persistent health conditions and disabilities, and topographical traits of households’ areas of resilience like rivers and mountains.

For any intervention, PSM estimates of impact are generated in three steps. The first is to estimate a probit treatment model to compute a probability of engagement, or “propensity score,” for each household conditional on the observed characteristics. In the second step, treated households are matched with a group of non-treated households based on similarity of propensity scores. An important condition for the success of this step is “common support”. Treatment households must be similar enough to non-treated households in the observed characteristics so that there are sufficient non-treated households close by in the propensity score distribution with which to make matches. Treatment household propensity scores that are higher than the maximum or lower than the minimum of the non-treated distribution are dropped. In the third step of PSM, the average value of the (change in the) outcome variable of the matched treated and non-treated groups of households are compared to calculate an estimate of the impact of the intervention, or the “average treatment effect on the treated” (ATT). For this analysis, DID-PSM is conducted for three groups: all households in the IE area, Borena households, and Jijiga households. DID-PSM is conducted separately for the project areas in order to ensure adequate matching for project area-level impact estimates.

Of the many techniques available, DID-PSM is conducted here using kernel matching, for which each treated household is matched to a group of non-treated households with propensity scores within a certain radius.<sup>10</sup> The control group outcome is computed as a weighted average, with a lower weight given the greater is the propensity score difference from that of the treated household. The analysis is conducted using PSMATCH2 in STATA, along with PSTEST to test for matching effectiveness (Leuven & Sianesi, 2003).

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<sup>10</sup> The radius (the distance between propensity scores of the treated and non-treated households) depends on the bandwidth of the kernel, which is set at 0.06 for all ATT estimates reported in this analysis.

**Table 2.5 Propensity Score Matching: Household and community characteristics used for matching**

	Exposure	Participation
<b>Baseline food security</b>		
Baseline resilience capacity		
Absorptive capacity		
Adaptive capacity		
Transformative capacity		
<b>Shock exposure</b>		
Household shock exposure index (baseline)		
Number of shocks in last 5 years		
Total rainfall deficit		
Soil moisture deficit		
<b>Household socio-demographic characteristics</b>		
Project area: Jijiga a/		
Borena		
Female-adult-only household		
Number of adult equivalents		
Percent males 0-16 a/		
Males 16-30		
Males 30 plus		
Females 0-16		
Females 16-30		
Females 30 plus		
Any member has a formal education		
Pastoral status: Pastoralist a/		
Agro-pastoralist		
Non-pastoralist		
<b>Household economic status</b>		
Consumption asset index		
Agricultural productive asset index		
Tropical Livestock Units		
Total per-capita daily expenditures		
Poverty gap		
<b>Other household characteristics potentially influencing their participation in interventions</b>		
Household owns radio		
Household owns phone		
Absence of fatalism		
Individual power		
Exposure to alternatives		
Bonding social capital		
Bridging social capital		
Linking social capital		
Women's decision making power		
Women's decision making over whether can join groups		
Women's leisure time		
<b>Village characteristics</b>		
Population		
Distance from nearest town		
Cell phone service available		
Paved road available		
Number of community organizations		
<b>Baseline number of gov't and NGO programs</b>		
Number of government programs		
Number of NGO programs		

Matching effectiveness is evaluated based on the criteria that the mean standardized percentage bias across all matching variables post matching is less than or equal to 10.0 and all matching variables have an individual bias less than 20.0.<sup>11</sup> These criteria ensure that there are no unacceptably large differences in characteristics between the control and treatment groups, ie, that the control group is essentially the same as the treatment group before the resilience-strengthening interventions were implemented. In cases where matching variables with standardized biases greater than 20.0 remain, these variables are noted and the results interpreted in light of the potential direction of bias in impact estimates.<sup>12</sup> Following Heinrich et al. (2010), the robustness of the estimations is evaluated by comparing the kernel matching estimates with those derived from Nearest Neighbor (1:1) and radius matching.

### **2.2.2.2 Standard Growth Regression with PSM-derived Intervention and Control Groups**

Resilience marks the ability of households to withstand and recover, specifically, from shocks and stresses. DID-PSM helps us to see how resilience-strengthening interventions impacted outcomes. Another way to assess the impact of resilience-strengthening interventions on resilience is to determine whether the interventions have actually served to *reduce the negative impact of such shocks and stresses on households' well-being*. Here we do so using standard growth regression (Yamano et al. 2015; Hoddinott and Kinsey 2001) whereby the change over time in households' food security serves as the dependent variable. The time period of analysis is from the last round (Round 6) of RMS-2 to the endline which, as will be seen in the next chapter, was one in which households experienced a great deal of shock exposure. The independent variables are:

- Shock exposure between RMS Round 6 and the endline ( $SE_{i,R6\_EL}$ );
- Initial well-being ( $Y_{i,R6}$ );
- Household characteristics as measured at baseline ( $X_i$ );
- Kebele of residence; and importantly
- An interaction term between the measure of shock exposure and the (on-common-support) treatment dummy derived using the PSM method above.

The specification is:

$$Y_{i,EL} - Y_{i,R6} = \alpha + \beta_1 T_i + \beta_2 SE_{i,R6\_EL} + \beta_3 T * SE_{i,R6\_EL} + \beta_4 Y_{i,BL} + \beta_5 X_i + \mu_k + \varepsilon_i. \quad (2)$$

where  $\alpha$  and the  $\beta$ s are coefficients to be estimated, the  $\mu_k$  are dummy variables representing kebele of residence (making this a kebele fixed-effects model), and  $\varepsilon_i$  is an error term. A coefficient on the

<sup>11</sup> The standardized percent bias is the percent difference of the sample means in the treated and non-treated sub-samples as a percentage of the square root of the average of the sample variances in the treated and non-treated groups. Heinrich, Maffioli and Vazquez (2010) reference Rosenbaum and Rubin's (1985) suggestion that a bias for any matching variable that is 20 or higher should be considered "large". Garrido et al. (2014) write that "there is no rule regarding how much imbalance is acceptable in a propensity score. Proposed maximum standardized differences for specific covariates range from 10 to 25... balance in theoretically important covariates is more crucial than balance in covariates that are less likely to impact the outcome" (p. 6).

<sup>12</sup> In rare cases, a matching variable is excluded from the DID-PSM estimation procedure in order to achieve adequate common support or balance. In these cases the excluded variable is compared across the treatment and control group post-matching to determine if any substantial imbalance remains for that variable. If so, the impact estimates are interpreted in light of the expected direction of bias.

interaction term ( $\beta_3$ ) that is statistically significant and positive indicates that the interventions did provide protection from shocks and thus served to bolster households' resilience.

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

- Number of household adult equivalents;
- 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+);
- Whether any adult household member has a formal education (at least at the primary level);
- Whether the household is a female-adult-only household, that is, there are no adult male household members;
- Pastoralist status (dummy variables for pastoralist, agro-pastoralist and non-pastoralist); and
- An asset index representing economic status.

## 2.3 Qualitative Survey: Data Collection

Qualitative data collection was done through focus group discussions (FGDs) and key informant interviews (KIs). Separate focus group discussions (FGDs) with men and women captured differing views based on their respective roles and responsibilities across a range of topics. Group discussions examined household and community preparedness and responses to shocks, impacts of shocks on livelihoods, community level impacts, exposure to drought, down-stream effects, coping strategies, reliance on social capital, livelihood security, humanitarian assistance, community actions, mitigation of impacts of future droughts, and attitudes and confidence levels, and more. Qualitative teams included female and male interviewers, though were not always gender-balanced. Separate FGDs were held for men and women, and attendance ranged from five to eight people. In total, 12 FGDs (6 male and 6 female) were conducted in Borena and 8 in Jijiga (4 male and 4 female).

KIs were conducted at the systems level, with key informants from four broad categories of intervention: 1) Livestock Productivity and Competitiveness, 2) Pastoral Natural Resource Management (PNRM), 3) Financial Services, and 4) Climate Change Adaptation. Interviewees included terrace building leaders, radio listeners group leaders, development team members, TOPS business group members, small enterprise business owners (e.g., female input suppliers, fodder traders, solar equipment/installation, youth employment enterprise), the Dean of the TVET Pastoralist College, the manager of the Somali Microfinance Institution (MFI), private veterinary pharmacies, livestock traders, women's association leaders, fodder traders, women's Rural Saving and Credit Organization (RUSACCO) chair, and manager of the Berwako Milk Processing Plant. In total, 16 KIs were carried out in Borena and 11 in Jijiga. Qualitative data collection was impeded somewhat in Jijiga due to a flare up Oromo-Somali tension, which restricted travel to a number of selected sites. Unfortunately, it was not possible to identify appropriate alternatives, based on input from Mercy Corps' local program staff.

## 2.4 Qualitative Survey: Data Analysis

Qualitative information from FGDs and KIIs was transferred into topically-structured matrices and 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 perceptions between groups based on gender, social or economic status, and ethnic group.

Specific research questions guiding the qualitative analysis included:

1. What kind of shocks and stresses is the community experiencing now?
2. How are the shocks and stresses affecting the community? What are the main ways households tried to cope with the shocks and stresses?
3. What are the gender-differentiated impacts of shocks?
4. What actions are members of the community taking to prepare for or respond to the shock?  
How has the community adapted to climate variability over the last five years?
5. How are recurrent shocks affecting relationships within the community? With other communities?  
Has social support eroded due to recurrent shocks?
6. Are community leaders effective at organizing support for all members of the community? Why or why not?
7. What collective action is the community taking to protect or maintain resources important to the whole community? Which resources and why?
8. Are communities successfully recovering from recurrent shocks/stresses? If not, why not?

## 3 SHOCK EXPOSURE

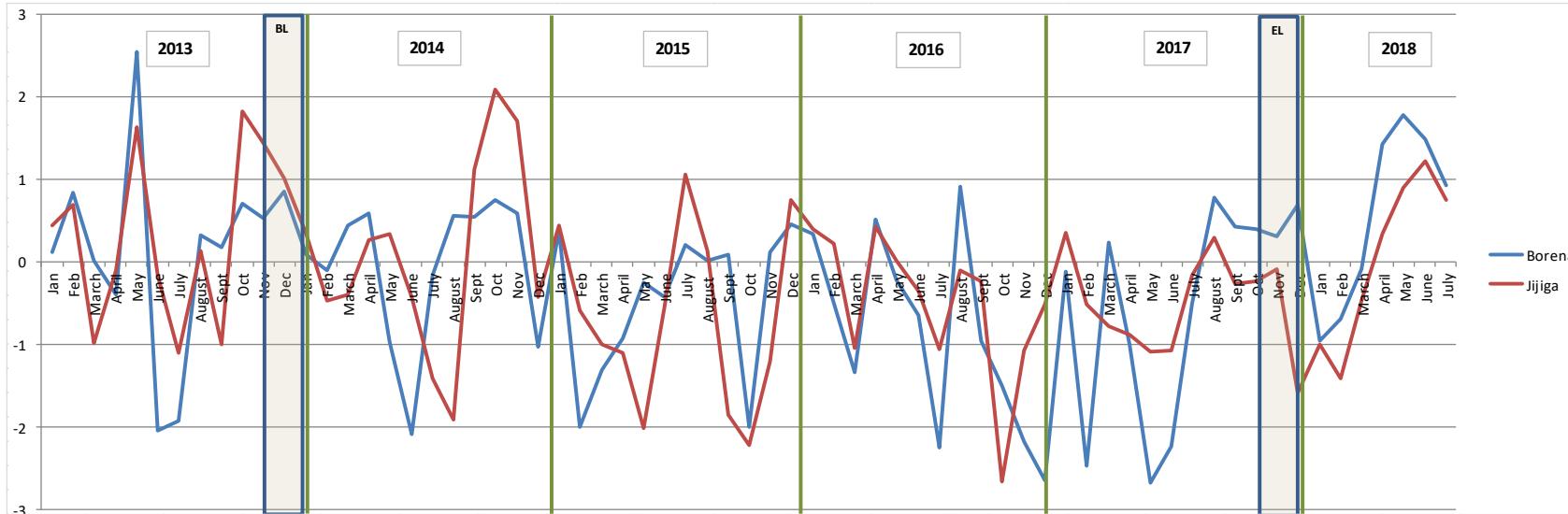
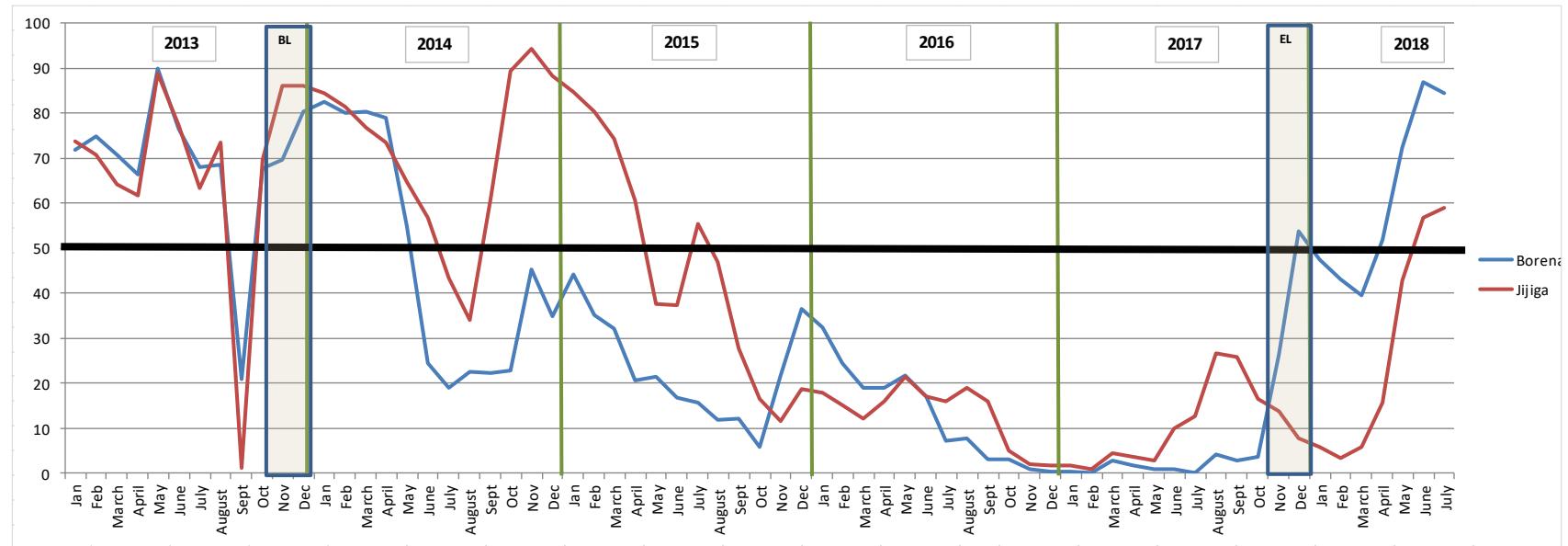
Drought was the biggest contributor to households' shock exposure over the PRIME project's operational period. This chapter thus starts by describing how climate conditions in the two IE areas, Borena and Jijiga, evolved over the period. It then presents quantitative data on households' own reports of their exposure to the drought and other shocks, including climate shocks, conflict shocks, and economic shocks. It ends with perspectives on shock exposure from the qualitative data.

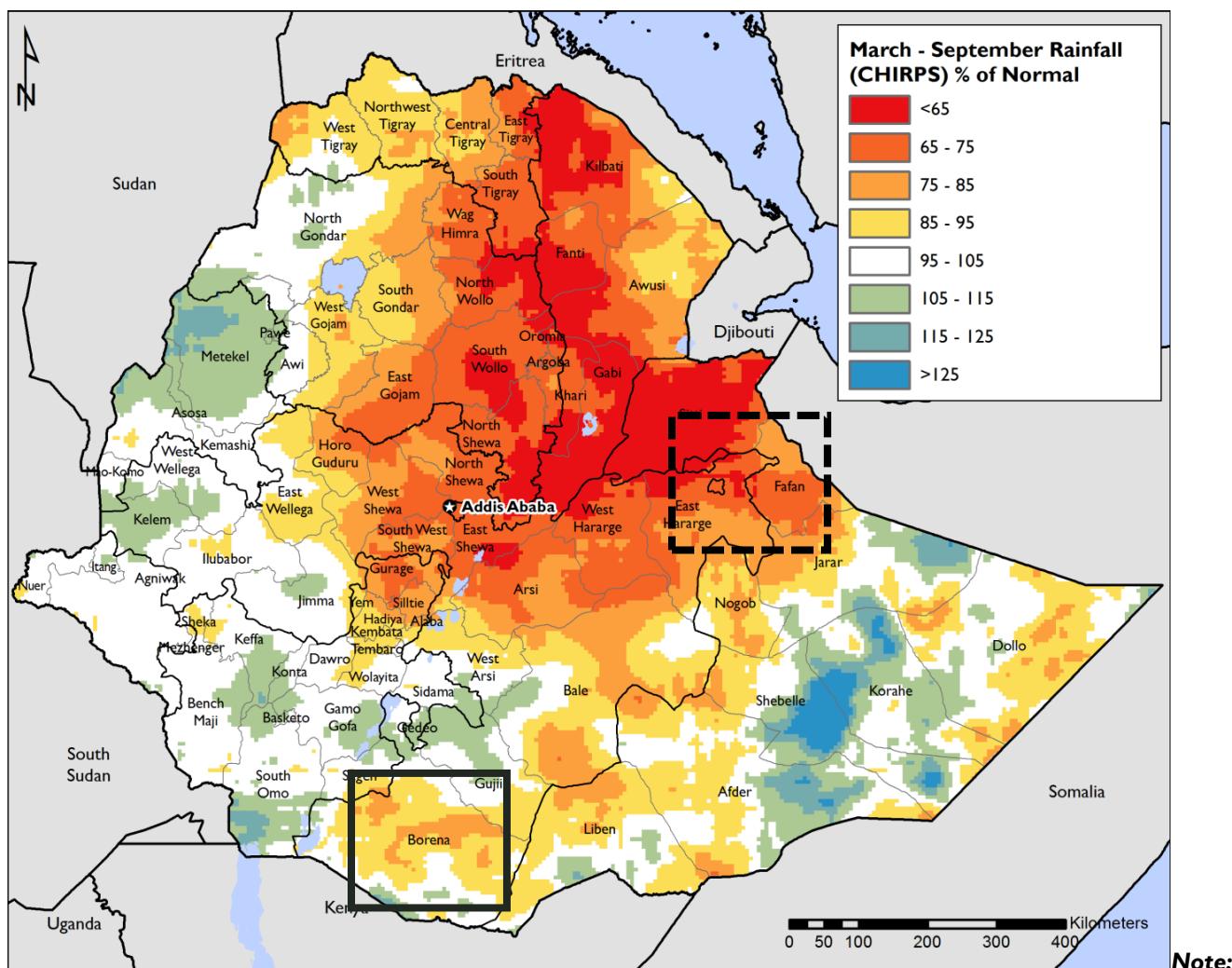
### 3.1 Climate Shock: Evolution of Drought Conditions over the Project Period

To describe the evolution of drought conditions and construct key measures of climate shock exposure that will be used for the impact evaluation, this report relies on satellite remote sensing data from the Africa Flood and Drought Monitor (AFDM). The AFDM is a real-time drought monitoring and seasonal forecast system for sub-Saharan Africa developed through a collaboration of the United Nations Educational, Scientific and Cultural Organization (UNESCO) and the International Hydrological Programme. Current conditions are compared to an historical, multi-decadal reconstruction of the terrestrial water cycle using data from 1950-2008. For this report, data on measures of rainfall and soil moisture that compare current conditions with the historical record are employed. The measures are (1) the Standardized Precipitation Index (SPI); and (2) the soil moisture percentile. The AFDM's internet interface allows Geographical Information System (GIS) coordinates to be employed to access data for localized geographical areas with 0.25° spatial resolution (Sheffield et. al. 2014). For this analysis, month-by-month AFDM data are downloaded using GIS coordinates for each of the 73 sample kebeles.

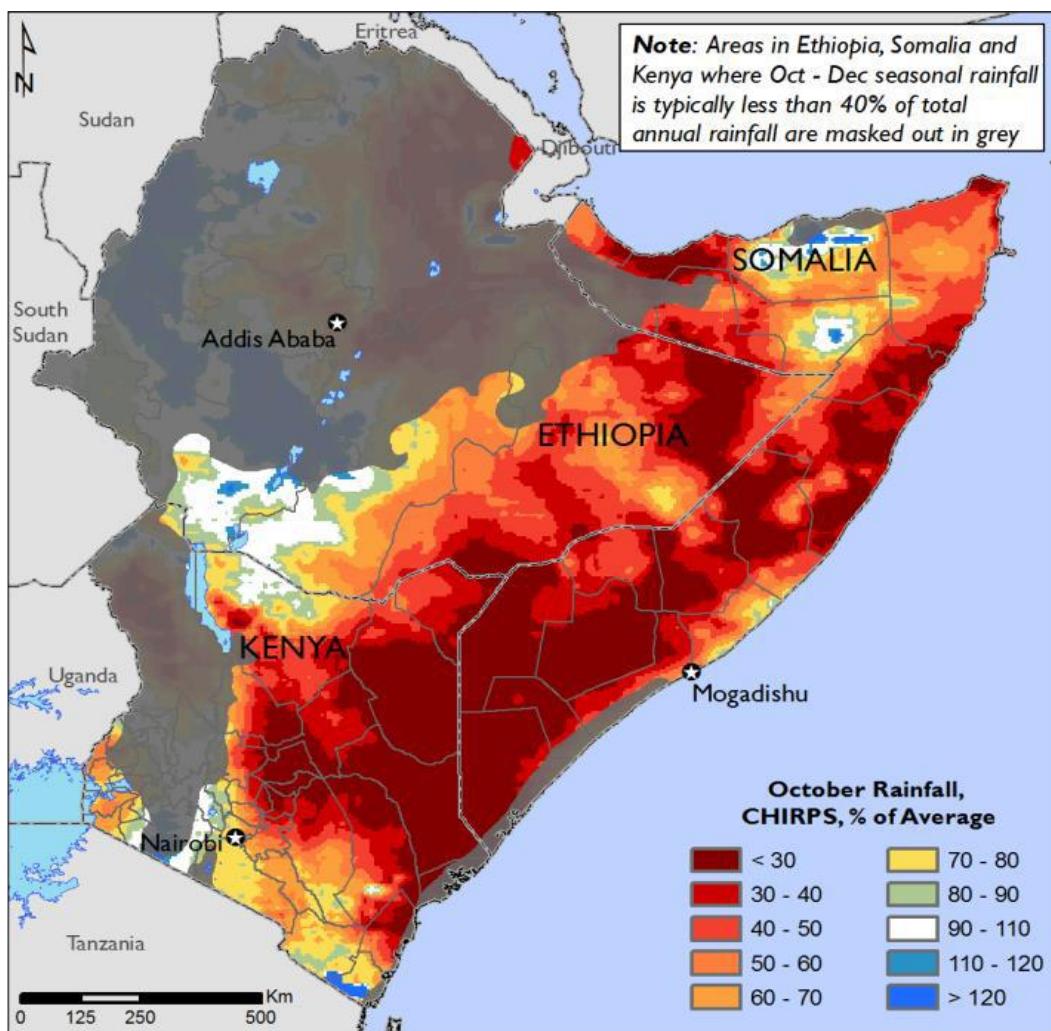
Figures 3.1 and 3.2 provide a snapshot of drought conditions in the IE areas over the project period, showing the monthly rainfall deviation from norm and soil moisture percentile from 2013 through mid-2018. As can be seen from the rainfall data, the period was decidedly rocky, with multiple back-to-back droughts occurring throughout (Figure 3.1). In normal years, the project areas both have a bi-modal rainfall pattern, with spring rains (Ganna in Borena, Diraa in Jijiga) occurring in the earlier part of the year and autumn rains (Hagaya and Karan) in the latter months. As can be seen, in all four years of the project—2014, 2015, 2016, and 2017—at least one of the rains failed (or was delayed in timing), and in some years both.

The failure of the rains in 2016, which was the subject of RMS-2, was induced by two weather phenomena. The first was the 2015/16 El Niño Southern Oscillation, which led to what was considered Ethiopia's worst drought in more than 50 years. Figure 3.3 shows its geographical spread from March through September 2015 in relation to the IE areas. The other weather phenomenon was what is known as the (negative) Indian Ocean Dipole (IOD), which was spread across the East Africa region (see Figure 3.4). The severity of the ensuing drought period is related to climate change: global warming has made weather phenomena like the El Niño and IOD more extreme (Marchant 2017).

**Figure 3.1 Rainfall deviation from the norm (Standard Precipitation Index) in Borena and Jijiga, January 2013 – July 2018****Figure 3.2 Soil moisture deviation from the norm (percentile) in Borena and Jijiga, January 2013 – July 2018**

**Figure 3.3 Spread of the 2015/16 El Niño-induced Drought, March-September 2015**

**Figure 3.4 Spread of the 2016 Indian Ocean Dipole-induced drought as of October 2016**



The on-the-ground, cumulative result of the successive droughts was a continually declining trend in soil moisture starting in December 2014 in both regions, bottoming out at the 0-th percentile by the beginning of 2017 (Figure 3.2).

As detailed in the RMS-1 and RMS-2 survey reports (Frankenberger and Smith 2015; Smith, Frankenberger and Nelson 2018), the successive rain failures exposed households to numerous downstream drought impacts. Critical water and pasture shortages, along with desperate livestock movements both within Ethiopia and cross-border ensued. Problems of insufficient fodder and water for livestock and consequent livestock disease, emaciation and unplanned deaths were widespread. Crop disease and failures were also widespread. The IE areas experienced sharp food price increases, along with drops in demand for livestock and agricultural products, decreases in their prices, and increases in the prices of inputs. The failure of the rains in 2016 was associated with a distinct uptick in thefts of livestock and crops and other conflict shocks, such as theft of money and violence against household members.

Analysis of the RMS data reveal the negative food security impact of the droughts. Many households found themselves dependent on humanitarian assistance to meet their food needs. Secondary data also confirm that the droughts took a toll on children's nutritional status, showing increased admissions to therapeutic feeding centers of children under five. As malnutrition cases increased, areas with both Borena and Jijiga were elevated to Priority I Nutrition Hotspot status by the Ethiopian government at some point over the project period.

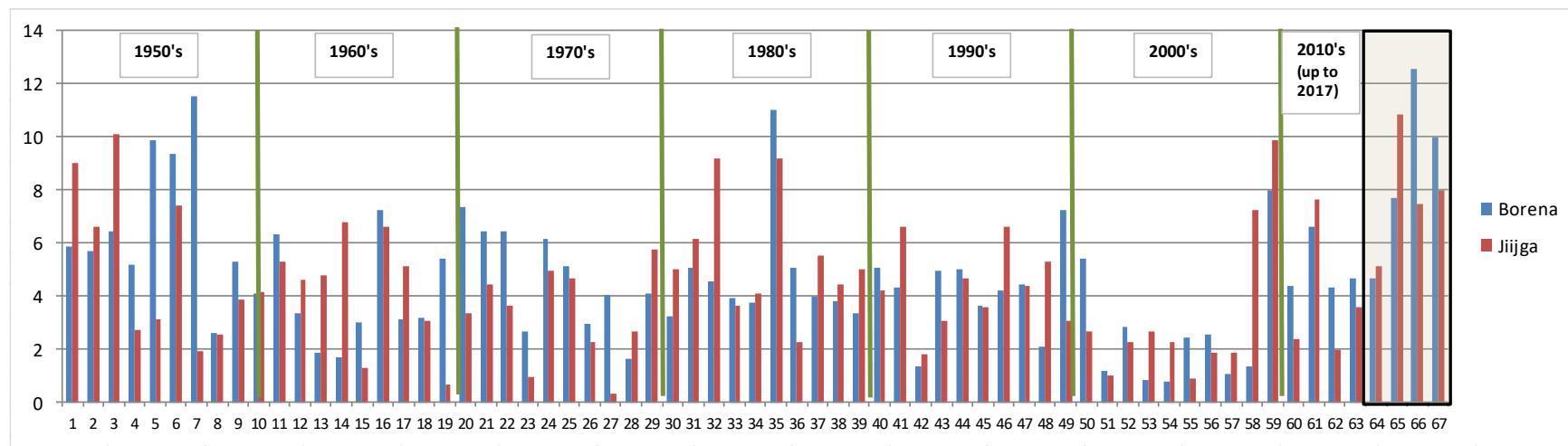
To help compare climate shock exposure across the project areas and over time (and to control for it in the impact evaluation), two summary objective measures of drought exposure will be used throughout this report: the total rainfall deficit and total soil moisture deficit. Rainfall deficit is the sum of the monthly deviations below the norm of the Standard Precipitation Index (where the norm is zero) presented in Figure 3.1. The soil moisture deficit is the sum of the monthly deviations below the norm of the soil moisture percentile (where the norm is 50 percent) presented in Figure 3.2.

Table 3.1 compares the rainfall and soil moisture deficits over the four-year period preceding the project's inception (2010-2013) with the project period (2014-2017). Both increased dramatically between these two periods, with the total rainfall deficit rising by 75 percent in Borena and doubling in Jijiga. The soil moisture deficit has increased by nearly 250 percent in Borena and over 400 percent in Jijiga. With respect to the relative severity of drought over the project period, the rainfall deficit was roughly equal for the Borena and Jijiga areas, but the soil moisture deficit was 22 percent higher in Borena.

**Table 3.1 Rainfall and soil moisture deficits pre-project and during the project period, by project area**

	Pre-project period					Project period					Total
	2010	2011	2012	2013	Total	2014	2015	2016	2017		
<b>Borena</b>											
Rainfall deficit	4.38	6.62	4.33	4.65	20.0	4.65	7.67	12.56	9.97		34.9
Soil moisture deficit	115.3	258.2	26.3	40.7	440.6	175.4	341.6	475.5	473.9		1466.4
<b>Jijiga</b>											
Rainfall deficit	2.39	7.64	1.95	3.57	15.6	5.10	10.86	7.46	7.97		31.4
Soil moisture deficit	45.2	99.1	42.4	56.1	242.7	46.6	224.4	459.7	470.2		1200.9

Figure 3.5 places the multi-year, volatile drought episode of the PRIME project's implementation period into longer historical perspective, reporting the annual rainfall deficit from 1950 through 2017 for the project areas. Borena's rainfall deficit in 2016, and Jijiga's in 2015, were the highest over the entire seven-decade period, surpassing even that of the drought of the mid-1980's that led to widespread famine. Fortunately, due to the quick humanitarian response of the Ethiopian government and international agencies, and public investments in the agriculture sector, markets and telecommunications (Dorosh and Rashid 2015), the widespread deaths of previous droughts were not repeated. Yet as will be seen in subsequent chapters in this report, many households did experience a large shock to their resilience capacities and food security, especially Borena households and pastoralists.

**Figure 3.5 Annual rainfall deficit in Borena and Jijiga, 1950 – 2017**

Note: Shaded area is the PRIME project operational period.

## 3.2 Household Reports of Exposure to Climate, Conflict, and Economic Shocks

Table 3.2 compares households' own self-reports of their shock exposure in the year prior to the PRIME baseline (December 2013) and endline (December 2017) surveys.

**Climate shock.** The data confirm that households' exposure to climate shocks and the immediate downstream impacts has greatly increased over the course of the project's implementation period. The percentage of households reporting exposure to drought has more than doubled, increasing from 44 percent to 92 percent. Exposure to livestock and crop disease and "very bad harvest" have also increased dramatically. There have been slight declines in exposure to excessive rains and landslides.

**Conflict shock.** The only type of conflict shock that was higher in the year prior to the endline than the year prior to the baseline is violence against household members, rising slightly from 0.2 to 1.5 percent of households in Borena. According to the quantitative data, thefts of money, crops, assets and livestock, as well as destruction or damage to households and loss of land due to conflict, have not shown significant increases. However, these baseline-endline comparisons overlook a great deal of conflict shock in the interim, for example during the El Niño/IOD drought of 2016. During the one-year period marking these droughts, over 25 percent of Borena households and 13 percent of Jijiga households experienced theft of livestock or crops. Similarly high percentages experienced other conflict shocks such as theft of assets, destruction of a home or loss of land due to conflict, and violence against household members (Frankenberger, Smith and Nelson 2018). The qualitative data also point to a great deal of conflict shock and other types of conflict shocks than those enumerated in the quantitative data collection.

**Economic shock.** Exposure to economic shocks was widespread and increasing throughout the project period. The percentage of households experiencing food price inflation increased from 63.2 to 90.3 percent and was elevated into the 90's during both RMS-1 and RMS-2. In addition to increases in problems with demand for agricultural and livestock products, households experienced increased exposure to input price inflation and drops in prices of agricultural and livestock products. The prevalence of these price shocks was very high during the RMS-2 period. For example, nearly 100 percent of households were exposed to input price inflation. The percentage of households reporting family member deaths (which can be a particularly harsh shock to households' livelihoods) increased from 2.4 to 3.8 in Borena. This finding signals that while the droughts did not lead to widespread deaths, they did take a toll on people's physical well-being, as confirmed by the qualitative data (see below).

**Summary measures of shock exposure.** The bottom of Table 3.2 reports values of two summary measures of shock exposure based on household self-reports: a perceptions-based shock exposure index and a count of the total number of shocks exposed to in the last year (out of 12). The perceptions-based index takes into account the perceived severity of shocks in addition to the number of shocks to which households were exposed.

**Table 3.2 Baseline-to-endline comparison of household shock exposure in the last year (self-reported), by project area and pastoralist status**

Indicator	All		Project area				Pastoral status						
	Baseline		Borena		Jijiga		Pastoralist		Agro-pastoralist		Non-pastoralist		
	Baseline	Endline	Baseline	Endline	Baseline	Endline	Baseline	Endline	Baseline	Endline	Baseline	Endline	
<b>Climate shocks (% of households)</b>													
Excessive rains	14.4	8.6 ***	10.2	8.5	24.9	9.0 ***	13.5	8.2 ***	17.1	5.8 ***	12.9	12.1	
Too little rain/drought	43.8	91.9 ***	39.8	94.8 ***	53.9	84.7 ***	42.6	94.9 ***	47.6	88.7 ***	41.4	91.2 ***	
Livestock/crop disease	47.5	68.5 ***	47.9	73.3 ***	46.6	56.4 ***	48.8	75.4 ***	48.9	63.8 ***	44.6	64.4 ***	
Very bad harvest	40.7	81.6 ***	40.7	85.3 ***	40.9	72.5 ***	39.9	83.9 ***	43.9	78.9 ***	38.6	81.5 ***	
Landslides/erosion	13.7	9.8 ***	12.4	9.3 **	17.0	11.1 ***	14.4	10.7 *	14.1	7.8 ***	12.5	10.7	
<b>Conflict shocks (% of households)</b>													
Theft of money	1.9	2.0	2.3	2.6	0.9	0.3	2.2	2.6	1.6	1.8	1.9	1.3	
Theft of crops	1.4	1.1	1.2	0.8	1.9	1.7	1.4	0.6 *	1.6	1.7	1.2	1.1	
Theft or destruction of assets	1.4	1.4	1.4	1.4	1.5	1.3	1.2	0.9	1.5	1.7	1.7	1.7	
Theft of livestock	2.9	3.7	3.5	4.7 *	1.5	1.1	3.9	4.3	1.9	3.3 *	2.7	3.3	
Destruction of house due to raids	0.4	0.4	0.2	0.2	0.8	0.7	0.4	0.6	0.7	0.1 *	0.2	0.4	
Loss of land due to conflict	1.1	1.1	1.2	1.2	0.8	0.8	1.1	0.6	1.3	0.4 *	0.8	2.4 **	
Violence against household members	0.6	1.3 **	0.2	1.5 ***	1.6	0.8	0.7	1.2	0.5	0.6	0.4	2.1 **	
<b>Economic shocks (% of households)</b>													
Sharp food price increases	63.2	90.3 ***	66.1	91.5 ***	56.1	87.2 ***	64.0	94.0 ***	61.8	87.4 ***	63.8	88.4 ***	
Unavailability of ag. or livestock inputs	21.4	51.4 ***	13.2	48.3 ***	41.6	59.3 ***	16.8	54.6 ***	27.4	52.2 ***	21.0	46.5 ***	
No demand for ag. or livestock products	15.7	36.2 ***	9.9	38.3 ***	30.3	31.1	15.4	39.8 ***	17.5	31.8 ***	14.3	36.3 ***	
Increase in price of ag. or livestock inputs	35.2	68.0 ***	33.1	68.4 ***	40.3	67.3 ***	35.8	73.0 ***	34.4	67.8 ***	35.2	62.0 ***	
Drop in price of ag. or livestock products	22.5	30.3 ***	19.7	29.4 ***	29.4	32.5	20.6	35.2 ***	24.5	28.8	22.9	25.5	
Death of household member	3.9	4.8	2.4	3.8 **	7.7	7.3	2.6	3.4	4.4	4.9	5.2	6.5	
<b>Index (mean)</b>													
Shock exposure index	11.6	20.0 ***	10.7	20.9 ***	13.7	17.9 ***	11.3	21.5 ***	12.2	18.7 ***	11.3	19.4 ***	
Number of shocks exposed to in last year	3.3	5.5 ***	3.1	5.6 ***	4.0	5.3 ***	3.3	5.8 ***	3.5	5.3 ***	3.2	5.4 ***	

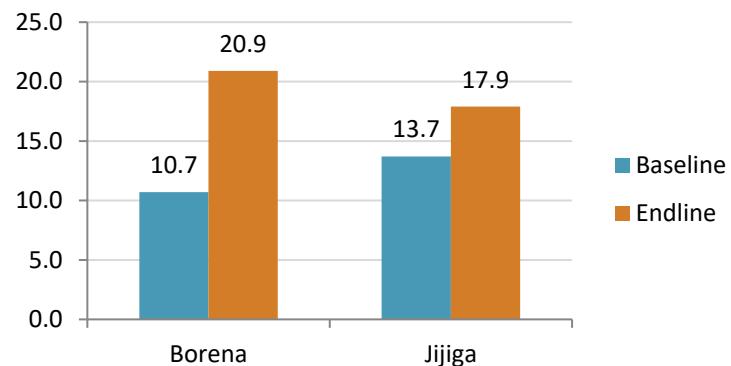
Note: Stars indicate statistical significance at the 10%(\*), 5%(\*\*), and 1%(\*\*\*) levels.

Perceived severity is measured from survey respondents' 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 a weighted sum of the incidence of each shock (a dummy variable equal to 0 if not experienced and 1 if experienced) and its perceived severity as measured on the 5-point scale. The resulting scale ranges from 0 to 49, with higher values indicating greater shock exposure.

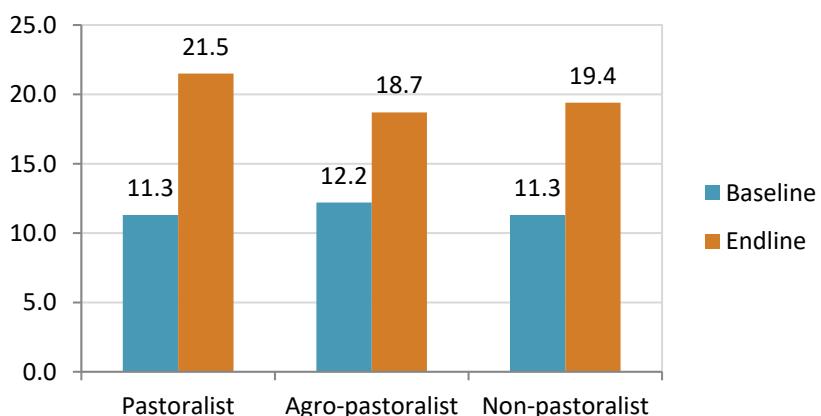
Both the perceptions-based shock exposure index and the number of shocks have increased markedly over the project period, with the shock exposure index rising a full 72.4 percent. As illustrated in Figure 3.6, shock exposure has increased more in Borena than Jijiga, with the perceptions-based index almost doubling in Borena. This difference between the project areas is consistent with greater severity of drought exposure in Borena seen from the AFDM data (Table 3.1). Pastoralists have experienced the greatest increase in their shock exposure, with the perceptions-based index rising by 90 percent, followed by non-pastoralists (72 percent) and agro-pastoralists (53 percent). The greater increase for pastoralists is due to higher increases in exposure to a host of shocks: drought, livestock and crop disease, poor harvests, food price increases, unavailability of and inflation in the prices of inputs, and drops in the prices of agricultural and livestock products.

**Figure 3.6 Shock exposure index (self-reported), baseline versus endline by project area and pastoralist status**

**(a) By project area**



**(b) By pastoralist status**



### 3.3 Qualitative Perspectives on Shock Exposure

#### 3.3.1 Climate Shock: Drought and How It Affected Different Groups of People

Insights from the qualitative research reveal that drought was the primary shock experienced by households in the five years prior to the endline survey (i.e., over the life of the program) in both Borena and Jijiga. Additionally, FGs and KIs in both regions reported two to three episodes of drought in that time period. Most kebeles in Jijiga indicated that the two years between 2015 and 2017 had been particularly difficult in terms of drought, with no rain at all during those two years (2015/2016 and 2016/2017 cropping seasons), at least in some locations. Other kebeles experienced these two years as “separate” droughts, with the second year exceedingly severe. Similarly, FGs and KIs in Borena reported experiencing three recurrent droughts in 2015 and 2016, with the impacts in the second year exceedingly more severe in terms of livestock losses, hunger, asset depletion and in some cases loss of life.

In Jijiga, with the exception of an early rainfall event, the 2017 rains in March-May were somewhat late—and below average—but above average during the later season rains (August-October). Thus, people in Jijiga experienced some relief in 2017 from the previous years of drought, but not enough to recover—even partially—from the substantial losses they had incurred prior to the last month of data collection in the RMS-2 (December 2016), particularly in terms of livestock.

There was widespread acknowledgement across all FGDs in both Jijiga and Borena that women (particularly pregnant and breastfeeding women), the elderly, and children are particularly vulnerable to the impacts of drought. In Borena, this vulnerability was linked to a lack of mobility; women are tied to productive and reproductive (e.g., child care) responsibilities in the homestead, and the lack of road infrastructure and transportation impedes their ability to market raw goods in town centers. As one women in Borena noted: *“If a woman goes to the market [16 hours of travel], she will be in a group and will spend the night under a tree with her donkey.”*

Women FGD participants in Jijiga also felt there are obvious differences in terms of how drought affects them. According to them, *“women are more impacted by drought because they give birth and have more trouble getting enough food, water, and care when everyone is suffering.”* When men and male youths migrate in search of either pasture or work, women are left on their own to deal with everything, however best they can manage. FGs in Borena suggested that while youth have greater mobility, they bear great responsibility for migrating to urban areas in search of employment and income support to their families. Thus, they are also negatively affected. During severe drought, the elderly may be “abandoned” if their families migrate, leaving them dependent on the community.

Women’s time burden collecting water is especially impacted during droughts, often requiring they walk long distances (e.g., 6-7 hours roundtrip), which may also expose them to certain dangers. This takes time away from child care, income generating activities, food preparation and other household activities. In

“Women have a lot of burdens. They have multiple responsibilities related to their biological make-up....as a result of all these, we are soft to the impact of drought.”

- Female FGD; Jijiga

their role as caretakers for children and the elderly, women experience both the physical and emotional strain of providing for the essential needs of others.

The elderly, children, and pregnant and lactating women suffer the most nutritionally; they are less able to cope with undernourishment and are more susceptible to illnesses caused by inadequate food or clean water. In at least one woreda in Jijiga, FGD respondents felt that child malnutrition—and stunting in particular—resulting from the drought was “pretty bad” over the three years prior to the endline.

There was strong agreement among all FGs in both Borena and Jijiga that everyone had suffered. But participants in both regions felt that the drought affects the poor more than the wealthy. As one person in Borena indicated, “*The wealthy feed cattle by buying molasses, while the poor wait for God to rescue their cattle.*” Wealthier households with large livestock holdings have the capacity to purchase feed or sell some livestock in advance of declining livestock body conditions and invest in other activities, including construction of rental homes in town centers in Borena. In multiple communities, discussants observed that while the poor are undoubtedly most negatively affected by drought, “rich men” who lost large herds (e.g., 100, 200, 300 cattle) suffered gravely, in some cases resulting in desperate acts or attempts of suicide.

Interestingly, women in one woreda in Jijiga suggested that wealthy households actually suffered more because they had more to lose. That is, poorer people could just migrate elsewhere to look for food or fodder; wealthy people would have a harder time migrating to other places. The underlying presumption was that poorer people were not leaving anything behind if they migrated whereas wealthier people were leaving nice houses, businesses, and other sources of “wealth”. A KI in Borena noted, “*The rich are affected by the loss of herds, whereas the poor are doomed to lose their lives.*”

Note that, as for the quantitative data, some flooding was reported in both regions; in Borena as a major secondary effect of drought, but in Jijiga it was primarily limited to communities located near rivers. Although many riverbeds are dry most of the year, intermittent rain or rains in the mountains result in flooding, destroying homes and washing away livestock and property. Additionally, because grass is unable to grow during periods of drought, when rains occur they lead to large-scale flooding, causing erosion, destruction of roads, wells, etc. Although not widespread, floods have a dramatic impact on those households and communities in which they occur, including death of people and livestock. Several communities in Borena reported building canals and digging ditches to protect houses from the negative effects of flooding.

“Every community member is suffering equally, the only difference is the timing. Those who are wealthy have been buying crops with the money they have until the money is depleted.”

- Female FGD; Borena

### 3.3.2 Downstream Effects of Drought

**Pastoral and farming livelihoods.** By and large, FG discussants considered drought to be the key shock they experienced over a several year period, which resulted in an array of downstream and compounding effects, primarily on their livelihoods. Both farming and pastoral livelihoods as a way of life

were severely threatened. Some households reportedly lost their entire asset base; there was nothing to sell in order to generate income. FGD participants said that especially in the 2015/2016 period many people's main livelihoods were simply wiped out. According to a female participant in Jijiga, “*Before this drought, we generated income by selling livestock products such as by selling milk, butter and cheese. But after this drought, our means of income generation decreased.*” As the main purveyors of these commodities, women were highly affected. Additionally, loss of such foods is particularly detrimental for children and the elderly, who “faced malnutrition twofold”.

FG participants in both regions indicated severe declines in crop and livestock production, including widespread and large-scale loss of livestock due to lack of water, pasture, feed, and increased incidence of disease. In the most extreme cases, households lost entire herds. In both regions, people reported little or no agricultural production, not even plant stubble or fodder. In previous years, even when crop production failed, households relied on minimal or erratic rainfall to produce crop residue, which was harvested and stored as livestock feed. Other downstream effects resulting from the drought included widespread acute watery diarrhea (AWD) and other water-borne diseases, particularly in Jijiga, and increased conflict and insecurity.

Even before the endline, the drought was primarily characterized by the large number of livestock deaths that had occurred. Everyone lost at least part of their livestock and for some, entire herds had been wiped out, especially among poorer households. Although the wealthy lost livestock in significant numbers also, their larger herds meant at least some animals typically survived, helping them recover faster. One male participant in Jijiga indicated only 20 out of his herd of 120 goats survived the drought; he finally migrated with the remaining animals in search of better pasture.

In both Borena and Jijiga, the increasing severity and frequency of drought resulted in a loss of pasture (and fodder), as well as the quality of pasture. Of note in Jijiga was that FGDs did not specifically report a lack of fodder as a critical downstream effect of the drought at endline, which contrasts strongly with RMS reports that it was a key limiting factor for livestock. As noted in the last round of RMS-2 (Nov-Dec 2016), some communities had reported improvements in pasture from sporadic rains that had occurred earlier that year. Given the slight improvement in rains during 2017, combined with the dramatic reduction in livestock remaining in the area, availability of fodder may simply not have been an issue. This is a somewhat interesting finding given that focused efforts to improve the supply and availability of fodder in the region may now be slightly more difficult (or at least involve lag-time) due to a reduction in demand (i.e., dramatically reduced herds).

Goats and camels are often preferable to cattle due to their better resistance to drought. Regardless, significant numbers of sheep perished, as well as cattle. According to one person in Jijiga, cattle were “wiped out” while camels mostly survived but suffered greatly (i.e., became very skinny and weak). Taken together, this had an effect on the entire livestock industry—in terms of trading, fattening, fodder

**“Almost all the cattle in our community are decimated. Even our goats and camels are unable to resist and have fallen on the ground due to this drought. No oxen survived for farming to supplement our income.”**

- Male FGD: Borena

suppliers, veterinary service providers, MFIs, as well as on the availability—and price—of milk and butter. In Jijiga, FG participants and KIs noted the drought had affected both the Jijiga Export Slaughter House (JESH) and the Barwako Milk Marketing Cooperative.

The catastrophic loss of livestock not only severely limited household income and consumption of highly nutritious foods (e.g., milk), it had cascading impacts on local economies. In Jijiga, a male FGD participant suggested that the primary effect of the drought was high “unemployment” because no one had a way to earn money. As one FGD participant put it, “income from livestock is closed,” which meant people had no money from livestock to purchase food and other household items, pay for school fees, repay loans, etc. Thus, the drought impacted other businesses as well, as people could not purchase food with cash and sought to take out loans, primarily from shop owners. As the drought wore on, however, even this became untenable; people were unable to repay their debts, forcing shop owners to stop making loans.

In Jijiga, other businesses closed entirely, especially those related to livestock. One private veterinary pharmacy owner indicated he had closed two of his three pharmacies in the region over the three years prior to the endline. Although he indicated there were challenges related to road blockades due to local conflict, which affected the price of medicine, etc., the main challenge was the lack of demand for veterinary services because people had lost their livestock (i.e., no animals to treat) as well as any income they may have derived from agricultural activities.

It is not clear from the endline qualitative data whether large numbers of animals continued dying between the last round of the RMS-2 (Nov-Dec 2016) and the endline (Dec 2017). Qualitative data collected by the end of 2016 included many reports of specific—and large—numbers of livestock deaths from the drought. For example, in July 2016 one kebele in Jijiga reported that 870 cattle and 2000 shoats had died from drought in one year. By contrast, at the endline in December 2017, there were few, if any specific numbers of animal losses reported from any of the FGDs or KIs. Rather, people tended to speak in general terms such as many, most, or all. This suggests that the catastrophic loss of livestock may have primarily occurred before December 2017, as an accumulation of the previous two years of drought. The slight relief in terms of rainfall during 2017—at least in Jijiga—may have helped minimize additional livestock losses after two years of drought. Additionally, by the endline, people may simply have blurred it all together in terms of the numbers of livestock that had died. Such details were, however, captured in both RMS rounds.

The widespread loss of livestock also negatively affected people’s ability to engage in productive activities with the onset of rains (e.g., from a lack of draught power, money from livestock sales to rent tractors or to purchase seeds and agricultural inputs). It is not uncommon for households within a community to provide support in terms of oxen for plowing, or money to rent a tractor, in order to help people become productive again. It is in the whole community’s interest that all households be productive.

**Price shocks.** FGs in Borena talked in detail about the soaring prices of food and agricultural inputs as a major secondary shock. One community leader reported, “Five years ago, the price of 1 kg of maize was 5

“No one has any money to spend so even if you don’t depend on livestock, you can’t sell things because no one can buy them.”

- Male FGD; Jijiga

*or 6 birr but now it has increased to 10 or 12 birr.*" Women remarked that their purchasing power declined drastically as market prices for sugar and wheat doubled or tripled. Prices of agricultural seeds tripled since the drought: a cup of seeds that previously sold for 4 birr in Borena cost 12 birr per kuch belu (local measuring unit) at the time of the baseline. At the same time, the price of livestock decreased dramatically due to the emaciated condition of cattle and the rise in the number of livestock on the market from destocking efforts; market prices are nearly half of what they once were. Thus, people experienced negative terms of trade, with increased prices for purchased grains and inputs, alongside declining prices for livestock and animal products.

**Disease and malnutrition.** Disease—among both people and livestock—was also considered to have been aggravated as a result of the drought. Widespread livestock diseases, particularly among cattle and camels, typically ended in death of the animal. People reported both that their traditional remedies appeared not to be working any more, and that they had no income to secure the services or medicines that might have helped prevent livestock illnesses and deaths.

In Jijiga especially, human illness and death were widely reported as one of the widespread impacts of the drought, more so during the RMS-2 than endline. The scarcity of water meant people and livestock shared what few water resources there were, resulting in contamination. "Everyone used the same sources of water; children got sick," according to one woman. Acute watery diarrhea

(AWD) was a problem in many communities in Jijiga and resulted in deaths throughout the region, particularly among the elderly, children, and women. FGD participants in one kebele reported seven elders and three children had died from AWD (or related causes). The scarcity of water, as well as the quality of water, made it difficult to maintain good sanitation practices, particularly among children. Women felt that children suffered greatly from vomiting and diarrhea, and that they were "less protected" in terms of getting enough to eat, a balanced diet, and clean water. Children—and the elderly—were plagued by weight loss, diarrhea, coughing, and overall weakened condition. Men noted that the loss of cows meant no milk and the loss of shoats reduced availability of "casual" meat, both of which increased malnutrition, especially among children. Children were too sick to attend school, or dropped out altogether, and many classes were combined because "classes were empty." Government-sponsored treatment centers were established at the kebele level in order to help deal with the outbreaks. Additionally, a government human health initiative focused on information to help create awareness about water-borne diseases, including prevention and treatment, and providing medicine and vaccinations for children, and water treatment tablets (e.g., chlorine).

**Land degradation and invasive species.** In both regions, people felt that land degradation was exacerbated by the drought. In Jijiga, trucks carrying contraband cut through fields to bypass established roads and "created" new ones in what had been farmland or scrub. As trucks loaded with contraband from Somaliland, as well as the soldiers chasing them, indiscriminately cut across both cultivated and non-cultivated lands, crops were damaged and vegetation destroyed. Loose soil was easily eroded both from

"In the first day or within one day 40 people were affected by water-borne disease while in the second day around 18 people were affected."

- Female FGD; Jijiga

wind and flooding. Influxes of refugees and their settlements also contributed to deforestation and land degradation.

In previous data collection events, FGD participants mentioned invasive species (e.g., cactus, weeds) as being aggravated by the drought. In Jijiga, a type of cactus has invaded the area, which swells in the guts of livestock and weakens or kills them. FGD participants also mentioned a grass that renders pasture unpalatable to livestock, as well as threatens their health. When land becomes infested, it is unusable for either crops or grazing. FGs in two woredas in Borena attribute a deterioration in the quality of pasture, in part, to invasive plant species, namely “tusee”, a thorny bush said to negatively affect cattle health.

**Conflict shock.** Although quantitative data in Table 3.2 suggest that few households experienced conflict as a shock during the project period, findings from the qualitative study suggest otherwise. This may simply be a result of how the list of possible shocks is worded, as there are not specific conflict-related shocks regarding “ethnic” conflicts generally, let alone “border disputes with the Somali.”

In Borena, FGD participants noted the on-going and sometimes escalating conflict between their communities and the neighboring Somali region, particularly over border disputes as the Somalis/Garis have expanded into Oromia state. Numerous communities reported large numbers of men dying while defending the border. One FG discussant indicated that several male household heads from the kebele had been sent to the Oromia border region for fear that the Somalis had further advanced into the area and upon hearing that armed groups had opened fire on the Oromos living near the border. Reportedly, over 200 Borena lives have been lost to conflict with the Somali. FG members explained, “*The Somali have taken 5 to 6 kilometers of our land every year but now they have begun to control up to 50 kilometers. Conflict with the Somali costs us our lives and makes us suffer when we have no wherewithal for resolution.*” A KI in another kebele further revealed the negative effects that conflict has on families: “*The conflict is taking away our young people and assets. The border war takes away our productive generation; leaving no one left to care for their families.*”

In Jijiga, conflict within and/or between communities was, for the most part, not considered as having increased significantly as a result of the drought. However, recurrent flare-ups of the long-standing Oromo/Somali ethnic conflict resulted in periodic road blockades into Jijiga, which contributed to price hikes (or reductions) and disruptions in transport, the livestock trade, and supplies (e.g., agricultural inputs). The price of green peppers decreased from 4000 birr/quintal to 500 birr even in local markets; farmers stopped harvesting their crops.

Illegal trade, particularly of livestock medicines, increased, which also contributed to a decline in demand for certain agricultural services. As previously noted, such blockade-induced price hikes had a negative effect on the income of service providers and businesses, contributing to a loss in livelihood support for some.

Overall, however, most FGD participants in Jijiga felt there was little conflict—or crime—in their communities, and none that resulted specifically from the drought. Communities reported they eat and live together “as one” and that generally trust remains high. Recognizing that they themselves may need help at some point, for example with better pasture, communities hold strong to the custom of sharing their resources with others, even in times of severe drought. In contrast, FG participants in Borena

suggested that drought has detrimentally affected social relationships with their neighbors, and has resulted in conflicts over grazing lands and water points.

Some FGD respondents in Borena went so far as to state that crime has become increasingly common in their community, and attribute this to the recent and severe drought. A male FG participant explained, “*In previous times, there was no such word as theft in our community. I remember when a man from this community found 200,000 birr lost by a rich man and returned it by traveling as far as the home of the owner. But after 2008 E.C. [2015], people started stealing from each other—cattle, camels, clothes, [from] shops, solar power—all due to the severe drought.*” Similarly, according to other male FG participants, “*In extreme cases, they steal cattle from the fields. They go to Yabello to steal anything they can find, including donkeys. Raids for cattle also take people up to the border of Kenya … Local people are seen as suspicious by the neighboring Gabra ethnic group because people started stealing their cattle either to sell or for consumption.*” Female participants in some Borena communities also expressed concern over increased incidents of domestic and gender-based violence.

At least some communities have conflict resolution processes, where leaders facilitate meetings to discuss the issues and recommend appropriate actions. Again, qualitative data from the RMS-2 rounds—at least in Jijiga—suggest that generally there is little conflict overall, and none considered to be triggered by the drought per se. However, FGD participants were more likely to mention inter- and intra-household conflicts during RMS data collection (2015 and 2016) than at endline. For example, the RMS-2 report shows that one FG in Jijiga indicated that disagreements and competition between community members happen even in the absence of drought and that, “*When the quality of existing grazing pastures is reduced due to persistent drought, our community members, including relatives, get into competition and conflict over available grazing pasture claims.*” In particular, disagreements between some married couples, mostly regarding household expenditures during times of drought, were reported as early as December 2015 (RMS-2 Round 2). This again supports the idea that as time passes after an event, even a severe one, its impacts can be somewhat diminished in the minds of those experiencing it. Data collected at endline still give credence to the severity of the drought(s) experienced over the five years of the PRIME project, but data from the RMS rounds show even more clearly the depth and extent of its impact in real-time.

### 3.4 Summary: Shock Exposure

Drought was by far the most prominent shock to hit the PRIME project area over its operational period. Households experienced multiple, back-to-back droughts with failures of at least one, if not both, rainy seasons in all four years between the baseline and endline surveys. Satellite remote sensing data show that annual rainfall deficits were the highest since 1950 and resulted in extremely dry soil moisture conditions. The failures of the rainy seasons in 2015 and 2016 were induced by the 2015/16 El Niño Southern Oscillation and subsequent Indian Ocean Dipole, weather phenomenon made more extreme by global warming. Fortunately, due to the quick humanitarian response, as well as public investments in the agricultural sector, markets, and telecommunications over the last few decades, the widespread deaths of previous drought-induced famines were not repeated. Yet both the quantitative and qualitative data show that households experienced numerous downstream shocks that were detrimental to their livelihoods and, for many, the very quality of their physical well-being.

Problems of insufficient fodder and water for livestock and consequent livestock disease, emaciation and unplanned deaths were widespread. Crop disease and failures were also extensive. The catastrophic loss of livestock not only negatively affected household income and consumption of highly nutritious foods (e.g., milk), it had cascading impacts on local economies, leading to unemployment and business failures. The declining terms of trade associated with food price inflation and falling livestock and crop prices exacerbated households' ability to meet their needs for food and non-food items like school fees, and to repay loans. Conflict shocks, such as thefts of livestock and crops, destruction of homes and loss of land due to conflict, as well as violence against household members were also quite prevalent. Some of this conflict was associated with escalating ethnic tensions and border disputes between the Oromo and Somali. Human illness and malnutrition among children were a rising problem over the project period, spurred by food and water scarcities, the latter which led to people and livestock sharing water resources, resulting in contamination.

According to the satellite remote sensing data, the cumulative drought over the project period was more severe in Borena than Jijiga. Self-reported shock exposure data, including both drought and its numerous downstream impacts, confirm that Borena households experienced a greater increase in shock exposure over the period. Shock exposure increased the most among pastoralists, followed by non-pastoralists and agro-pastoralists. Women, the elderly, children and the poor were particularly vulnerable to the impacts of drought.

## 4 LIVELIHOODS AND LIVELIHOOD ENVIRONMENT

As seen in the last chapter, both PRIME IE areas experienced a great deal of climate and economic shock over the course of the project's implementation period. This chapter shows that accompanying these shocks—and the resilience-strengthening activities and humanitarian assistance of PRIME and other projects—have come some significant shifts in households' livelihoods and livelihood environments. This chapter starts by examining changes since the baseline in the pastoral status of households and in their socio-demographic makeup since the baseline. It then turns to describing changes in households' economic status and livelihood activities, followed by a more detailed look at livestock production and marketing. Finally, it describes changes in migration patterns that took place over the four years of the project.

### 4.1 Shifts in Pastoral Status and Socio-demographic Characteristics

Table 4.1 and Figure 4.1 report on the shifts that have taken place in the percentage of households falling into the three pastoral status categories: pastoralist, agro-pastoralist, and non-pastoralist. The classification system is described in Section 2.2.1 above. The biggest changes have taken place in the Borena project area, where there has been a shift of households out of the agro-pastoralist group and into the non-pastoralist group. This shift likely reflects the longer-term trend towards livelihoods that are not highly climate-vulnerable, but may also be a response to the devastation wrought on agricultural production due to back-to-back droughts. Notably, the percentage of pastoralists has increased slightly in both project areas.

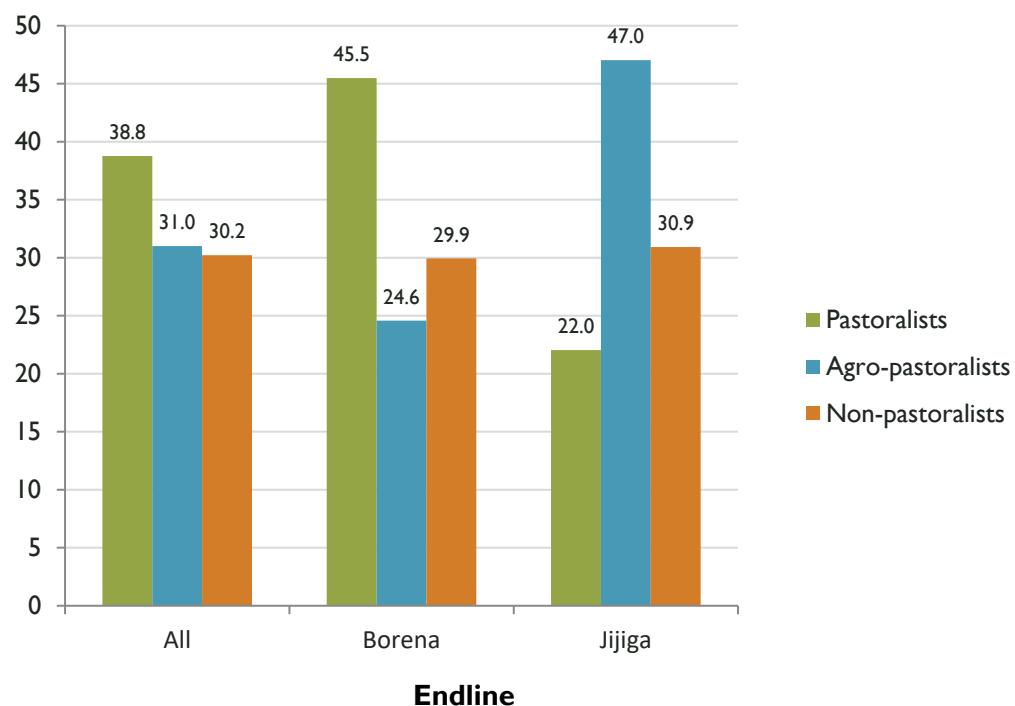
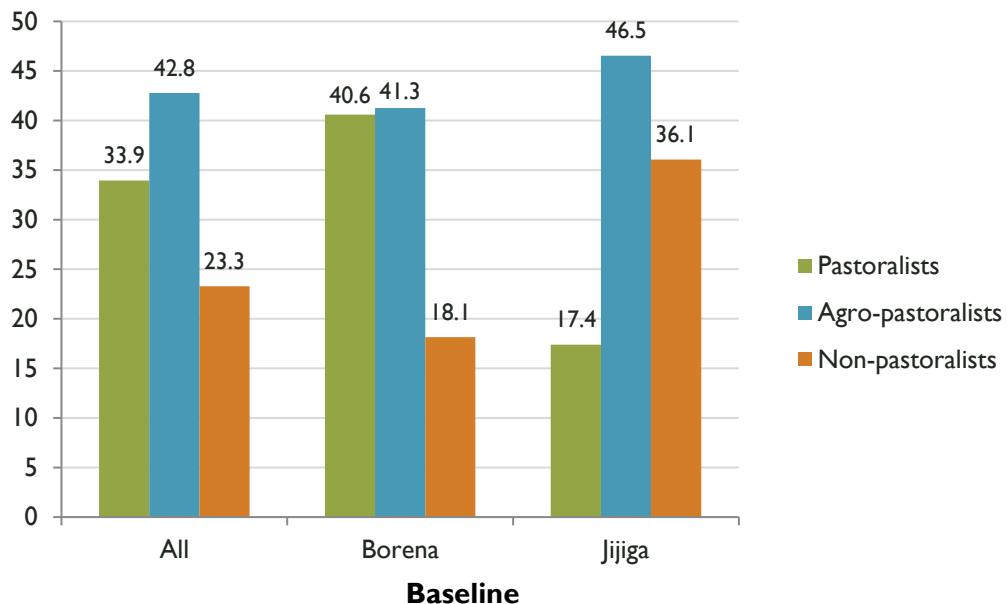
**Table 4.1 Percent of households in pastoral status groups, baseline versus endline, by project area**

	All		Project area			
	Base-line	End-line	Borena		Jijiga	
			Base-line	End-line	Base-line	End-line
Pastoralist	33.9	38.8 **	40.6	45.5 *	17.4	22.0 **
Agro-pastoralist	42.8	31.0 ***	41.3	24.6 ***	46.5	47.0
Non-pastoralist	23.3	30.2 ***	18.1	29.9 ***	36.1	30.9 *

Stars indicate a statistically significant difference at the 10%(\*), 5%(\*\*), and 1%(\*\*\*) levels.

Note: These values differ slightly from those in Figure 1.2 as they are calculated using the panel data set (N=2,750).

**Figure 4.1: Percent of pastoralists, agro-pastoralists, and non-pastoralists at baseline and endline (panel data set), by region**



There have also been some noticeable shifts in household socio-demographic characteristics over the period (Table 4.2). Household size and the percentage of households with a disabled member have increased in both project areas and for all of the pastoralist status groups. The change in disability is associated with increases in “partial visual impairment” and “mobility and orthopedic”-related disabilities. It is unclear whether this represents actual increases in disability, perhaps as a result of sporadic violence due to ethnic conflicts in both program areas or reflects an increase in reporting of disabilities. The percentage of female adult-only households has risen in Jijiga, from 7.5 at baseline to 10.0 at endline, perhaps rooted in family separation due to male migration. Increases in formal education, especially for women, likely reflect a long-term trend, but may also be due to fewer students being pulled out of school to work as a coping strategy in response to shocks (see Chapter 6).

There have also been some shifts in the types of dwellings in which households reside. In Borena, the percentage of households with a brick, cement or adobe house has risen, offset by a decline in the percentage with a thatched hut. In Jijiga the percentage with a thatched hut has increased while that living in a tent has declined considerably. These changes may be a reflection of the increase in wealth (asset ownership) and income in both project areas (see next section). Note also that the decline of residence in a tent has been particularly large for non-pastoralists, the group that has seen the greatest increase in its asset wealth.

Finally, there has been a slight increase in women’s decision-making power in both project areas and for all three pastoralist status groups (bottom of Table 4.2). Decision-making power is measured as an index using data collected from women regarding who usually participates in 12 types of decisions ranging from which types of crops to grow, to women’s participation in groups. The data were collected at endline with a retrospective recall method used for estimating the index at baseline.<sup>13</sup> This change may be associated with women’s role in shifting livestock marketing towards areas with the best prices, as observed from the qualitative data (see below).

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<sup>13</sup> See Chapter 9 for measurement of the index.

**Table 4.2 Household socio-demographic characteristics, baseline versus endline, by project area and pastoral status**

	All		Project area				Pastoralist status					
	Base-line	End-line	Borena		Jijiga		Pastoralist		Agro-pastoralist		Non-pastoralist	
			Base-line	End-line	Base-line	End-line	Base-line	End-line	Base-line	End-line	Base-line	End-line
<b>Household size</b>	5.7	6.1 ***	5.7	6.2 ***	5.7	6.0 ***	5.8	6.3 ***	6.0	6.3 ***	5.0	5.6 ***
<b>Female adult-only household (%)</b>	10.9	11.4	12.2	12.0	7.5	10.0 **	11.6	11.2	6.9	8.2	17.1	17.8
<b>Disabled member (%)</b>	10.4	13.5 ***	10.4	13.3 ***	10.3	14.1 ***	10.3	14.2 **	9.8	11.8 **	11.5	15.7 **
<b>Education (at least some primary school)</b>			8.4	11.8 ***	10.2	14.0 ***	4.1	6.1	7.6	10.4 *	8.6	12.3 ***
Female adult member	8.4	11.8 ***	10.2	14.0 ***	4.1	6.1	7.6	10.4 *	8.6	12.3 ***	9.4	12.7 **
Male adult member	25.6	28.6 ***	27.9	30.7 **	19.8	23.4 *	22.3	26.5 **	26.8	30.7 ***	28.1	28.0
<b>Type of dwelling (%)</b>			9.1	17.5 ***	6.2	16.7 ***	16.3	19.3	4.2	13.1 ***	10.6	18.2 ***
House (brick, cement or adobe)	9.1	17.5 ***	6.2	16.7 ***	16.3	19.3	4.2	13.1 ***	10.6	18.2 ***	13.4	22.6 ***
Thatched hut	78.3	74.8 **	90.4	80.7 ***	48.1	60.0 ***	88.2	81.4 ***	77.1	75.3	65.9	64.2
Tent	10.1	4.0 ***	1.4	1.1	31.9	11.0 ***	6.4	3.1 **	9.7	3.4 ***	16.4	6.2 ***
Number of rooms (mean)	2.5	3.8	2.1	1.4	3.6	9.7 ***	1.2	2.4 *	2.7	3.1	4.2	7.0 *
<b>Women's decision making power (index) a/</b>	5.4	5.8	5.3	5.8	5.7	5.9	5.4	5.9	5.5	5.8	5.4	5.9

Stars indicate a statistically significant difference at the 10%(\*), 5%(\*\*), and 1%(\*\*\*) levels.

a/ Baseline values are estimates from retrospective recall data collected at endline (see text); thus no statistical significance testing was undertaken.

## 4.2 Changes in Wealth, Income, and Poverty

This section looks at how households' wealth and income have changed over the project period. Wealth is measured based on household ownership of assets, including domestic (or "consumption" assets), agricultural productive assets, and livestock. Income is measured using households' (real) total per capita expenditures as a proxy. The latter is used to measure the percentage of households in poverty, that is, unable to meet their basic survival needs, such as food, shelter, and clothing. As we will see, the asset-based and expenditures-based indicators tell different stories about the distribution of households' economic well-being and its evolution between the PRIME IE baseline and endline surveys, and this is because they capture alternative aspects of that well-being.

The *income-based measure of poverty* indicates whether a household currently has sufficient resources to meet its basic needs. Household incomes are measured using total expenditures per capita on food and non-food items.<sup>14</sup> For food, which makes up the largest proportion of household expenditures (82 percent at baseline), data are collected on cash purchases, food consumed from a household's own production, and food received in-kind. The poverty line below which a household is deemed to be poor is the USD 1.90 per day line currently used by the World Bank for measuring global poverty (World Bank 2018). The equivalent poverty line in Ethiopian Birr (ETB) is derived using 2010 Purchasing Power Parity (PPP) exchange rates. Expenditures are calculated using spatial and temporal price deflators, which are cost-of-living adjustments that reflect the fact that prices are generally higher in Jijiga than Borena and have increased over the project period.<sup>15</sup>

A wealth measure based on ownership of assets has a number of advantages over an income-based measure for understanding economic well-being for this study. First, asset wealth provides insight into long-lasting, structural economic deprivation. Measurement based on current income, by contrast, may only be picking up on transitory, short-term deprivation.<sup>16</sup> Second, asset ownership may more fully capture true "income" in the pastoralist setting because it takes into account the contribution of pastoralists' main asset—animals—to their well-being. Examining productive asset ownership, such as herd size, can reveal how pastoral households increase long-term wealth and buffer themselves against shocks by asset protection and accumulation, perhaps even at the expense of current consumption.<sup>17</sup> Third, asset-based wealth measures are more consistent with traditional wealth rankings than income-based measures and thus reflect people's own experiences of poverty. Finally, unlike flow-based measures such as income, stock-based measures of asset holdings are more relevant for shock-prone settings such as the PRIME project area. This is because asset holdings are a resource for meeting basic needs when households are faced with a negative shock that reduces incoming income flows.<sup>18</sup>

<sup>14</sup> The expenditures questionnaire contains 71 food items and 42 non-food items.

<sup>15</sup> The price deflators are calculated using International Monetary Fund-published CPI data (IMF 2018).

<sup>16</sup> Carter and Barrett (2006).

<sup>17</sup> Little, McPeak, Barrett and Kristjanson (2008).

<sup>18</sup> Tache and Sjaastad (2010).

Asset wealth is measured here based on three categories of assets: ownership of consumer durables (out of 11), ownership of agricultural productive assets (out of 22), and ownership of animals (measured in Tropical Livestock Units). These asset types reflect the diversity of livelihoods in the study area, being relevant to pastoralists, agro-pastoralists and those mainly dependent on cash incomes. An overall asset index is constructed using a Factor Analysis (see Appendix 4 for calculation method).

**Wealth.** Despite the extraordinary shocks to which they have been exposed, the average household in both project areas and in all of the pastoralist status groups has seen an increase in ownership of assets (see Table 4.3). The overall index of asset ownership increased by 16 percent, led by increases in consumption and productive assets. There was no increase in livestock ownership, the asset that is most vulnerable to climate shock in the project area. Figure 4.2(a) illustrates the rightward shift in the entire distribution of the asset index that has taken place since the baseline.

The increase in asset wealth was far greater among Jijiga than Borena households, with the index rising by 22.6 percent among Jijiga households but only 7.4 percent among Borena households. Non-pastoralists saw a much greater increase in their asset wealth than the other groups, with an overall index increase near 40 percent. This group is the only that saw an increase in livestock ownership.

**Income (total expenditures).** While households' total *nominal* expenditures have increased over the project period, because of high price inflation (which has undermined purchasing power) their real expenditures have declined (Table 4.3, bottom panel). Real expenditures fell in both project areas and among all pastoral status groups, but the drop was highest among Jijiga households, who experienced an average 35 percent reduction, and non-pastoralists (a 24.4 percent reduction). The higher drop in Jijiga can be partially explained by higher inflation.<sup>19</sup> The reduction in real expenditures means that, despite increases in their asset ownership, households are less able to obtain what they need for daily living, such as food, from their current resources—including food assistance. They have been unable to translate the increased asset ownership into increased consumption. The reduction is consistent with the recorded decline in food security over the project period (see Chapter 7). Figure 4.2(b) shows the slight leftward shift in the distribution of total expenditures and also demonstrates a small decline in inequality (the distribution is more concentrated around the mean).

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<sup>19</sup> The Consumer Price Index rose in the Somalie region (where Jijiga is located) by 47.3 percent, while it rose in Oromiya (where Borena is located) by 44.6 percent.

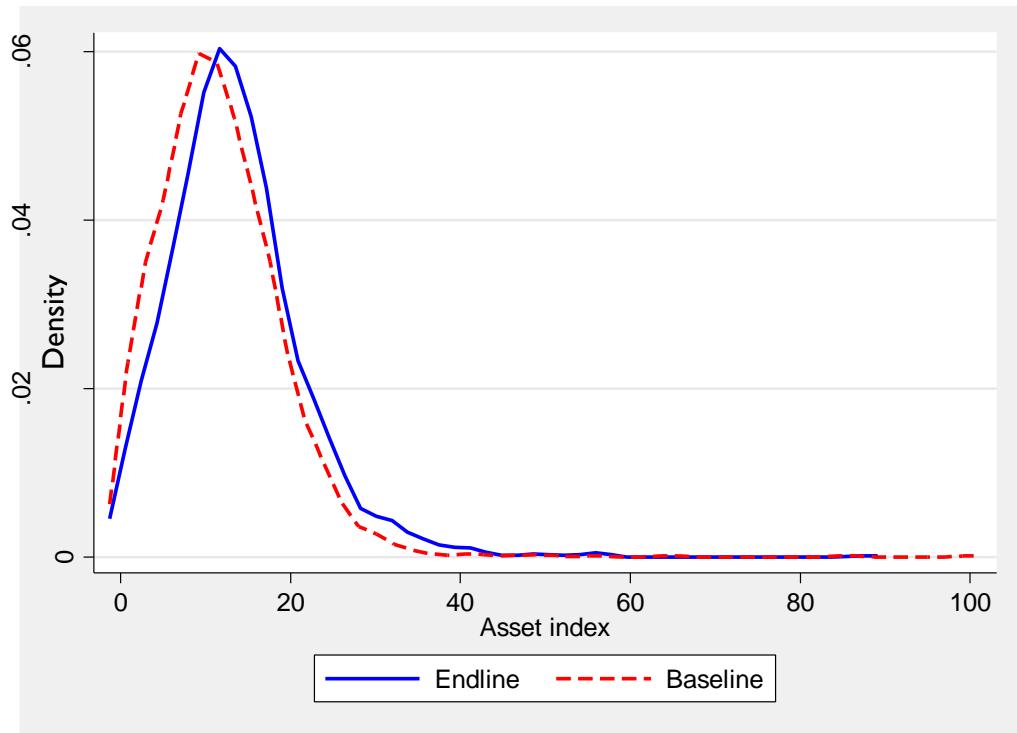
**Table 4.3 Changes in wealth, income and poverty between the baseline and endline, by project area and pastoralist status**

Indicators	All		Project area				Pastoralist status					
	Base-line	End-line	Borena		Jijiga		Pastoralist		Agro-pastoralist		Non-pastoralist	
			Base-line	End-line	Base-line	End-line	Base-line	End-line	Base-line	End-line	Base-line	End-line
<b>Asset wealth</b>												
Index of consumption assets	1.3	1.8 ***	1.5	1.9 ***	0.9	1.7 ***	1.5	1.9 ***	1.3	1.8 ***	1.1	1.8 ***
Index of productive assets	7.5	8.0 ***	8.1	8.9 ***	6.0	5.7 ***	7.6	8.2 ***	8.5	8.6	5.4	6.5 ***
Animals owned (TLUs)	6.4	6.5	7.3	7.3	4.3	4.6	10.2	9.5	5.5	5.7	2.5	3.8 ***
Overall asset index	12.4	14.4 ***	13.6	15.5 ***	9.3	11.4 ***	14.6	15.9 ***	12.7	14.5 ***	8.6	12.0 ***
<b>Income and poverty</b>												
Total per-capita expenditures (daily Birr)												
Nominal	18.2	20.2 ***	11.9	15.2 ***	34.0	32.7	15.6	17.5 ***	18.3	20.3 ***	21.8	24.1 *
Real	22.4	17.2 ***	15.1	13.5 ***	40.5	26.3 ***	19.5	15.1 ***	22.5	17.2 ***	26.5	20.1 ***
Poverty (\$1.9/day line)	63.5	71.8 ***	79.0	84.4 ***	24.9	40.4 ***	69.3	78.5 ***	63.1	71.6 ***	55.8	62.5 **

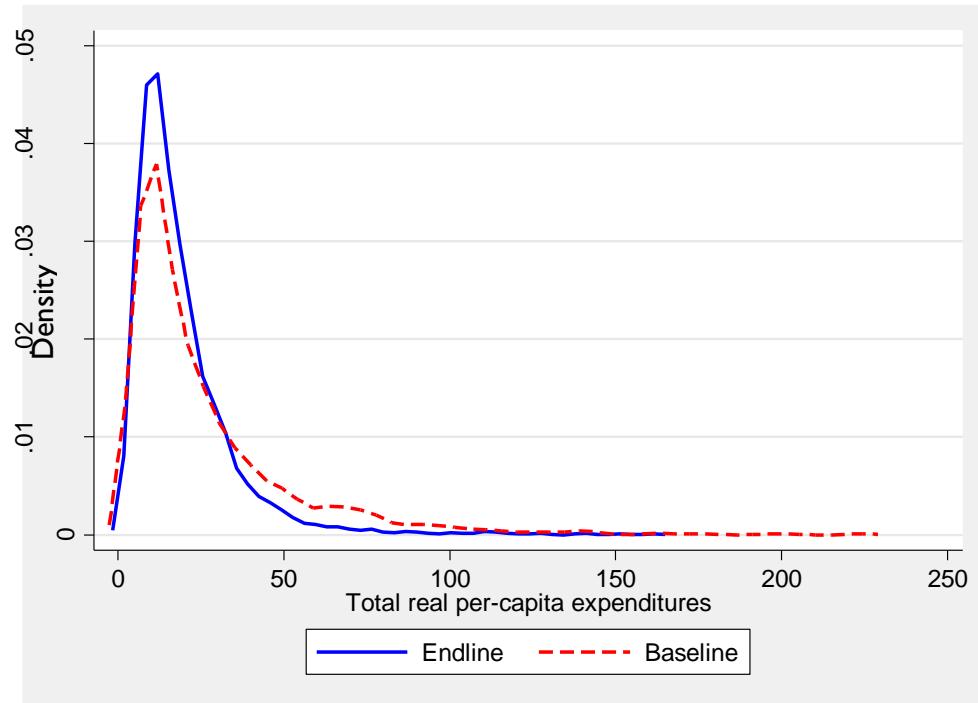
Stars indicate a statistically significant difference at the 10%(\*), 5%(\*\*), and 1%(\*\*\*) levels.

**Figure 4.2 Shifts in the distributions of asset ownership and total expenditures per-capita between the baseline and endline**

**(a) Asset ownership**



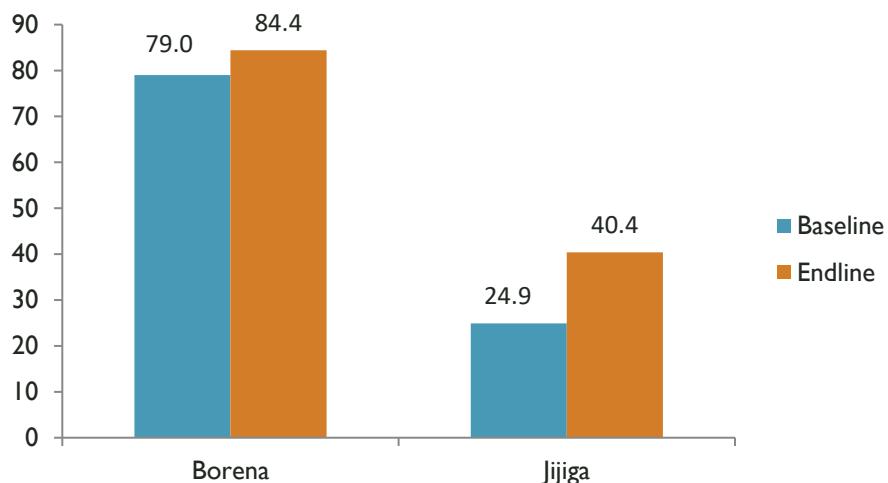
**(b) Total expenditures per capita**



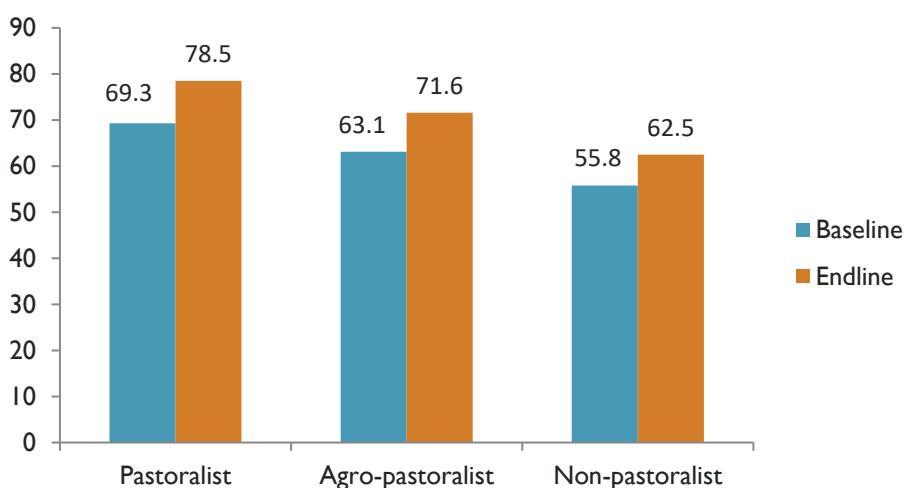
**Poverty.** Poverty has risen in the PRIME area, by 8.3 percentage points. The increase is greatest among Jijiga households (15.5 percentage points) and pastoralists (9.2 points). Note that poverty was far lower in Jijiga than Borena at baseline—the poverty rate was less than *one-third* that of Borena. This means that despite having smaller livestock holdings and productive assets, Jijiga households were better able to acquire food and non-food items using their current resources. With the greater increase in income poverty in Jijiga than Borena over the project period, the gap between the two areas has narrowed. However, Borena households remain far poorer than Jijiga households by this measure.

**Figure 4.3 Changes in the prevalence of poverty between the baseline and endline, by project area and pastoralist status**

**(a) By project area**



**(a) By pastoral status**



### 4.3 Livelihood Activities

Changes over the project period in the percentage of households gaining their livelihood from various sources are reported in Table 4.4. One trend seen in both project areas and for all pastoral status groups is a large increase in reliance on “gifts/inheritance”. The percentage of households gaining livelihood from this non-work source increased from 6.8 at baseline to 31.9 percent at endline. Some of this increase is undoubtedly related to the rising reliance on food assistance (see Chapters 6 and 8). In Jijiga, where bonding and bridging social capital, and reliance on “money/food from family members” as a coping strategy were on the rise (see Chapters 5 and 6, respectively), it may also be due to increased support from other households.

There was a notable reduction in reliance on farming as a source of livelihood among Borena households (from 85.7 to 65.7 percent), a change that may be related to the multiple crop failures that took place throughout the project period. The small increase in the percentage of households engaged in salaried work may signal a switch out of climate-vulnerable livelihoods like farming. The recorded increase in the sale of wild/brush products may be a more desperate “survival” strategy. The Jijiga area saw an increase in the percentage of households engaged in livestock production and sales, along with small increases in the percentage engaged in salaried work and self-employment.

Pastoralists and agro-pastoralists saw significant reductions in both of the main climate-vulnerable livelihoods, farming and livestock rearing. By contrast, as confirmed by data on livestock ownership trends presented in Section 4.4, a large percentage of non-pastoralists apparently took up livestock production sometime between the baseline and endline, increasing from 20.5 to 67.4 over the four-year period.

**Table 4.4 Percent of households engaging in various livelihood activities, baseline versus endline, by project area and pastoral status**

	All		Project area				Pastoralist status					
	Base-line	End-line	Borena		Jijiga		Pastoralist		Agro-pastoralist		Non-pastoralist	
			Base-line	End-line	Base-line	End-line	Base-line	End-line	Base-line	End-line	Base-line	End-line
Farming/crop production and sales	86.5	72.0 ***	85.7	65.7 ***	88.5	87.9	78.4	60.7 ***	100.0	80.9 ***	73.6	72.3
Livestock production and sales	81.2	81.7	87.3	84.0 *	66.1	75.9 ***	99.8	88.4 ***	99.4	84.2 ***	20.5	67.4 ***
Wage labor	17.7	17.5	21.4	20.7	8.4	9.3	11.6	12.9	18.0	17.7	25.8	23.7
Salaried work	1.3	2.3 ***	1.6	2.5 **	0.7	2.0 **	0.2	1.4 **	0.7	2.2 ***	4.2	4.0
Sale of wild/brush products	1.4	2.5 **	1.4	2.6 *	1.6	2.2	0.6	2.5 ***	1.4	1.6	2.7	3.8
Self-employment	6.6	7.6	7.8	7.7	3.6	7.3 ***	3.9	5.8 *	4.7	7.0 **	14.2	11.1 *
Sale of other non-livestock assets	0.2	0.4	0.2	0.3	0.3	0.7	0.3	0.2	0.1	0.4 *	0.5	0.8
Remittances	3.7	3.1	4.9	4.2	0.5	0.4	3.6	3.6	1.6	2.5	7.7	3.5 ***
Gifts/inheritance	6.8	31.9 ***	7.7	35.5 ***	4.4	22.8 ***	4.6	34.0 ***	3.3	30.4 ***	16.3	31.7 ***

Stars indicate a statistically significant difference at the 10%(\*), 5%(\*\*), and 1%(\*\*\*) levels.

Insights from the qualitative data reveal the stress to livestock rearing brought on by the droughts and the pressure to turn to alternatives. In Borena, FGD respondents stated that their communities are traditionally pastoralist and thus rely primarily on cattle and the sale of milk and butter for their subsistence. However, a majority of communities reported losing between 70 and 80 percent of their

cattle, and those cattle that did survive were emaciated and unable to produce milk. As the drought worsened and cattle began to die, many started to seek alternative livelihoods.

With a higher prevalence of agro-pastoralism than pastoralism in Jijiga, more and more households are growing sorghum in addition to—or as a replacement for—maize, primarily because it is more drought tolerant and may at least provide some fodder for livestock when rains fail. As noted at RMS-2, khat can provide income before other crops produce any harvest and responds to rain with a flush of leaves that can be harvested and sold long before other crops. Growing high-value vegetables (e.g., onions, tomatoes, chiles, watermelon) in small, irrigated gardens has gotten much attention in the Jijiga region. Men have formed farmer cooperatives to grow vegetables, though more support in terms of irrigation and seeds is critically needed. Large-scale water schemes have not been completely successful yet, primarily due to improper construction (e.g., lack of lining to prevent seepage) of ponds.

In both Borena and Jijiga, alternative livelihood opportunities are severely limited by a lack of local markets, market demand, and in some cases lack of transportation. However, many households engage in some sort of trading—of milk, livestock, firewood—as an important way to supplement household income. Hargeisa (Somalia) represents a huge market for khat, supplied in part by production in northeastern Ethiopia, including the Jijiga area. Broadly, men are engaged in livestock and cash crop trading and petty trade such as selling charcoal. Wage labor as construction workers on the Jijiga Export Slaughter House (JESH) provided income for many households in the region, though that was primarily temporary work rather than permanent. More importantly, the drought simply wiped out most livestock herds and people no longer had animals to fatten and trade. In Borena, men engage in casual wage labor and small trade, and in some cases have started to work as livestock brokers. Reportedly, it is typically men with financial capital (i.e., are “better off”) who engage in market sales and have more opportunities for livelihood diversification, including investments in livestock sales, constructing rental homes in town centers, or purchasing motorcycles, Bajaj taxis, and other vehicles to start transport services.

In both regions, women tend to sell milk or tea, engage in petty trade, or have small shops where household items (e.g., soap, salt, pasta, etc.) can be purchased. In Jijiga, handicrafts and beauty services (e.g., hair braiding) also provide women with income, but as “luxury” items they are not usually affordable during severe drought. In one Jijiga community, Mercy Corps provided credit to a women’s cooperative for peanut trading and other petty trade activities. Some groups performed quite well and were able to repay their loans on time, providing them with another round of funding. Other livelihood strategies noted by women in Borena include selling poultry and eggs; preparing and selling tella (local drink), and beer; and animal fattening. While animal products, namely milk and butter, have long been central to household sustenance, women appear to be increasing their role in marketing these commodities. In some Borena communities, women buy milk from nearby areas to resell in urban centers; for example, purchasing milk for 7 ETB in a local village and reselling it for 10 ETB in a nearby urban center (e.g., Yabello). While the profit margin is low after transportation costs, this activity has “helped [them] some for survival.”

Qualitative data suggest that the recent shift into agricultural production, particularly in response to herd loss, can be a negative or maladaptive strategy, as cultivation expands in dryland areas unsuitable for grain production. In Borena, some communities reported that the lack of available water combined with

excessive sun exposure resulted in little to no crop yields. FGDs with one pastoralist group revealed that many community members recently began to sow wheat after receiving advice from agricultural extension workers. However, their crops failed, leaving only residue for animal feed. Another pastoralist community in Borena—who lost most of its livestock, chickens, and honeybees to drought—also began growing teff, wheat, and sorghum. Though agricultural extension agents brought fertilizers and pest control measures, many community members could not afford to buy them and consequently, most of their production was lost to pest damage. Others commented that their oxen and cattle are too weak to plough, making agricultural production too difficult. While communities do see some improvements from diversifying into new livelihoods, the overwhelming majority reported that these strategies are not bringing the desired results in enhancing their well-being. Rather, both women and men report engaging in certain livelihood strategies with negative longer-term consequences, such as firewood collection and charcoal production.

Overall however, most FGD participants maintained that they survived the drought by relying on government support to provide food aid or feed for their livestock.

#### 4.4 Livestock Production and Marketing

Data were collected in both the quantitative and qualitative surveys that give more detailed information about changes in livestock production and marketing over the project period, including livestock ownership and losses, sources of fodder and water, and livestock marketing.

**Livestock ownership and losses.** Comparing the numbers of animals owned by households in the year prior to the baseline survey and the year prior to the endline survey, very little change is detected (Table 4.5). As seen above, a notable exception is for non-pastoralists, for whom all categories of livestock, including cattle, oxen, poultry, and sheep/goats, saw increased ownership across the periods. The average total number owned by non-pastoralists rose from 9.8 to 14.1, a 44 percent increase.<sup>20</sup>

With regard to the types of livestock owned, the Borena area saw moderate reductions in household ownership of cattle, oxen, and sheep/goats along with a moderate increase in poultry ownership. The Jijiga area saw moderate increases in the percentage of households owning cattle and sheep/goats. In Jijiga there was a substantial increase in household ownership of “other” types of animals between baseline and endline. These increases are due to a large increase in the percent of households owning donkeys (from 44.7 to 61.7 percent), which are primarily used to haul small carts, such as for transporting water, and a moderate increase in those owning camels (from 17.7 to 20.1 percent), which serve multiple uses.

Despite the relatively stable situation with respect to livestock ownership for the average household, many did still experience a reduction in their livestock holdings at some point over the project period, as would be expected over a period of extreme drought. Nearly one-half of all Borena households experienced livestock losses, and 43.5 percent did so in Jijiga (Table 4.5). The average loss for both project areas was approximately 14.5 animals, ranging from 1 to 284 animals. Among the pastoral status groups, pastoralists experienced the greatest losses (19 animals on average) followed by agro-pastoralists (13) and non-pastoralists (9).

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<sup>20</sup> While investigation of the reasons for this increase cannot be undertaken with the available data, PRIME project field staff maybe be a good source of information.

Accounting of livestock deaths makes it clear that the biggest source of these losses was unintentional deaths (see bottom of Table 4.5). The percentage of households with a livestock death in the year prior to each survey increased dramatically for all population groups, rising from 59.9 to 83.8 percent between the baseline and endline for the project area as a whole. The large majority of these deaths were “unplanned”. The total number of unplanned deaths increased the most for pastoralists (by 171 percent) and Borena households (by 130 percent), which is the project area with the highest percentage of pastoralists.

This finding of large losses is consistent with the qualitative findings. According to FGDs and KIIs in both regions, previous droughts typically resulted in loss of “few cattle, especially old cattle.” However, the severe drought conditions since 2015 resulted in die-off of large numbers of animals, including entire herds of some households. A KI in Borena reported as many as 10,000 head of livestock had died in his kebele alone. Eight women in one FG lost between 14 and 60 head of cattle due to the drought.

**Table 4.5 Livestock ownership and losses, baseline versus endline, by project area and pastoral status**

	All		Project area				Pastoralist status					
	Base-line	End-line	Borena		Jijiga		Pastoralist		Agro-pastoralist		Non-pastoralist	
			Base-line	End-line	Base-line	End-line	Base-line	End-line	Base-line	End-line	Base-line	End-line
<b>Number of animals owned</b>												
Cattle	6.6	6.3		7.9	7.3		3.4	3.6	10.8	9.3 ***	5.5	5.4
Oxen	1.1	1.0 **		1.2	1.1 **		0.7	0.6	1.2	1.0 **	1.2	1.1 **
Poultry	2.0	2.1		2.7	2.9		0.3	0.1	2.0	2.3	2.4	2.2
Sheep/goats	9.9	10.7 *		9.7	11.0 ***		10.5	10.0	13.3	13.6	9.8	10.1
Other	1.1	1.4 ***		1.2	1.4 *		1.1	1.4 ***	1.9	2.1	0.9	1.1
Total number owned	20.7	21.4		22.7	23.7		15.9	15.8	29.2	28.3	19.8	19.9
<b>Percent of households owning various types of animals</b>												
Cattle	86.2	86.1		89.0	85.7 **		79.2	87.1 ***	95.8	93.2 **	92.7	88.2 ***
Oxen	49.9	46.6 **		54.6	49.7 ***		38.4	39.0	55.5	45.3 ***	56.8	53.3
Poultry	33.5	37.7 **		45.5	51.2 ***		4.2	3.9	34.7	40.7 **	38.4	40.9
Sheep/goats	79.7	79.7		84.8	82.4 *		67.0	72.9 ***	88.5	86.3	83.9	80.9 *
Other	44.1	53.2 ***		40.1	46.0 ***		53.9	71.3 ***	53.4	59.8 ***	44.6	53.6 ***
<b>Total livestock losses between the baseline and endline</b>												
Percent hholds with any loss		47.0			48.4			43.5		54.3		49.6
Average loss (number of animals)		-14.8			-14.9			-14.4		-19.0		-12.9
<b>Livestock deaths in the last year</b>												
Percent hholds with a death	59.9	83.8 ***		66.0	89.6 ***		45.0	69.4 ***	71.9	90.1 ***	61.5	86.2 ***
Percent of deaths unplanned	96.0	98.0 ***		97.2	98.6 **		91.6	95.9 ***	96.4	98.5 **	96.3	98.1 *
Number of unplanned deaths	8.4	18.0 ***		8.5	19.6 ***		8.1	13.1 **	8.7	23.6 ***	8.8	16.1 ***

Stars indicate a statistically significant difference at the 10%(\*), 5%(\*\*), and 1%(\*\*\*) levels.

Another indicated she had started with 50 cattle but only eight remained after the drought. Still another man reported losing 300 cattle in 2015 due to lack of feed. Other areas reported cattle dying en masse due to respiratory disease. One FGD participant remarked, “Even our goats and camels are unable to resist and have fallen on the ground due to this drought.”

**Sources of fodder and water.** With regard to the types of fodder for animals, there was a shift in the project area away from communal pasture browse toward private pastures and crop residue, though the pattern differs in each project area (Table 4.6). In Borena, communal pasture browse remains the most commonly-used animal feed. However, over the project period there was a shift away from communal and towards private pasture browse. The pattern is quite different in Jijiga, where there has been a shift away from private pasture browse and toward crop residue. The use of communal pasture browse has declined among all three pastoralist status groups.

The qualitative data indicate that this shift away from communal pasture browse is in part likely due to degradation of communal pasture lands (particularly when unfenced) from overgrazing, invasive weeds, soil erosion, and reduced quality of pasture. In the case of Jijiga, degradation of communal pasture land—and other lands—has resulted from cross-country chases by the military of trucks with contraband.

When asked “Where do you get the fodder?”, the same overall patterns emerge, with a shift towards households’ own fields and away from communal fields in Borena and across all pastoralist status groups. The pattern is slightly different in Jijiga; households shifted away from their own fields and toward market sources (from 4.7 percent at baseline to 10.9 percent at endline), which has increased for Borena as well, and for all pastoralist status groups. Similarly, there has been a small but notable increase in acquisition of feed from livestock feed services in Borena and among pastoralists and agro-pastoralists.

As would be expected in a time of extended drought, both project areas and all pastoral status groups have seen an increase in the length of time needed to get to fodder or pasture (see Figure 4.3). The increase has been quite dramatic for Borena households and pastoralists. As of the endline, households in these groups were traveling four-and-a-half hours to obtain feed for their animals, double the travel time at baseline.

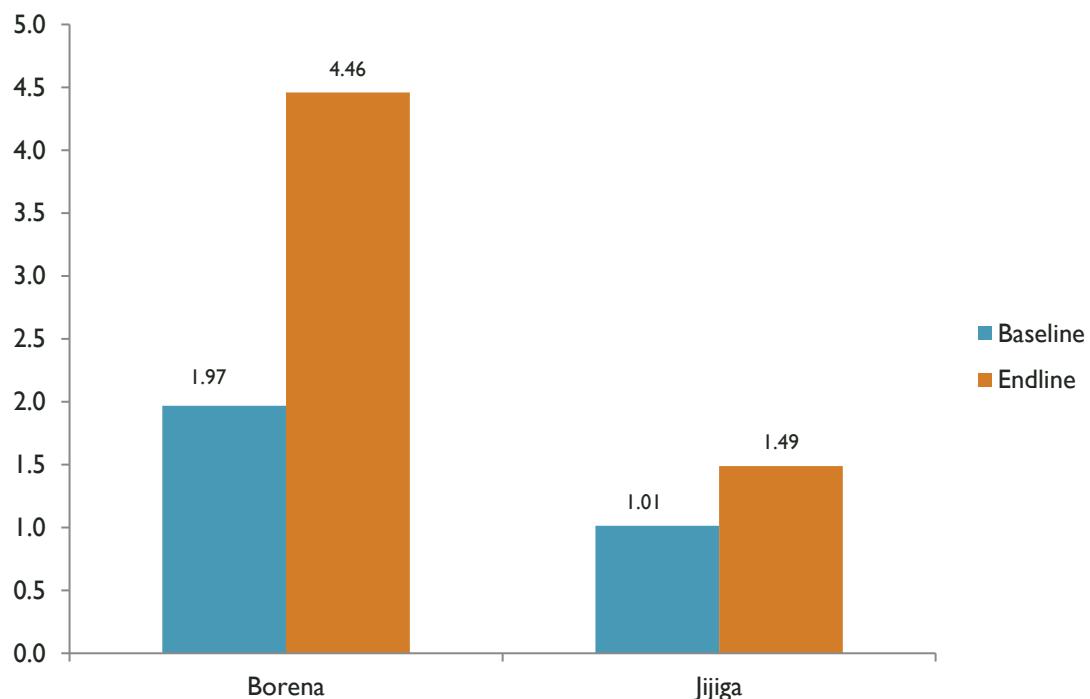
With regard to sources of water for livestock, the trend in the two project areas again differ. In Borena, there has been a decline in the use of hand dug wells and increases in the use of water from ponds, streams and rivers. In Jijiga, by contrast, there has been a decline in the use of water from these nature-made sources and a large increase in “other” types. There was a large increase in the percentage of households reporting use of “other” for non-pastoralists as well. Unfortunately, no data were collected that define “other”.

**Table 4.6 Sources of fodder and water, baseline versus endline, by project area and pastoral status**

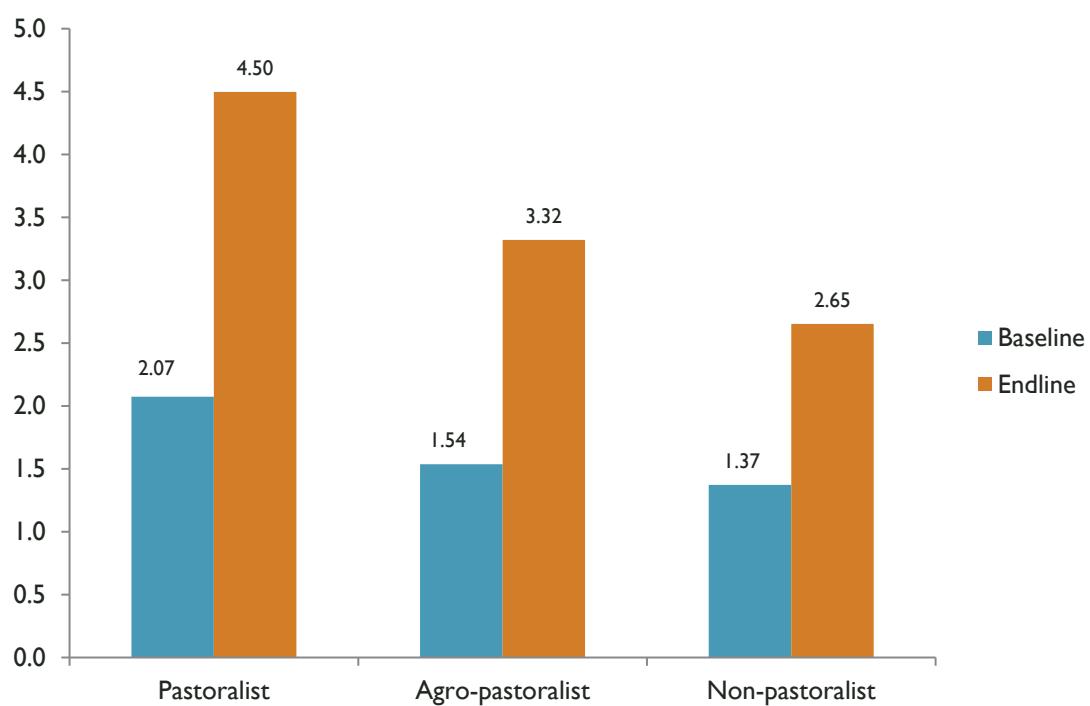
	All		Project area				Pastoralist status					
	Base-line	End-line	Borena		Jijiga		Pastoralist		Agro-pastoralist		Non-pastoralist	
			Base-line	End-line	Base-line	End-line	Base-line	End-line	Base-line	End-line	Base-line	End-line
<b>Types of fodder used (% of hhs)</b>												
Communal pasture browse	71.6	56.4 ***	89.4	68.1 ***	25.9	27.9	89.0	72.5 ***	64.6	50.4 ***	54.5	42.6 ***
Private pasture browse	21.8	31.2 ***	7.4	29.1 ***	58.5	36.4 ***	8.4	21.0 ***	27.3	36.7 ***	34.3	36.7
Green fodder	1.3	2.1 *	0.4	1.2 **	3.5	4.3	0.3	1.4 ***	1.2	2.5 **	3.4	2.5
Crop residue	4.3	9.9 ***	2.4	1.3	9.2	30.9 ***	1.5	5.0 ***	6.0	10.2 ***	5.7	17.5 ***
Improved feed	0.0	0.1	0.0	0.0	0.2	0.3	0.0	0.0	0.0	0.2	0.2	0.0
Hay	1.0	0.2 ***	0.3	0.3	2.7	0.0 ***	0.8	0.2	0.8	0.0 ***	1.8	0.5
Bi-product	0.0	0.1	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.2
<b>Sources of fodder (% of hhs)</b>												
Market	1.4	4.9 ***	0.1	2.4 ***	4.7	10.9 ***	1.2	3.9 **	0.7	5.3 ***	3.6	5.7 **
Own field	28.4	48.3 ***	10.5	39.5 ***	74.5	69.7 **	11.5	34.1 ***	36.9	54.3 ***	40.3	59.1 ***
Neighbors	1.2	2.2 **	0.5	2.2 ***	3.1	2.0	0.2	2.2 ***	0.9	1.9 **	4.0	2.8
Livestock feed service	0.8	3.2 ***	0.1	3.7 ***	2.6	2.2	0.2	4.6 ***	0.7	2.4 ***	2.3	2.8
Community field	67.7	40.1 ***	88.4	50.6 ***	14.4	14.6	86.6	53.0 ***	60.5	35.5 ***	48.2	28.8 ***
Other	0.5	1.3 ***	0.5	1.5 **	0.7	0.7	0.3	2.2 ***	0.3	0.7	1.5	0.9
<b>Mean length of time to get to fodder/pasture (hrs)</b>												
	1.7	3.6 ***	2.0	4.5 ***	1.0	1.5 **	2.1	4.5 ***	1.5	3.3 ***	1.4	2.7 ***
<b>Sources of water (% of hhs)</b>												
River	5.2	12.3 ***	5.5	15.2 ***	4.6	5.2	2.3	9.4 ***	6.2	12.7 ***	8.6	16.3 ***
Stream	2.0	3.9 ***	1.2	5.2 ***	4.1	0.7 ***	0.5	3.6 ***	2.7	4.1	3.2	4.0
Spring	3.1	4.3	3.9	5.8 *	0.9	0.4	0.6	3.0 ***	4.0	4.8	5.5	5.3
Pond	49.1	48.7	49.5	59.5 ***	47.9	21.9 ***	58.2	63.3	45.0	43.6	41.1	35.3
Borehole well	14.1	10.1 **	12.0	8.3	19.4	14.5	11.1	7.9	16.0	11.9 *	15.2	9.9 *
Hand dug well	20.8	5.7 ***	24.7	4.7 ***	10.8	8.1	22.7	4.5 ***	20.7	6.4 ***	17.3	6.0 ***
Delivered by water truck	1.9	1.6	0.4	0.1	5.7	5.2	0.9	0.5	2.2	1.7	3.0	3.1
Other	3.8	13.4 ***	2.7	1.1 **	6.6	44.0 ***	3.6	7.7 ***	3.1	14.7 ***	6.1	20.1 ***

**Figure 4.4 Length of Time to Get to Fodder/Pasture (hours), by Project Area and Pastoral Status**

**(a) By project area**



**(b) By pastoral status**



**Livestock marketing.** Turning finally to changes in households' behavior regarding livestock marketing, both project areas have seen a definite increase in livestock market participation over the course of the PRIME project (Table 4.7). Two indicators of such participation are employed here. The first is the percentage of households buying or selling any animal in the year prior to each survey, which rose from 60.2 to 74.9 for the sample as a whole and by about the same (15 percentage points) in both project areas. The second measure is an index based on household reports of the actual quantities of animals sold and purchased over the year prior to each survey. It shows the same pattern. Note that livestock market participation was higher in Borena than Jijiga at baseline and remained so at endline. The increase in livestock market participation was strong across all of the pastoralist status groups but particularly so for non-pastoralists, which is consistent with the increase in livestock ownership seen for this group.

In seeming contrast to the quantitative results, qualitative data suggest that the drought had a profound impact on the livestock industry and all those who depended on it. According to FGDs in Jijiga, the widespread loss of livestock meant that engagement in markets was dramatically reduced, especially for women. That is, there were no livestock to sell, and those that survived were in too poor a condition. One participant said, “*It used to be that folks might take 100 shoats to market in any given day, but today they're lucky to have 10 [shoats] to take.*”

Note that while the qualitative data indicate that everyone's market participation was reduced, women still dominated the smaller livestock industry (e.g., shoats) in Jijiga and men the larger livestock industry (e.g., cattle, camels). By one FG's estimation, women make up 80 percent of the local Jijiga shoat market. According to men, women do not have the physical strength needed to manage large animals in urban market settings (where animals might scare from unexpected noise, etc.) or during long periods of travel to distant markets. Though not widespread, some women rely on male relatives as their “representative”, especially for taking livestock to distant markets.

Some FGD participants in Borena have reported that market participation has improved in recent years due to the recently adopted practice of cattle fattening. The Dean of the Oromia Technical and Vocational Education and Training (TVET) Pastoral College stated, “*Years ago the cost of livestock in Borena was cheap due to poor feeding of livestock. Now since the drought has become worse over time and many cattle have suffered, the community has started to fatten their livestock with better livestock forage and, as a result, they [have] started to get a good income.*”

The project period has also seen some shifts in the places where households buy and sell livestock. The most prominent shift is a movement away from more localized areas towards places farther afield—woreda towns in both Borena and Jijiga and, additionally, zonal towns and other areas within Ethiopia for Jijiga. This pattern generally holds for the pastoralist status groups as well, with one exception: among pastoralists there has been an increase in livestock purchases within households' own villages, with this location making up nearly 25 percent of all purchases by endline.

Qualitative data suggest women may play some role in this shift. FGD participants in Jijiga feel that women are more “active” actors in livestock marketing than men, taking the time to find the best prices by calling friends, relatives, woreda officials, etc. Men suggested that women want the best prices and are more

**Table 4.7 Participation in Livestock Markets, baseline versus endline, by project area and pastoral status**

	All		Project area				Pastoralist status					
	Base-line	End-line	Borena		Jijiga		Pastoralist		Agro-pastoralist		Non-pastoralist	
			Base-line	End-line	Base-line	End-line	Base-line	End-line	Base-line	End-line	Base-line	End-line
<b>Livestock market participation indicators</b>												
Percent of households buying or selling any animal in the last year	60.2	74.9 ***	65.9	80.3 ***	46.3	61.4 ***	75.9	83.1 ***	60.1	74.8 ***	36.9	63.1 ***
Livestock market participation index												
Percent owned a year ago sold	9.1	13.1 ***	9.9	14.1 ***	7.2	10.4 ***	11.5	13.8 **	8.8	12.5 ***	6.2	12.9 ***
Percent currently owned purchased	3.6	3.1	3.2	2.8	4.6	3.7 *	2.1	2.7	3.5	3.0	6.0	3.7 **
Index	6.3	8.0 ***	6.5	8.4 ***	5.6	7.1 **	6.8	8.3 **	6.0	7.7 ***	5.9	8.2 ***
<b>Primary places of livestock purchases a/</b>												
This village	14.4	16.7	13.6	18.4 *	15.3	14.8	13.1	23.1 ***	13.2	9.0 *	20.1	22.2
Another village	11.7	11.3	10.2	10.5	13.4	12.1	13.1	13.7	11.6	10.0	9.8	10.8
Local market town	50.2	36.1 ***	64.0	49.3 ***	34.7	22.1 ***	54.8	41.8 ***	49.0	37.5 ***	45.7	29.1 ***
Woreda town	19.5	29.5 ***	11.3	21.0 ***	28.7	38.7 ***	15.9	19.8	21.5	32.8 ***	20.1	33.5 ***
Zonal town	1.2	2.8 **	0.6	0.6	1.9	5.1 **	1.1	0.0 *	1.8	5.0 **	0.0	2.0 **
Regional town	2.0	1.2	0.0	0.0	4.3	2.4	1.8	1.1	2.5	1.7	1.2	0.5
Another area within Ethiopia	0.7	2.2 **	0.2	0.0	1.2	4.5 ***	0.0	0.5	0.2	3.3 ***	3.0	2.0
Outside of Ethiopia	0.2	0.1	0.0	0.0	0.5	0.3	0.4	0.0	0.2	0.3	0.0	0.0
<b>Primary places of livestock sales a/</b>												
This village	7.1	5.5 ***	7.7	6.2 **	5.8	3.6 **	6.3	6.2	7.2	5.0 **	11.3	5.1 ***
Another village	11.3	11.0	8.6	11.4 ***	17.9	10.0 ***	10.3	12.4 *	12.5	10.7	10.9	8.7
Local market town	63.9	50.1 ***	75.9	58.8 ***	35.0	27.6 ***	71.6	53.8 ***	58.5	50.9 ***	49.8	40.1 ***
Woreda town	15.2	28.6 ***	6.7	22.9 ***	35.6	43.5 ***	9.9	24.4 ***	18.9	28.1 ***	24.9	39.1 ***
Zonal town	0.4	2.4 ***	0.2	0.6 ***	0.9	6.9 ***	0.3	1.8 ***	0.5	2.3 ***	0.0	3.8 ***
Regional town	1.8	1.2	0.9	0.1 ***	3.9	4.0	1.4	0.7 *	2.1	1.2 *	2.3	2.1
Another area within Ethiopia	0.3	1.0 ***	0.1	0.0	0.7	3.8 ***	0.2	0.7 *	0.3	1.5 ***	0.8	0.8
Outside of Ethiopia	0.0	0.2 **	0.0	0.0	0.1	0.6 **	0.1	0.0	0.0	0.3 ***	0.0	0.2

Stars indicate a statistically significant difference at the 10%(\*), 5%(\*\*), and 1%(\*\*\*) levels.

a/ Note: These values are calculated for households that purchased or sold livestock in the prior year.

willing to wait the entire day. In other words, women do not just sell livestock anywhere but are more strategic in finding the best prices. This may be facilitated by cell phones—particularly for women. FGs talked about tracking prices through merchants in Somaliland, who pass along price and other information from traders in Saudi Arabia, which is an important end market for livestock from the Jijiga region.

Livestock markets are few and far between in Jijiga; the main markets are Hargeisa (Somalia), Hartisheik, and the city of Jijiga. Most FGs felt that the conflict in Yemen was affecting livestock markets in terms of reducing demand and blocking routes. Border restrictions also make it challenging for households to get livestock to Hargeisa; livestock are often confiscated by local police, militia, or Ethiopian soldiers when attempting to cross the Ethiopia-Somalia border.

In Jijiga, lack of capital also constrains livestock fattening and marketing, as does a lack of fodder and veterinary/pharmacy services, and a general lack of livestock in local markets, which means people have to travel long distances to Hartisheik to purchase good animals. During the protracted drought, all of these constraints were exacerbated. People could not repay their loans or afford to pay for medicines/veterinary services. Private veterinary pharmacies lacked supplies due to sporadic road blockades and high prices. At least some areas lack private veterinary providers as well as community animal health workers (CAHWs), while others indicated their veterinary services were provided by the government and were “good”.

## 4.5 Migration Patterns

Two factors should be kept in mind in interpreting changes between the baseline and endline surveys revealed by the migration data. The first is that many of the sample households who dropped out of the survey since the baseline, and are therefore not included in the endline, may have done so because of out-migration. Thus, the reported data will tend to underestimate migration. The second factor is that the survey questionnaire did not make a distinction between planning to temporarily migrate in search of water or fodder and planning to permanently migrate to an entirely new home base.

Table 4.8 presents the data on changes in migration patterns. Among the panel households there has been a reduction in the percentage of households declaring that they migrated in the two years prior to each survey, but an increase in the number of households declaring that an individual household member migrated. This pattern generally holds across the project areas and pastoralist status groups. Among households who planned to migrate at the time of the surveys, the primary reason remains migration in search of water, grazing land or farm land, which increased among Jijiga households. Another pattern of interest is that planned migration due to the death of a household member has declined considerably in Borena (and among pastoralists) while it has increased in Jijiga (and among non-pastoralists).

See Chapter 6 for more detailed insights from the qualitative findings regarding migration.

**Table 4.8 Migration Patterns, baseline versus endline, by project area and pastoral status**

	All		Project area				Pastoralist status					
	Base-line	End-line	Borena		Jijiga		Pastoralist		Agro-pastoralist		Non-pastoralist	
			Base-line	End-line	Base-line	End-line	Base-line	End-line	Base-line	End-line	Base-line	End-line
<b>Percent of households migrating in the last two years</b>	10.3	3.3 ***	12.9	4.2 ***	3.7	0.9 ***	14.4	5.4 ***	7.9	2.5 ***	8.7	1.5 ***
<b>Percent of households with plans to migrate</b>	4.6	4.3	4.3	5.0	5.5	2.7 ***	5.8	4.3	4.1	4.3	3.7	4.4
<b>Reasons for planning to migrate (%) among planners)</b>												
Water/grazing land/farm land	51.5	61.7	55.1	61.0	44.6	65.2 **	64.0	71.4	45.9	58.8	34.5	53.0
Security reasons	1.8	2.4	0.0	2.4	5.2	2.3	2.1	2.2	2.3	0.9	0.0	5.3
Marriage	2.3	1.2	3.6	1.5	0.0	0.0	0.0	0.0	3.1	0.0	6.2	5.3
Death of a family member	8.4	4.8	12.1	3.9 *	1.1	9.1 *	16.0	0.0 **	4.0	5.6	0.0	10.4 *
Government resettlement	3.8	4.5	2.9	5.4	5.6	0.0	4.4	3.7	3.0	5.8	4.0	3.2
Other	31.3	25.3	26.4	25.7	40.9	23.5	13.5	22.7	39.4	28.8	55.2	22.8
<b>Percent of households with an individual member who migrated in the last two years</b>	10.3	16.2 ***	10.7	18.0 ***	9.2	11.8	14.7	19.8 **	8.3	15.9 ***	7.7	11.7 **

## 4.6 Summary: Livelihoods and Livelihood Environment

Despite the extraordinary shocks to which they have been exposed, the average household in both project areas and in all of the pastoralist status groups has seen a modest increase in their wealth, as measured by ownership of assets. Ownership of both durable consumption goods and agricultural productive assets, but not livestock, increased between the baseline and endline surveys. Households' real expenditures have declined, however. They have thus not been able to translate increased wealth into a better ability to meet their basic needs, such as food, from their current resources, including food assistance. Poverty has risen from 63.5 to 71.8 percent, a total of 8.3 percentage points.

Paradoxically, asset wealth has increased the most in Jijiga where poverty has seen the greatest rise, a full 35 percentage points. Poverty has increased the most among pastoralists, followed by agro-pastoralists and non-pastoralists.

The project area has also seen some changes in its basic socio-demographic makeup. In Borena there has been a shift of households out of the agro-pastoralist group and into the non-pastoralist group, perhaps related to the devastation wrought on agricultural production. The percentage of households with a disabled member has increased project area -wide, and the percent of female-adult-only households has increased in Jijiga. Positive trends are increases in the quality of dwellings and in women's decision-making power.

In terms of sources of households' livelihood, there has been a large increase in reliance on "gifts/inheritance". The qualitative data concur that many households have survived the droughts by relying on food assistance for themselves and their animals. Households did seek alternative livelihoods as they lost livestock, but due to limited opportunities they were largely not successful. There has been a notable reduction in farming among Jijiga households, and an increase in livestock rearing among non-pastoralists.

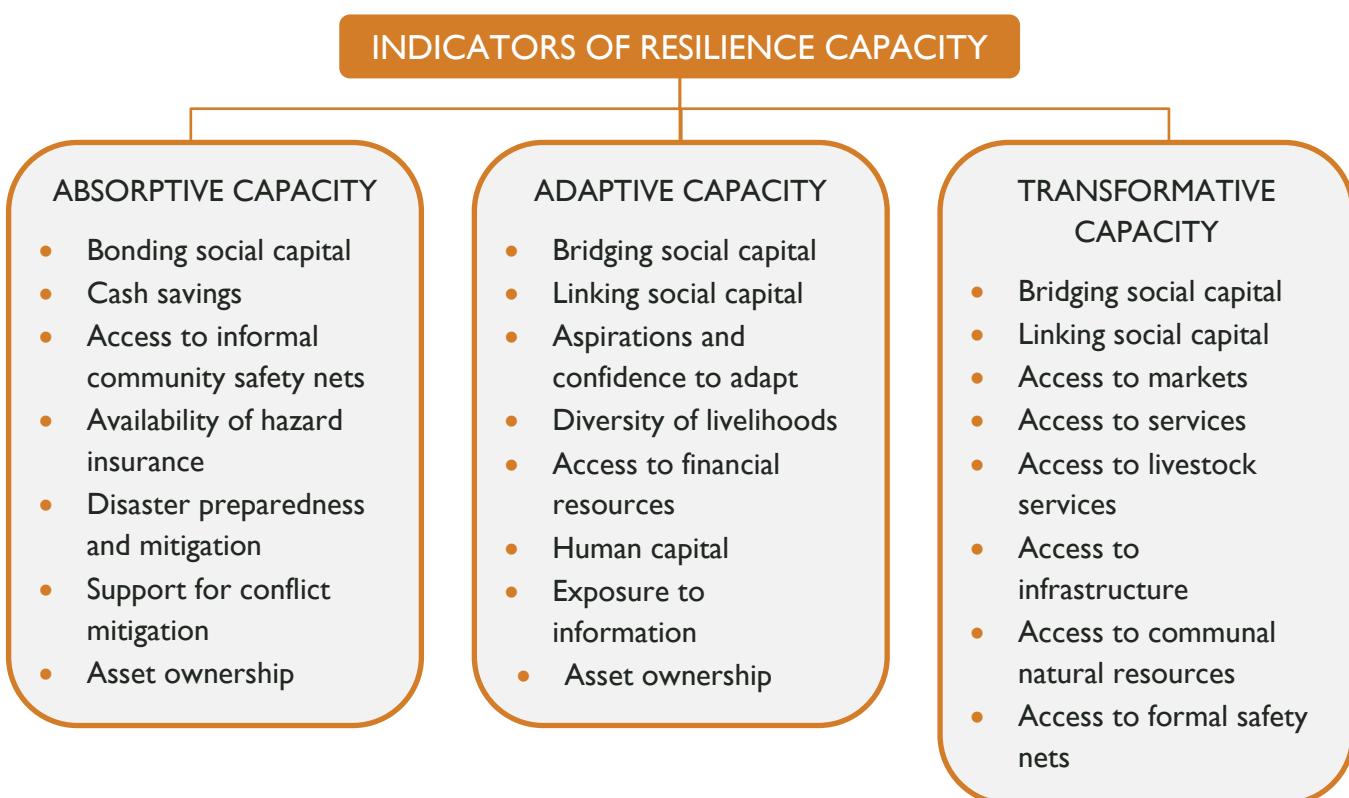
With regards specifically to livestock production and marketing, the quantitative data show a shift in reliance on communal pasture browse for fodder towards private pastures and crop residue, likely due to degradation of communal pasture lands. There are some signs of an increase in acquisition of fodder from market sources, such as livestock feed services. The length of time needed to get to fodder has increased dramatically since the baseline. While the quantitative data indicate an increase in livestock market participation, the qualitative data tell a story of reduced engagement, especially for women, due to drought-induced losses of livestock. Livestock marketing is increasingly spreading away from localized areas to woreda towns and other regions within Ethiopia where stocks are higher and prices better.

## 5 RESILIENCE CAPACITIES

Resilience capacities make up the enabling environment for households to achieve resilience in the face of shocks. As noted in Chapter 1, they can be classified into three dimensions: absorptive capacity, adaptive capacity, and transformative capacity. Given their complexity, measuring these concepts requires combining multiple indicators of specific individual capacities, which themselves are the actionable policy levers for enhancing households' ability to recover from shocks. Figure 5.1 lays out the individual capacities falling under the three dimensions that are used to measure them in this report.

This chapter examines changes between the baseline and endline in each of the indicators and indexes of resilience capacity as households navigated the extraordinarily severe and prolonged shock exposure they faced. The influence on trends in resilience capacities of the large influx of humanitarian assistance, and of households' exposure to or direct participation in resilience-strengthening interventions of PRIME and other development actors (see Chapter 9), should also be kept in mind. Brief descriptions of each resilience capacity indicator and their measurement are given here; more detail can be found in the baseline report (Smith et. al. 2015).

**Figure 5.1 Indicators employed to measure resilience capacity**



## 5.1 Social Capital

Social capital, which has been described as the “glue” that binds people together in society, is the quantity and quality of social resources people draw on in pursuit of livelihoods. Examples of these resources are networks, membership in groups, social relations, and access to wider institutions in society (Frankenberger et al. 2013; Frankenberger and Garrett 1998). The three types of social capital that enhance resilience are defined as follows (Aldrich 2012; Elliott, Haney, and Sams-Abiodun 2010; Wetterberg 2004; Woolcock and Narayan 2000):

- **Bonding social capital** is reflected in the bonds between community members. It involves principles and norms such as trust, reciprocity, and cooperation, and is often drawn on in the disaster context, where survivors work closely to help each other to cope and recover.
- **Bridging social capital** connects members of one community to members of other communities. It often crosses ethnic/racial lines, geographic boundaries and language groups, and can facilitate links to external resources when local resources are insufficient or unavailable.
- **Linking social capital** is founded in the vertical links between households and some form of authority or power outside of their community.

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

Table 5.1 reports on the changes in social capital over the life of the PRIME project; they are illustrated in Figure 5.1. Bonding, bridging and linking social capital all declined in Borena and among pastoralists and agro-pastoralists. By contrast, Jijiga households experienced large increases in bonding and bridging social capital and a slight decline in linking social capital. Bonding and bridging social capital have stayed relatively steady for non-pastoralists, while linking social capital has declined considerably.

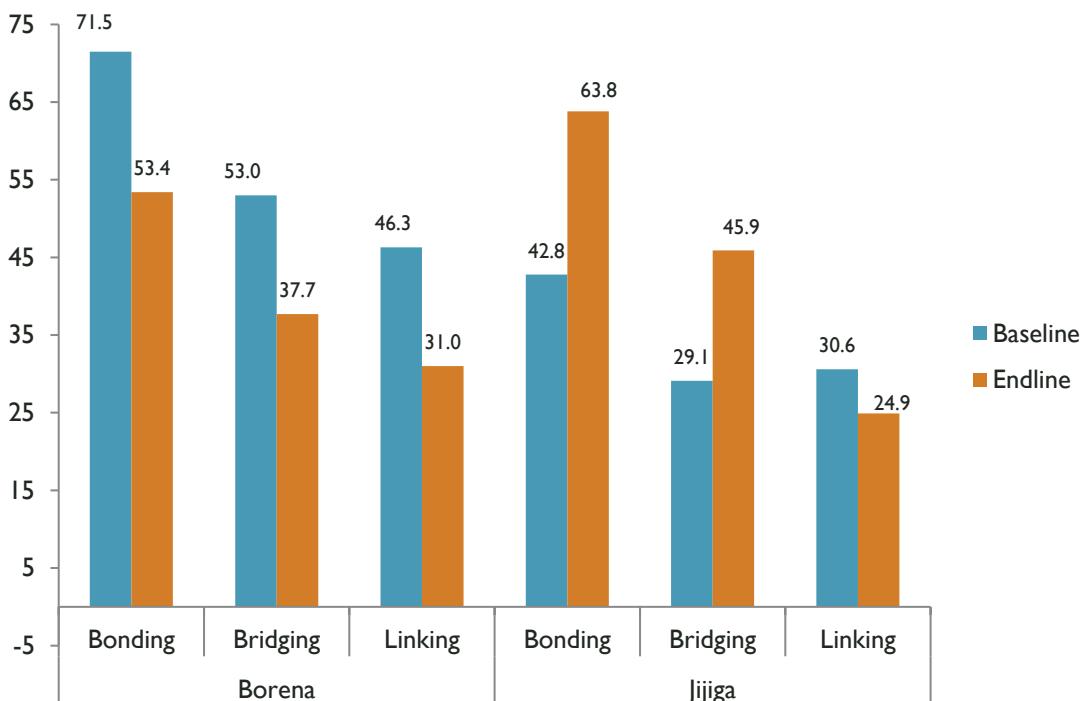
**Table 5.1 Changes in social capital and aspirations between the baseline and endline, by project area and pastoralist status**

Indicators	All		Project area				Pastoralist status					
	Base-line	End-line	Borena		Jijiga		Pastoralist		Agro-pastoralist		Non-pastoralist	
			Base-line	End-line	Base-line	End-line	Base-line	End-line	Base-line	End-line	Base-line	End-line
<b>Social capital</b>												
Bonding social capital	63.3	56.4 ***	71.5	53.4 ***	42.8	63.8 ***	69.9	55.7 ***	63.7	56.4 ***	52.9	57.4
Bridging social capital	46.2	40.0 ***	53.0	37.7 ***	29.1	45.9 ***	54.6	39.5 ***	45.1	40.8 *	35.7	39.3
Linking social capital	41.8	29.2 ***	46.3	31.0 ***	30.6	24.9 **	45.5	31.1 ***	39.9	29.5 ***	39.9	26.2 ***
<b>Aspirations and confidence to adapt</b>												
Absence of fatalism	44.5	56.0 ***	43.6	61.7 ***	46.6	42.0	40.2	58.0 ***	47.7	56.4 ***	45.0	52.4 ***
Belief in individual power to enact change	65.2	69.8 ***	67.4	70.4 ***	59.8	68.2 ***	66.9	69.7 **	64.9	70.8 ***	63.5	68.0 ***
Exposure to alternatives to the status quo	5.6	6.9 ***	5.8	6.6 ***	5.1	7.7 ***	5.9	6.9 **	5.3	6.8 ***	5.7	7.1 ***
Aspirations index	35.2	40.1 ***	36.0	41.4 ***	33.4	36.8 ***	35.1	40.5 ***	35.7	40.5 ***	34.7	38.7 ***

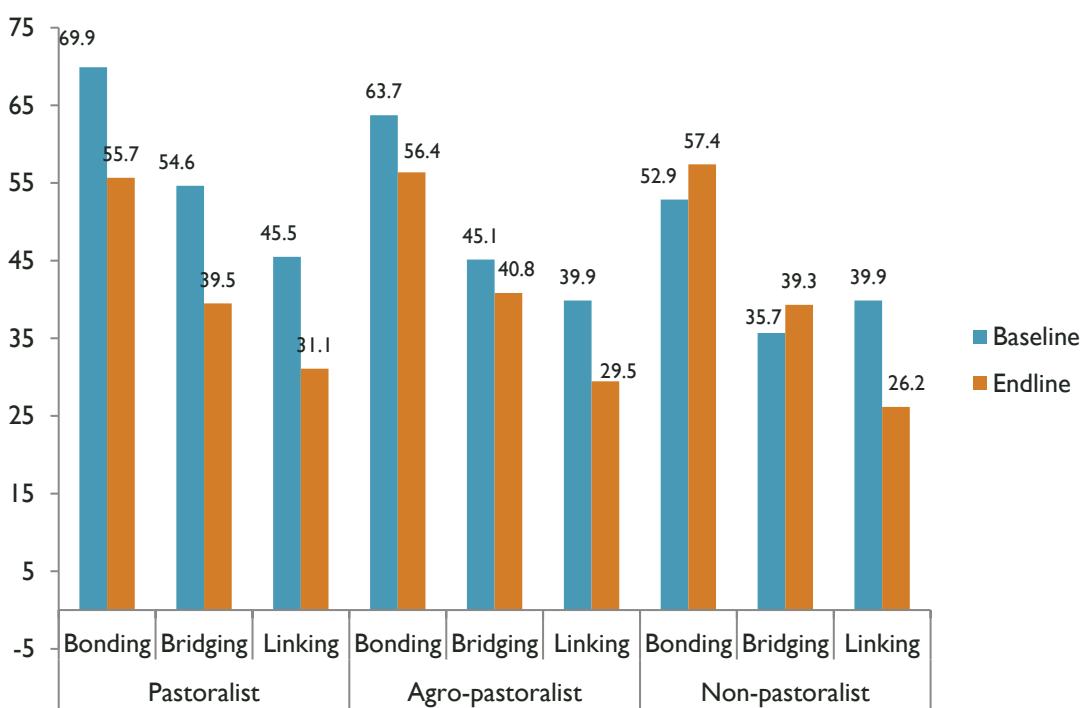
Stars indicate a statistically significant difference at the 10%(\*), 5%(\*\*), and 1%(\*\*\*) levels.

**Figure 5.2 Changes in social capital between the baseline and endline, by project area and pastoralist status**

**(a) By project area**



**(b) By pastoralist status**



KIs and FGD participants in both Borena and Jijiga had somewhat mixed perspectives regarding whether social bonds/networks in their communities had been strengthened or weakened as a result of the drought. According to respondents in both areas, there is a strong cultural tradition of people helping each other.

In Jijiga, many FGD participants felt that social bonds/networks in their communities had been strengthened as a result of the drought “because everyone has need.” For example, men and women both indicated they used to spend all their time tending to their crops and/or large(r) herds but because there were no crops or livestock to tend now, they spend much more time interacting with neighbors. Thus, communication and sharing of information (e.g., people were more aware of their neighbors’ problems) improved during the drought because people spent more time with each other.

Sharing is considered a way of life and is deeply ingrained in Somali culture; everyone shares food, money, livestock, crops, etc. to help people in need. The drought was seen to have affected the whole community, not just one household; “*if one family is affected, the whole community is affected.*” However, there was also general agreement that people’s capacity to share or help others in times of need had been dramatically reduced over the four years leading up to the endline. For example, people were no longer able to provide large livestock, such as camels or cattle, to households in need, which was more common among past generations. Now, small livestock—primarily shoats—are the main type of livestock shared among neighbors and friends. Among close relatives, larger livestock may still be shared, but livestock losses had been so severe that even this was not always possible. One participant reported that, “*no big contribution is possible anymore.*”

**“We were busy in the past looking after large [herds] and working on agricultural activities; we had less chance to spend the whole day at home and [now] we interact with our neighbors.”**

- Female FGD; Jijiga

As a result, sharing was perceived by some in Jijiga as very strategic now; people are not able to help just anyone but rather focus primarily on those households who are “*on the verge of starvation.*” Anyone who might be able to get at least some food—even for a single day—is not a priority. Additionally, support may be provided provisionally, that is, for a certain amount of time only (e.g., 10-15 days). At some point, the burden on the household providing the support may become too great for its own survival. Some people refuse to help, though this is generally considered to be “urbanite thinking” and against Somali culture.

An interesting notion emerged from FGDs in Jijiga regarding how the drought strengthened social relationships through the process of “equalization”, i.e., after three successive years of drought, everyone needed help regardless of their wealth status. In a number of female FGs, participants felt that although wealthier households had more assets to help them deal with and recover from shocks, after the third drought even they had been significantly—and severely—affected. They may still have had slightly more assets than less wealthy households, but they were considered to have been “equally” affected by the

drought. That is, just like everyone else, they needed help from their neighbors and relatives. As one participant said, “Everyone was helping each other and everyone was at an “equal” level in terms of sharing.”

In addition to individual sharing arrangements between households and neighbors, some kebeles have more formal communal systems for organizing assistance. In times of need, the community meets (e.g., elders/leaders organize meetings and/or women gather informally) to discuss who needs help, what type of help, and who can provide it. Food, money, livestock, tools, etc. are collected from households within the community and distributed to the most vulnerable. After several years of consecutive drought, however, women in Jijiga indicated they relied more heavily on relatives living in urban cities or areas less affected by the drought than on others within their communities for cash, food, and clothes. Everyone was so negatively impacted by the drought that most of the support people received could only come from outside of their communities.

It is also notable that they then shared whatever support they received within their communities.

In Borena, most FGs and KIs agreed that community support mechanisms are based on Gada clan systems and organized through village customary leaders. In addition to the Gada system, some participants reported that neighbors identify families that are most in need and prioritize them to receive NGO or government support. Others noted that the community supports the wives of men who have left to defend the border against the Somalis, by providing them with food and cash until their husbands return. As a KI in Borena explained, “Our community has a culture of support. For example, if my clan member lost cattle, then other clan members who are well-to-do will give cattle to the ones who lost his/her cattle.” Others agree that community support mechanisms have not diminished due to drought and that the community helps each other by providing food to those with nothing to eat, giving cattle to those with none, and loaning money to those in need.

As was the case in Jijiga, other KIs and FGD participants in Borena conceded that while communities still generally help each other by sharing food and cash, this type of social support has been waning in recent years due to recurrent droughts. One FGD participant remarked that the Gada system had been robust in the past, but today people hesitate to support their fellow community members. Another participant reported that community members who previously provided loans to those in need are now afraid of loan defaults, stating, “Now, before lending money, they consider the ability of borrowers to pay back the loan.”

“Drought has broken many intimate relations among people.”

- Female FGD; Borena

“It is common for Borena people to share whatever they have in times of deprivation: money, fodder, water, food.... People share with one another and do not save for themselves when others are facing problems. The drought has enhanced social cohesion [rather] than weakening it.”

- KII; Borena

Overall, both Borena and Jijiga have strong sharing cultures, but over time the trend in helping others has been declining as everyone is affected by the drought and traditional self-help mechanisms are increasingly stretched.

## 5.2 Aspirations and Confidence to Adapt

Aspirations and confidence to adapt are “psychosocial” capabilities that are thought to be important for fostering resilience in the face of shocks. Research in Ethiopia in particular has pointed to low self-esteem, low aspirations, and a fatalistic view among the poor as linked with their inability to take action to improve their material well-being (Bernard et al. 2012). These traits would be particularly disabling in the face of shocks, which require quick adaptation in order to successfully cope. The bottom panel of Table 5.1 presents means of an index of “aspirations and confidence to adapt,” along with those for the three indicators on which the index is based: absence of fatalism, belief in individual power to enact change, and exposure to alternatives to the status quo.

In contrast to social capital, this resilience capacity indicator has increased over the project period for both project areas and all pastoralist status groups (Table 5.1). It increased the most for Borena households and pastoralists, with all three factors affecting aspirations and confidence to adapt increasing. The increase in absence of fatalism is particularly strong: its index value rose by 25.8 percent. Apparently, people’s attitudes over the project period shifted significantly, such that by its end more believed that their own decisions and actions are responsible for success in life rather than only luck or destiny.

Qualitative data from both areas shows that people felt hard work was the better strategy for dealing with shocks/stresses and that sitting back and relying on Allah or destiny was not enough. People felt strongly that drought was the work of God, but that one has to help themselves (e.g., seek work, food, fodder, migrate elsewhere) rather than rely on divine intervention to be able to successfully deal with drought. As a FG participant in Jijiga said, “*Allah helps, but if you wring your hands and sit idle, you can’t be rich.*” It is a mixture of hard work and hope in Allah that makes up most people’s attitudes about their ability to deal with shocks/stresses. In Jijiga, a few individuals suggested that there are people who “*sleep while their wives strive to help the family*” or that sit back and expect that Allah will provide for them without putting any effort into helping themselves. This does not include those that are unable to work or help themselves, such as the elderly or labor-constrained households. Many in Borena felt that those who heeded early warning advice were able to help themselves cope with drought while those who chose not to respond, brought suffering on themselves. Most also recognized that being dependent on others for external support was not a sustainable

**“So, we don’t wring our hands but we try to do something to reduce the impact of drought. Even if it is not possible to cultivate and engage in livestock production, we try to look for other ways of life.”**

- Female FGD; Jijiga

**“Most of the time drought will happen from God, but loss of assets is up to us and our level of understanding [of early warning advice].”**

- Female FGD; Borena

support mechanism. Still other communities in both regions felt a sense of hopelessness and were despondent about their abilities to help themselves. A FGD participant in Borena stated, “*We can do nothing but suffer thinking about our situation. If things continue for the next five years, we fear that we will die all together.*” When asked about the major impacts of drought on the community, one agricultural development agent replied, “*There is wear and tear on the motivation of people to change or improve their lives. The drought demotivates people from hard work. It takes away the livestock they rear.*”

Although not specifically mentioned at endline, RMS-2 qualitative data showed that people in Jijiga generally feel that households who believe in hard work are better at dealing with shocks and stresses than those who “just wait for Allah”. This supports the idea of a psychological component to “successful coping” and not just a physical component (i.e., hard work). While perhaps not distinctly better off physically than households that believe in destiny or wait for God to intervene, they are psychologically better off, which contributes in tangible ways to their overall ability to cope.

### 5.3 Economic Sources of Resilience Capacity

Table 5.2 reports on changes in indicators of three economic sources of resilience capacity—livelihood diversity, asset ownership, and access to financial resources—between the baseline and endline.

**Asset ownership.** The moderate increase in the ownership of assets, which can be used by households to increase income and as a buffer against shocks, has already been discussed in Chapter 4 (Section 4.2).

**Livelihood diversity.** Diversity in households’ livelihood activities is important for resilience as it allows flexibility in the face of changing conditions, thereby reducing households’ vulnerability in the face of shocks. Here livelihood diversity is measured as the total number of livelihood sources out of the nine listed in the table.<sup>21</sup>

Livelihood diversity has increased slightly over the project period only among Jijiga households and non-pastoralists, remaining constant for the other groups (Table 5.2). The changing patterns of livelihood activities that underlie these livelihood diversity changes were already discussed in Chapter 4 (Section 4.3). These include a large increase across the board in the percentage of households for whom “gifts/inheritance” is claimed as a source of livelihood and concurrent reductions in the percentage of households engaged in farming among Borena households, pastoralists, and agro-pastoralists. The decline in livestock rearing as a livelihood among pastoralists and agro-pastoralists, and the increase for non-pastoralists, are also contributors to the trends in livelihood diversity seen in Table 5.2.

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<sup>21</sup> While not taken into account in this measure, it is recognized that diversity in livelihoods across risk environments is critical for resilience.

**Table 5.2 Changes in economic sources of resilience capacity between the baseline and endline, by project area and pastoralist status**

Indicators	All		Project area				Pastoralist status					
	Base-line	End-line	Borena		Jijiga		Pastoralist		Agro-pastoralist		Non-pastoralist	
			Base-line	End-line	Base-line	End-line	Base-line	End-line	Base-line	End-line	Base-line	End-line
<b>Livelihood diversity a/</b>												
Farming/crop prodn and sales	86.5	71.9 ***	85.1	65.7 ***	90.1	87.6	79.0	60.7 ***	99.5	80.8 ***	73.4	72.1
Livestock production and sales	81.2	81.6	86.8	84.0	66.6	75.7 ***	99.3	88.2 ***	99.5	84.2 ***	20.5	67.2 ***
Wage labor	17.7	17.5	21.3	20.7	8.4	9.3	11.8	12.9	18.1	17.6	25.7	23.7
Salaried work	1.3	2.3 ***	1.6	2.5 **	0.8	2.0 ***	0.2	1.4 ***	0.7	2.2 ***	4.2	4.0
Sale of wild/brush products	1.5	2.3 *	1.4	2.3	1.7	2.2	0.6	2.3 ***	1.4	1.5	2.7	3.6
Self-employment	6.5	8.0 **	7.8	8.2	3.2	7.6 ***	3.9	6.3 **	4.6	7.2 ***	13.9	12.1
Sale of other non-livestock assets	0.2	0.4	0.2	0.3	0.4	0.6	0.3	0.2	0.1	0.4	0.5	0.7
Remittances	3.7	3.1	4.9	4.2	0.5	0.4	3.6	3.6	1.6	2.5	7.8	3.5 ***
Gifts/inheritance	7.1	32.2 ***	7.9	35.5 ***	5.2	23.9 ***	4.6	34.4 ***	3.4	30.4 ***	17.9	32.3 ***
Livelihood diversity index	2.06	2.20 ***	2.18	2.23	1.75	2.10 ***	2.03	2.10	2.29	2.27	1.68	2.20 ***
<b>Asset ownership</b>												
Consumption assets	1.3	1.8 ***	1.5	1.9 ***	0.9	1.7 ***	1.5	1.9 ***	1.3	1.8 ***	1.1	1.8 ***
Agricultural productive assets	7.5	8.0 ***	8.1	8.9 ***	6.0	5.7	7.7	8.2 ***	8.5	8.6	5.4	6.5 ***
Animals owned (TLU's)	6.4	6.5	7.3	7.3	4.3	4.6	10.2	9.5	5.5	5.7	2.5	3.8 ***
Asset ownership index	12.4	14.4 ***	13.7	15.5 ***	9.3	11.4 ***	14.6	15.9 ***	12.7	14.5 ***	8.7	12.0 ***
<b>Access to financial resources</b>												
Access to credit (% of hholds)	50.2	74.4 ***	69.1	74.3	3.2	74.7 ***	59.1	73.7	51.6	75.5 ***	34.8	73.4 ***
Access to savings (%)	51.8	60.3	72.6	68.7	0.0	39.4 ***	65.9	68.6	51.5	57.6	31.9	53.3 **
Index of access to fin. resources	1.0	1.3 ***	1.4	1.4	0.0	1.1 ***	1.3	1.4	1.0	1.3 **	0.7	1.3 ***
Current holdings of savings	14.1	19.1 ***	17.5	24.9 ***	5.5	4.7	19.4	20.9	12.3	19.0 ***	9.7	16.5 ***

Stars indicate a statistically significant difference at the 10%(\*), 5%(\*\*), and 1%(\*\*\*) levels.

a/ Reported values are the percent of households engaged in each activity.

Qualitative data suggest that communities in Jijiga are more aware of the importance of livelihoods diversification now than before the recurring droughts. At endline, male FGD participants suggested that some agro-pastoralist households were becoming discouraged in terms of their ability to make a living through farming and/or livestock because, “*The pastoralist way of life is becoming too risky.*” The extensive crop failures and near total loss of livestock in many communities meant people had significantly less income from their usual livelihood activities. Households had to depend on alternative—especially non-agricultural—livelihoods options. Boys shined shoes, children sold peanuts, men sought wage labor in construction and as porters, women washed clothes and made handicrafts, and young girls did domestic work. Women also sold firewood/charcoal, opened small shops, or worked in petty trade (e.g., selling soaps, perfume, chat, etc.).

One of the PRIME project’s objectives was to help people develop alternative livelihoods, through both push and pull strategies (see Chapter 8). An example is strengthening MFIs so that small (and sharia-compliant) loans were more readily available to poorer households and women. In the Jijiga region, women were considered—by both men and women—to dominate the livestock industry, at least for sheep and goats. While there was significant evidence from both KIIs and FGDs that this strategy was having a positive impact on women’s engagement in livestock fattening and trading generally, most female FGs at endline indicated they were spending much more time at home because there were no herds or crops for them to tend.

**Access to financial resources.** Financial resources, in particular credit and savings, can also be used by households to increase income and buffer against shocks. Access to financial resources has increased only for Jijiga households, agro-pastoralists, and non-pastoralists (Table 5.2). At baseline, almost no households in Jijiga had access to credit and savings while more than two-thirds of households did in Borena. By endline, three-quarters of Jijiga households had access to credit, and 40 percent had access to savings. This increase has helped to bridge the gap between Borena and Jijiga households, but access to savings is still far lower in Jijiga. This is likely due, at least in part, to the relatively recent introduction of savings groups by the PRIME project in Jijiga. Note that current holdings of savings, which could be used to recover from a future shock, has not increased in Jijiga.

FGD participants in Jijiga indicated that saving is not inherent to Somali culture, especially in terms of cash but also in terms of grain, fodder, etc. According to them, “*Our culture is different from others, we only care about today; tomorrow is on God’s hands.*” Additionally, women described the first year of drought (2015) as somewhat short-lived and less severe than subsequent droughts and indicated that for the most part, they had enough reserves to get them through that first year, though they eventually “used their savings”. Thus, while saving was generally increasing in Jijiga over the life of the project, the successive and ever more severe droughts made it nearly impossible for households to regenerate their small and depleted cash savings.

“To diversify our livelihood, we don’t have any capacity. Because, for example, to engage in livestock fattening and irrigation needs initial capital. So, that is difficult for us to diversify our livelihoods.”

- Female FGD; Jijiga

Although the quantitative data indicate relatively good access to savings and credit in Borena, the qualitative data suggest saving and borrowing among Borena households is limited. Even though the government and NGOs advise people to save their money in banks or through WALKO savings and credit associations, one FGD participant suggested that “*There is no savings culture.*” There is, however, expressed desire or “*yearning*” for savings to diversify incomes, and an observation that those with the means to save (e.g., wealthier households) are better able to cope with drought. Several communities indicated they had established local savings groups, including a “*welda qusena*” or traditional savings group in which each of the 26 members (2 male and 24 females) contributes 5 ETB per week. Members in need of a loan can borrow money from the association at an interest rate of 10 percent. Likewise, members of other communities reported starting small businesses with WALKO loans. It was not uncommon, however, for FGD participants to explain that their savings had waned because members could no longer afford monthly contributions. This was also true in Jijiga.

In Jijiga, there was some reliance on more formal loans as well, particularly from MFIs. At least for those people who were able to secure an MFI loan, once it was repaid they then had access to even more credit. That is, they could continue borrowing larger and larger amounts as long as they were able to repay their debts.

The pattern of households in the Jijiga area starting out at baseline with lower levels of a resilience capacity than Borena, but then experiencing a greater increase and thus narrowing the gap by endline, will be repeated below for many other capacities. Another repeated pattern is strong improvements in the resilience capacities of non-pastoralists as a group. In the case of financial resources, the percentage of non-pastoralist households with access to credit rose from 34.8 to 73.4 percent, more than doubling by endline. The percentage with access to savings also saw a large increase (21.4 percentage points).

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

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

**Access to markets.**<sup>22</sup> Access to markets was lower in Borena at baseline than Jijiga (Table 5.3), and much lower among pastoralists than the other pastoralist status groups. It changed little over the project period.

Insights from FGDs and KIIs in Borena suggest that market participation is limited due to distant market centers, lack of transportation, low market prices of cattle relative to the price of feed grain, and the lack of business skills and training. As one KI stated, “*People go to the market in Hoboq, a distance of 100 km, near the Kenyan border. After covering this long distance on foot, the livestock are fatigued and the buyers think*

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<sup>22</sup> The measurement of access to markets employed here, which is based on whether there is a market within 20 kilometers, is different than that originally employed at baseline. Previously other factors were also taken into account, such as whether there was adequate transportation to get to the market (see Smith et al. 2015).

*they are not valuable.*" Respondents also indicated that even when access to better but more distant markets exists, people are unable to sell their livestock and engage in business activities due to roadblocks that hinder the transportation of goods. The significant jump in access to livestock markets noted in Jijiga may have resulted—at least in part—from construction of the JESH slaughterhouse in the city of Jijiga, which is considerably closer to many PRIME kebeles than Hargeisa, Somalia, and with no international boundaries to cross.

FG participants and KIs indicate that there are some differences between men's and women's access to markets. The long distances to many markets is a major barrier for most women, who sell smaller livestock such as chickens or goats and engage in petty trade of animal byproducts such as eggs, butter, or milk. Women in Borena explained, "*In our community, it is the men who participate in the sale of cattle: the area is too far for a woman to go with cattle because they might be expected to spend the night on the road. Thus, there would be no one at home with the kids. It is because of the distance that a woman will not go to the livestock market.*"

**Table 5.3 Changes in access to markets, infrastructure, and communal natural resources between the baseline and endline, by project area and pastoralist status**

Indicators	All		Project area				Pastoralist status					
	Base-line	End-line	Borena		Jijiga		Pastoralist		Agro-pastoralist		Non-pastoralist	
			Base-line	End-line	Base-line	End-line	Base-line	End-line	Base-line	End-line	Base-line	End-line
<b>Markets a/</b>												
Livestock	63.5	64.4	60.6	60.9	70.8	73.2	44.4	46.2	71.3	70.3	77.1	80.3
Agricultural products	68.9	68.1	68.1	65.8	70.8	73.2	52.9	51.5	75.9	73.4	79.3	81.8
Agricultural inputs	64.9	61.2	62.6	61.8	70.8	59.8	45.3	44.2	73.0	67.6 *	78.6	74.1
Index of access to markets	1.97	1.94	1.91	1.89	2.12	2.06	1.43	1.42	2.20	2.11	2.35	2.36
<b>Infrastructure a/</b>												
Piped water	20.2	19.7	26.3	16.8	5.0	26.9 ***	15.8	6.4 *	23.8	27.4	20.1	25.0
Electricity	5.8	16.8 ***	7.2	8.0	2.3	38.9 ***	10.4	15.0	2.5	14.9 ***	5.1	23.1 ***
Phone services	86.6	77.2 **	82.7	68.0 **	96.3	100.0 *	80.5	68.2	88.0	79.5 *	92.9	86.0
Paved road	29.8	38.2 *	36.4	40.6	13.3	32.3 ***	31.9	41.8 *	30.6	37.0	25.1	35.3 *
Index of access to infrastructure	1.42	1.52	1.53	1.33 *	1.17	1.98 ***	1.39	1.31	1.45	1.59	1.43	1.69 ***
<b>Communal natural resources a/</b>												
Grazing areas	79.2	75.3	94.6	92.0	40.7	33.6	88.3	88.5	75.8	71.5	72.1	63.0 *
Water sources for livestock	82.1	89.4 *	93.1	92.9	54.7	80.9 ***	91.3	91.9	80.0	88.0	72.7	88.5 **
Firewood	74.5	72.9	80.8	88.3	58.8	34.5 **	90.7	87.1	65.4	70.1	67.8	57.3
Index of access to communal natural resources	2.36	2.38	2.69	2.73	1.54	1.49	2.70	2.67	2.21	2.30	2.13	2.09

Stars indicate a statistically significant difference at the 10%(\*), 5%(\*\*), and 1%(\*\*\*) levels.

a/ Reported values are the percent of households with access to each resource.

**Access to infrastructure.** With respect to infrastructure, we find the same general pattern. Jijiga households started out with less access to infrastructure, including piped water, electricity, and paved roads than Borena households but by endline had greater access. Non-pastoralists also saw an increase in their access to infrastructure. Although qualitative data do not reveal obvious reasons for this change, there is significant development happening throughout Ethiopia, including re/paving of major roads, new businesses, and expansion of mobile cell phone services. As a large metropolitan area, Jijiga city in particular appears to be experiencing a period of growth, which may be affecting access to certain types of infrastructure and services.

**Access to communal natural resources.** Access to communal natural resources stayed fairly constant overall but there were some notable changes in access to water sources for livestock and to firewood in Jijiga. Water access for livestock increased from 54.7 to 80.9 percent of households in Jijiga. However, access to firewood on communal lands declined from near 60 percent of households to just 34.5. Qualitative data suggest that land degradation is severe in Jijiga, an extremely arid region with mostly scrub or small trees in many areas. Thus, firewood is rare during the best of times, let alone after several years of severe drought.

The qualitative data also give insight into the improved access to water for livestock in Jijiga, suggesting that it may be due to several large-scale water projects recently constructed there, as well as concerted efforts within individual communities to harvest and conserve water. Across both the RMS-1 and RMS-2, FGD participants in Jijiga considered water harvesting/storage as an important strategy for dealing with drought. Communities build large communal reservoirs, or birkas, for livestock (and domestic) use. Plastic sheeting or cement is used to line ponds and larger reservoirs in order to keep the water from seeping into the soil. Plastic is also used as a cover to prevent evaporation. Large cement-lined reservoirs require resources that are beyond the capacity of communities to deliver and are typically supported by NGOs or government initiatives, both of whom implemented large water scheme projects during the life of the PRIME project.

**Access to basic services.** Jijiga has also experienced a substantial increase in access to some important basic services, including veterinary services, financial services (as seen above), and security services (Table 5.4). Borena, on the other hand, experienced reductions in access to veterinary services and agricultural extension services, both of which are critical for building households' resilience to shocks in a population with a strong dependence on livestock rearing and agriculture. One common trend across both project areas and all three pastoralist status groups is a large increase in access to security services. Although the qualitative data do not address this specifically, it is possible that police or security forces increased as a result of continuing clashes between ethnic groups. Delays in endline survey data collection occurred in both project areas due to road closures by security forces, and some sites sampled at baseline were inaccessible to research teams at the endline due to security issues.

**Table 5.4 Changes in access to basic services and livestock services between the baseline and endline, by project area and pastoralist status**

Indicators	All		Project area				Pastoralist status					
	Base-line	End-line	Borena		Jijiga		Pastoralist		Agro-pastoralist		Non-pastoralist	
			Base-line	End-line	Base-line	End-line	Base-line	End-line	Base-line	End-line	Base-line	End-line
<b>Basic services a/</b>												
Primary school	95.5	100.0	**	94.1	100.0	**	98.9	100.0		93.7	100.0	**
Health center	84.1	57.7	***	80.0	69.0		94.3	29.7	***	83.1	62.7	***
Veterinary services	79.4	74.7		87.7	73.2	***	58.7	78.6	***	85.9	83.0	
Agricultural extension services	85.3	77.3	*	88.1	77.4	*	78.1	77.2		85.0	72.2	*
Financial services	43.7	65.7	***	60.0	63.0		3.2	72.4	***	54.1	58.9	
Security services (police)	41.3	77.0	***	40.3	74.9	***	43.6	82.4	***	36.8	75.0	***
Index of access to basic services	4.29	4.53	**	4.50	4.57		3.77	4.40	***	4.39	4.52	
<b>Livestock services a/</b>												
Vaccination, dipping inoculation	65.4	72.1	***	69.1	76.9	***	56.4	60.0	**	68.8	73.8	***
Treatment for diseases	57.1	49.8	***	65.1	57.5	***	37.1	30.5	***	60.7	53.6	***
Animal de-worming	29.8	19.5	***	38.9	24.0	***	7.2	8.2		33.6	22.6	***
Breeding services	1.0	0.6	*	0.9	0.6		1.1	0.5	*	0.8	0.5	
Commercial feed supply	1.0	5.0	***	1.3	6.3	***	0.3	1.7	***	1.5	6.4	***
Veterinary store with vaccines	11.7	17.7	***	12.4	18.3	***	9.8	16.2	***	10.9	17.3	***
Veterinary store with de-worming supplies	7.2	6.3		9.8	7.2	*	0.6	4.3	***	7.6	6.7	
Veterinary store with antibiotics	7.3	10.6	***	8.8	9.4		3.4	13.4	***	7.2	9.6	**
Veterinary store with salt licks/mineral supplements	3.9	4.3		4.9	5.9		1.3	0.3	**	5.5	5.0	
Other	7.2	6.9		1.8	5.2	***	20.7	11.3	***	4.2	7.2	***
Index of access to livestock services	1.92	1.93		2.13	2.11		1.38	1.46	**	2.01	2.03	

Stars indicate a statistically significant difference at the 10%(\*), 5%(\*\*), and 1%(\*\*\*) levels.

a/ Reported values are the percent of households with access to each service.

The bottom panel of Table 5.4 goes into more detail regarding access to livestock services, from vaccinations, to breeding services and livestock feed. The only group to have experienced an increase in almost all of the listed veterinary services is Jijiga households. While Borena appears to have better overall access to livestock services, measured as an index of livestock services, they also saw declines in availability of treatments for animal diseases and de-worming services.

One of the PRIME project's key strategies was supporting Private Veterinary Pharmacies (PVP) and Community Animal Health Workers (CAHW) (see Chapter 8). By all accounts, such services were widely available, at least for a time. In Jijiga, KIs generally reported overwhelming success, although had seen a decline in demand for many of their services by the endline. Not only did most people not have money for such services, most had not yet rebuilt their herds sufficiently to warrant the expense.

## 5.5 Human Capital and Access to Information

Human capital, measured here using literacy, education levels, and trainings received, endows people with the ability to use information and other resources to cope with shocks and stressors. Access to information allows them to put such human capital to use. It is measured here based on an index of access to 13 topics ranging from weather patterns to market prices.

**Human capital.** Human capital has remained relatively constant in the project area, with only slight increases in Borena and among pastoralists and agro-pastoralists (Table 5.5). Across qualitative sites in Borena, there appears to be a shift in perceptions around education, with an increase in the value placed on educating youth. Multiple KIs and FG participants described a “traditional” perspective, whereby male youth perceived to have the greatest intellect and capacity are charged with caring for livestock—the most critical cultural and economic asset of the household. Formal education is perceived to conflict with this highly valued role.

In some sites, however, study participants expressed a desire to send children to school, anticipating future employment opportunities and the benefit of remittances to the household.

Despite shifting attitudes towards the potential benefits of education, families are likely to pull students out of school during periods of severe drought. In some areas, households relied on support of clan or ‘Gosa’ members to support school expenses. Under severe drought conditions, this support is no longer available in some communities. Qualitative data from multiple sites in Borena suggest that the presence of government or World Food Programme (WFP) school feeding programs were critical to keeping children in school and reducing school drop outs. Where school feeding programs were discontinued, or where the community contributions to support the program became too challenging, families were forced to pull students out of school.

“People began to understand the value of education after they started receiving remittances from their educated children who have gotten jobs elsewhere. Thus, participants started replacing their children who used to look after the cattle (rather than attend school) until the children return back from school.”

- Female FGD; Borena

**Table 5.5 Changes in human capital and access to information between the baseline and endline, by project area and pastoralist status**

Indicators	All		Project area				Pastoralist status					
	Base-line	End-line	Borena		Jijiga		Pastoralist	Agro-pastoralist		Non-pastoralist		
			Base-line	End-line	Base-line	End-line		Base-line	End-line	Base-line	End-line	
<b>Human capital</b>												
Literate adult (%)	31.0	33.4 **	31.4	34.0 **	30.0	31.9	27.8	31.5 **	33.6	35.2	30.9	32.7
Adult with primary or higher education (%)	29.4	33.6 ***	32.6	36.7 ***	21.6	25.8 *	26.8	31.8 ***	30.7	35.5 ***	31.0	32.6
Number of trainings received	0.7	0.4 ***	0.9	0.6 ***	0.1	0.2 **	0.8	0.4 ***	0.7	0.5 ***	0.4	0.4
Index of human capital	47.02	49.15 ***	48.60	50.61 **	43.08	45.51	45.09	48.00 **	48.23	50.53 **	47.60	48.30
<b>Access to information a/</b>												
Long-term changes: weather patterns	34.4	37.2	44.0	39.0 **	10.7	32.5 ***	42.0	40.5	34.8	37.0	22.7	32.5 ***
Rainfall prospects / weather prospects for coming season	45.9	40.1 ***	58.5	40.3 ***	14.4	39.5 ***	54.5	41.0 ***	47.5	41.6 **	30.5	36.0
Water available and prices in local boreholes, shallow wells etc	52.5	39.5 ***	64.1	35.4 ***	23.7	49.7 ***	56.8	36.8 ***	57.1	39.1 ***	37.9	44.0
health/husbandry	35.5	39.7 *	43.9	40.9	14.6	36.6 ***	43.7	40.3	37.9	40.7	19.2	37.0 ***
Livestk disease threats/epidemics	38.6	47.4 ***	47.5	48.2	16.4	45.3 ***	47.7	47.6	39.9	47.6 ***	23.1	46.7 ***
Current market prices for live animals	54.5	58.1 *	64.6	53.2 ***	29.4	70.2 ***	61.6	55.1 *	59.3	59.3	35.4	60.1 ***
Market prices for animal products	49.2	43.1 ***	56.4	35.1 ***	31.4	63.0 ***	57.2	37.6 ***	52.9	45.1 ***	30.8	47.5 ***
Grazing conditions in nearby areas	56.1	46.1 ***	68.3	48.9 ***	25.6	39.0 ***	66.4	49.7 ***	59.4	45.6 ***	34.8	41.9 *
Conflict or other restrictions on access to grazing	43.7	43.1	52.0	44.2 ***	23.2	40.5 ***	50.3	46.0	46.4	43.0	29.3	39.1 ***
Business and investment opps.	12.7	15.4	16.6	17.5	3.0	10.3 ***	16.1	14.9	13.1	16.4	7.1	14.4 **
Opportunities for borrowing money	20.7	28.5 ***	28.4	33.9 **	1.5	15.1 ***	25.1	30.5 *	21.5	28.9 ***	12.9	25.1 ***
Market prices of the food that you buy	49.9	57.5 ***	59.1	54.1 **	27.2	65.9 ***	55.0	52.5	54.2	59.0 *	34.8	62.0 ***
Child nutrition and health	42.8	44.5	53.6	48.8	15.7	33.6 ***	54.2	47.3 **	40.1	42.9	31.0	43.2 ***
Index of access to information	5.44	5.40	6.66	5.40 ***	2.39	5.42 ***	6.35	5.40 ***	5.66	5.46	3.69	5.30 ***

Stars indicate a statistically significant difference at the 10%(\*), 5%(\*\*), and 1%(\*\*\*) levels.

a/ Reported values are the percent of households with access to each type of information.

**Access to information.** In contrast to human capital, household access to information in the PRIME project area has seen some larger changes (Table 5.5). Following the familiar pattern established earlier in this report, access to information was far lower in Jijiga than Borena at baseline. Because of declines in access to almost all 13 types of information in Borena and large increases for all types in Jijiga, the regions were roughly on par by the end of the PRIME project. Note also that access to information declined slightly for pastoralists and increased considerably for non-pastoralists. Overall, and in both project areas, information regarding market prices (e.g., livestock, animal products, food) were among the most commonly accessed types of information, followed by information on grazing conditions and livestock disease threats.

The quantitative data show that approximately one-third of households in both Borena and Jijiga report having access to weather-related information (both longer- and shorter-term trends). The qualitative data suggest that communities access multiple sources of information related to weather forecasts (i.e., early warning) and conflict, as well as information and resources intended to promote awareness and behavior change in human and animal health practices, disaster mitigation and preparedness, natural resource management, and financial services. Qualitative data also indicate that there is no systematic way communities receive information, rather it is communicated, to varying degrees, through traditional forecasters (“Uuchu”) and local knowledge, local leaders, national meteorological service forecasts, government extension agents, NGOs, and radio services.

In some Jijiga communities, “meteorological people” provide information to kebele leaders, who then hold community-wide meetings to inform households and to suggest ways of preparing, in particular destocking and saving food and fodder. Most FGs felt that normally such preparation is sufficient to withstand droughts in the region, but this time the drought was extended, lasting longer than “normal”. One participant noted that had their community not been forewarned, “we all would have been lost.” On the other hand, women in one community indicated that they did not always pay much attention to information provided by the kebele leaders because they were so busy tending livestock and farming. After more than two years of drought, however, they have more time and are more aware of the importance of early warning and other types of information disseminated by kebele leaders.

By contrast, FGs and KIs in Borena indicated that regardless of access to early warning and preparedness information and recommendations (e.g., destocking and saving in banks), households often do not apply the information. Many communities emphasized traditional cultural values, status, and identity tied to keeping large herds of cattle. As explained by one FG participant: “*Government bodies told the community to destock their livestock and to save the money in the bank to use it for later during the drought. However, no one has accepted and applied this because in this community of Borena, the wealth of a person is determined by the number of livestock he or she owns and not by the money they have saved at the bank.*” This sentiment ran through all of the qualitative FG discussions, even among communities that reported uptake of improved

“When cattle come together and lay on the ground, we know drought is coming. But if they graze dispersed over a large area, then we recognize that there is no drought in the year to come.”

- KII; Borena

livestock and natural resource management practices as a result of improved access to information and services over the past five years.

In both regions, there is also reliance on local or self-knowledge to anticipate drought as well as a few elders who still read stars as a means of traditional forecasting, but they are very few and their information is not always reliable. There is wide-spread demand for support from the government or NGOs for better early warning alerts, i.e., that rely on scientific information rather than traditional forecasting, and increasing reliance on the government meteorological service as well as information from extension agents and NGOs.

In Borena, qualitative data point to two trends of interest. The first is community receptivity to hybrid models of information sharing and forecasting, merging traditional and government forecasts, together with awareness raising from government and NGOs. In some communities, coordination between traditional leaders and government agents has had a positive impact on community-level decision making and preparedness. The second is the extent to which some communities describe behavior change as a result of this information, as well as cultural and resource barriers to uptake of new practices.

In Borena, some communities express a loss of trust in traditional forecasters. Similarly, there appears to be a lack of confidence in government or NGO sources of information. When information sources are communicated together, however, FGs expressed a higher level of confidence in forecasts and greater incentive to take action to prepare for droughts.

In some sites this mix of information appears to be augmented by engagement of NGO and government extension workers. Where implemented, the provision of information and training coupled with increased access to services has led to an uptake of preparedness and improved rangeland management, animal health care, and human health care.

Additionally, how communities access information has had dramatic effects on behavior change. FG participants and KIs in Borena attribute a recent community “paradigm shift” to listening to a radio drama provided through support from Mercy Corps. Both KIs and FG participants reported changes in fodder and crop residue harvest and storage practices, fencing, poultry rearing (previously considered “not culturally recognized to be eaten since it is a flying animal”), and WASH practices (e.g., building toilets). Additionally, community members have begun to share household duties among men and women, and are working to ensure pregnant and lactating women consume a more balanced diet.

Some respondents in Borena pointed out that the availability of information directly correlates with location of villages in relation to urban centers. Communities located closer to towns have significantly better access to information than villages located in “deep” rural areas.

“With the information we get, we are able to learn [about] fattening animals, providing fodder, and taking livestock to animal health services.”

- KII; Borena

## 5.6 Access to Formal and Informal Safety Nets

Safety nets, both formal and informal, are important sources of resilience capacity for coping in the immediate aftermath of shocks. In the case of formal safety nets, it is important to keep in mind that access to this capacity will tend to fluctuate in response to the immediate shock exposure situation. Thus, any changes between baseline and endline may not represent a long-term trend in access to safety nets.

**Formal safety nets.** As can be seen in Table 5.6 (and illustrated in Figure 5.3), access to food assistance at endline was far higher than it was at baseline for both project areas and across the pastoralist status groups. In fact, 100 percent of households had access to food assistance at the time of the endline survey. Access to all four forms of formal assistance—food assistance, housing and non-food assistance, assistance for livestock losses, and disaster assistance—was lower in Jijiga than Borena at baseline and rose precipitously over time. Meanwhile, despite more extreme exposure to drought in the year before the endline and all four years of the PRIME project, Borena households experienced a decline in assistance for housing and non-food items, livestock losses, and disaster assistance. Of note is that pastoralists and agro-pastoralists, but not non-pastoralists, experienced a decline in their access to these forms of formal assistance as well.

The qualitative data indicate that, by and large, the types of formal assistance provided to communities over the course of the PRIME project were similar across project areas. The government and various NGOs provided fodder/forage and medications for cattle (e.g., Mercy Corps, SEFA, CARE), food (e.g., WFP, Mercy Corps, the Red Cross), Plumpy Nut and fafa for underweight children and adults, respectively (e.g., Action Against Hunger), water treatment tablets and vaccinations for children, and food/cash transfers for public works (e.g., PSNP, CARE, Safety Net). Several communities in Borena reported that the SEFA program rounded up cattle from the community and placed them in fenced-off areas where they fattened them for three or four months. A number of other agencies, including the government, provided forage or fodder for livestock for different amounts of time (e.g., two months, three months, five months), though most FGs and KIs felt they were not adequate, regardless of how long support was provided.

The PSNP provided cash or food transfers in exchange for public works (e.g., road maintenance). Most all FGs and KIs in both areas felt strongly that while support through the PSNP did help households deal with the impacts of drought, it was insufficient overall and varied in quantity and quality over the three years of drought. Though most support was provided based on household size, a large majority of participants reported that the support was not only insufficient, but untimely and infrequent as well. According to one FG in Jijiga, the PSNP program provided support in the form of periodic cash allocations (e.g., monthly, quarterly) of 600-1500 ETB per household in the first year, 1200-9200 ETB in the second year, and 300-3500 ETB in the third year. Although the specific amounts provided by the FG may not be entirely accurate, the main take-away was that most FGD participants—at least in Jijiga—considered PSNP support in the second year to have been essentially “sufficient”, but woefully lacking in the first and third years.

**Table 5.6 Changes in access to safety nets between the baseline and endline, by project area and pastoralist status**

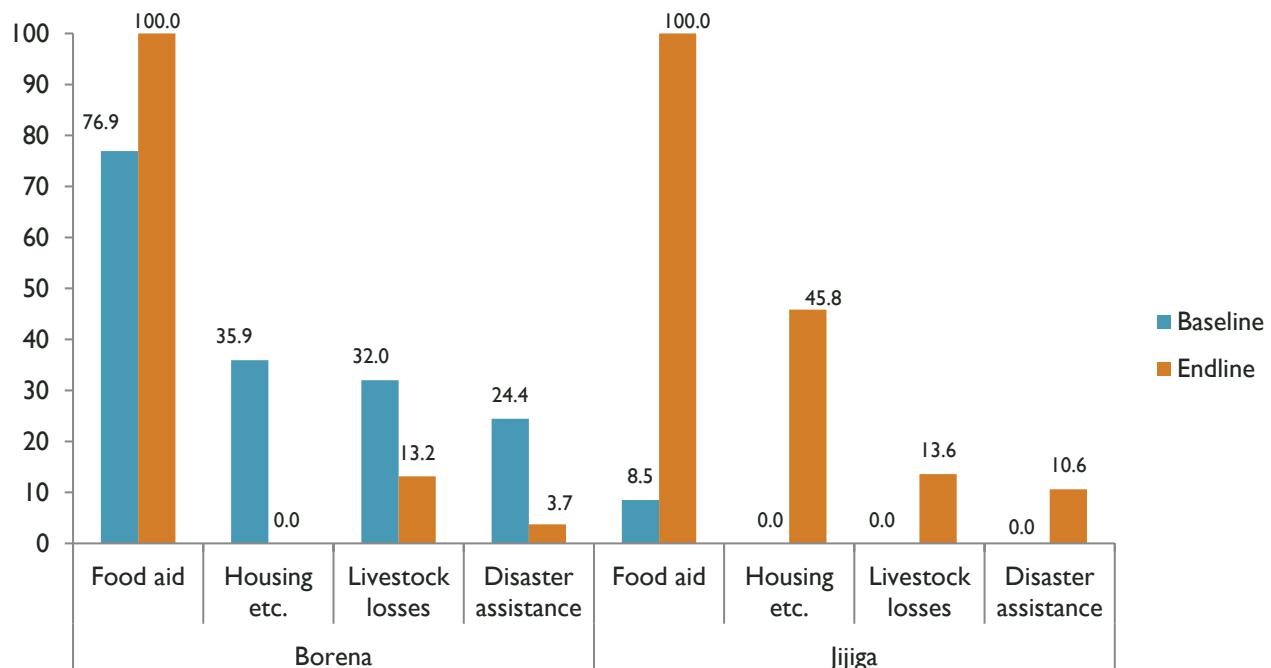
Indicators	All		Project area				Pastoralist status					
	Base-line	End-line	Borena		Jijiga		Pastoralist		Agro-pastoralist		Non-pastoralist	
			Base-line	End-line	Base-line	End-line	Base-line	End-line	Base-line	End-line	Base-line	End-line
<b>Access to formal safety nets a/</b>												
Food assistance	57.3	100.0 ***	76.9	100.0 ***	8.5	100.0 ***	68.1	100.0 ***	55.0	100.0 ***	46.1	100.0 ***
Housing and other non-food assistance	25.6	13.1 ***	35.9	0.0 ***	0.0	45.8 ***	37.6	6.0 ***	22.0	13.0 *	15.0	23.7
Assistance for livestock losses	22.9	13.3 *	32.0	13.2 ***	0.0	13.6 ***	23.7	9.4 **	25.7	15.6	16.3	14.5
Assistance in the case of a disaster	17.4	5.7 ***	24.4	3.7 ***	0.0	10.6 **	22.1	4.4 ***	16.4	6.8 **	12.5	5.6
Index of access to formal safety nets	1.23	1.32	1.69	1.17 ***	0.09	1.70 ***	1.52	1.20 **	1.19	1.35	0.90	1.44 ***
<b>Access to informal safety nets (community groups) a/</b>												
Credit or microfinance group	48.3	59.3 *	67.7	71.7	0.0	28.3 ***	58.7	64.0	49.1	59.6 *	31.7	52.0 ***
Mutual help group	64.3	43.9 ***	85.3	56.7 ***	11.8	12.0	72.6	49.6 ***	63.8	43.1 ***	52.9	37.3 ***
Civic (improving community) group	19.5	11.8	27.3	13.5 **	0.0	7.6 ***	25.1	16.4	19.5	11.0	11.4	6.6
Charitable group	11.9	31.4 ***	16.7	42.9 ***	0.0	2.5	14.6	34.3 ***	11.2	34.7 ***	9.3	21.0 *
Religious group	58.6	33.8 ***	78.3	46.4 ***	9.5	2.5	60.1	42.6 *	60.3	30.7 ***	53.3	26.9 ***
Women's group	74.6	67.7	88.0	80.3	41.3	36.1	81.2	73.4	74.9	68.2	64.5	58.3
Savings group	51.8	60.3	72.6	68.7	0.0	39.4 ***	65.9	68.6	51.5	57.6	31.9	53.3 **
Index of access to informal safety nets	3.60	3.36	4.41	3.87 *	1.58	2.07 *	4.00	3.67	3.61	3.31	3.01	2.97

Stars indicate a statistically significant difference at the 10%(\*), 5%(\*\*), and 1%(\*\*\*) levels.

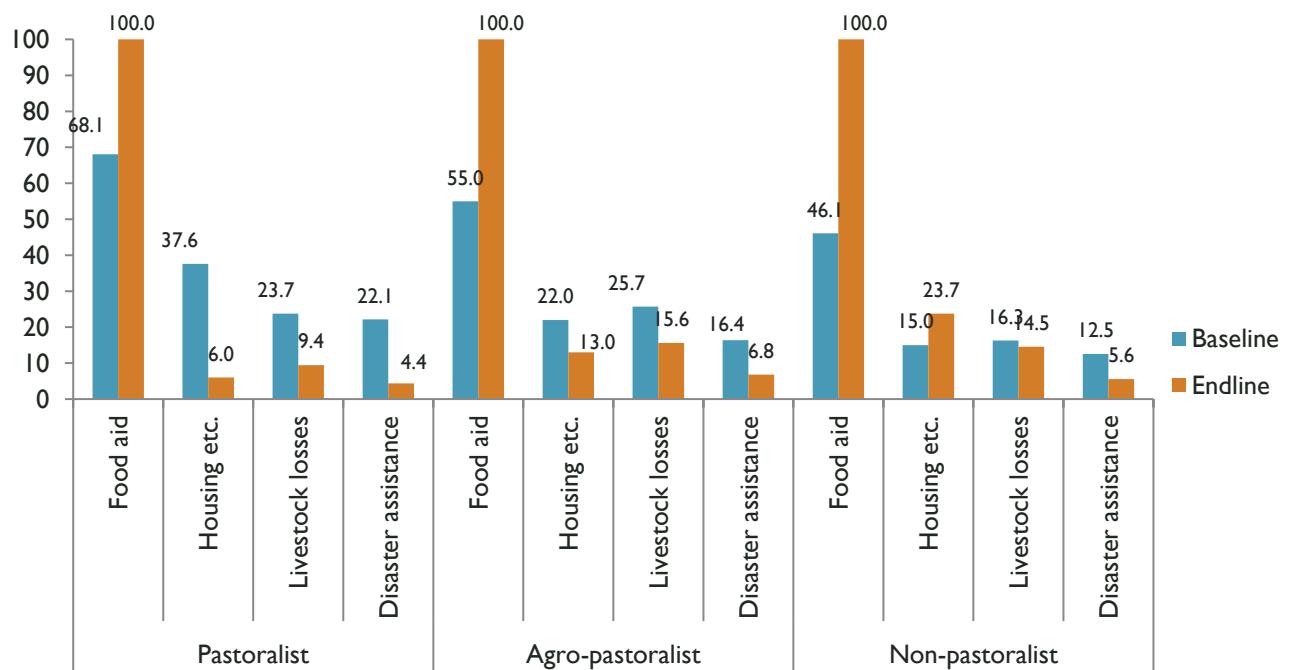
a/ Reported values are the percent of households with access to type of safety net or community group.

**Figure 5.3 Changes in access to humanitarian assistance, by project area and pastoralist status**

**(a) By project area**



**(b) By pastoralist status**



According to several FGDs, PSNP activities emphasized maintenance of roads and other infrastructure, and building schools and toilet facilities. Males provided labor, women provided tea, and the community contributed money for materials. There is coordination between the community—through its leaders—and higher levels of government; the community expresses interest to its leaders, who solicit the woreda government, who then provides permission (e.g., for building roads). FGD participants also indicated PSNP activities included terracing and soil conservation activities (e.g., soil bunds, stone gabions, and trenches).

“Usually support from the government and NGOs arrived very late after our large herds died from the effects of drought.”

- Male FGD; Borena

**Informal safety nets.** Informal safety nets in the form of community groups show the same project-area pattern as formal safety nets: access to such groups has declined in Borena and increased in Jijiga. The types of community groups that have seen a decline in Borena are mutual help groups (from 85.3 to 56.7 percent of households), civic groups (from 27.3 to 13.5 percent), and religious groups (from near 80 to 46.4 percent). These large declines signal a strong erosion of informal support for households in Borena. The groups that were on the rise in Jijiga are credit/microfinance groups, civic groups, and savings groups.

The qualitative data point additionally to the role of community leaders (e.g., village elders, clan leaders, local kebele officials) in mobilizing community resources (e.g., food, shoats, fodder) to support poor households or those needing help during times of crisis. In Jijiga, most FGs felt the process was a good one and their leaders were (mostly) effective at mobilizing community support. Community members give what they can, and leaders ensure it is distributed to those most in need. Women in one kebele reported that their community leader solicited help from the government, who provided 10 female goats to each of 10 poor households identified by the community leader, for a total of 100 goats.

Although traditional clan ties also facilitate the pooling of social support for those in need, FGs mentioned a recent push by the local government to adopt a 1-to-5 approach in which five households create a “network” to support each other. If their need is beyond their capacity—as a group—to help, their representative requests additional support through the kebele administration.

## 5.7 Disaster Risk Reduction

**Disaster preparedness and mitigation.** Changes over the project period in four indicators of disaster preparedness and mitigation are shown in Table 5.7. This resilience capacity has been strengthened across the board, with the greatest increases seen in Jijiga and for non-pastoralists. Consistent with repeated droughts throughout the project period, all population groups experienced increases in the availability of government and NGO disaster planning or response programs. The availability of disaster planning groups within households’ communities increased only for Jijiga and non-pastoralist households. An increase in the availability of an emergency plan for livestock offtake in the event of drought can be seen for these same groups as well as agro-pastoralists. Note that while the availability of disaster preparedness and mitigation has improved in Borena since the baseline, the formal safety net “assistance in the case of a disaster” has declined (see last section, Table 5.6).

**Table 5.7 Changes in disaster preparedness and mitigation, availability of hazard insurance, and support for conflict mitigation between the baseline and endline, by project area and pastoralist status**

Indicators	All		Project area				Pastoralist status					
	Base-line	End-line	Borena		Jijiga		Pastoralist		Agro-pastoralist		Non-pastoralist	
			Base-line	End-line	Base-line	End-line	Base-line	End-line	Base-line	End-line	Base-line	End-line
<b>Disaster preparedness and mitigation a/</b>												
Availability of a government disaster planning or response program	16.9	51.9 ***	23.7	58.6 ***	0.0	35.1 ***	17.3	65.6 ***	19.1	47.2 ***	12.2	40.5 ***
Availability of an NGO disaster planning or response program	14.6	57.3 ***	20.5	65.9 ***	0.0	35.9 ***	20.3	53.3 ***	11.8	62.0 ***	11.7	54.5 ***
Availability of a disaster planning group	28.3	35.9	39.6	41.8	0.0	21.3 ***	42.1	44.8	24.5	32.8	15.0	28.7 ***
Emergency plan for livestock offtake if a drought hits	18.1	25.3	22.4	24.3	7.5	27.9 ***	27.5	28.4	14.9	25.7 **	10.4	20.2 ***
<b>Index of disaster prep and mitigation</b>	0.78	1.70 ***	1.06	1.91 ***	0.08	1.20 ***	1.07	1.92 ***	0.70	1.68 ***	0.49	1.44 ***
<b>Availability of hazard insurance (%)</b>	22.9	13.3 *	32.0	13.2 ***	0.0	13.6 ***	23.7	9.4 **	25.7	15.6 *	16.3	14.5
<b>Availability of an institution providing conflict mitigation (%)</b>	99.0	94.5 *	98.6	92.7 *	100.0	99.0	99.8	95.4 **	98.7	94.4	98.2	93.3

Stars indicate a statistically significant difference at the 10%(\*), 5%(\*\*), and 1%(\*\*\*) levels.

a/ Reported values are percentages of households.

Availability of programs, groups and plans that support disaster preparedness and mitigation apparently does not correlate with actual assistance in the event of a disaster. According to qualitative data, limited assistance results primarily from budget constraints, particularly at the woreda level. Many woreda-level plans exist for responding to various shocks, but lack funds for actually responding.

As previously noted, communities in both regions mobilize households through collective action in times of need (post-shock), although some communities indicated such mobilization was lacking. Box 5.1 lists types of activities related to disaster preparedness and mitigation reported by qualitative survey respondents.

In Borena, community actions are organized through Gada system leaders, clan elders, and kebele administrators. Most FGs reported that traditional community leaders generally organize their clans to contribute cattle, cash, fodder, and food for households in need. Some leaders also facilitated food aid and financial support for community members by requesting support from the government or NGOs. For example, community members' needs are generally reported to the kebele office first, and are then communicated to the woreda offices to mobilize support as necessary.

Early in the drought, many communities in Jijiga mobilized around harvesting rainwater, primarily building ponds or water reservoirs. Such efforts were often combined with strategies to conserve water. For example, some communities reported that their leaders implemented policies to regulate and manage household and community use of water from communal birkas, ponds, and other sources. Note that RMS-2 qualitative data from Jijiga suggest that a number of communities thought leaders (at the local, kebele and woreda levels) to be corrupt or negligent, prioritizing help to their friends and family over those most in need, selling and/or trading PSNP

commodities for khat, etc. However, there was virtually no mention of such shortcomings at endline. It is possible that the small amount of relief afforded by rains in 2017 limited some of the worst impacts of the drought and helped diminish the more negative issues associated with it. Alternatively, it is possible such behavior had consequences and ceased between the RMS-2 and endline.

## **Box 5.1 Collective Action for Disaster Preparedness & Mitigation**

### **Water Collection / Conservation**

Digging new wells, including for irrigation; Constructing new and maintaining existing ponds; Rainwater collection; Water conservation

### **Erosion Control**

Digging ditches; Constructing canals; Tree plantings; Constructing soil bunds; Building terraces

### **Rangeland Management**

Protecting common grazing areas; Clearing grazing lands of invasive plant species that suppress native grasses; Building cattle enclosures for fattening livestock with improved forage; Harvesting grass

### **Reforestation**

Planting seedlings, grasses and trees

### **Other**

Saving money; Storing grains for food; Storing crop residues for livestock food/fodder; Support for children who have dropped out of school

*Source: Focus Group Discussions*

Effective DPM strategies require proactive measures to be taken prior to a shock/stress. FGs and KIs in both program areas felt there was a general lack of pre-emptive action (pre-shock) on the part of community leaders, as well as lack of access to resources and knowledge in developing action plans for dealing with droughts and other shocks/stresses. When asked how their communities prepare for—or protect themselves from—future drought, qualitative findings suggest a mix of despair or fatalism, as well as hope. For the most part, people in the Jijiga area consider their way of life to be “set”; in particular, they rely on rain. People felt there is a rich heritage of pastoralism as a livelihood in this arid region, though they recognize climate change is having an impact and they need to adapt. Within this context, they also have plans for things that will improve their way of life (e.g., digging wells, building dams) if only they get some external support (e.g., from the government). Some communities in Borena reported that community actions in the area of disaster preparedness and mitigation have improved collective well-being and created a sense of belonging.

**Availability of hazard insurance.** Consistent with trends seen for access to “assistance in the case of livestock losses” (Table 5.6), the availability of hazard insurance has declined considerably in Borena and among pastoralist households, and increased moderately in Jijiga.

#### **Availability of support for conflict mitigation.**

There has been very little change in the availability of institutions providing conflict mitigation, which were already widespread in the project area at the PRIME project’s inception.

“People do not engage in collective works except when they are paid. There is a lack of ownership and protection for works initiated by NGOs.”

- KII; Borena

## 5.8 Absorptive, Adaptive, and Transformative Capacity

Changes in the indexes of the three dimensions of resilience capacity over the project period are reported in Table 5.8. The indexes are calculated using factor analysis as described in Chapter 2 (Section 2.2.1).

Figure 5.4 gives a snap shot of trends for the project areas and pastoralist status groups. The pattern that has played out for many individual resilience capacities is represented here for the overall indexes. Jijiga households started out at baseline with far lower resilience capacities than Borena households. Over the course of the project, resilience capacities among Jijiga households increased substantially while dropping somewhat in Borena, thus narrowing the differences between the two areas. By endline, adaptive capacity was roughly on par in the two areas. Absorptive capacity, especially, and transformative capacity were still higher in Borena but had increased dramatically in Jijiga. The direction of trends for each of the individual capacities making up the indexes is summarized in Table 5.9. As will be seen in Chapter 7, these project-area differences in resilience capacity trends align with that of households’ actual ability to recover from shocks over the period.

Differences in trends in resilience capacity across the pastoralist status groups are comparatively small. Pastoralists have seen a slight reduction and non-pastoralists have seen a modest increase. Agro-pastoralists have experienced no change in their overall resilience capacities.

**Table 5.8 Changes in absorptive, adaptive and transformative capacity between the baseline and endline, by project area and pastoralist status**

Indicators	All		Project area				Pastoralist status					
	Base-line	End-line	Borena		Jijiga		Pastoralist		Agro-pastoralist		Non-pastoralist	
			Base-line	End-line	Base-line	End-line	Base-line	End-line	Base-line	End-line	Base-line	End-line
<b>Absorptive capacity</b>												
Bonding social capital	63.3	56.4 ***	71.5	53.4 ***	42.8	63.8 ***	69.9	55.7 ***	63.7	56.4 ***	52.9	57.4
Cash savings	14.1	19.1 ***	17.5	24.9 ***	5.5	4.7	19.4	20.9	12.3	19.0 ***	9.7	16.5 ***
Access to informal safety nets	3.6	3.4	4.4	3.9 *	1.6	2.1 *	4.0	3.7	3.6	3.3	3.0	3.0
Availability of hazard insurance	22.9	13.3 *	32.0	13.2 ***	0.0	13.6 ***	23.7	9.4 **	25.7	15.6 *	16.3	14.5
Disaster mitigation and preparedness	0.8	1.7 ***	1.1	1.9 ***	0.1	1.2 ***	1.1	1.9 ***	0.7	1.7 ***	0.5	1.4 ***
Conflict mitigation support	99.0	94.5 *	98.6	92.7 *	100.0	99.0	99.8	95.4 **	98.7	94.4	98.2	93.3
Asset ownership	12.4	14.4 ***	13.7	15.5 ***	9.3	11.4 ***	14.6	15.9 ***	12.7	14.5 ***	8.7	12.0 ***
Index	38.1	40.4	48.1	45.9	13.2	26.5 ***	44.7	44.4	38.1	40.1	28.6	35.0 ***
<b>Adaptive capacity</b>												
Bridging social capital	46.2	40.0 ***	53.0	37.7 ***	29.1	45.9 ***	54.6	39.5 ***	45.1	40.8 *	35.7	39.3
Linking social capital	41.8	29.2 ***	46.3	31.0 ***	30.6	24.9 **	45.5	31.1 ***	39.9	29.5 ***	39.9	26.2 ***
Aspirations/confidence to adapt	35.2	40.1 ***	36.0	41.4 ***	33.4	36.8 ***	35.1	40.5 ***	35.7	40.5 ***	34.7	38.7 ***
Livelihood diversity	2.1	2.2 ***	2.2	2.2	1.7	2.1 ***	2.0	2.1	2.3	2.3	1.7	2.2 ***
Access to financial resources	1.0	1.3 ***	1.4	1.4	0.0	1.1 ***	1.3	1.4	1.0	1.3 **	0.7	1.3 ***
Human capital	47.0	49.2 ***	48.6	50.6 **	43.1	45.5	45.1	48.0 **	48.2	50.5 **	47.6	48.3
Exposure to information	5.4	5.4	6.7	5.4 ***	2.4	5.4 ***	6.3	5.4 ***	5.7	5.5	3.7	5.3 ***
Asset ownership	12.4	14.4 ***	13.7	15.5 ***	9.3	11.4 ***	14.6	15.9 ***	12.7	14.5 ***	8.7	12.0 ***
Index	36.7	37.0	42.8	38.4 ***	21.4	33.5 ***	41.2	37.9 ***	37.9	37.6	27.8	34.5 ***

Continued on p. 88

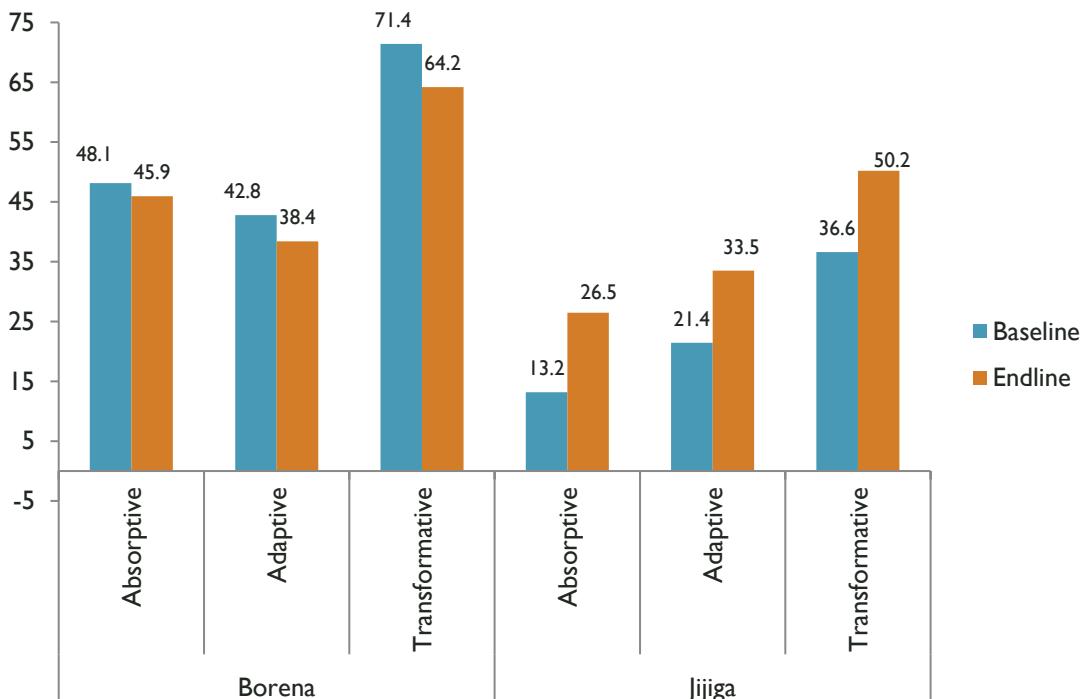
**Table 5.8 Continued.**

Transformative capacity																		
Bridging social capital	46.2	40.0	***	53.0	37.7	***	29.1	45.9	***	54.6	39.5	***	45.1	40.8	*	35.7	39.3	
Linking social capital	41.8	29.2	***	46.3	31.0	***	30.6	24.9	**	45.5	31.1	***	39.9	29.5	***	39.9	26.2	***
Access to markets	1.97	1.94		1.91	1.89		2.12	2.06		1.43	1.42		2.20	2.11		2.35	2.36	
Access to services	4.3	4.5	**	4.5	4.6		3.8	4.4	***	4.4	4.5		4.3	4.6	**	4.2	4.5	*
Access to livestock services	1.9	1.9		2.1	2.1		1.4	1.5	**	2.0	2.0		1.9	1.9		1.8	1.8	
Access to infrastructure	1.4	1.5		1.5	1.3	*	1.2	2.0	***	1.4	1.3		1.4	1.6		1.4	1.7	***
Access to communal natural resources	2.4	2.4		2.7	2.7		1.5	1.5		2.7	2.7		2.2	2.3		2.1	2.1	
Access to formal safety nets	1.2	1.3		1.7	1.2	***	0.1	1.7	***	1.5	1.2	**	1.2	1.4	*	0.9	1.4	***
Index	61.4	60.2		71.4	64.2	***	36.6	50.2	***	67.4	62.4	**	60.2	60.0		54.9	57.2	

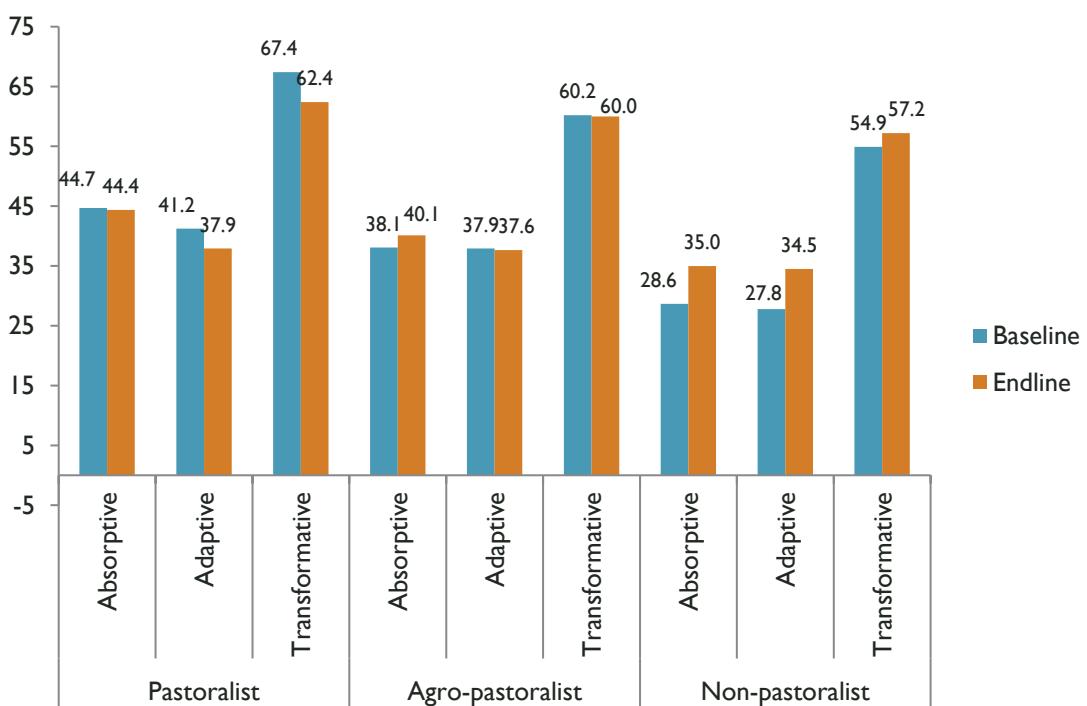
Stars indicate a statistically significant difference at the 10%(\*), 5%(\*\*), and 1%(\*\*\*) levels.

**Figure 5.4 Changes in absorptive, adaptive and transformative capacity between the baseline and endline, by project area and pastoralist status**

**(a) By project area**



**(b) By pastoralist status**



**Table 5.9 Summary of trends in the resilience capacities for the project areas**

<b>Indicator</b>	<b>Borena</b>	<b>Jijiga</b>
<b>Social capital</b>		
Bonding social capital	■	■
Bridging social capital	■	■
Linking social capital	■	■
<b>Aspirations/confidence to adapt</b>	■	■
<b>Economic sources of resilience capacity</b>		
Livelihood diversity	■	■
Asset ownership	■	■
Access to financial resources	■	■
Cash savings	■	■
<b>Access to markets, infrastructure, communal natural resources and services</b>		
Access to markets	■	■
Access to basic services	■	■
Access to livestock services	■	■
Access to infrastructure	■	■
Access to communal natural resources	■	■
<b>Human capital and access to information</b>		
Human capital	■	■
Access to information	■	■
<b>Access to safety nets</b>		
Access to formal safety nets	■	■
Access to informal safety nets	■	■
<b>Disaster risk reduction</b>		
Availability of hazard insurance	■	■
Disaster preparedness and mitigation	■	■
Conflict mitigation support	■	■
<b>Indexes of resilience capacity</b>		
Absorptive capacity	■	■
Adaptive capacity	■	■
Transformative capacity	■	■

Note: Green-shaded cells indicate that there has been an increase in the capacity.  
Red-shaded cells indicate that there has been a decrease.

## 5.9 Summary: Resilience Capacities

Resilience capacities are the underlying determinants of resilience. This chapter examined trends in the three dimensions of resilience capacity—absorptive capacity, adaptive capacity, and transformative capacity—as well as the individual capacities used to measure them. These individual capacities, 20 in all, are the actionable policy levers for enhancing households' ability to recover from shocks.

**The three dimensions of resilience capacity.** Trends in the three dimensions of resilience capacity differ greatly for the two project areas. All three have increased among Jijiga households. However, Borena households have seen no change in absorptive capacity and declines in both adaptive and transformative capacity. As will be seen in Chapter 7, these project-area differences align with those of households' actual ability to recover from shocks over the period.

Differences in trends in resilience capacity across the pastoralist status groups are comparatively small. Pastoralists have seen a slight reduction in all three dimensions of resilience capacity, and non-pastoralists have seen modest increases. Agro-pastoralists have experienced little change in their overall resilience capacities.

**Individual resilience capacities.** Three individual capacities have seen definite improvements in both project areas: aspirations and confidence to adapt, asset ownership, and support for disaster preparation and mitigation. As for the overall indexes, however, trends for most of the individual capacities differ between the project areas. A common pattern is for a capacity to be at a higher level in Borena at baseline but then to increase in Jijiga more than in Borena, thus closing the initial gap between the areas.

The changes found by project area are as follows.

**Borena.** Five capacities increased:

- Aspirations and confidence to adapt
- Asset ownership
- Cash savings
- Human capital
- Disaster mitigation and preparedness

Seven capacities declined:

- Bonding, bridging and linking social capital
- Access to information
- Access to formal and informal safety nets
- Availability of hazard insurance

**Jijiga.** Thirteen capacities increased:

- Bonding and bridging social capital
- Aspirations and confidence to adapt
- Economic sources of resilience capacity: Livelihood diversity, asset ownership and access to financial resources

- Access to services, including livestock services, and infrastructure
- Access to information
- Access to formal safety nets
- Disaster risk reduction: Disaster mitigation and preparedness and availability of hazard insurance.

One capacity declined:

- Linking social capital.

The qualitative data provide a rich source of information from the perspective of the Focus Group Discussion participants and Key Informants living in Borena and Jijiga on how these trends played out on the ground in relation to the prolonged drought conditions their households faced.

## 6 HOUSEHOLD COPING STRATEGIES

Coping strategies are households' responses to the shocks and stressors they face; they mediate the influence of their resilience capacities on their well-being (see Figure 1.3). This chapter looks at changes since the baseline in the coping strategies households used for dealing with the back-to-back droughts that hit during the PRIME project's implementation period and their many downstream impacts.

### 6.1 Coping Strategies Related to Food Security

From a list of 25 coping strategies, the most commonly-reported by households participating in the quantitative survey at both baseline and endline was “reduce food consumption”, a negative coping strategy because it undermines human health. As illustrated in Figure 6.1, the use of this coping strategy increased over the project period in both Borena and Jijiga and for all of the pastoralist status groups—a strong indication that the droughts and their downstream impacts were having a negative effect on households' food security. Its use was highest and almost ubiquitous among Borena households (93.1 percent) and pastoralists (90.4 percent) by endline. Note that the elevated levels picked up by the endline data had already emerged during the RMS-1 survey period and continued during RMS-2 (Frankenberger and Smith 2015; Smith, Frankenberger and Nelson 2018).

Table 6.1 provides more detail on the coping strategies related to food security used by households over the project period. Because collection of these data took place using a common recall period (7 days), it is possible to follow trends over four one-year time intervals spanning the baseline, two RMSs and endline surveys.

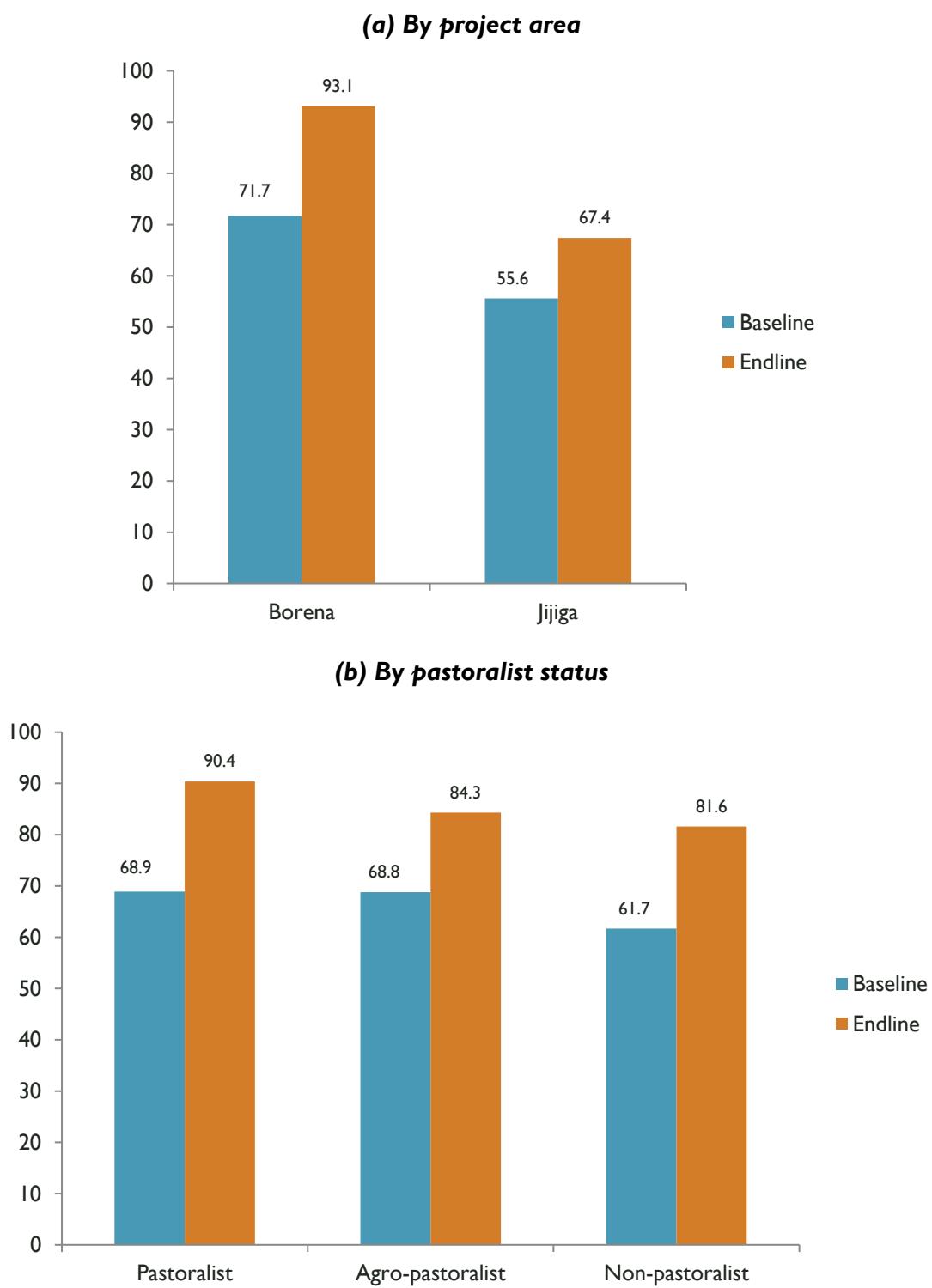
**Borena.** In Borena, the most common strategies at baseline (those used by over 50 percent of households) were to reduce the number of meals eaten in a day, limit portion sizes at mealtimes, and rely on less preferred and less expensive foods. By endline, these strategies were still very common, and another had emerged as well: restricting consumption by adults in order for small children to eat.

Consistent with an increase in food insecurity in the region (see Table 7.1 in Chapter 7), most of the food insecurity coping strategies used by households in Borena increased or stayed constant over the project period. However, three strategies increased almost continually: limiting portion size at mealtimes, restricting consumption by adults, and reducing the number of meals eaten in a day. Others that increased over the period (although not continuously) are: relying on less preferred and less expensive foods, feeding working members at the expense of non-working members, and skipping entire days without eating. The latter strategy, a sure sign of severe food insecurity, was being used by over one-quarter of households by endline. Note that the strategy “borrow food or rely on help from friends or relatives” increased over the first two years but then declined afterwards, consistent with the erosion of social capital described in Chapter 5.

“Previously we ate three times within a day but during that year we [were] forced to eat twice or one time in a day.”

- Female FGD; Jijiga

**Figure 6.1 Changes between the baseline and endline in the percent of households who reduced food consumption in order to cope with shocks in the previous year, by project area and pastoralist status**



Note: Differences for all population groups are statistically significant at the 1% level.

**Table 6.1 Changes in the percent of households employing food insecurity coping strategies between the baseline and endline, by project area**

Coping strategy	All					Borena					Jijiga				
	Dec 2013 (Baseline)	Dec 2014 (RMS1)	Dec 2015 (RMS2)	Oct 2016 (RMS2)	Dec 2017 (Endline)	Dec 2013 (Baseline)	Dec 2014 (RMS1)	Dec 2015 (RMS2)	Oct 2016 (RMS2)	Dec 2017 (Endline)	Dec 2013 (Baseline)	Dec 2014 (RMS1)	Dec 2015 (RMS2)	Oct 2016 (RMS2)	Dec 2017 (Endline)
Rely on less preferred and less expensive foods	50.3	36.9	40.9	33.0	63.2 ***	50.2	41.5	43.3	34.9	66.0 ***	50.6	24.5	34.8	28.2	56.4
Borrow food or rely on help from friend/relative	32.9	32.6	40.0	21.9	35.8 *	28.6	34.2	45.8	26.8	31.6	44.0	28.4	25.5	9.5	46.0
Purchase food on credit	27.6	24.4	39.5	16.4	28.8	22.9	24.5	38.6	9.1	20.3	39.5	24.1	42.0	34.4	49.9 ***
Gather wild food, hunt, or harvest immature crops	16.6	1.5	3.5	3.8	13.5 **	12.4	1.5	4.6	1.5	11.9	27.4	1.7	0.8	9.6	17.5 ***
Consume seed stock held for next season	23.1	4.1	18.9	10.2	18.4 ***	19.7	4.7	26.3	14.0	15.5 *	31.8	2.8	0.5	0.8	25.5 **
Send household members to eat elsewhere	16.9	1.6	0.9	0.7	16.6	14.2	1.7	1.1	0.9	15.2	23.6	1.1	0.5	0.0	19.9 *
Limit portion size at mealtimes	55.8	69.6	67.9	73.1	76.9 ***	59.8	75.2	73.1	79.5	83.6 ***	45.6	54.4	55.0	57.3	60.1 ***
Restrict consumption by adults in order for small children to eat	34.0	41.8	33.8	41.9	48.4 ***	34.3	56.4	46.7	57.1	53.3 ***	33.5	2.3	1.7	4.1	36.2
Feed working members of household at the expense of non-working members	15.4	0.7	1.3	0.4	21.7 ***	10.1	1.0	1.4	0.5	21.5 ***	28.8	0.0	0.9	0.0	22.1 **
Reduce number of meals eaten in a day	59.8	67.7	71.4	83.8	74.9 ***	63.3	80.3	77.0	93.7	82.6 ***	50.8	33.9	57.3	59.3	55.6
Skip entire days without eating	22.8	3.0	10.4	4.9	24.5	21.1	3.3	12.4	6.9	26.6 **	27.4	2.3	5.3	0.0	19.3 ***

Note: Stars denote a statistically significant difference (at least at the 5% level) between baseline and endline values.

Note: The values presented refer to the coping strategies used in response to the shocks experienced in the previous year with two exceptions: purchasing food on credit and consuming seed stock. These were strategies households reported employing in the 7 days prior to administration of the survey.

**Jijiga.** In the Jijiga project area, the most common food-related coping strategies at baseline were to rely on less preferred and less expensive foods and to reduce the number of meals eaten in a day (Table 6.1). By endline, limiting portion sizes at meal time had also become quite widespread.

In contrast to Borena, household food security in Jijiga held steady over the project period (see Table 7.1 in Chapter 7), and while some food insecurity coping strategies increased, many were on the decline. For example, feeding working members at the expense of non-working members declined from 28.8 percent to 22.1 percent of households. Skipping entire days without eating dropped from 27.4 percent to 19.3 percent of households, a signal of a decline in severe food insecurity. Other negative coping strategies that declined by endline include: gathering/hunting wild food or harvesting immature crops, consuming seed stock intended for future planting, and sending household members elsewhere to eat.

Two coping strategies that became considerably more common were purchasing food on credit (see Section 6.2 below for more on this strategy) and limiting portion sizes at mealtime, signaling that many households were still struggling to maintain their food security at the time of the endline.

## 6.2 Asset, Labor, and Financial Strategies

**Asset-based strategies.** Beyond reducing food consumption, selling livestock—undoubtedly the most valuable asset owned by households in both project areas—was by far the most commonly-employed strategy for dealing with shocks at both baseline and endline. Use of this strategy increased among Borena households, while it declined among Jijiga households (Table 6.2). Among the pastoralist status groups, a change can be detected only for non-pastoralists, whose use of the strategy increased from 61.7 to 81.6 percent (Table 6.3). This finding is consistent with the increased livestock ownership among this group of households previously reported. Sale of household items and agricultural productive assets was rarely used as a coping strategy, but did see a decline among Jijiga households. Overall Jijiga households reduced their use of all of the asset-based coping strategies while Borena households reduced their use of only one: consuming seed stock held for the next season. The drop in the use of this negative coping strategy in both project areas is likely due to drought-induced crop failures (i.e., a reduction in seed stock itself).

Qualitative findings confirm that households in both regions sold livestock (e.g., one or two animals) to help with household purchases of food and other essential items. However, most households resort to selling livestock after a drought has had some impact on their food or income, often when livestock body conditions are diminished and prices are low. As one FGD participant in Jijiga noted, “[It’s] hard to sell livestock during the drought because it’s not healthy, so no one buys it.” By endline, livestock herds had been so severely decimated that this was not a viable coping strategy available to most—at least in Jijiga; there were few livestock left for households to sell. As a general strategy, livestock destocking (i.e., as a pre-emptive strategy against unnecessary loss of livestock) is fairly widely known, though not widely practiced.

**Table 6.2 Percent of households employing various coping strategies: Baseline versus endline, by project area**

Coping strategy	All		Borena		Jijiga	
	Base-line	End-line	Base-line	End-line	Base-line	End-line
<b>Sell or consume assets</b>						
Sell livestock	66.8	69.9 **	67.9	74.4 ***	64.1	58.7 **
Slaughter livestock	17.1	14.3 *	16.4	15.9	19.0	10.3 ***
Sell household items (e.g., radio, bed)	2.0	1.3	1.0	1.3	4.8	1.5 ***
Sell agricultural productive assets	1.9	1.1 *	1.0	1.0	4.1	1.5 **
Consume seed stock held for next season	23.2	18.3 ***	19.8	15.4 **	32.1	25.6 ***
<b>Change labor patterns</b>						
Take up new wage labor	26.1	22.7 **	29.9	27.4	16.4	11.0 **
Send children to work for money	4.3	2.5 ***	3.6	2.5 *	5.9	2.7 **
Take children out of school	9.6	8.4	7.7	8.4	14.5	8.2 ***
Participate in food-for-work/cash-for-work	24.6	52.5 ***	27.8	49.4 ***	16.3	60.2 ***
<b>Financial strategies</b>						
Borrow money from friends or relatives	44.0	40.0 **	47.2	34.4 ***	35.6	53.8 ***
Borrow money from an NGO	1.5	2.4 *	1.8	2.3	0.6	2.6 **
Borrow money from a bank	1.0	0.5	1.3	0.4 **	0.3	0.7
Borrow from a money lender	9.3	6.2 ***	10.8	6.2 ***	5.6	6.1
Lease out land	3.5	2.1 **	0.5	1.1 **	11.7	4.4 ***
Purchase food on credit	27.5	28.8	22.8	20.3	40.0	50.0 ***
Draw down on savings	10.6	9.4	12.5	12.3	5.5	2.1 **
<b>Rely on informal sources of assistance</b>						
Money/food from family members	30.5	25.2 ***	31.6	21.1 ***	27.6	35.5 ***
Remittances from a relative	7.2	2.3 ***	7.8	2.3 ***	5.6	2.4 **
<b>Rely on food aid</b>						
Receive food aid from the government	14.9	37.6 ***	16.5	32.4 ***	10.9	50.7 ***
Receive food aid from an NGO	15.4	46.3 ***	17.8	49.2 ***	9.1	38.8 ***
<b>Migration</b>						
Migration of some family members	20.6	20.2	19.3	19.7	24.0	21.4
Migration of the whole family	5.4	3.6 ***	4.3	2.7 *	8.3	6.0 **
Send member to stay with relatives	9.3	5.0 ***	6.4	4.8 *	17.0	5.5 ***

Stars indicate a statistically significant difference at the 10%(\*), 5%(\*\*), and 1%(\*\*\*) levels.

Note: The values presented refer to the coping strategies used in response to the shocks experienced in the previous year with two exceptions: purchasing food on credit and consuming seed stock. These were strategies households reported employing in the 7 days prior to administration of the survey.

**Table 6.3 Percent of households employing various coping strategies: Baseline versus endline, by pastoral status**

Coping strategy	All		Pastoralist		Agro-pastoralist		Non-pastoralist	
	Base-line	End-line	Base-line	End-line	Base-line	End-line	Base-line	End-line
<b>Sell or consume assets</b>								
Sell livestock	66.8	69.9 **	78.5	76.9 ***	69.5	70.5	43.9	58.7 ***
Slaughter livestock	17.1	14.3 *	25.0	16.7 ***	13.3	13.9	12.3	11.7
Sell household items (e.g., radio, bed)	2.0	1.3	1.1	0.6	2.3	1.4	2.8	2.3
Sell agricultural productive assets	1.9	1.1 *	1.2	0.9	2.5	1.2 *	1.5	1.3
Consume seed stock held for next season	23.2	18.3 ***	18.4	16.8	25.0	18.8 ***	27.1	19.6 **
<b>Change labor patterns</b>								
Take up new wage labor	26.1	22.7 **	18.2	18.8	30.4	24.1 *	30.1	25.7
Send children to work for money	4.3	2.5 ***	2.7	2.1	4.6	2.7 *	6.1	2.9 **
Take children out of school	9.6	8.4	8.0	9.8	10.4	8.6	10.4	5.9 **
Participate in food-for-work/cash-for-work	24.6	52.5 ***	25.6	51.5 ***	27.1	52.8 ***	18.4	53.2 ***
<b>Financial strategies</b>								
Borrow money from friends or relatives	44.0	40.0 **	47.7	39.0 ***	43.7	41.1	38.7	39.2
Borrow money from an NGO	1.5	2.4 *	1.9	2.4	1.3	2.1	1.2	3.0 *
Borrow money from a bank	1.0	0.5	0.6	0.1	1.0	0.3	1.6	1.3
Borrow from a money lender	9.3	6.2 ***	11.0	5.7 ***	9.5	6.3 *	6.7	6.6
Lease out land	3.5	2.1 **	2.1	1.8	4.9	1.7 ***	3.2	3.1
Purchase food on credit	27.5	28.8	24.5	24.7	29.2	29.3	28.9	33.9
Draw down on savings	10.6	9.4	11.4	10.7	11.2	9.6	8.0	7.0
<b>Rely on informal sources of assistance</b>								
Money/food from family members	30.5	25.2 ***	32.3	24.3 ***	29.4	25.0	29.7	26.9
Remittances from a relative	7.2	2.3 ***	8.5	2.1 ***	5.8	2.3 ***	7.7	2.6 ***
<b>Rely on food aid</b>								
Receive food aid from the government	14.9	37.6 ***	17.2	39.9 ***	13.9	35.9 ***	13.4	37.6 ***
Receive food aid from an NGO	15.4	46.3 ***	19.0	51.7 ***	14.4	43.9 ***	12.0	42.6 ***
<b>Migration</b>								
Migration of some family members	20.6	20.2	26.4	24.4	20.0	19.5	13.0	15.2
Migration of the whole family	5.4	3.6 ***	5.8	4.5	5.1	3.1 **	5.4	3.4
Send member to stay with relatives	9.3	5.0 ***	6.2	5.7	10.6	4.5 ***	11.6	4.7 ***

Stars indicate a statistically significant difference at the 10%(\*), 5%(\*\*), and 1%(\*\*\*) levels.

Note: The values presented refer to the coping strategies used in response to the shocks experienced in the previous year with two exceptions: purchasing food on credit and consuming seed stock. These were strategies households reported employing in the 7 days prior to administration of the survey.

**Changing labor patterns.** Among labor-based strategies, the most commonly employed were taking up new wage labor and participating in food-for-work or cash-for-work (FFW/CFW). Taking up new wage labor declined among Jijiga households, perhaps due to declining wage labor opportunities as construction workers at the JESH abattoir (Table 6.2). However, consistent with the large increase in humanitarian assistance due to the drought conditions, both areas saw substantial increases in participation in FFW/CFW. The increase was particularly large for Jijiga households. Only 16.3 percent were engaged in FFW/CFW at baseline; a full 60.2 percent were at endline.

Taking children out of school to work is a particularly negative coping strategy as it undermines the long-term human capital of households and degrades their opportunities to escape from poverty and food insecurity in the future. Use of this strategy did not change over time in Borena, but declined considerably in Jijiga, from 14.5 to 8.2 percent of households.

**Financial strategies.** The most commonly-employed financial strategy (at baseline and endline) in both project areas was borrowing money from friends or relatives, though it decreased in Borena and increased in Jijiga (Table 6.2), which parallels results reported for social capital (Chapter 5). Borrowing from friends or relatives also declined considerably among pastoralists (Table 6.3).

The qualitative data reveal that for some Jijiga households the option of borrowing money became increasingly limited as drought progressed. A few FGD participants mentioned borrowing money—from informal sources—as a strategy for dealing with the drought, though it became more and more untenable as the drought wore on. For example, small shops used to allow people to “borrow” food and other necessities, and pay off the loan after harvest (i.e., purchase on credit). As the drought worsened, not only were people unable to repay their loans because they had no harvest or income, shops were often empty of the goods for which people wanted to borrow. Traders would also make in-kind loans, but with high rates of conversion (e.g., a 300 ETB loan might require a bag of peanuts valued of 1000 ETB).

Additionally, there was some reliance on more formal loans as well, particularly from MFIs. At least for those people who were able to secure an MFI loan, once it was repaid, they then had access to even more credit. That is, they could continue borrowing larger and larger amounts as long as they were able to repay their debts.

Returning to the quantitative data in Table 6.2, other financial strategies that saw a change over the project period were leasing out land and drawing down on savings, both of which declined among Jijiga households.

### 6.3 Reliance on Informal and Formal Assistance

**Informal assistance.** Together, relying on assistance from others—whether family and friends or more formal sources—is a common coping strategy in the project area. The quantitative survey results on the percent of households receiving various forms of assistance in order to cope with shocks are illustrated in Figure 6.2 (see Table 6.1 and Table 6.2 for statistical significance).

Following a similar pattern to that of borrowing money from friends or relatives, relying on gifts of money or food from family members has declined in Borena and increased in Jijiga. Reliance on remittances from relatives has declined among all groups. Women participating in the qualitative survey in Jijiga described

the third year of drought as prolonged, saying it “tested our ability to withstand the impact.” They indicated more heavy reliance on remittances and in-kind help (e.g., food, clothes) from relatives living in urban areas.

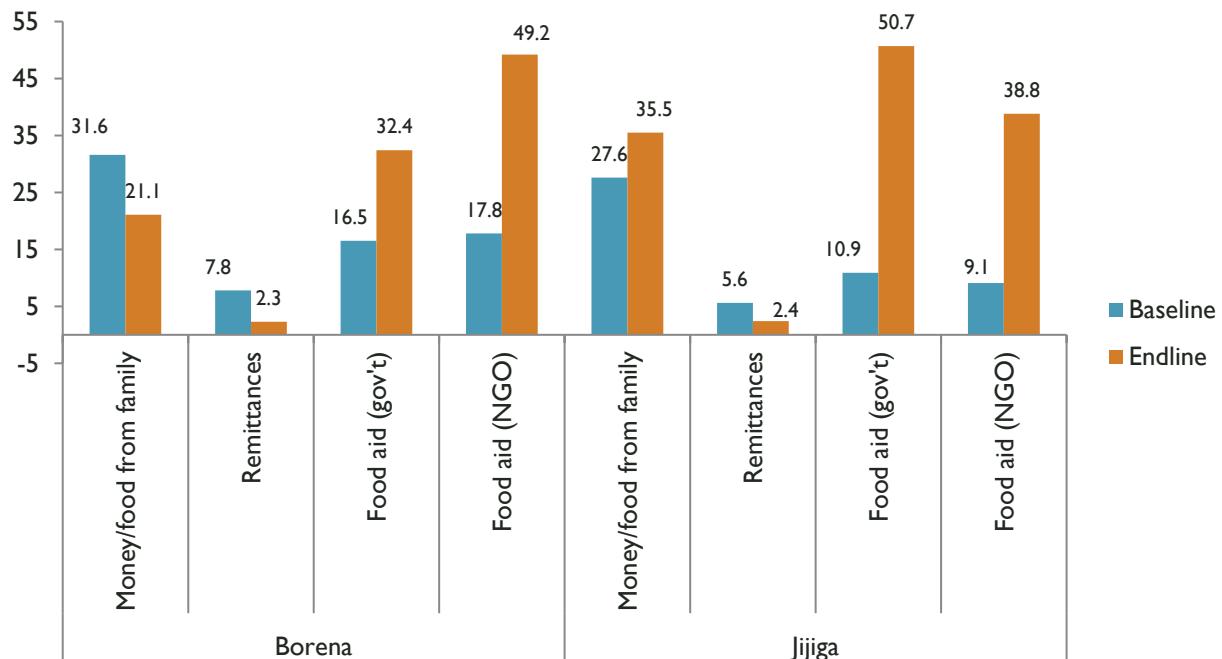
**Formal assistance.** As would be expected with the increase in humanitarian assistance in the project area and the food-stress signaled by high use of food-related coping strategies, reliance on food aid has increased among all groups, more than doubling and in some cases more than tripling between baseline and endline. The most dramatic increase is in food aid received from the government among Jijiga households, which rose from 10.9 to 50.7 percent over the project period.

The qualitative data concur that relying on food aid from NGOs or the government is a key coping strategy in Borena and Jijiga. Food assistance is provided by NGOs, the government’s Productive Safety Net Program (PSNP), and emergency food aid initiatives. As noted in Chapter 5, most KIs and FGD participants felt the food aid they received was insufficient in quantity and quality. Participants reported that households targeted for food aid by one agency were not permitted to also receive support from PSNP and vice versa.

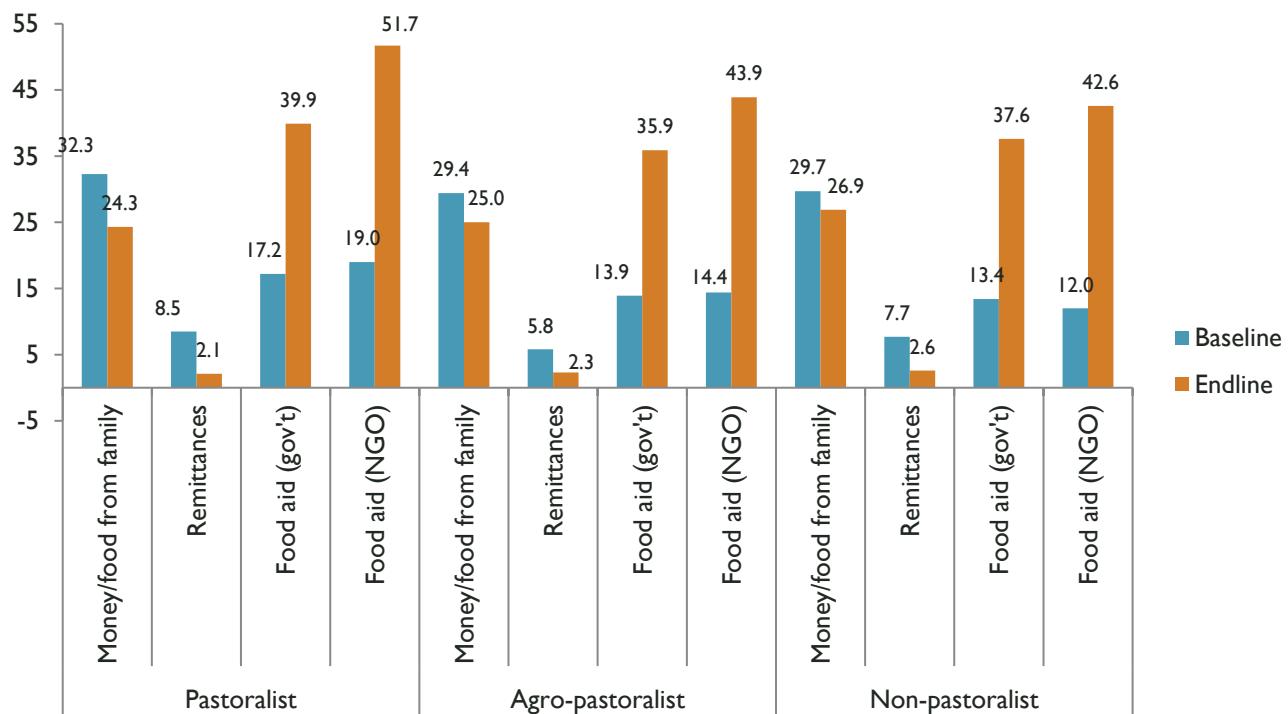
Communities in both regions depend heavily on external support from the government and NGOs to help them during periods of need. At the same time, most feel they must work hard on their own. Thus, while households “depend” on external support at times, by and large there is little mentality of “dependency” in the sense of households refusing to provide their own food or income and rely solely on government or NGO assistance. However, one KI in Borena felt there is a mentality of dependence on food aid in at least some communities, saying it was common to hear, “When is the assistance day? When is it?” even among the able-bodied.

**Figure 6.2 Changes between the baseline and endline in the percent of households relying on various forms of assistance in order to cope with shocks, by project area and pastoralist status**

**(a) By project area**



**(b) By pastoralist status**



## 6.4 Migration

The data on migration presented in Chapter 4 (Section 4.5) showed that there has been a reduction in migration among the panel households included in this endline analysis. While the coping strategies data indicate that migration of some family members has stayed constant, it concurs that migration of whole families and sending members to stay with relatives as a way to cope with stressors have declined (Table 6.2 and Table 6.3).

According to the qualitative data, however, temporarily migrating with livestock to locations with better pasture and/or water is still widely practiced in both Jijiga and Borena. Although distances may be large, such a strategy is often the only way to ensure livestock survive. In fact, moving livestock to better pasture/water is such an integral part of pastoralism in the Jijiga region that FGD participants described it as “an obvious” strategy and do not consider it as “migration” per se. However, female livestock herders often suffer more than men as they tend to have smaller herds (and of smaller animals), limiting the effectiveness of seasonal migration as a strategy for escaping drought.

When asked about migrating in search of work, FGs in Jijiga reported that it was commonly practiced. However, women in several FGs were quite adamant that, “*The fact they [their children] are migrating is not bringing any good fortune to us!*” Rather, they felt that the risks and dangers associated with migrating—particularly internationally—were not worth whatever money could be remitted. In particular, there was strong agreement that international migrants (e.g., to Sweden, Djibouti, Saudi Arabia, Thailand, and Libya) risked being kidnapped and held for ransom by brokers, who often attempted to extort up to ETB 200,000 from families. The women also felt that the drought had not resulted in an increase in people migrating in search of work. Youth migration to urban centers (e.g., Jijiga, Hartisheik, Addis) remains common, though was not discussed as being overly dangerous or life-threatening—nor as having increased as a result of the drought per se. Female youths tend to do domestic work and males tend to look for construction jobs and other wage labor. In Borena, “*The youngsters from the community are expected to migrate to the nearby woreda in search of jobs and to help their family by sending money to cope with the drought.*”

## 6.5 Summary: Household Coping Strategies

Coping strategies are households' responses to the shocks they face and mediate the influence of their resilience capacities on their well-being. The most commonly-employed strategy for coping with the droughts and their many downstream impacts was to reduce food consumption, a negative coping strategy because it undermines human health. The percent of households doing so increased substantially over the project period in Borena (from 71.7 to 93.1 percent) and more moderately so in Jijiga (from 55.6 to 67.4 percent). These trends are a strong indication that the shocks households were exposed to had a negative effect on their food security. Consistent with project-area differences in shock exposure and with food security trends, the use of many food-related coping strategies, such as limiting portion sizes at meal times and the extreme strategy of skipping entire days without eating, increased in Borena but declined in Jijiga.

Relying on informal and formal assistance was also a widely employed coping strategy. Paralleling trends in social capital seen in the last chapter, borrowing from or relying on gifts of food or money from friends and relatives decreased in Borena and increased in Jijiga. Reliance on food aid as a coping strategy has increased dramatically in both Borena and Jijiga and among all of the pastoralist status groups. The project areas also saw substantial increases in participation in food-for-work or cash-for-work.

The large majority of households, a full 70 percent, sold their livestock to cope with shocks. The use of this strategy has increased among Borena households and declined among Jijiga households since the baseline. Taking up new wage labor was also a common strategy that declined among Jijiga households, perhaps due to increasingly limited opportunities. Migration as a coping strategy has been on the decline. Qualitative survey respondents agree that there has not been an increase in migration due to drought, although temporary migration with livestock to seek better pasture or water is still widely practiced.

Resilience marks the ability of households to recover from shocks while not undermining their ability to recover from future shocks. Besides reducing food consumption, the only negative coping strategy to increase over the project period was purchasing food on credit (which puts households at risk of falling into long-term debt). The percent of households employing this strategy rose from 40 to 50 percent in Jijiga. Borrowing from money lenders (who can charge exorbitant interest rates), taking children out of school (which undermines human capital), and consuming seed stock held for the next season (which undermines future food production) all declined, whether due to less need or depleted options.

## 7 HOUSEHOLD WELL-BEING OUTCOMES AND RESILIENCE TO SHOCKS

As seen in Chapter 3, households were exposed to an extreme degree of climate shock over the course of the PRIME project's implementation, along with its numerous downstream impacts. Chapters 4, 5, and 6 documented the changes that have taken place over the four-year period in households' livelihoods (including their economic well-being), and in their livelihood environments, resilience capacities, and coping strategies. This chapter examines the changes in two key well-being outcomes, food security and acute malnutrition among children under five, and in the outcome of prime interest in this report: household resilience to shocks.

### 7.1 Household Food Security

#### 7.1.1 Measurement of Food Security, Hunger, and Dietary Diversity

**Food security.** The measure of food security employed in this report is the inverse of an experiential indicator of food insecurity, the Household Food Insecurity Access Scale (HFIAS) (Coates, Swindale and Bilinsky 2007). The HFIAS is an index constructed from the responses to nine questions regarding people's experiences of food insecurity in the previous four weeks. Responses range from worry about not having enough food to actual experiences of food deprivation associated with hunger, with the nine experiences related to food security being:

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 ever 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 they or another household member experienced the event or feeling in question and, if yes, how often in the 30 days prior to the survey (rarely, sometimes or often). An index is then calculated based on these frequency responses. The inverse of the index is taken for this analysis so that the measure increases with increasing food security. The resulting food security index ranges from 0 to 27.

The HFIAS can also be used to categorize households into four groups: “food secure,” “mildly food insecure,” “moderately food insecure,” and “severely food insecure.” The groups are formulated based on the assumption that the severity of food insecurity progresses from feeling worried, through concerns about dietary quality, and finally, experiencing an actual lack of food. A food secure household faces none of the nine experiences listed above, or just worry, but rarely. At the other end of the spectrum, a severely food insecure household has cut back on meal size or the number of meals eaten in a day often, and/or faces any of the three most severe conditions: running out of food, going to bed hungry, or going a whole day and night without eating.

**Hunger.** The “Household hunger scale”, ranging from 0 to 6, is similar to the HFIAS but is only based on the three HFIAS questions pertaining to the most severe forms of food insecurity. The prevalence of hunger is calculated as the percentage of households whose scale value is greater than or equal to two, which represents “moderate to severe hunger” (Ballard, Coates, Swindale and Deitchler 2011).

**Dietary diversity.** The HFIAS combines information on the sufficiency of food consumption with information on the quality of households’ diets, both of which are important dimensions of food security. A measure focused specifically on dietary quality is also employed here: a dietary diversity score calculated as the total number of food groups, out of 12, from which household members consumed food in the day prior to the survey (Swindale and Bilinsky 2006).

## 7.1.2 Changes in Food Security

Table 7.1 documents the changes in food security and related indicators that took place between the baseline and endline surveys. As illustrated in Figure 7.1, the Borena area experienced a strong reduction in food security, with the index value falling by 25 percent, but it held steady overall in Jijiga. Note that the two project areas started out with near the same level of food security at baseline, but by endline the food security index was 27 percent higher among Jijiga households. The food security index declined for all of the pastoralist status groups, with the greatest declines seen for pastoralists (by 25 percent), followed by agro-pastoralists (by 15.5 percent), and non-pastoralists (by 11.8 percent).

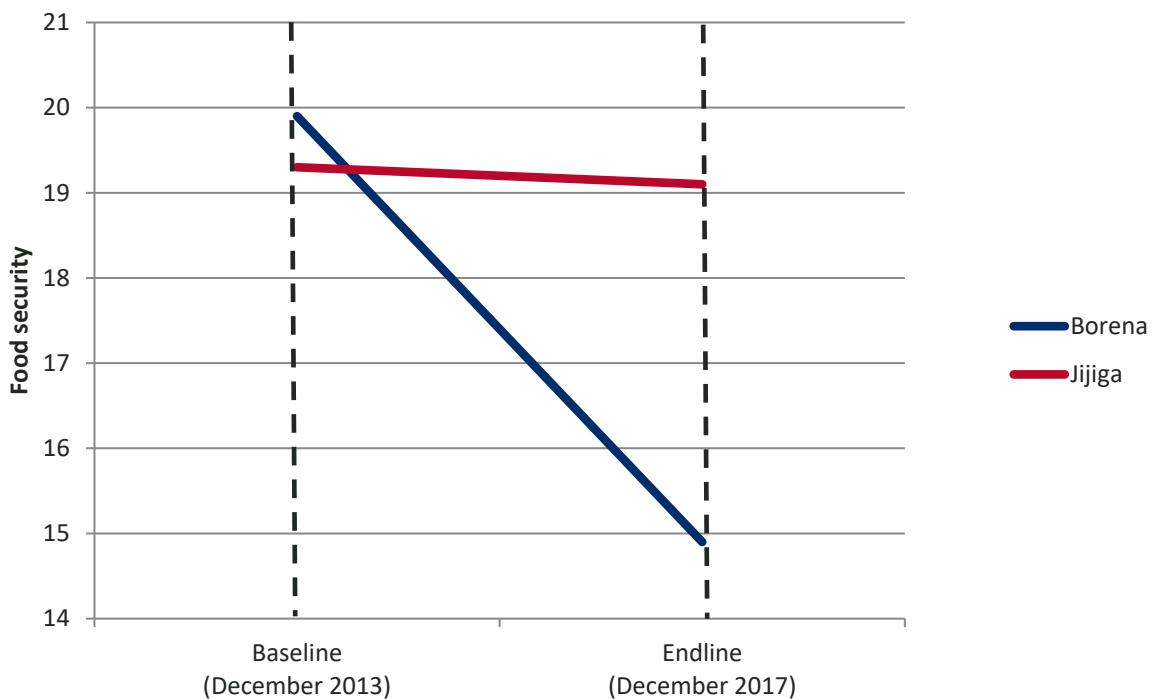
The percentage of households classified as food secure fell for all groups, even among Jijiga households, a trend related to shifts within the three food *insecurity* classifications (see Figure 7.2). In Borena, the percentage of food secure households declined so much that by endline only 4.4 percent of households fell into this category. Meanwhile, the percentage of households severely food insecure rose dramatically from 31.9 percent at baseline to 64.6 percent at endline. Among the pastoralist status groups, pastoralists and agro-pastoralists also saw large increases in the percentage of severely food insecure households (see Figure 7.2b).

Similar to the results for changes in severe food insecurity, the percentage of households classified as being in hunger showed a sharp increase in Borena and a sharp decrease in Jijiga (Table 7.1). Hunger increased among pastoralists and agro-pastoralists and showed no change among non-pastoralists.

**Table 7.1 Changes in food security between the baseline and endline, by project area and pastoralist status**

Food security indicators	All		Project area				Pastoralist status					
	Base-line	End-line	Borena		Jijiga		Pastoralist		Agro-pastoralist		Non-pastoralist	
			Base-line	End-line	Base-line	End-line	Base-line	End-line	Base-line	End-line	Base-line	End-line
Household food security scale (mean)	19.7	16.1 ***		19.9	14.9 ***	19.3	19.1		20.0	15.0 ***	20.0	16.9 ***
Food security groups(%)									24.3	4.4 ***	25.9	9.0 ***
Food secure	26.4	7.9 ***	25.5	4.4 ***	28.8	17.1 ***			30.6	11.2 ***		
Mildly food insecure	3.8	4.3	3.7	2.8	3.9	8.4 ***			3.7	2.7	3.7	4.0
Moderately food insecure	33.9	30.1 *	38.9	28.2 ***	21.0	35.1 ***			20.1	28.3 **		
Severely food insecure	35.9	57.6 ***	31.9	64.6 ***	46.3	39.4 **			45.2	56.0 **		
Household Hunger Scale (mean; range 0-6)	0.7	1.0 ***	0.5	1.1 ***	1.0	0.7 ***			1.0	1.0		
Households in hunger(%)	18.7	28.4 ***	13.7	32.3 ***	31.3	18.8 ***			28.7	26.1		
Dietary diversity score(mean;range 0-12)	4.2	4.6 ***	4.5	4.6	3.5	4.5 ***			3.6	4.7 ***		

Stars indicate a statistically significant difference at the 10%(\*), 5%(\*\*), and 1%(\*\*\*) levels.

**Figure 7.1 Trajectory of food security between the baseline and endline, by project area**

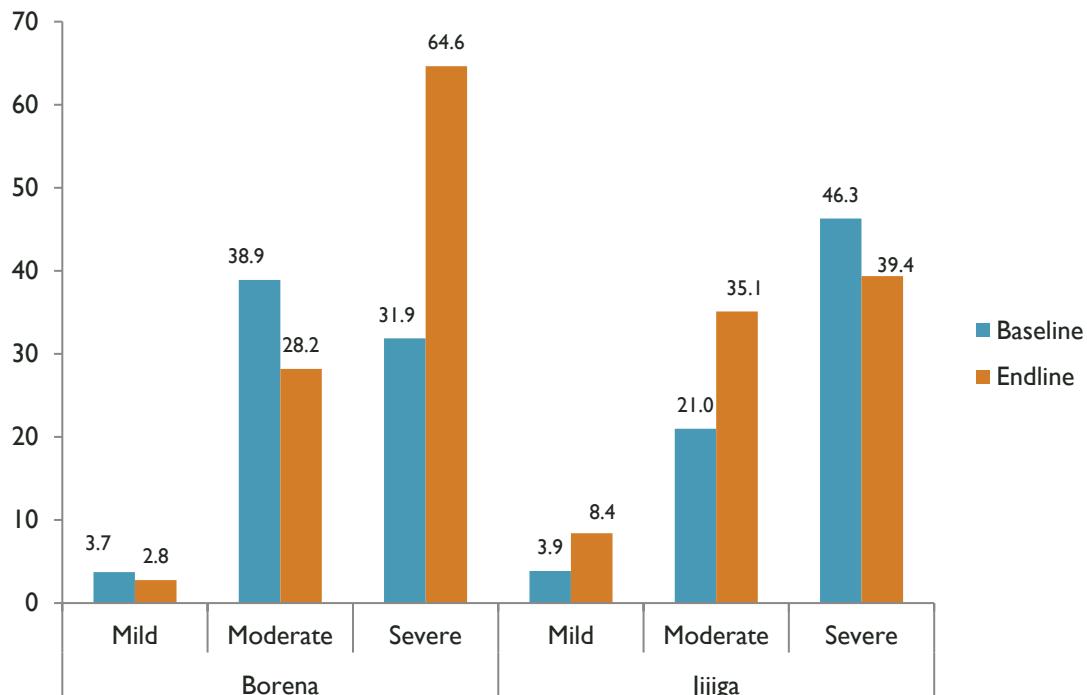
Dietary diversity increased among Jijiga households and non-pastoralists but did not change among Borena households. The food groups that saw increased consumption in Jijiga (in terms of percentages of households) were grains, roots and tubers, vegetables, legumes, dairy, oils and fats, and sweeteners. Note that some other nutritionally significant food groups, including meat, eggs and fish, while rarely consumed, saw declines in consumption.

Data on the total change in food security from baseline to endline masks significant fluctuations in the interim period, as can be seen in Table 7.2 and Figure 7.3, which incorporate data from RMS-1 and RMS-2. The overall decline in food security for Borena is marked by a sharp drop-off between the baseline and the RMS-1 shock period, during which the index declined to its lowest measured level of 13 points in January 2015. This low level of food security continued throughout the El Niño/ IOD shock period, as captured in the RMS-2. There was a steady decline in the percentage of Borena households classified as food secure and a fluctuating, but ultimately increasing, percentage of households classified as severely food insecure.

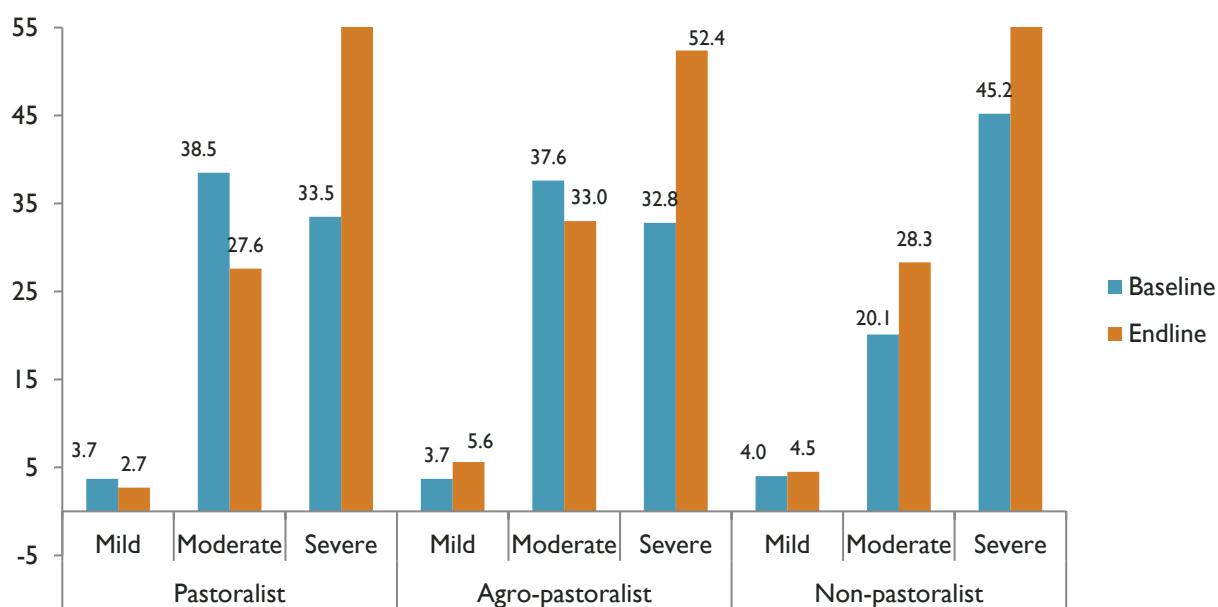
While the total baseline-to-endline trend is flat for Jijiga, in fact households in Jijiga were able to achieve far higher levels of food security in the interim. The RMS-1 shock period saw a rise in the food security index to its highest measured level of 23.2—also in January 2015, the same month in which it reached its lowest level for Borena households. In the RMS-2 period, the food security index started out at this high level but steadily declined thereafter (Figure 7.3).

**Figure 7.2 Percent of households mildly, moderately, and severely food insecure, baseline versus midline for the project areas and pastoralist status groups**

**(a) Project area**



**(b) Pastoralist status**

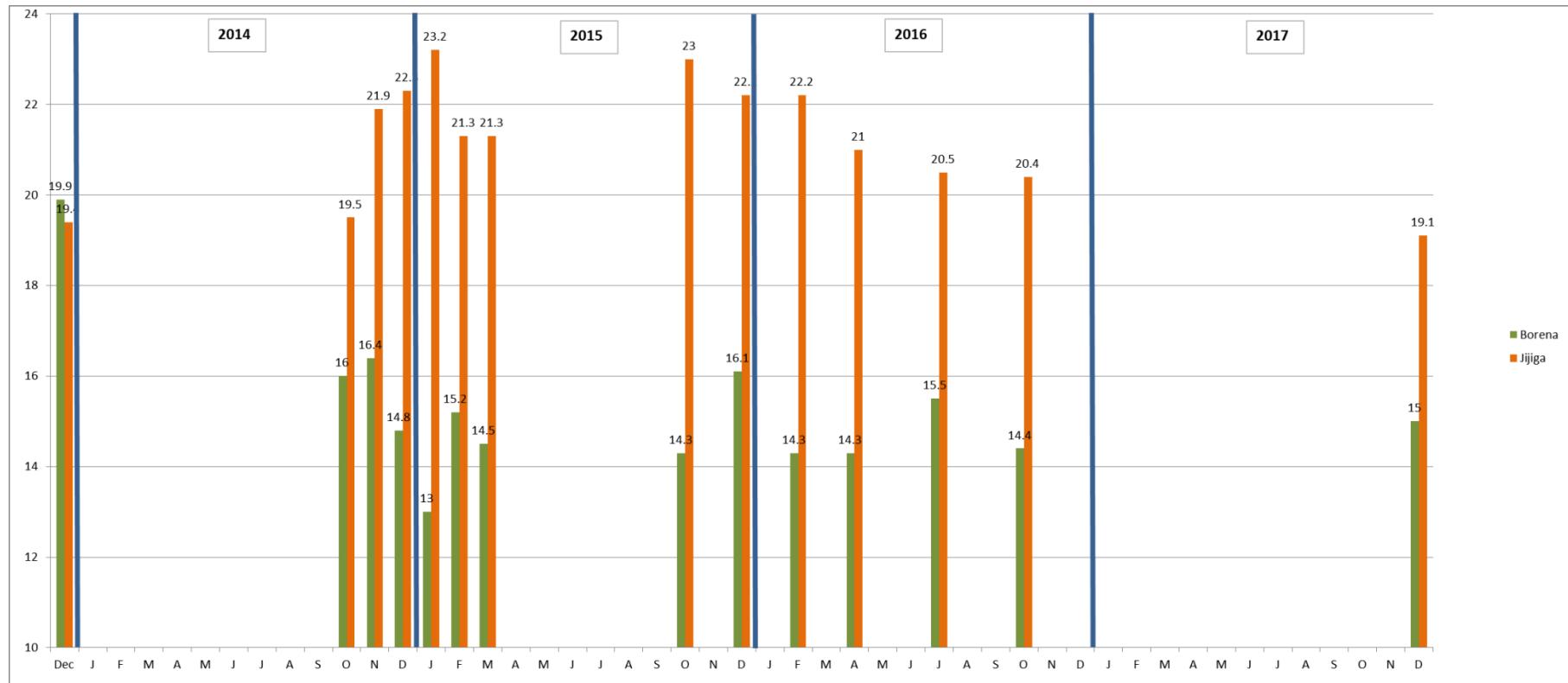


**Table 7.2 Changes in food security between the baseline and endline at five points in time, by project area**

Coping strategy	All					Borena					Jijiga				
	Dec 2013 (Baseline)	Dec 2014 (RMS1)	Dec 2015 (RMS2)	Oct 2016 (RMS2)	Dec 2017 (Endline)	Dec 2013 (Baseline)	Dec 2014 (RMS1)	Dec 2015 (RMS2)	Oct 2016 (RMS2)	Dec 2017 (Endline)	Dec 2013 (Baseline)	Dec 2014 (RMS1)	Dec 2015 (RMS2)	Oct 2016 (RMS2)	Dec 2017 (Endline)
Household food security scale (mean; range 0-27)	19.7	16.8	18	16.2	16.1	19.9	14.8	16.1	14.4	14.9	19.3	22.3	22.2	20.4	19.1
Food security groups(%)															
Food secure	26.4	19.4	10.9	5.4	7.9	25.5	12.4	9.4	0.6	4.4	28.8	38.2	20.0	23.2	17.1
Mildly food insecure	3.8	2.4	5.0	0.6	4.3	3.7	0.0	0.5	0.0	2.8	3.9	9.0	20.7	1.4	8.4
Moderately food insecure	33.9	17.2	32.9	52.5	30.1	38.9	13.9	29.8	50.2	28.2	21.0	26.0	40.1	52.3	35.1
Severely food insecure	35.9	61.0	51.2	41.6	57.6	31.9	73.7	60.2	49.3	64.6	46.3	26.9	19.3	23.2	39.4

Note: Stars denote a statistically significant difference (at least at the 5% level) between baseline and endline values.

Note: The values presented refer to the coping strategies used in response to the shocks experienced in the previous year with two exceptions: purchasing food on credit and consuming seed stock. These were strategies households reported employing in the 7 days prior to administration of the survey.

**Figure 7.3 Trends in food security between the baseline and endline with RMS-1 and RMS-2 data points, by project area**

## 7.2 Acute Malnutrition Among Children Under Five

In this section, data are presented on changes since baseline in the prevalence of wasting—or “acute malnutrition”—among one of the most vulnerable population groups, children under five years of age. Wasting is a particularly relevant indicator in this shock-prone environment because it is a short-term indicator of poor nutritional status that is sensitive to recent and severe events leading to substantial weight loss, usually due to inadequate food consumption, illness, or both.”<sup>23</sup> While relevant, it is important to note that, being reflective of recent events, any changes over time will represent current conditions at the beginning and end points rather than long-term trends.

A child is considered to be wasted if her or his weight-for-height z-score is below -2 standard deviations from the international reference. The World Health Organization 2006 Child Growth Standards are employed here.<sup>24</sup> Note that the Ethiopia-wide prevalence of wasting was 10.0 percent in 2016 (WHO 2019).

As seen in Table 7.3 and Figure 7.4, the prevalence of wasting has fallen substantially in the Borena project area but increased in Jijiga, the opposite pattern seen for food security. Among the pastoralist status groups, wasting fell for pastoralists and agro-pastoralists, but changed little for non-pastoralists.

Given no decline in food security or dietary diversity in Jijiga, the almost doubling of the wasting prevalence there is likely due to the deteriorating health conditions described in Chapter 3, Section 3.3. According to reports from qualitative respondents, increasing scarcities of clean water and the ensuing poor sanitation practices led to outbreaks of acute watery diarrhea among children. Relatedly, the percentage of households with access to a health center in Jijiga fell markedly, from 94.3 percent at baseline to 29.7 percent at endline (see Table 5.4). The reasons behind the large increase in the wasting prevalence in Jijiga merit further research.

**“Babies are malnourished; some are surviving only because of the Plumpy’Nut provided by health extension workers.”**

- KII; Borena

<sup>23</sup> It is not possible to calculate prevalence of stunting and underweight as the large majority of respondents were not able to accurately report their children’s ages to the level of precision required (month of age) or provide official documents with birth dates such as vaccination records.

<sup>24</sup> de Onis, M., Garza, C., Victora, C.G., Bhan, M.K., and Norum, K.R. 2004. It should be kept in mind that there is some controversy over whether these standards are applicable to pastoralist populations, among whom children under five tend to be exceptionally tall and thin. This growth pattern results in values for wasting prevalence that are substantially higher than the norm, which may be linked to genetics rather than inadequate food consumption or poor health (Crobler-Tanner, C. 2006).

**Table 7.3 Child malnutrition: Wasting among children under five, by project area and pastoralist status**

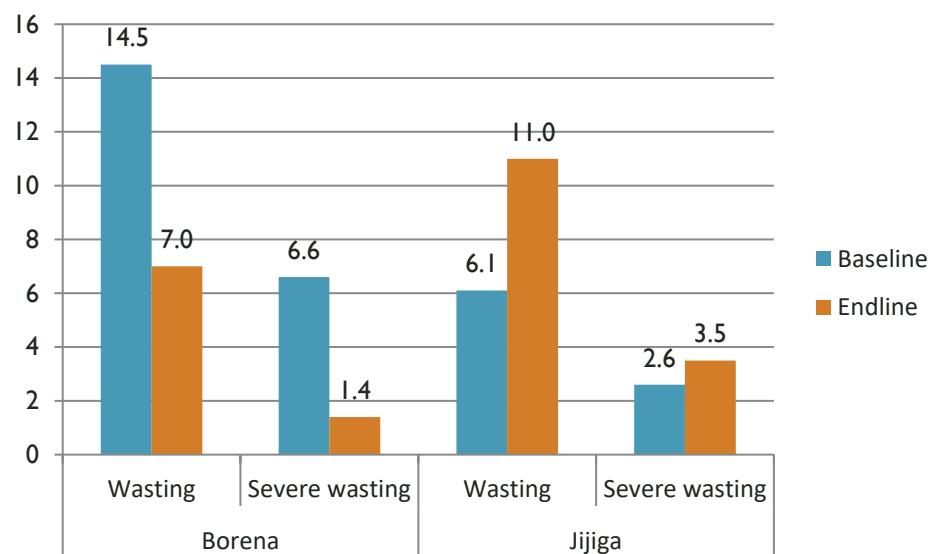
Food security indicators	All		Project area				Pastoralist status					
	Base- line	End- line	Borena		Jijiga		Pastoralist		Agro- pastoralist		Non-pastoralist	
			Base- line	End- line	Base- line	End- line	Base- line	End- line	Base- line	End- line	Base- line	End- line
Percent wasted	12.3	8.0 ***	14.5	7.0 ***	6.1	11.0 ***	13.6	7.6 ***	13.2	7.9 ***	8.5	9.0
Percent severely wasted	5.4	1.9 ***	6.6	1.4 ***	2.6	3.5	6.9	2.8 ***	5.6	1.0 ***	3.3	2.5

Stars indicate a statistically significant difference at the 10%(\*), 5%(\*\*), and 1%(\*\*\*) levels.

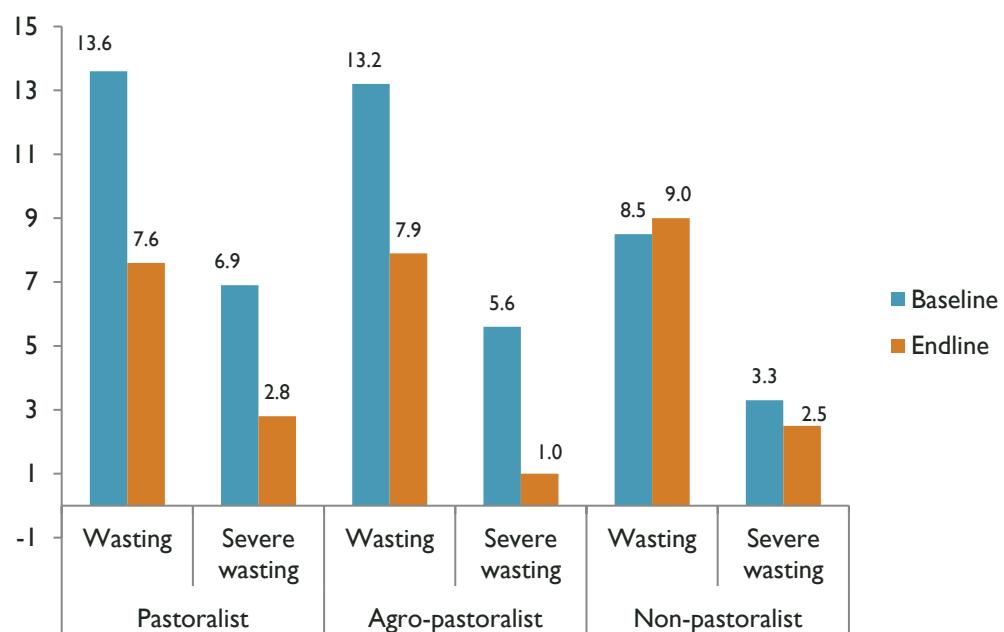
Note: The number of children under five for these calculations is 2,266 at baseline and 2,426 at endline.

**Figure 7.4 Percent of children under five wasted, baseline versus endline for the project areas and pastoralist status groups**

**(a) By project area**



**(b) By pastoralist status**



Qualitative data from Jijiga also point to dramatically reduced milk production, which also led to significant increases in price, as a consequence of the drought. According to one FGD participant, the price of milk had more than tripled between baseline and endline, rising from 5 ETB to 20 ETB at endline. Thus, there was a large reduction in availability of milk, a highly nutritious and important source of food, particularly for children. Note that the increase in the percent of Jijiga households consuming dairy products between the baseline and endline referred to above (specifically, from 59.4 to 74.0%) may mask a reduction in average quantities consumed.

Increased malnutrition, health ailments and disease in humans, both children and adults, were widely cited in the qualitative data collected in both Jijiga and Borena as significant consequences of the drought. Some FG participants stated that many community members had suffered from diarrhea and malnutrition. One group in Borena reported that the number of women, children, and elderly affected by malnutrition increased two-fold in their community. FGs and KIs in Jijiga indicated that women—especially pregnant and lactating women—and children had suffered nutritionally and that “stunting” among children had increased. They also indicated that while many communities have health posts, they tend to be non-functional, primarily due to a lack of supplies and materials. FGs felt that the prolonged nature and severity of the El Niño-related drought simply overwhelmed an already inadequate system.

### 7.3 Resilience to Shocks

Which population groups have been the most resilient? Did households’ ability to recover from shocks improve over the PRIME project’s operational period? Two indicators of resilience—one objective and one subjective—are employed to answer these questions and, in Chapter 9, determine whether the PRIME projects’ interventions strengthened households’ resilience. The objective indicator is the change in food security over the project period.<sup>25</sup> This indicator directly measures households’ ability to recover, with ability indexed to a well-being outcome related to households’ basic survival.<sup>26</sup> Figure 1.3 in Chapter I illustrates the various possible trajectories of a well-being outcome over a shock period: “collapse”, “recover some” (both of which indicate that a household was not resilient), and “bounce back” and “better off than before” (which indicate resilience).

The subjective indicator is an index of households’ perceived ability to recover from the shocks they experienced in the year prior to each survey. The index is constructed based on households’ reports of their ability to recover from the specific shocks they were exposed to. The shocks used in this measure are the same downstream shocks employed to construct the perceptions-based shock exposure measure (see Section 3.2). Regarding each shock, survey respondents were asked “To what extent were you and your household able to recover?” The possible responses were:

- Did not recover;
- Recovered some, but worse off than before;

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<sup>25</sup> Note that it was not possible to construct another important objective indicator of resilience, stability of food security, because panel data were not collected for all sample households at regular intervals.

<sup>26</sup> The change in asset ownership over the course of the drought was also considered as a potential measure of households’ resilience. However, because some PRIME project (and humanitarian assistance) implementation modalities involved productive and livestock assets (for example livestock off-take, input provision, and proactive herd size reduction), this was not an option.

- Recovered to same level as before;
- Recovered and better off; and
- Not affected.<sup>27</sup>

Table 7.4 reports on the change in food security over the project period. The mean change is negative, indicating that the average household was not able to maintain its baseline level of food security or get back to it by endline. The probability densities<sup>28</sup> of the change in food security shown in Figure 7.5 for Borena and Jijiga indicate wide variation in individual households' recovery, however. Thirty-six percent were resilient—able to get back to or improve upon their pre-drought level of food security—while the rest were not (Table 7.4).

**Table 7.4 Resilience: Changes in food security between the baseline and endline, by project area and pastoralist status**

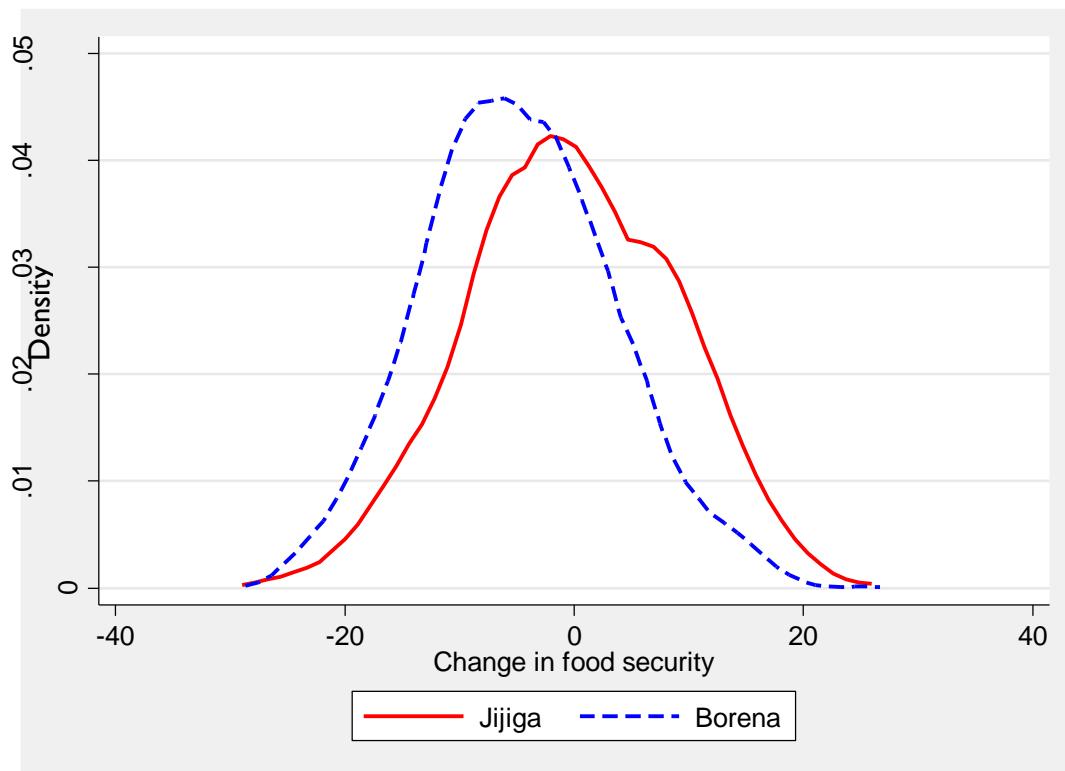
	All	Project area		Pastoralist status		
		Borena	Jijiga	Pastoralist	Agro-pastoralist	Non-pastoralist
<b>Food security</b>						
Total change	-3.6	-4.9	-0.3 <sup>a</sup>	-5.1 <sup>a</sup>	-3.2 <sup>a</sup>	-2.2 <sup>a</sup>
Percent households resilient	36.1	29.9	51.3 <sup>a</sup>	30.5 <sup>a</sup>	36.9 <sup>a</sup>	42.6 <sup>a</sup>
<b>For reference</b>						
Baseline food security		19.9	19.3	20.0	20.0	18.7
<b>Shock exposure</b>						
Total rainfall deficit		34.9	31.4			
Total soil moisture deficit		1466.4	1200.9			
Shock exposure index (Endline)		20.9	17.9	21.5	18.7	19.4
Number of shocks in last year (Endline)		5.6	5.3	5.8	5.3	5.4

Note: Reported values for subgroups with the same superscript are significantly different at least at the 0.05 level.

<sup>27</sup> The index is a weighted sum constructed as  $\sum D * Score$ , where D is a dummy variable equal to 0 if the shock was not experienced and 1 if it was experienced, and “Score” is the value of the five-point ability to recover score.

<sup>28</sup> A probability density function shows the probability of attaining each value of a variable in a sample. The total area under the function is equal to 1 (covering 100 percent of the sample).

**Figure 7.5 Probability density of the change in food security between the baseline and endline, by project area**



As a group, Jijiga households were more resilient than Borena households. Over one-half of Jijiga households recovered from the shocks they faced, but only one-third of Borena households did. This pattern partially reflects the differences in drought exposure across the areas—the total rainfall and soil moisture deficits were higher in Borena. Additionally the self-reported measures of shock exposure show higher levels in Borena at endline (see bottom panel of Table 7.4). Note that substantial differences in baseline food security across the regions could also induce measurement-related differences in this resilience indicator. Baseline food security differs little across them (19.9 vs. 19.3).

Among the pastoralist status groups, non-pastoralists were the most resilient followed by agro-pastoralists. Pastoralists were the least resilient. Here again, these differences partially reflect shock exposure, with pastoralists experiencing the highest shock exposure by endline. In terms of initial food security, non-pastoralists did have somewhat lower food security at baseline, which could give them a slight comparative resilience advantage by this measure.<sup>29</sup>

At endline, the perceived ability to recover measure showed a similar pattern of Jijiga households being more resilient than Borena households and pastoralists being the least resilient. However, agro-pastoralists indicated a better ability to recover than non-pastoralists.

<sup>29</sup> Households with lower starting food security have relatively greater room for growth in food security.

Unlike the objective measure of resilience, the perceived ability to recover index allows us to look at changes in resilience over the project period (see Table 7.5 and Figure 7.6). By this measure, households' ability to recover has declined among Borena households (a fall in the index value of 25.2 percent) but increased slightly among Jijiga households (by 6 percent).

Note, however, that female FGs in Jijiga described successive worsening in their ability to deal with and recover from the three years of drought they experienced. Although they still relied on assistance every year, they also saw their resources diminishing and their strategies failing more so every year. Most communities in Jijiga perceived they were not recovering from the drought by the second round of monitoring in 2015. Most had lost all or most of their livestock, there were no reserves of water or pasture, and no tangible ways of making up the income or producing food.

Resilience as measured by households' perceived ability to recover has declined among all of the pastoralist status groups, but the most among pastoralists.

Looking at specific types of shocks, Borena households' perceived ability to recover from all of the most prevalent climate shocks and economic shocks, including drought, has declined (Table 7.5). Jijiga households' perceived ability to recover from these shocks has increased. However, their ability to recover from the economic shocks has stayed constant with the exception of a decline in ability to recover from "no demand for agricultural or livestock products".

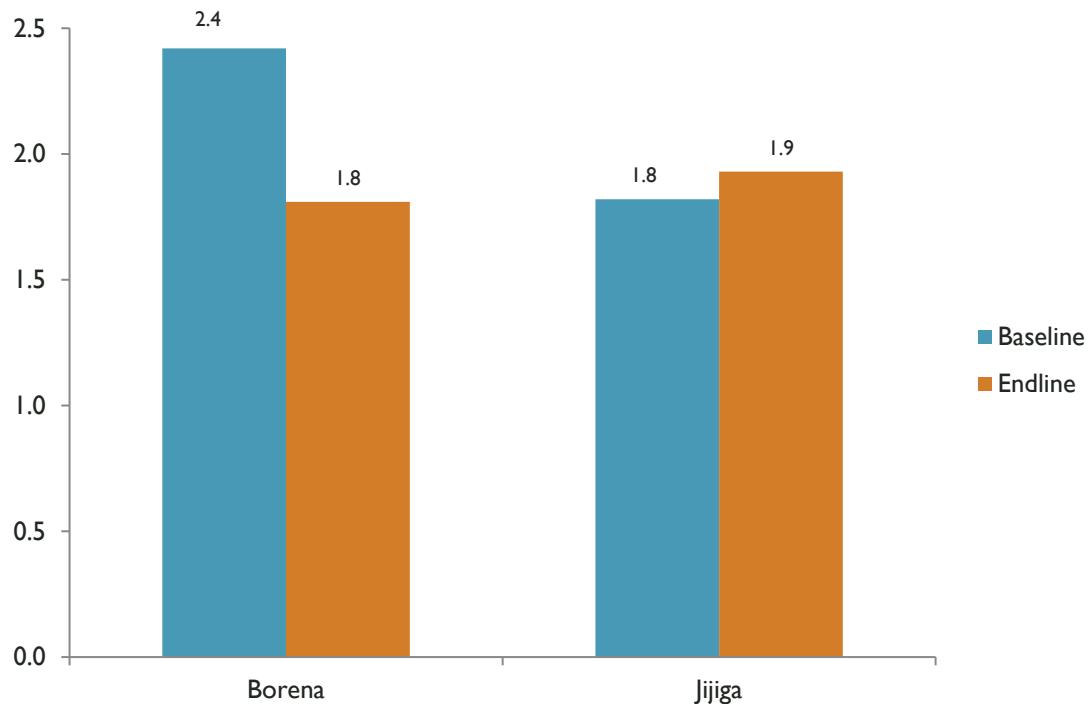
**Table 7.5 Resilience: Changes in perceived ability to recover between the baseline and endline, by project area and pastoral status**

	All		Project area				Pastoralist status					
	Base-line	End-line	Borena		Jijiga		Pastoralist		Agro-pastoralist		Non-pastoralist	
			Base-line	End-line	Base-line	End-line	Base-line	End-line	Base-line	End-line	Base-line	End-line
<b>Perceived ability to recover (index)</b>	2.25	1.84 ***			2.42	1.81 ***	1.82	1.93 **			2.33	1.78 ***
<b>Ability to recover from ...</b>												
Climate shocks												
Too little rain/drought	2.12	1.69 ***			2.33	1.61 ***	1.75	1.90 **			2.24	1.60 ***
Livestock/crop disease	2.32	1.90 ***			2.54	1.85 ***	1.73	2.03 ***			2.46	1.82 ***
Very bad harvest	2.05	1.71 ***			2.19	1.66 ***	1.69	1.88 **			2.22	1.64 ***
Economic shocks												
Sharp food price increases	2.29	1.70 ***			2.50	1.69 ***	1.67	1.74			2.35	1.65 ***
Unavailability of agricultural or livestock inputs	2.14	1.83 ***			2.55	1.86 ***	1.80	1.77			2.32	1.84 ***
No demand for agricultural or livestock products	2.25	1.80 ***			2.40	1.77 ***	2.13	1.88 ***			2.28	1.78 ***
Increase in price of agricultural or livestock inputs	2.41	1.97 ***			2.67	2.02 ***	1.87	1.83			2.45	1.96 ***
Drop in price of agricultural or livestock products	2.47	1.80 ***			2.79	1.77 ***	1.92	1.88			2.59	1.71 ***

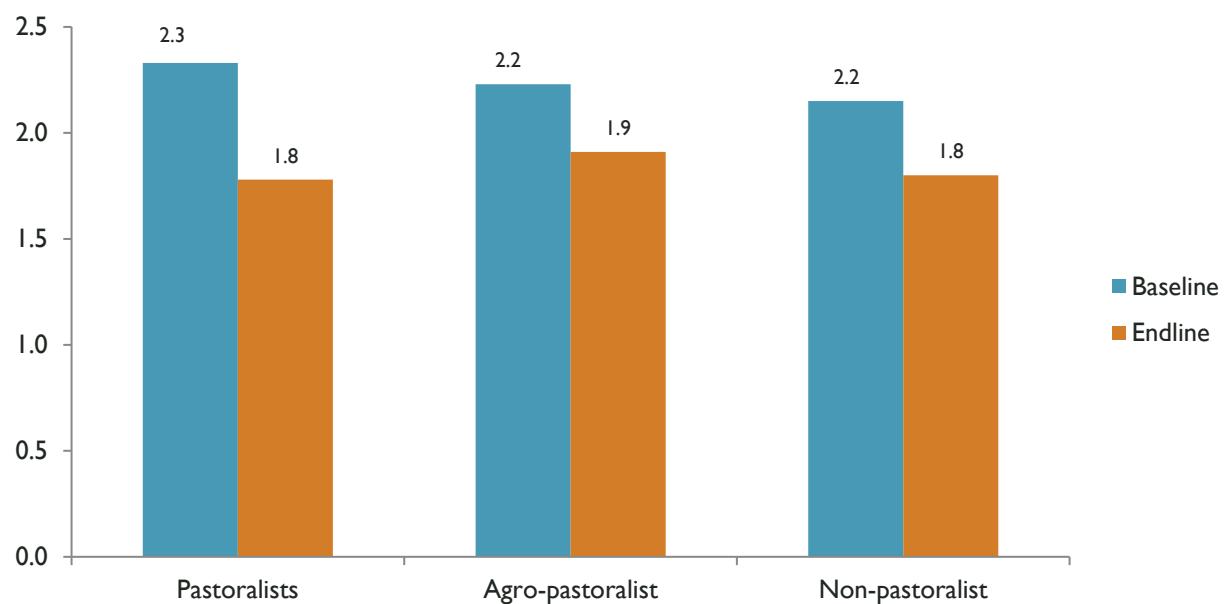
Stars indicate a statistically significant difference at the 10%(\*), 5%(\*\*), and 1%(\*\*\*) levels.

**Figure 7.6 Changes in perceived ability to recover, baseline versus endline for the project areas and pastoral status groups**

**(a) By project area**



**(b) By pastoral status**



## 7.4 Summary: Household Well-being Outcomes and Resilience to Shocks

This chapter has examined trends over the project period in two key well-being outcomes, household food security and acute malnutrition among children under five, and trends in the key outcome of interest in this report: household resilience to shocks.

The Borena area experienced a strong reduction in food security over the project period, accompanied by a very large increase in the prevalence of severe food insecurity, from 31.9 to 64.6 percent. By contrast, food security held steady in Jijiga, and the prevalence of severe food insecurity dropped (from 46.3 to 39.4 percent). Food security declined for all of the pastoralist status groups, but the most among pastoralists, followed by agro-pastoralists and non-pastoralists.

In contrast to these regional differences in food security trends, the prevalence of wasting almost doubled in Jijiga (from 6.1 to 11.0 percent), but declined in Borena (from 14.5 to 7.0 percent).

Wasting is a measure of acute malnutrition that is sensitive to recent and severe events leading to substantial weight loss, usually due to inadequate food consumption or illness or both. The qualitative data point to increasing scarcities of clean water due to successive droughts and the ensuing poor sanitation practices leading to diarrhea among children as a cause of the increase in wasting in Jijiga. Access to health services also fell markedly in Jijiga, but not Borena.

Two indicators of resilience are employed in this report. The first, an objective indicator, is the change in food security between the baseline and endline surveys. The second, a subjective indicator, is an index of households' perceived ability to recover from the shocks they faced in the previous year. By the objective measure, Jijiga households as a group were more resilient to the shocks they faced over the project period than Borena households. Among the pastoralist status groups, non-pastoralists were the most resilient followed by agro-pastoralists. Pastoralists were the least resilient. At endline, and referring to the shocks in the previous year, the perceived ability to recover measure showed a similar pattern of Jijiga households being more resilient than Borena households and pastoralists being the least resilient. However, agro-pastoralists indicated a better ability to recover than non-pastoralists.

Mirroring relative trends in food security, the perceived ability to recover measure indicates that households' ability to recover has declined considerably among Borena households over the project period, but increased slightly among Jijiga households.

## 8 HOUSEHOLDS' ENGAGEMENT IN RESILIENCE-STRENGTHENING INTERVENTIONS AND RECEIPTS OF HUMANITARIAN ASSISTANCE

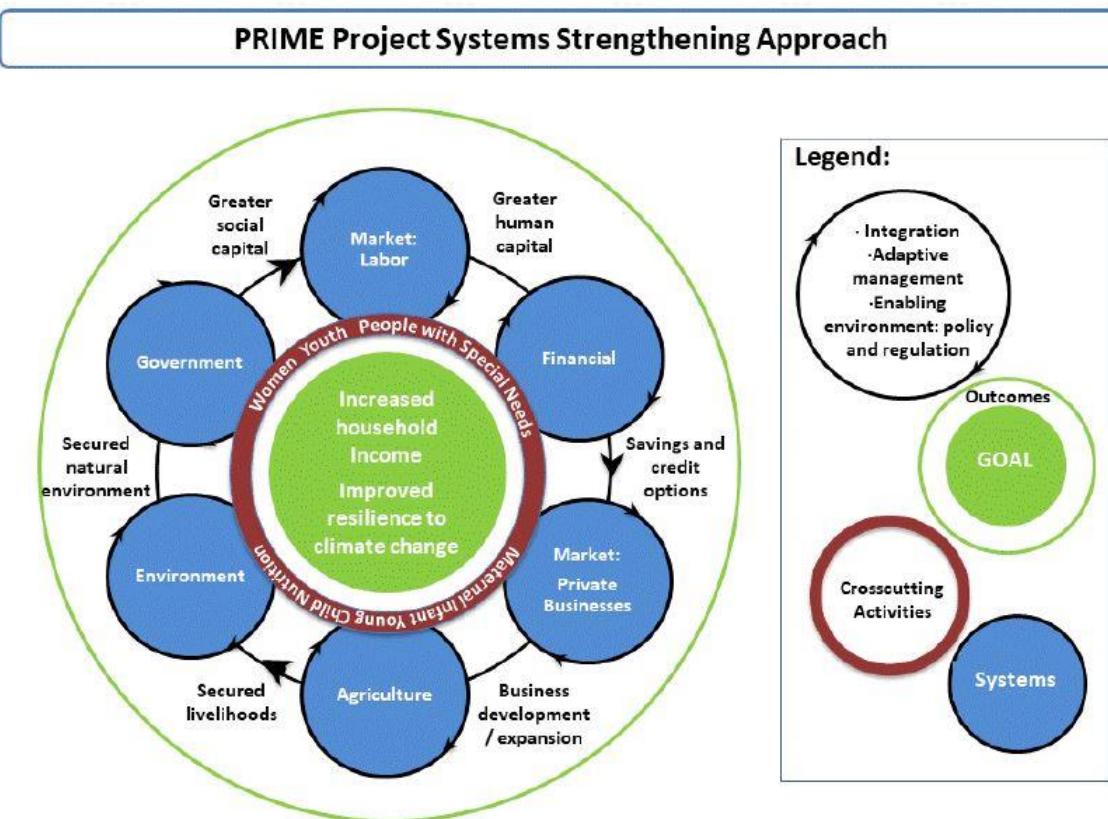
In addition to their resilience capacities, households' ability to recover from the shocks they faced over the PRIME project's operational period was influenced by two factors. The first is the resilience-strengthening interventions they were engaged in, which are hypothesized to have strengthened their resilience. The second is the humanitarian assistance they received as part of the government and NGO response (including that of the PRIME project). In preparation for the impact evaluation analysis presented in Chapter 9, this chapter looks at how widespread these interventions and assistance were in the PRIME IE area and compares their prevalence across Borena and Jijiga and the pastoralist status groups.

### 8.1 Engagement in Resilience-strengthening Interventions

The PRIME project had wide coverage among its target population, reaching an estimated 1,733,000 households. However, other development actors, including the Ethiopian government and NGOs not associated with PRIME, were also operating in the IE area during the project's implementation period. The data collected from households and communities on their engagement in resilience-strengthening interventions do not allow us to distinguish between PRIME's and these other actors' interventions. While the indicators of engagement in interventions for which data are presented below are for the specific types of interventions implemented by PRIME, they are thus referred to more broadly as "resilience-strengthening interventions" and not PRIME interventions. Note that in Chapter 9 some woreda-level data provided by Mercy Corps enumerating PRIME interventions will be used to help discern attribution to the project.

#### 8.1.1 *Exposure To versus Participation In Interventions*

The PRIME project used a "systems-strengthening approach" spanning many sectors, including markets, financial services, livestock/agriculture, and the environment (Mercy Corps 2018) (see Figure 8.1). It implemented most of its resilience-strengthening interventions at a systems level, meaning that households were not targeted for direct participation in them. For example, PRIME helped to establish ten new milk collection centers, including offering trainings on milk quality and hygiene and basic business skills. In support of local livestock trading enterprises, it established 12 new feedlots and ran trainings for feedlot operators (Mercy Corps 2018). Even though households and their members, the ultimate intended beneficiaries of the project, may not have directly participated in such systems-level interventions, those nearby were "exposed" to them and may have benefitted indirectly, for example through induced price changes, employment, or information made available.

**Figure 8.1 The PRIME project's systems-based approach**

On the other hand, households were given the opportunity to directly participate in some interventions, for example, those that strengthened access to financial services. Additionally, they may have made a decision to take advantage of a service implemented at a broader systems level, for example by selling an animal to a feedlot or purchasing medications at a veterinary clinic. This direct participation may have had a stronger impact on the household-level outcomes of interest here, such as their resilience.

For the purposes of this impact evaluation, households' overall “engagement” in resilience-strengthening interventions is thus measured using separate indicators of their exposure to interventions and their participation in interventions.

### 8.1.2 Measurement of Exposure To and Participation In Interventions

Based on the data collected in the endline survey, household engagement in resilience-strengthening interventions is measured following three steps.

**Step 1.** First the project's interventions were divided into four categories. These “intervention sets,” along with a description of the main interventions implemented in each, are:

#### (I) Livestock productivity and competitiveness

Establishment of veterinary pharmacies, support for community animal health workers, improving access to commercial animal feed and fodder seed, supporting livestock and livestock product

(milk) businesses, and dissemination of information on animal health and feeding topics and on livestock market prices.

#### **(2) Pastoral natural resource management (PNRM)**

Assistance to communities in mapping their natural resources and making natural resource management plans. Support of improvements in water sources for animals and in rangeland management.

#### **(3) Financial services**

Establishment or support of existing VSLAs, RuSACOs, mobile banking services, and microfinance/savings groups.

#### **(4) Climate change adaptation (CCA)**

Support of disaster planning and response programs and community groups, assistance to communities in developing plans to respond to shocks, and dissemination of information about early warning and climate change adaptation topics.

**Step 2.** Next, indexes of exposure to and participation in each of the four intervention sets were calculated. The indexes of *exposure* to each set of interventions are based on multiple indicators of the presence of the interventions in each of the 73 sample kebeles at some time over the project period. The indicators, listed in the left-hand column of Table 8.1 (in Section 8.1.3), are calculated using data collected in the community surveys and supplemented by kebele-level measures derived from aggregated household-level data. They were chosen based on a comprehensive inventory of the PRIME project's resilience-strengthening activities culled from project documents and activity sheets provided by Mercy Corps. The indexes are calculated by placing each indicator on a zero-to-ten scale and then summing them up. It is important to note that, because the number of indicators used to measure each index differs, the levels of the indexes are not comparable. For example, the index of exposure to PNRM interventions (8 indicators) cannot be compared to that of exposure to CCA interventions (6 indicators).

The indexes of *participation* in each intervention set are built from indicators of household's actual reported activity patterns related to the interventions in the four years between the baseline and endline surveys. The indicators are listed in the left-hand column of Table 8.2. As for the exposure indexes, the participation indexes are calculated by placing each indicator on a zero-to-ten scale and then summing them up, and their levels are not comparable.

Application of the Propensity Score Matching method on which the impact evaluation of Chapter 9 is based to evaluation of the four intervention sets individually requires that "treatment" variables be dichotomous. Thus indicators (dummy variables) identifying the set of households who were most highly exposed to or had the highest participation in each intervention set are calculated based on the top tercile of households on each index.

**Step 3.** Finally, overall summary indicators of households' engagement in resilience-strengthening interventions were calculated. Recall from the introduction (Chapter 1) that the PRIME project's choice of interventions and the timing and placement of their implementation were based on the theory that resilience-related systems (market, financial, livestock/agricultural and environmental) act in synergy rather

than in isolation. As such, it followed an integrated approach, strengthening multiple systems or “sectors” simultaneously, which is thought to lead households to be more resilient than focusing on each separately (Mercy Corps 2018).

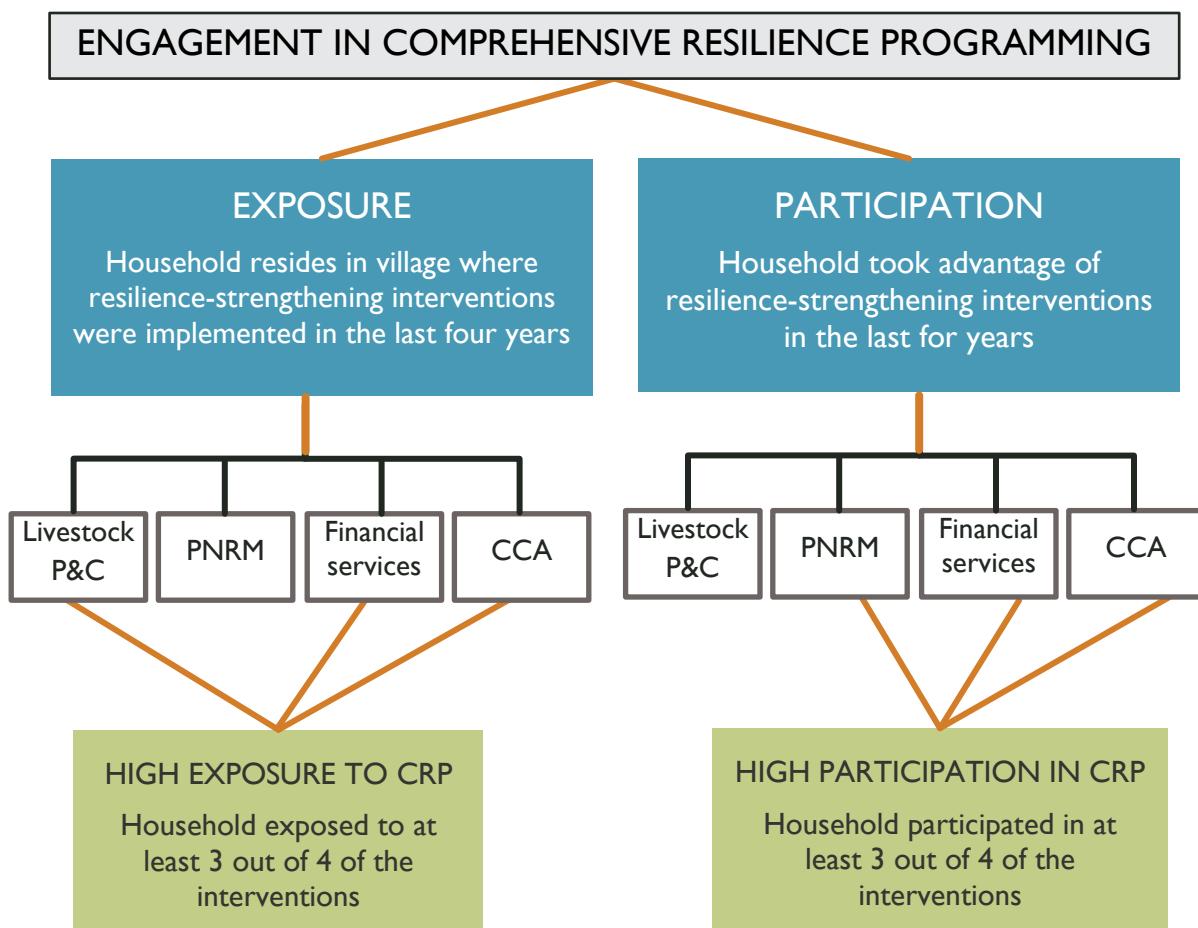
In light of this approach, the two key variables employed for evaluating the overall impact of PRIME’s resilience-strengthening interventions are: (1) exposure to “Comprehensive Resilience Programming” (or CRP); and (2) participation in CRP. CRP is defined as having had at least moderate exposure to/participation in at least three of the four intervention sets. Moderate engagement is itself defined as having an index value greater than or equal to 30 when the indexes are placed on a 0-100 scale. Three out of four is the criteria because it allows households and communities that are not highly pastoral (and thus may be exposed to relatively few livestock productivity and PNRM interventions) to still be classified into the CRP category. Figure 8.2 lays out the method for measuring engagement in CRP.

### 8.1.3 Comparison Across the Project Areas and Pastoral Status Groups

The data in Table 8.1 show that exposure to livestock productivity and competitiveness interventions was higher among Jijiga households than Borena households. On the other hand, PNRM interventions appear to have been more concentrated in Borena. While exposure to financial services and CCA interventions overall was roughly the same across the project areas, exposure to particular types of interventions did differ. For example, 62.9 percent of households in Borena live in communities that gained a VSLA while only 15.3 percent did in Jijiga. The only intervention set for which there are noticeable differences across the pastoral status groups is PNRM. Here, as would be expected, pastoralists’ exposure was far higher than that of agro-pastoralists and non-pastoralists.

Table 8.2 contains the data on households’ *participation* in resilience-strengthening interventions, revealing a fairly consistent pattern of greater participation among Borena households. The exception is participation in CCA interventions, which was roughly the same for the two project areas. Participation in livestock productivity interventions was highest amongst pastoralists, followed by agro-pastoralists and non-pastoralists. This same pattern is found for financial services. However, in contrast to exposure, participation in PNRM was highest among non-pastoralists, followed by agro-pastoralists, and lowest among pastoralists. There is no difference across the pastoral status groups in participation in CCA interventions.

**Figure 8.2 Measurement of engagement in Comprehensive Resilience Programming (CRP): Conceptual framework**



Note: The particular intervention sets selected to represent high exposure/participation are examples of possible combinations.

Livestock P&C=Livestock Productivity and Competitiveness

PNRM=Pastoral Natural Resource Management

CCA=Climate Change Adaptation

**Table 8.1 Household exposure to resilience-strengthening interventions of the last four years, by project area and pastoralist status**

Indicator	All	Project area		Pastoralist status		
		Borena	Jijiga	Pastor-alist	Agro-pastor-alist	Non-pastoralist
<b>Livestock productivity and competitiveness</b>						
Gained access to a veterinary facility	27.4	28.1	25.5	23.9	28.8	29.9
Improvement in veterinary pharmacy services (score)	0.50	0.27 <sup>a</sup>	1.04 <sup>a</sup>	0.39 <sup>a</sup>	0.50	0.64 <sup>a</sup>
Increase in number of veterinary services available (out of 7)	-0.19	-0.97 <sup>a</sup>	1.76 <sup>a</sup>	-0.53 <sup>ab</sup>	-0.13 <sup>a</sup>	0.21 <sup>b</sup>
Increase in quality of veterinary facility: physical condition (score)	0.03	0.15 <sup>a</sup>	-0.25 <sup>a</sup>	0.12	0.03	-0.09
Increase in quality of veterinary facility: absense of problems (score)	-0.54	-0.77 <sup>a</sup>	0.04 <sup>a</sup>	-0.69	-0.43	-0.52
Increase in the number of community animal health workers (CAHW)	0.08	-0.04 <sup>a</sup>	0.39 <sup>a</sup>	0.18	0.00	0.09
Improvement in services of CAHW's (score)	1.15	0.73 <sup>a</sup>	2.21 <sup>a</sup>	1.03	1.12	1.38
Number of animal health topics received info about (out of 4)	3.53	3.50	3.60	3.50	3.55	3.54
Number of animal feeding topics received info about (out of 4)	2.19	2.02 <sup>a</sup>	2.60 <sup>a</sup>	2.12	2.23	2.23
Gained access to commercial animal feed or fodder seed	17.5	23.6 <sup>a</sup>	2.5 <sup>a</sup>	22.8	16.2	12.4
Gained access to a milk sales facility/equipment supplier	15.3	12.2	23.2	17.2	13.6	15.8
Received info about "how to run a business selling livestock"	27.7	15.1 <sup>a</sup>	59.3 <sup>a</sup>	23.6	30.3	29.0
Increase in % of hhs receiving livestock market price info	2.7	-12.5 <sup>a</sup>	40.6 <sup>a</sup>	-6.7 <sup>ab</sup>	5.1 <sup>ac</sup>	12.2 <sup>bc</sup>
Index	49.8	44.3 <sup>a</sup>	63.4 <sup>a</sup>	47.9	50.3	51.7
<b>Pastoral natural resource management</b>						
Mapped natural resources	25.7	25.4	26.5	18.5 <sup>b</sup>	28.5	31.0 <sup>b</sup>
Made a natural resource management plan	20.2	21.9	16.0	19.7	19.6	22.0
Gained a water user's group	43.3	58.2 <sup>a</sup>	6.3 <sup>a</sup>	54.3 <sup>ab</sup>	40.4 <sup>a</sup>	32.7 <sup>b</sup>
New construction of any water source	60.1	78.3 <sup>a</sup>	14.9 <sup>a</sup>	74.8 <sup>ab</sup>	57.2 <sup>ac</sup>	44.1 <sup>bc</sup>
Work done to improve any water source	59.3	54.3 <sup>a</sup>	71.9 <sup>a</sup>	63.4	57.8	56.1
Gained a grazing land user's group	55.3	61.4 <sup>a</sup>	40.1 <sup>a</sup>	66.4 <sup>ab</sup>	52.6 <sup>a</sup>	44.1 <sup>b</sup>
Improvement in quality of rangeland	47.3	64.3 <sup>a</sup>	5.0 <sup>a</sup>	63.4 <sup>ab</sup>	41.3 <sup>a</sup>	34.8 <sup>b</sup>
Received info about rangeland management	31.3	43.9 <sup>a</sup>	0.0 <sup>a</sup>	39.5 <sup>b</sup>	30.9 <sup>c</sup>	20.2 <sup>bc</sup>
Index	34.3	40.8 <sup>a</sup>	18.1 <sup>a</sup>	40.0 <sup>ab</sup>	32.8 <sup>ac</sup>	28.5 <sup>bc</sup>
<b>Financial services</b>						
Gained a VSLA	49.3	62.9 <sup>a</sup>	15.3 <sup>a</sup>	55.0	46.2	46.6
Gained a RuSACCO	13.2	9.1 <sup>a</sup>	23.6 <sup>a</sup>	5.5 <sup>ab</sup>	16.5 <sup>a</sup>	18.6 <sup>b</sup>
Gained mobile banking service (Hellocash)	15.6	7.4 <sup>a</sup>	35.9 <sup>a</sup>	10.0 <sup>ab</sup>	17.1 <sup>a</sup>	21.0 <sup>b</sup>
Gained a microfinance/savings group	30.1	30.9	28.3	27.7	28.2 <sup>c</sup>	37.4 <sup>c</sup>
Received info about opportunities for borrowing money	7.4	4.9 <sup>a</sup>	13.5 <sup>a</sup>	7.1 <sup>b</sup>	7.4	7.7 <sup>b</sup>
Index	15.9	15.6	16.7	14.7	15.9	17.7
<b>Climate change adaptation</b>						
Gained access to a disaster planning or response program	56.3	60.5	45.8	55.6	57.9	54.2
Gained a disaster planning group	17.4	15.9	21.3	17.2	16.8	19.0
Created a shock plan	43.5	50.1 <sup>a</sup>	27.0 <sup>a</sup>	59.0 <sup>ab</sup>	34.4 <sup>a</sup>	37.6 <sup>b</sup>
Created livestock care plan in event of a shock (% hhs reporting)	18.6	20.2 <sup>a</sup>	14.7 <sup>a</sup>	19.8 <sup>b</sup>	18.9 <sup>c</sup>	16.5 <sup>bc</sup>
Number of early warning topics received info about (out of 9)	6.4	6.1 <sup>a</sup>	7.3 <sup>a</sup>	6.5	6.5	6.3
Received info about six climate change adaptation topics	-3.8	-14.4 <sup>a</sup>	22.4 <sup>a</sup>	-10.6 <sup>ab</sup>	-1.8 <sup>ac</sup>	2.2 <sup>bc</sup>
Index	28.5	28.1	29.4	29.4	28.1	27.9

Note: Unless otherwise specified, indicators are the percent of households exposed to the intervention.

Reported values for subgroups with the same superscript are significantly different at least at the 0.05 level.

**Table 8.2 Household participation in resilience-strengthening interventions of the last four years, by project area and pastoralist status**

Indicator	All	Project area		Pastoralist status		
		Borena	Jijiga	Pastor-alist	Agro-pastor-alist	Non-pastor-alist
<b>Livestock productivity and competitiveness</b>						
Used services of a veterinary pharmacy	41.6	44.7 <sup>a</sup>	33.8 <sup>a</sup>	45.3	40.5	38.1
Used services of a Community Animal Health Worker	41.2	42.7	37.4	41.7	40.7	41.3
Purchased commercial animal feed from a vendor	46.2	52.9 <sup>a</sup>	29.4 <sup>a</sup>	54.7 <sup>ab</sup>	45.0 <sup>ac</sup>	36.0 <sup>bc</sup>
Purchased commercial fodder seed from a vendor	30.3	35.2 <sup>a</sup>	18.0 <sup>a</sup>	38.4 <sup>ab</sup>	27.7 <sup>a</sup>	23.2 <sup>b</sup>
Purchased milk processing equipment from a vendor	5.2	4.4	7.2	4.0 <sup>a</sup>	6.4 <sup>a</sup>	4.8
Sold milk at a commercial milk facility	1.2	0.7 <sup>a</sup>	2.6 <sup>a</sup>	1.0	1.7	0.9
Got water for animals from new water source	21.8	17.4 <sup>a</sup>	32.5 <sup>a</sup>	21.1	21.8	22.7
Got water for animals from improved water source	22.3	21.4	24.5	22.1	22.9	21.5
Used improved rangeland for animals	34.5	46.8 <sup>a</sup>	3.8 <sup>a</sup>	44.6 <sup>ab</sup>	34.1 <sup>ac</sup>	20.4 <sup>bc</sup>
Started up a fattening farm business	13.7	13.5	14.2	9.4 <sup>ab</sup>	16.3 <sup>a</sup>	15.2 <sup>b</sup>
Started up a dairy farm business	8.8	5.5 <sup>a</sup>	16.9 <sup>a</sup>	6.0 <sup>ab</sup>	9.8 <sup>a</sup>	11.0 <sup>b</sup>
Number of animal health/feeding topics received info about	4.1	4.2	3.9	4.2 <sup>b</sup>	4.1	3.8 <sup>b</sup>
Number of livestock management practices adopted	0.58	0.59	0.56	0.55	0.61	0.60
Index	32.5	34.5 <sup>a</sup>	27.6 <sup>a</sup>	34.7 <sup>b</sup>	32.6 <sup>c</sup>	29.1 <sup>bc</sup>
<b>Pastoral natural resource management</b>						
Got water for animals from new water source	24.4	20.4 <sup>a</sup>	34.4 <sup>a</sup>	24.3	24.4	24.8
Got water for animals from improved water source	21.2	21.2	21.2	21.7	21.5	20.0
Grazed animals on improved rangeland	34.5	46.8 <sup>a</sup>	3.8 <sup>a</sup>	44.6 <sup>ab</sup>	34.1 <sup>ac</sup>	20.4 <sup>bc</sup>
Received info about rangeland management	27.4	26.9	28.6	25.8	29.4	26.1
Number of adaptive rangeland practices adopted (out of 8)	0.79	0.90 <sup>a</sup>	0.52 <sup>a</sup>	0.80	0.81	0.75
Index	11.7	12.7 <sup>a</sup>	9.5 <sup>a</sup>	12.6 <sup>b</sup>	11.9 <sup>c</sup>	10.1 <sup>bc</sup>
<b>Financial services</b>						
Took out loan/held savings with a VSLA	11.4	15.1 <sup>a</sup>	2.1 <sup>a</sup>	14.4 <sup>b</sup>	12.0 <sup>c</sup>	5.9 <sup>bc</sup>
Took out loan/held savings with a RuSACCO	3.0	3.5	1.9	3.1	3.3	2.5
Took out loan/held savings with mobile banking service	0.1	0.1	0.1	0.1	0.1	0.1
Index	1.45	1.87 <sup>a</sup>	0.42 <sup>a</sup>	1.76 <sup>b</sup>	1.54 <sup>c</sup>	0.85 <sup>bc</sup>
<b>Climate change adaptation</b>						
Able to sell animals early when a drought was expected	27.7	29.3 <sup>a</sup>	23.6 <sup>a</sup>	27.9	29.9 <sup>c</sup>	23.3 <sup>c</sup>
Shock plan helped with food for animals during drought	17.2	18.6	13.6	17.4	18.1	15.4
Shock plan helped with water for animals during drought	14.7	16.1	11.3	15.3	15.2	13.2
Number of drought early warning topics received info about	4.4	4.2 <sup>a</sup>	4.7 <sup>a</sup>	4.4	4.4	4.4
Index	11.9	12.2	11.2	12.1	12.3	11.2

Note: Unless otherwise specified, measures are the percent of households exposed to the intervention.

Reported values for subgroups with the same superscript are significantly different at least at the 0.05 level.

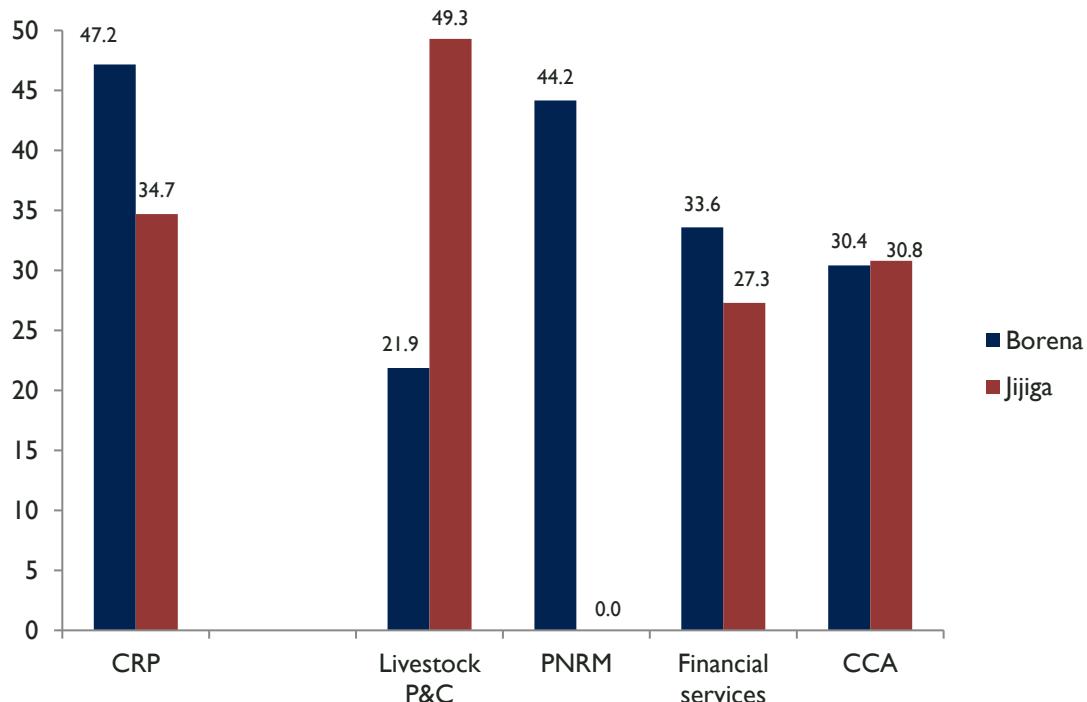
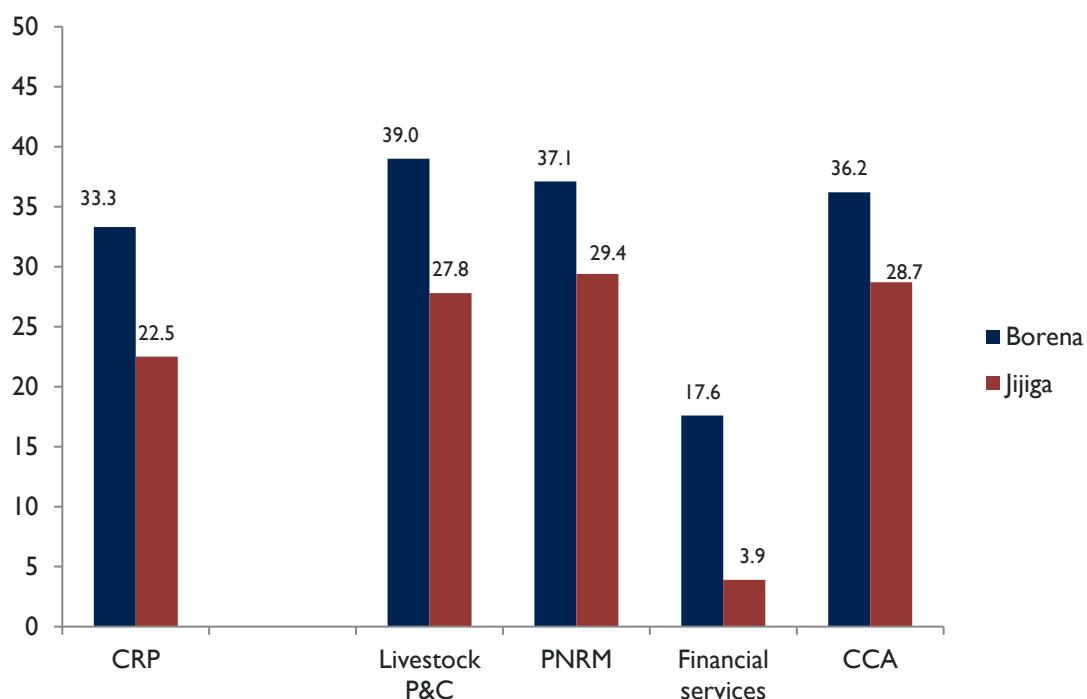
The percentage of households exposed to and participating in CRP, along with those having high exposure to and high participation in the four intervention sets, is given in Table 8.3 and illustrated in Figures 8.1 and 8.2. Borena households were more likely to be both exposed to and participate in CRP: Just under half, 47.2 percent, of Borena households were exposed to CRP, while only 34.7 percent of Jijiga households were. The prevalence of participation in CRP is 10.8 percentage-points higher among Borena households.

**Table 8.3 Percent of households engaged in Comprehensive Resilience Programming, by project area and pastoralist status**

Indicator	All	Project area		Pastoralist status		
		Borena	Jijiga	Pastor-alist	Agro-pastor-alist	Non-pastor-alist
(Percent of households)						
<b>High exposure to interventions</b>						
Livestock productivity and competitiveness	29.7	21.9 <sup>a</sup>	49.3 <sup>a</sup>	22.7 <sup>a</sup>	32.2	35.4 <sup>a</sup>
Pastoral Natural Resource Management	31.5	44.2 <sup>a</sup>	0.0 <sup>a</sup>	43.3 <sup>ab</sup>	28.7 <sup>ac</sup>	19.6 <sup>bc</sup>
Financial services	31.8	33.6	27.3	31.5	28.4 <sup>a</sup>	38.4 <sup>a</sup>
Climate Change Adaption	30.5	30.4	30.8	38.0	26.7	26.7
<b>Exposure to Comprehensive Resilience Programming</b>	<b>43.6</b>	<b>47.2</b>	<b>34.7</b>	<b>55.4 <sup>ab</sup></b>	<b>36.1 <sup>a</sup></b>	<b>40.3 <sup>b</sup></b>
<b>High participation in interventions</b>						
Livestock productivity and competitiveness	35.8	39.0 <sup>a</sup>	27.8 <sup>a</sup>	39.7 <sup>a</sup>	35.5	30.8 <sup>a</sup>
Pastoral Natural Resource Management	34.9	37.1 <sup>a</sup>	29.4 <sup>a</sup>	35.4	37.5 <sup>a</sup>	29.3 <sup>a</sup>
Financial services	13.7	17.6 <sup>a</sup>	3.9 <sup>a</sup>	16.6 <sup>a</sup>	14.3	8.4 <sup>ab</sup>
Climate Change Adaption	34.0	36.2 <sup>a</sup>	28.7 <sup>a</sup>	35.1 <sup>a</sup>	36.4	28.1 <sup>ab</sup>
<b>Participation in Comprehensive Resilience Programming</b>	<b>30.2</b>	<b>33.3 <sup>a</sup></b>	<b>22.5 <sup>a</sup></b>	<b>33.4 <sup>a</sup></b>	<b>30.6</b>	<b>24.7 <sup>ab</sup></b>

Note: Reported values for subgroups with the same superscript are significantly different at least at the 0.05 level.

It is important to note that exposure to CRP (and the intervention sets) refers specifically to exposure over the *project period*. Households that participated in CRP during that time obviously were exposed as well, but not necessarily to interventions implemented in this same time period (they may have been exposed to interventions implemented prior to the period). Thus, the participant households are not a sub-set of the exposed households. In fact, for CRP only half of households classified into the “high participation” group are also classified into the “high exposure” group. The difference in reference periods for initial exposure shows up starkly in the case of the PNRM interventions in Jijiga. Here, no households were exposed to the interventions over the project period, but 29.4 percent reported participating in them.

**Figure 8.3 High exposure to resilience-strengthening interventions, by program area****Figure 8.4 High participation in resilience-strengthening interventions, by program area**

## 8.2 Humanitarian Assistance Received

Chapter 5 (on resilience capacities) and Chapter 6 (on coping strategies) documented the dramatic rise in reliance on food aid that took place over the project period. The endline household survey includes a module directly asking respondents to report on whether and for how long they received food aid and three other types of humanitarian assistance over the project period: cash assistance, food-for-work, and cash-for-work. As can be seen in Table 8.4, food aid was by far the most common type of humanitarian assistance received. Just over 60 percent of households received food aid in both project areas, with pastoralists as a group being the most likely to receive it. The average household in the project area received food aid for 1.8 years out of the four.

The second most-common type of humanitarian assistance is food-for-work, received by 57.3 percent of households in Jijiga and 51.1 percent of households in Borena. Cash assistance and cash-for-work were far more common in Jijiga than Borena, which may be one reason why Jijiga households were more resilient. The pattern for humanitarian assistance received in the last year is the same as for the last four years.

The qualitative data give three insights into these quantitative findings. First, FGD participants and KIs in both Borena and Jijiga indicated that while emergency assistance definitely helped, it was not sufficient. Second, the qualitative data from the endline survey and both RMSs indicate that the government's emergency response is often conflated with PSNP activities, at least during times of crisis. In large part this is due to "overlap" of formal assistance in general (e.g., NGO or government development initiatives, government safety net programs) with emergency efforts implemented specifically in response to drought. Thus the numbers in Table 8.4 likely represent both emergency and long-term assistance. Finally, the qualitative data point to other types of humanitarian assistance than those enumerated in the quantitative survey. The government not only provided emergency food assistance, but also trucked in water and fodder and set up temporary centers for treating Acute Watery Diarrhea and other illnesses.

**Table 8.4 Humanitarian assistance received since the baseline, by project area and pastoralist status**

Indicator	All	Project area		Pastoralist status		
		Borena	Jijiga	Pastor-alist	Agro-pastor-alist	Non-pastoralist
<b>Assistance received in the last four years</b>						
Percent of households that received ...						
Food	63.0	63.0	63.1	69.5 <sup>ab</sup>	59.4 <sup>a</sup>	60.2 <sup>b</sup>
Cash	14.6	9.0 <sup>a</sup>	28.3 <sup>a</sup>	10.2 <sup>ab</sup>	14.9 <sup>ac</sup>	20.4 <sup>bc</sup>
Food-for-work	52.9	51.1	57.3	51.3	54.1	52.9
Cash-for-work	24.0	10.8 <sup>a</sup>	56.8 <sup>a</sup>	17.0 <sup>ab</sup>	24.5 <sup>ac</sup>	33.4 <sup>bc</sup>
Any humanitarian assistance	87.3	97.5	86.5	90.6	85.1	86.4
Number of years (mean)						
Food	1.80	1.77	1.87	1.93 <sup>a</sup>	1.68 <sup>a</sup>	1.84
Cash	0.35	0.22 <sup>a</sup>	0.66 <sup>a</sup>	0.24 <sup>ab</sup>	0.36 <sup>ac</sup>	0.47 <sup>bc</sup>
Food-for-work	1.63	1.65	1.59	1.59	1.65	1.66
Cash-for-work	0.57	0.27 <sup>a</sup>	1.33 <sup>a</sup>	0.40 <sup>ab</sup>	0.59 <sup>ac</sup>	0.79 <sup>bc</sup>
<b>Assistance received in the last year</b>						
Percent of households that received ...						
Food	60.9	63.6 <sup>a</sup>	54.3 <sup>a</sup>	69.2 <sup>ab</sup>	57.0 <sup>a</sup>	56.3 <sup>b</sup>
Cash	12.4	7.4 <sup>a</sup>	25.1 <sup>a</sup>	8.0 <sup>ab</sup>	12.9 <sup>ac</sup>	18.1 <sup>bc</sup>
Food-for-work	50.2	49.3	52.3	50.1	50.8	49.3
Cash-for-work	22.5	9.2 <sup>a</sup>	55.6 <sup>a</sup>	15.0 <sup>ab</sup>	23.3 <sup>ac</sup>	32.1 <sup>bc</sup>
Any humanitarian assistance	87.4	88.9	83.7	91.6 <sup>ab</sup>	85.0 <sup>a</sup>	85.9 <sup>b</sup>
Number of months (mean)						
Food	2.48	2.99 <sup>a</sup>	1.22 <sup>a</sup>	3.05 <sup>ab</sup>	2.26 <sup>a</sup>	2.06 <sup>b</sup>
Cash	0.32	0.24 <sup>a</sup>	0.49 <sup>a</sup>	0.20 <sup>ab</sup>	0.32 <sup>ac</sup>	0.48 <sup>bc</sup>
Food-for-work	2.27	2.68 <sup>a</sup>	1.26 <sup>a</sup>	2.50	2.23	2.03
Cash-for-work	0.59	0.28 <sup>a</sup>	1.36 <sup>a</sup>	0.45 <sup>b</sup>	0.58 <sup>c</sup>	0.81 <sup>bc</sup>

Note: Reported values for subgroups with the same superscript are significantly different at least at the 0.05 level.

## 8.3 Summary: Households' Engagement in Resilience-strengthening Interventions and Receipts of Humanitarian Assistance

In preparation for the impact evaluation of the next chapter, this chapter introduced the measures of engagement in resilience-strengthening interventions employed. The PRIME project was implemented using a multi-sectoral, systems-strengthening approach. Most of its resilience-strengthening interventions were implemented at a broader, systems level. However, households could make decisions to take advantage of them, and some were directly targeted to them. Because exposure and direct participation could have differing impacts, for this impact evaluation households' engagement in resilience-strengthening interventions is thus measured using separate indicators for each.

To construct overall measures of exposure and participation, the project's interventions were first divided into four categories—livestock productivity and competitiveness, pastoral natural resource management (PNRM), financial services, and climate change adaptation (CCA)—and indexes of each were calculated. Then, recognizing the multi-sectoral nature of the PRIME project's approach (multiple systems were strengthened simultaneously to better strengthen resilience), a dichotomous measure of “Comprehensive Resilience Programming” (CRP) was calculated. Households engaged in at least three out of four of the intervention sets were classified into the CRP group.

Forty-four percent of households residing in the project area as a whole were exposed to CRP, and thirty percent directly participated in it. Borena households were more likely to be both exposed to and participate in CRP.

With respect to differences in engagement in the four intervention sets, exposure to livestock productivity interventions was higher among Jijiga than Borena households (49.3 versus 21.9 percent). On the other hand, PNRM interventions were more heavily concentrated in Borena (44.2 versus none in Jijiga). Exposure to financial services and CCA interventions was roughly equal across the two areas. Participation in interventions was generally higher among Borena than Jijiga households.

Humanitarian assistance data collected from households at endline confirm the dramatic rise over the project period in access to food aid and reliance on it as a coping strategy. A full 87.3 percent of households residing in the PRIME IE area received some form of assistance over the project period. Food aid was the most commonly received, followed by food-for-work, cash-for-work, and cash assistance. Borena and Jijiga were equally likely to have received assistance, although the types differ across the areas. Jijiga households were far more likely to receive cash assistance or engage in cash-for-work.

## 9 IMPACT OF PRIME ON HOUSEHOLDS' RESILIENCE AND RESILIENCE CAPACITIES

This chapter presents the results for three key research questions asked in this report:

- (1) Did household exposure to and direct participation in resilience-strengthening interventions increase their resilience capacities and resilience to shocks?
- (2) Which resilience capacities were strengthened due to households' engagement in the interventions?
- (3) Which specific types of interventions enhanced households' resilience capacities and resilience?

After evaluating the impact of “Comprehensive Resilience Programming” (CRP), it focuses in on the impact of the four types of resilience-strengthening interventions implemented: livestock productivity and competitiveness, pastoral natural resource management (PNRM), financial services, and climate change adaptation (CCA).

From Chapter 2, the main method employed for conducting this impact evaluation is Difference-in-difference Propensity Score Matching (DID-PSM). Appendix I describes the selection of treatment and control groups for the analysis. The results of statistical tests assessing the conditions for implementing DID-PSM and that ensure the rigor of this impact evaluation are also presented there. All DID-PSM impact estimates reported in the chapter are the Average Treatment Effect on the Treated (ATT).

Note that throughout the chapter impact estimates are presented separately by program area (for Borena and Jijiga) only for participation in CRP or the individual intervention sets. Separate area-specific estimates are not presented for exposure to CRP or the intervention sets because the conditions for implementing DID-PSM are not satisfied in this case (see Appendix I, Section A1.2 for details).

### 9.1 Impact of Engagement in Comprehensive Resilience Programming

#### 9.1.1 Impact on Resilience to Shocks

The upper panel of Table 9.1 reports DID-PSM estimates of the impact of exposure to CRP on households' resilience, starting with the first indicator of resilience, the change in food security over the project period. The estimate for the preferred matching algorithm, kernel matching, is 1.05 and statistically significant at the 5 percent level: households' exposure to resilience-strengthening interventions spanning multiple sectors did indeed strengthen their resilience. The estimates for nearest-neighbor matching and radius matching are higher (although the latter is not statistically significant), indicating that those for kernel matching may be on the conservative side. Exposure to CRP had no impact on households' perceived ability to recover from shocks, the subjective measure of resilience.

**Table 9.1 Impact of exposure to comprehensive resilience programming: Difference-in-Difference Propensity Score Matching estimates**

	DID Propensity score matching		
	Kernel matching	Nearest neighbor (1:1)	Radius matching
<b>Resilience</b>			
Change in food security	1.05 **	2.09 ***	1.60
Perceived ability to recover	0.08	0.05	0.09
<b>Absorptive capacity</b>			
Bonding social capital	2.30	5.03	2.41
Cash savings	-11.6 **	-15.9 ***	-14.8 ***
Access to informal safety nets	0.905 ***	0.889 ***	0.851 ***
Availability of hazard insurance	23.9 ***	27.6 ***	25.7 ***
Disaster preparedness and mitigation	0.571 ***	0.606 ***	0.575 ***
Conflict mitigation support	5.1 **	6.3 **	6.0 ***
Asset ownership	2.68 **	2.37 **	2.82 **
Index	12.44 ***	12.93 ***	12.33 ***
<b>Adaptive capacity</b>			
Bridging social capital	5.60 *	13.27 ***	9.62 **
Linking social capital	-8.26 ***	-6.91 ***	-7.45 ***
Aspirations/confidence to adapt	-0.59	-0.98	-1.46
Livelihood diversity	0.285 ***	0.292 ***	0.264 ***
Access to financial resources	0.782 ***	0.657 ***	0.682 ***
Human capital	2.83	1.33	2.27
Exposure to information	1.22 ***	1.24 **	1.27 ***
Asset ownership	2.68 **	2.37 **	2.82 **
Index	6.24 ***	6.54 ***	6.34 ***
<b>Transformative capacity</b>			
Bridging social capital	5.60 *	13.27 **	9.62 **
Linking social capital	-8.26 ***	-6.91 **	-7.45 ***
Access to markets	0.125 **	0.147 **	0.122
Access to basic services	0.082	0.086	0.065
Access to livestock services	0.065 ***	0.078 ***	0.067 ***
Access to infrastructure	0.050	0.055	0.073
Access to communal natural resources	-0.303 ***	-0.189 **	-0.318 ***
Access to formal safety nets	0.888 ***	0.891 ***	0.862 ***
Index	2.90 ***	4.31 ***	3.17 *

Note: Values reported are the Average Treatment Affect on the Treated (ATT)

Stars indicate statistical significance at the 10%(\*), 5%(\*\*), and 1%(\*\*\*) levels.

Turning to the participation impact estimates in the upper panel of Table 9.2, those yielded by all three algorithms are positive and statistically significant. The kernel matching estimate for the change in food security indicators is 1.53 and is substantially higher than for exposure (45 percent higher). The estimate for perceived ability to recover is also positive and highly statistically significant. These results confirm that households' direct participation in resilience-strengthening interventions of the type implemented by the PRIME project had a positive impact on their resilience. This impact was stronger when households directly participated in interventions than if they were just exposed to them.

**Table 9.2 Impact of participation in comprehensive resilience programming: Difference-in-Difference Propensity Score Matching estimates**

	DID Propensity score matching		
	Kernel matching	Nearest neighbor	Radius matching
<b>Resilience</b>			
Change in food security	1.53 ***	1.86 ***	1.66 ***
Perceived ability to recover	0.176 ***	0.198 **	0.182 ***
<b>Absorptive capacity</b>			
Bonding social capital	0.435	1.67	0.323
Cash savings	6.2 ***	5.2 *	5.5 **
Access to informal safety nets	0.064	0.085	0.053
Availability of hazard insurance	-3.3	-2.4	-3.6
Disaster preparedness and mitigation	0.025	-0.003	0.034
Conflict mitigation support	-3.0 ***	-3.9 ***	-3.0 **
Asset ownership	4.10 ***	3.85 ***	4.14 ***
Index	2.39 ***	2.41 *	2.30 **
<b>Adaptive capacity</b>			
Bridging social capital	2.44	3.73	2.28
Linking social capital	7.91 ***	7.56 ***	7.97 ***
Aspirations/confidence to adapt	3.29 ***	1.82 *	3.19 ***
Livelihood diversity	0.135 ***	0.108	0.116 **
Access to financial resources	0.052	0.113	0.049
Human capital	4.35 ***	1.16	3.86 **
Exposure to information	4.22 ***	4.19 ***	4.24 ***
Asset ownership	4.10 ***	3.85 ***	4.14 ***
Index	11.70 ***	11.4 ***	11.62 ***
<b>Transformative capacity</b>			
Bridging social capital	2.44	3.73	2.28
Linking social capital	7.91 ***	7.56	7.97 ***
Access to markets	0.018	0.08	0.026
Access to basic services	0.073	0.125	0.074
Access to livestock services	0.063 ***	0.066 ***	0.063 ***
Access to infrastructure	0.113 ***	0.113 *	0.126 **
Access to communal natural resources	-0.053	-0.081	-0.06
Access to formal safety nets	0.008	0.035	0.018
Index	3.74 ***	4.10 ***	3.81 ***

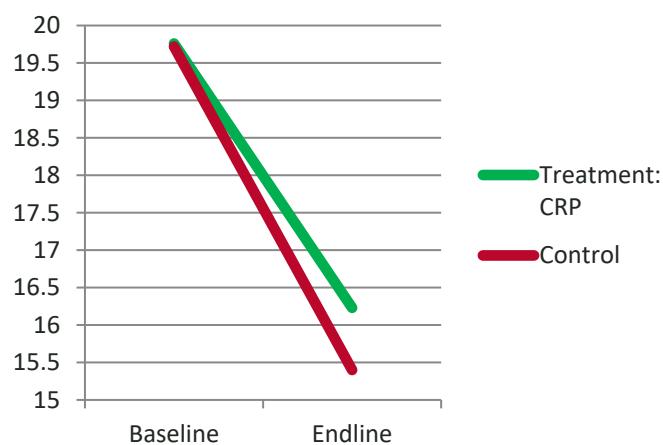
Note: Values reported are the Average Treatment Affect on the Treated (ATT)

Stars indicate statistical significance at the 10%(\*), 5%(\*\*), and 1%(\*\*\*) levels.

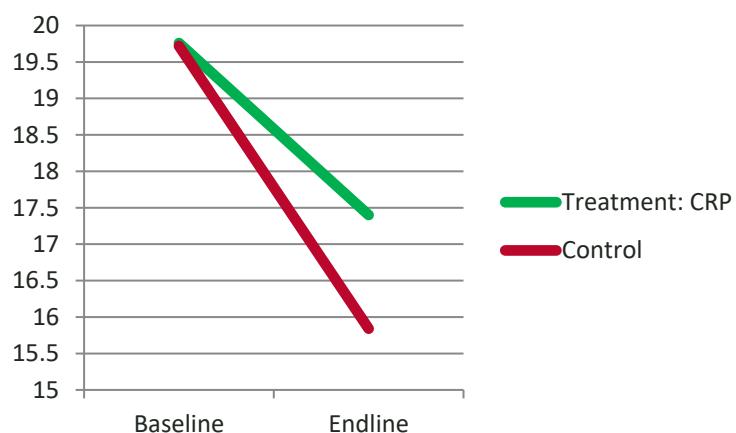
Recall that household food security declined significantly over the project period (see Chapter 7, Table 7.1). From the evidence presented here, because of their engagement, the decline was less for households engaged in CRP than those not. Figure 9.1 illustrates the relative declines in food security for the treatment and control groups. Households that were exposed to CRP experienced an 18 percent lower decline in food security than their unexposed counterparts. The impact was much stronger if they directly participated in CRP. Households that did so experienced a forty percent (39.2) lower decline in food security than those that did not, that is, they were much more resilient.

**Figure 9.1 Impact of Comprehensive Resilience Programming on resilience (changes in households' food security)**

**(a) Exposure to CRP**



**(b) Participation in CRP**



Severe food insecurity, which is associated with such behaviors as going to bed without eating and going a whole day and night without eating, increased a great deal in the project area since the baseline—from 35.9 to 57.6 percent of households (see Chapter 7). Households' engagement in CRP had a strong preventative effect on this outcome, as can be seen in Figure 9.2. Exposure to CRP led to a 15.6 percentage-point drop in severe food insecurity at endline. In the absence of exposure to the variety of resilience-strengthening interventions made available, the prevalence of severe food insecurity would have risen to 72.1 percent of households (versus 56.5 for exposed). Participation in CRP also had a preventative effect, although in this case weaker than exposure, reducing the prevalence of severe food insecurity at endline by 9.4 percentage points.<sup>30</sup>

**Figure 9.2 Change in the percent of households severely food insecure for Comprehensive Resilience Programming treatment and control groups**

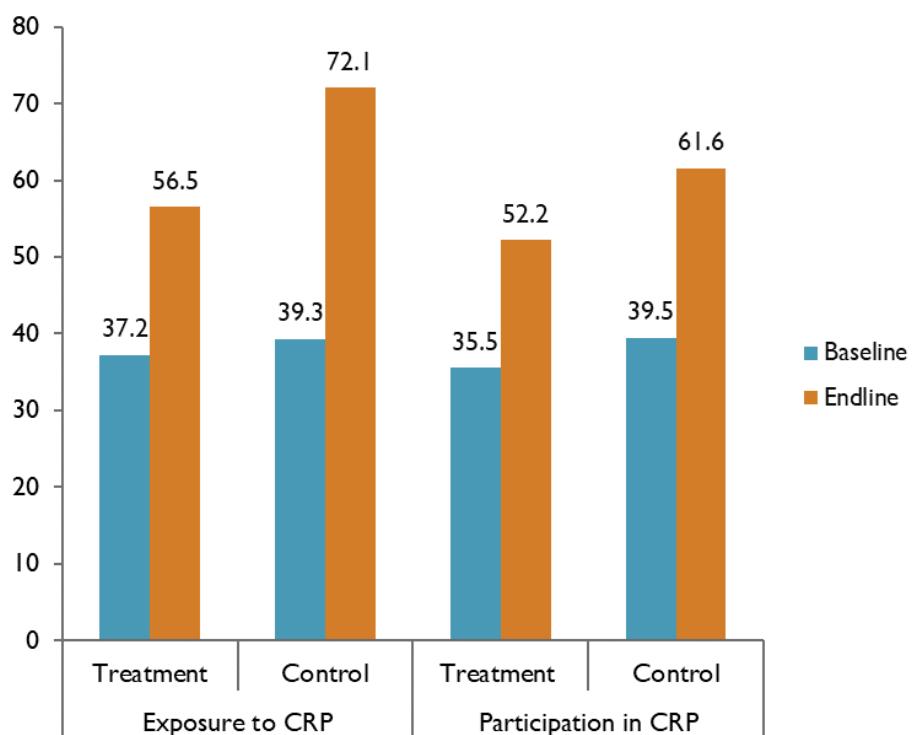


Table 9.3 presents the resilience impact estimates for participation in CRP separately for Borena and Jijiga, showing that they differ substantially. In Borena, where food security declined considerably between the baseline and endline, participation in CRP had quite a strong impact. It likely served to mitigate the decline substantially. For Jijiga, where food security did not decline for the average household, a positive (though weakly significant,  $p=0.086$ ) impact is found for participation. In this case, it likely helped to put households on an upward food security trajectory, as can be seen in Figure 9.3.

<sup>30</sup> The severe food insecurity ATT for the exposure model is -13.5 ( $p=0.002$ ); that for the participation model is -5.43 ( $p=0.046$ ). Given the baseline prevalences reported in Figure 9.2, these estimates lead to the differences seen between the control and treatment group prevalences (15.6 and 9.4 percentage points) by endline.

**Table 9.3 Impact of participation in comprehensive resilience programming: Difference-in-Difference Propensity Score Matching estimates (kernel matching), by project area**

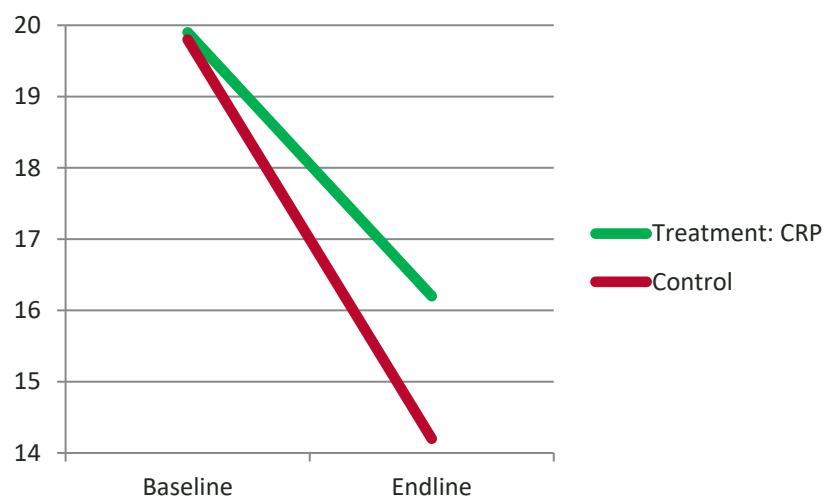
	All	Borena	Jijga
<b>Resilience</b>			
Change in food security	1.53 ***	1.86 ***	0.808 *
Perceived ability to recover	0.176 ***	0.25 ***	0.105
<b>Absorptive capacity</b>			
Bonding social capital	0.435	0.60	-0.81
Cash savings	6.2 ***	8.7 ***	3.1
Access to informal safety nets	0.064	0.038	0.018
Availability of hazard insurance	-3.3	-0.9	0.6
Disaster preparedness and mitigation	0.025	0.028	0.065
Conflict mitigation support	-3.0 ***	-4.5 ***	-0.9
Asset ownership	4.10 ***	4.94 ***	1.880 ***
Index	2.39 ***	2.85 ***	1.38
<b>Adaptive capacity</b>			
Bridging social capital	2.44	-1.46	8.02 ***
Linking social capital	7.91 ***	11.60 ***	0.852
Aspirations/confidence to adapt	3.29 ***	4.790 ***	-0.259
Livelihood diversity	0.135 ***	0.043	0.162 **
Access to financial resources	0.052	0.002	0.031
Human capital	4.35 ***	3.92 *	3.85
Exposure to information	4.22 ***	4.860 ***	2.57 ***
Asset ownership	4.10 ***	4.940 ***	1.88 ***
Index	11.70 ***	13.03 ***	6.97 ***
<b>Transformative capacity</b>			
Bridging social capital	2.44	-1.46	8.02 ***
Linking social capital	7.91 ***	11.60 ***	0.852
Access to markets	0.018	-0.090 *	0.067
Access to basic services	0.073	0.053	0.077
Access to livestock services	0.063 ***	0.038 *	0.039 **
Access to infrastructure	0.113 ***	0.142 ***	0.041
Access to communal natural resources	-0.053	0.062 *	-0.070
Access to formal safety nets	0.008	0.040	0.009
Index	3.74 ***	4.69 ***	1.34

Note: Values reported are the Average Treatment Affect on the Treated (ATT)

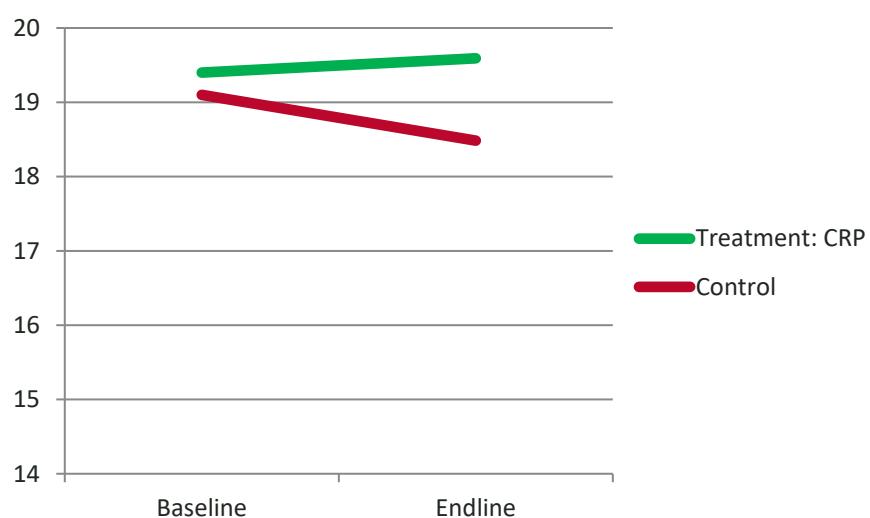
Stars indicate statistical significance at the 10%(\*), 5%(\*\*), and 1%(\*\*\*) levels.

**Figure 9.3 Impact of participation in Comprehensive Resilience Programming on resilience (changes in households' food security) for Borena and Jijiga**

**(a) Borena**



**(b) Jijiga**



### 9.1.2 Impact on Resilience Capacities

Multi-sectoral resilience-strengthening interventions implemented during the PRIME project's operational period had a positive impact on a wide variety of resilience capacities. These are the pathways through which the positive impacts on resilience itself found here were brought about.

The results for resilience capacity impacts are presented in the lower panels of Table 9.1, Table 9.2, and Table 9.3. They are summarized in Table 9.4. The green-colored cells indicate that engagement in CRP (whether exposure or participation) had a positive impact on a resilience capacity; the red-colored cells indicate a negative impact.

**Table 9.4 Impact of engagement in comprehensive resilience programming on households' resilience capacities: Summary**

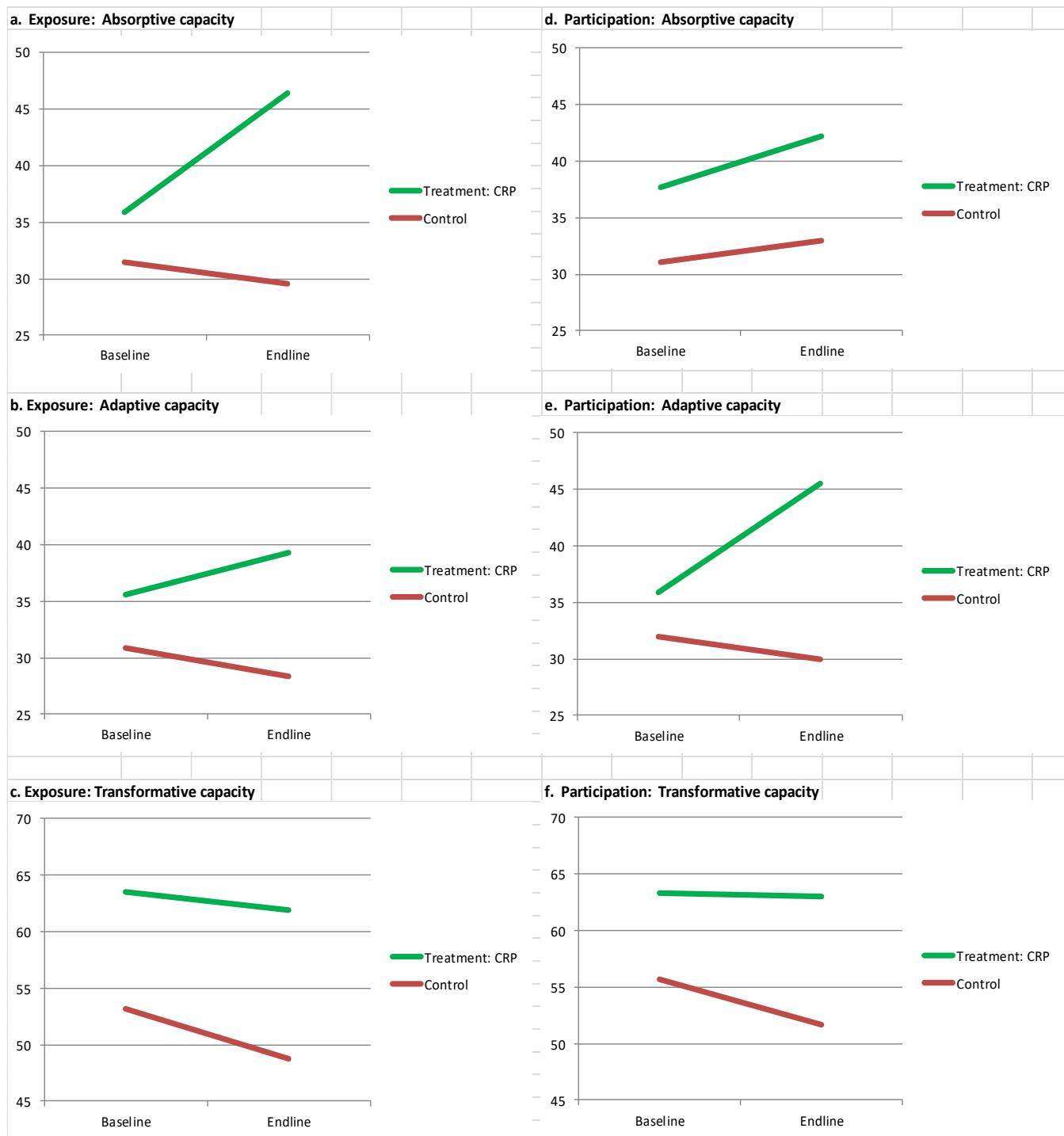
	Exposure	Participation		
		All	Borena	Jijiga
<b>Absorptive capacity</b>				
Bonding social capital				
Cash savings	-11.6	6.2	8.7	
Access to informal safety nets	0.905			
Availability of hazard insurance	23.9			
Disaster preparedness and mitigation	0.571			
Conflict mitigation support	5.1	-3.0	-4.5	
Asset ownership	2.68	4.1	4.94	1.88
Index	12.44	2.39	2.85	
<b>Adaptive capacity</b>				
Bridging social capital	5.6			8.02
Linking social capital	-8.26	7.91	11.6	
Aspirations/confidence to adapt		3.29	4.79	
Livelihood diversity	0.285	0.135		0.162
Access to financial resources	0.782			
Human capital		4.35	3.92	
Exposure to information	1.22	4.22	4.86	2.57
Asset ownership	2.68	4.1	4.94	1.88
Index	6.24	11.7	13.03	6.97
<b>Transformative capacity</b>				
Bridging social capital	5.6			8.02
Linking social capital	-8.26	7.91	11.6	
Access to markets	0.125			
Access to basic services				
Access to livestock services	0.065	0.063		0.039
Access to infrastructure		0.113	0.142	
Access to communal natural resources	-0.303			
Access to formal safety nets	0.888			
Index	2.90	3.74	4.69	

Note: Green-shaded cells indicate a positive impact significant at the 10% level; red-shaded cells indicate a negative impact.

Summary statistics for the resilience capacities that are helpful for interpreting the magnitudes of the impact estimates can be found in Appendix 2 (Table A2.1).

**The three dimensions of resilience capacity.** For the PRIME IE area as a whole, exposure to and participation in CRP both had positive impacts on all three dimensions of resilience capacity—absorptive capacity, adaptive capacity, and transformative capacity (see estimates in Table 9.4 for their respective indexes). As depicted in Figure 9.4 (a-f), the change in the index value was largely negative for the control group: in the absence of households' engagement in CRP, the average household in the PRIME area would have experienced a reduction in their resilience capacities during this period of extreme drought. However, the resilience capacities of those engaged in multiple resilience-strengthening interventions were maintained or even strengthened, enabling them to recover and preparing them to cope with future shocks. The greatest impact was on absorptive capacity among households exposed to CRP (whose capacity increased by 29.2 percent, see Figure 9.4a) and adaptive capacity among those who participated in CRP (for whom it increased by 26.7 percent, see Figure 9.4e).

The results for participation in CRP for Borena and Jijiga show that the positive impacts were higher for Borena (Table 9.4, right-hand panel). Participation in CRP strengthened absorptive and transformative capacity in Borena but had no impact on these important dimensions of resilience capacity among Jijiga households. While CRP had a positive impact on adaptive capacity in both project areas, the impact estimate was far higher for Borena (86.9 percent higher). Participation in CRP had a positive impact on seven of the individual capacities in Borena, and five in Jijiga.

**Figure 9.4 Impact of Comprehensive Resilience Programming on resilience capacity**

**Absorptive capacities.** Focusing in on the specific resilience capacities associated with households' absorptive capacity, engagement in CRP had a positive impact on:

- Access to informal safety nets
- Availability of hazard insurance
- Disaster preparedness and mitigation
- Asset ownership.

Asset ownership was strengthened by both exposure to and participation in CRP. The impact of exposure to CRP on cash savings was negative while that of direct participation was positive. The finding of a negative impact of exposure could be because exposure has enabled households to draw down on their savings in ways that support their ability to recover from shocks, for example, to maintain their assets or engage in a new livelihood activity. That households' actual access to savings has declined is unlikely given the positive impact of exposure to CRP on access to financial resources (see below). The small, positive impact of exposure to CRP on support for conflict mitigation is offset by a negative impact of participation (which is only statistically significant for Borena).

**Adaptive capacities.** Engagement in CRP had a positive impact on the following adaptive capacities:

- Bridging social capital
- Aspirations and confidence to adapt
- Livelihood diversity
- Access to financial resources
- Human capital
- Exposure to information
- Asset ownership.

Livelihood diversity, exposure to information, and asset ownership were strengthened by both exposure to and participation in resilience-strengthening interventions. Exposure to CRP had a negative impact on households' linking social capital while direct participation had a positive impact (which is only statistically significant for Borena).

**Transformative capacities.** Engagement in CRP had positive impacts on the following transformative capacities:

- Bridging social capital
- Access to markets
- Access to livestock services
- Access to infrastructure
- Access to formal safety nets.

Access to livestock services was strengthened by both exposure to and participation in CRP. As noted above, exposure to CRP had a negative impact on linking social capital while participation had a positive impact. Exposure to CRP had a negative impact on access to communal natural resources project area-wide. Further inspection reveals that these findings apply to all three types of communal natural resources: grazing land, water and firewood.

### 9.1.3 Did Resilience-strengthening Interventions Reduce the Negative Impact of Shocks on Households' Food Security?

In Section 9.2.1, we found that the resilience-strengthening interventions implemented in the PRIME project area had a positive impact on households' ability to maintain their food security. Resilience marks the ability of households to recover from, specifically, shocks. In this section, we evaluate the evidence on whether the positive impact was achieved through reducing the negative impact of climate and other shocks on households' food security.

This analysis focuses on the shock period in the year before the endline survey which, as can be seen in Figure 3.1 and Table 3.1 of Chapter 3, was one marked by failures of both rainy seasons in Borena and extremely low soil moisture levels in both project areas. As detailed in Chapter 2, panel growth regression is employed, and the analysis focuses on the RMS-2 households, for which data are available on changes in households' food security over this period.

Table 9.5 contains the panel growth regression results for three measures of shock exposure: the rainfall deficit over the period, the household shock exposure index (which is based on one-year recall), and the number of shocks reported by each household in the last year. The key reported value of interest is the coefficient on the interaction term between the PSM treatment group indicator and shock exposure. A positive and statistically significant coefficient on this term indicates that engagement in CRP (whether exposure or participation) reduces the negative impact of shocks on households' food security.

In the case of *exposure* to CRP, the interaction term coefficients are not statistically significant. For *participation* in CRP, they are statistically significant for the project area as a whole and both Borena and Jijiga when shock exposure is measured as the total number of shocks experienced by households over the year. In Jijiga it is also positive and statistically significant when the household shock exposure index is employed. These findings indicate that households' engagement in resilience-strengthening interventions did indeed reduce the negative impact of shocks on their food security. It is additional evidence that resilience-strengthening interventions of the type implemented by PRIME did in fact build resilience to shocks.

**Table 9.5 Has engagement in Comprehensive Resilience Programming reduced the negative impact of shocks on food security? Panel growth regression results**

Shock exposure measure	Exposure to CRP	Participation in CRP			
		All	All	Borena	Jijiga
<b>Rainfall deficit in the last year</b>					
Shock exposure	0.173	0.239	-2.38 ***	0.597 **	
CRP	0.675	4.10	9.39	2.10	
Shock exposure*CRP	-0.045	-0.384	-0.958	-0.146	
<b>Household shock exposure index</b>					
Shock exposure	-0.124	-0.157 ***	-0.157 **	-0.227 ***	
CRP	-0.426	-0.334	-1.99	-3.740	
Shock exposure*CRP	0.047	0.085	0.107	0.273 *	
<b>Number of shocks in the last year</b>					
Shock exposure	-0.274	-0.442 **	-0.477 *	-0.635 **	
CRP	-1.00	-2.72	-5.38 *	-3.270	
Shock exposure*CRP	0.266	0.642 **	0.889 *	0.819 *	
Number of observations	320	352	141	132	
Note: The dependent variable is the change in food security between RMS Round 6 (October/November 2016) and the endline survey (December 2017). Reported values are regression coefficients.					
Stars indicate statistical significance at the 10%(*), 5%(**), and 1%(***) levels.					

Delving further into the project-area-wide findings for participation in CRP, the regression results imply the following relationship between shock exposure (SE), CRP, and households' resilience (R):

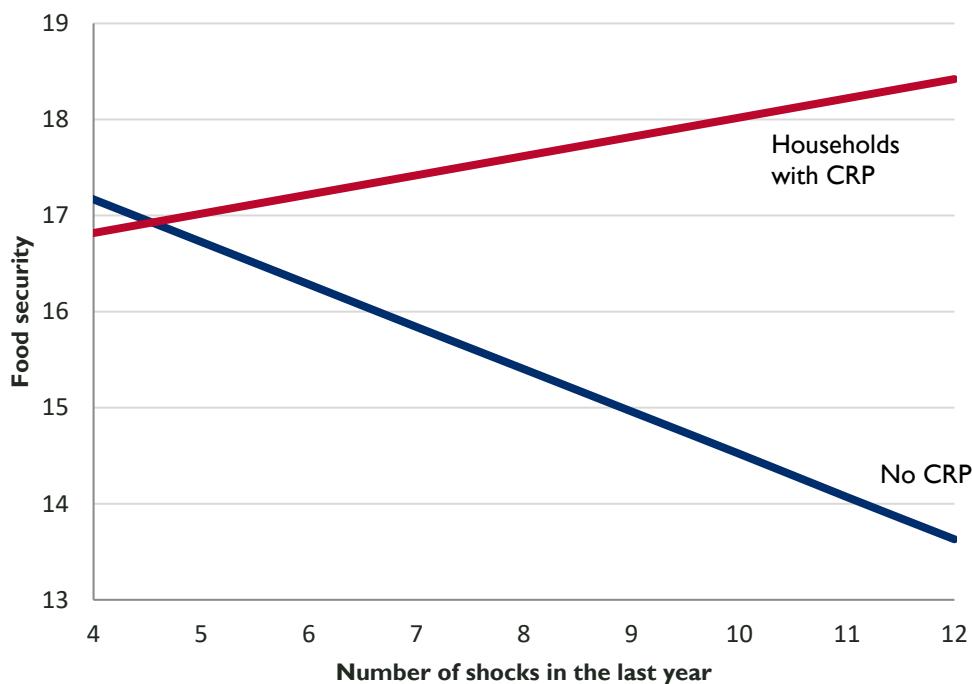
$$R = -0.442 * SE - 2.74 * CRP + 0.642 * SE * CRP.$$

The estimated impact of SE on our measure of resilience is thus:

$$\frac{\partial R}{\partial SE} = -0.442 + 0.642 * CRP.$$

Shock exposure reduces resilience (ability to recover) for households in the non-exposed group (when CRP=0), but not for households exposed to CRP (CRP=1). The relationship is illustrated in Figure 9.5, which shows the simulated trajectory of food security as the number of shocks households were exposed to increased. With intensified shock exposure, the households exposed to multiple types of resilience-strengthening interventions maintained (even increased) their food security while those not exposed experienced a steep decline—they were *not* resilient to the shocks they faced.

**Figure 9.5 Estimated endline food security as shock exposure increases for households participating in Comprehensive Resilience Programming versus control group**



## 9.2 What Worked? Impact of Specific Types of Interventions

This section explores the impact of the four sets of interventions implemented as part of the PRIME project: livestock productivity and competitiveness, PNRM, financial services, and CCA. The key questions asked are: Which of the intervention sets contributed most to enhancing households' resilience to shocks? Which resilience capacities did they strengthen? Did they have positive impacts when implemented singly rather than along with the other resilience-strengthening interventions? Note that the

latter question can be asked because for this analysis engagement in the other three intervention types than the one of immediate interest is controlled for in the exposure/participation regressions. Matching diagnostics for the results presented in this section are in Appendix I (Table A1.4).

It is important to keep in mind that due to the integrative nature of the PRIME project, only a minority of households actually were engaged in only one intervention set to the exclusion of the others. Nevertheless, the estimates presented here enable us to get a sense of the relative effectiveness of the intervention sets in strengthening households' resilience and resilience capacities.<sup>31</sup>

### 9.2.1 Impact on Resilience to Shocks

The impact estimates for resilience are presented in Table 9.6. Exposure to livestock productivity interventions and participation in CCA interventions had positive impacts on households' ability to recover from shocks, as measured by the change in food security. Between the two, participation in CCA had the strongest impact, and especially so for Borena households. Although only weakly significant ( $p=0.081$ ), the magnitude of the livestock productivity estimate is quite large. The financial services interventions did not have a positive impact on resilience when implemented on their own.

The results indicate that exposure to PNRM interventions on their own had a negative impact on households' resilience. However, in the large majority of cases this intervention set was *not* implemented on its own, but in conjunction with others: only 9.7 percent of households had high exposure to it alone. Further, participation in the interventions had a positive impact (the all-households estimate is just shy of statistical significance,  $p=0.137$ ), especially among Borena households. The positive impact of participation is further confirmed by the results for the perceived ability to recover measure of resilience.

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<sup>31</sup> Note that while the magnitude of the impact estimates presented in this section are comparable across the intervention sets, they are *not* comparable to those for CRP presented in the last section. This is because the measures of engagement (exposure and participation) employed for the four intervention sets were not used to construct the measures of engagement in CRP.

**Table 9.6 Impact of the four intervention sets on resilience: Difference-in-Difference Propensity Score Matching estimates (kernel matching)**

	Livestock productivity & competitiveness		PNRM		Financial services		CCA	
	Exposure	Particip-ation	Exposure	Particip-ation	Exposure	Particip-ation	Exposure	Particip-ation
<b>Change in food security</b>								
All	0.911 *	0.056	-2.140 ***	0.542	-0.487	-0.061	-0.516	1.470 ***
Borena	--	-0.055	--	1.450 ***	--	0.043	--	1.740 ***
Jijiga	--	0.072	--	0.124	--	a/	--	0.759
<b>Perceived ability to recover</b>								
All	-0.062	0.033	-0.025	0.153 ***	-0.217 ***	0.047	-0.036	0.011
Borena	--	0.038	--	0.252 **	--	0.072	--	0.052
Jijiga	--	-0.020	--	0.104	--	a/	--	0.052

Note: Values reported are the Average Treatment Affect on the Treated (ATT)

Stars indicate statistical significance at the 10%(\*), 5%(\*\*), and 1%(\*\*\*) levels.

a/ The number of treatment observations is insufficient for estimating the ATT (N=44).

## 9.2.2 Impact on Resilience Capacities

The detailed results for the resilience capacities can be found in Appendix 3 (Table A3.1). They are summarized in Table 9.7. Again, useful summary statistics for the resilience capacities can be found in Appendix 2.

**Overview.** Despite not improving households' resilience over the short time span of the project, from the point of view of the *magnitude* of estimates (how large they are in value), the financial services interventions had the most powerful impact on the three dimensions of resilience capacity. They had a particularly strong effect on households' absorptive capacity. In all, they served to strengthen 14 out of the 20 individual capacities. The livestock productivity and competitiveness interventions had the second-strongest impact on the three dimensions of resilience capacity in terms of magnitudes, and strengthened a full 17 of the individual resilience capacities. The CCA interventions had the third-strongest impact on the capacity dimensions, having a positive (though lower) impact on all three, and strengthening 12 of the capacities. Finally, the PNRM interventions strengthened only adaptive capacity. They had a positive impact on 7 individual capacities.

**Livestock productivity and competitiveness interventions.** Engagement in the livestock productivity interventions, whether exposure or direct participation, contributed to improvements in all three types of resilience capacity—especially absorptive capacity—and to strengthening a long list of individual capacities. These include:

- Bonding, bridging and linking social capital
- Aspirations and confidence to adapt
- Economic capacities: Asset ownership, cash savings, access to financial resources
- Livelihood diversity
- Human capital and exposure to information
- Disaster preparedness and mitigation
- Conflict mitigation support
- Access to services, including livestock services
- Access to markets
- Access to formal and informal safety nets.

Note that participation in livestock productivity interventions appears to have had a small negative impact on households' linking social capital (-1.38 index points), but this negative impact is far overcome by the positive impact of exposure to the interventions (+6.66 points).

**Table 9.7 Impact of the four intervention sets on resilience capacity (summary): Difference-in-Difference Propensity Score Matching estimates (kernel matching)**

	Livestock productivity & competitiveness		PNRM		Financial services		CCA	
	Exposure	Participation	Exposure	Participation	Exposure	Participation	Exposure	Participation
<b>Absorptive capacity</b>								
Bonding social capital	9.249		-7.581	-4.810		4.412		-5.979
Cash savings	14.100				11.50	30.7		4.9
Access to informal safety nets	1.036				2.54	0.438	0.198	
Availability of hazard insurance			-52.4		6.41		5.8	
Disaster preparedness & mitig'n	0.609		0.469			0.193	1.722	
Conflict mitigation support	3.8		1.20				-12.1	-2.600
Asset ownership		2.526	1.598		2.84	1.099		2.554
Index	12.890				23.10	7.44	10.461	
<b>Adaptive capacity</b>								
Bridging social capital	7.455					3.99		-4.458
Linking social capital	6.657	-1.377	4.369	5.698	3.30		6.715	5.254
Aspirations/confidence to adapt		2.647			1.97			
Livelihood diversity	0.204							0.129
Access to financial resources	0.282	0.118	-0.548		1.81	0.190	-0.232	
Human capital		5.338						2.803
Exposure to information		2.235	1.290	2.002				1.734
Asset ownership		2.526	1.598			1.10		2.554
Index	3.506	6.428		4.358	9.17			5.424
<b>Transformative capacity</b>								
Bridging social capital	7.455					3.99		-4.458
Linking social capital	6.657	-1.377	4.369	5.698	3.30		6.715	5.254
Access to markets	0.530				0.766	0.156	0.675	
Access to basic services	0.410		0.304		1.11		0.189	
Access to livestock services		0.042			0.168		-0.053	0.070
Access to infrastructure				-0.131			0.195	
Access to communal natural resources			0.263		-0.474		-0.323	-0.094
Access to formal safety nets	0.359		-0.631	-0.157	0.202			
Index	5.50	1.790			9.90			2.410

Estimates that are significant at the 10% level are only highlighted if their magnitude is deemed to be practically significant given the range of the indicator.

**Pastoral Natural Resource Management interventions.** PNRM interventions had a positive impact on households' adaptive capacity overall and on seven individual resilience capacities:

- Linking social capital
- Economic capacities: asset ownership
- Exposure to information
- Disaster preparedness and mitigation
- Support for conflict mitigation
- Access to basic services
- Access to communal natural resources.

However, they had a negative impact on five resilience capacities, including bonding social capital, the availability of hazard insurance, access to financial resources, access to infrastructure, and access to formal safety nets. The negative impact of exposure to PNRM interventions on households' resilience (see last section) was likely related to induced reductions in the availability of hazard insurance, access to financial resources, and access to formal safety nets. Exposure is associated with a particularly large reduction in the percent of households for which hazard insurance is available. The exposed group of households experienced a decline of 30.3 percentage points while the control group experienced an increase of 22.2 percentage points. The availability of hazard insurance was shown to have likely helped households recover from the El Niño/IOD drought covered by RMS-2 (Smith, Frankenberger and Nelson 2018). Thus, why households exposed to PNRM interventions experienced such a large decline in this capacity compared to those that did not merits further investigation.

**Financial services interventions.** Both exposure to and direct participation in financial services interventions had a positive impact on absorptive capacity, and exposure to them had positive impacts on adaptive and transformative capacity. The following individual capacities were strengthened by households' engagement in the interventions:

- Bonding, bridging and linking social capital
- Aspirations and confidence to adapt
- Economic capacities: Asset ownership, access to financial services, and cash savings
- Disaster preparedness and mitigation
- Availability of hazard insurance
- Access to formal and informal safety nets
- Access to services, including livestock services
- Access to markets.

The financial service interventions, implemented on their own, appear to have had a negative impact on access to communal natural resources. Note again that only a minority of households were actually engaged in these interventions to the exclusion of the others (9.5 percent).

As would be expected, households' exposure to financial services interventions between the baseline and endline had a strong positive impact on their access to the services. The impact estimate is 1.81, which is 90 percent of the range of the variable (at baseline, see Table A2.1). The impact of participation in the interventions on cash savings—a 30.7 percentage-point increase in the percent of households holding savings—was also quite strong.

**Climate change adaptation interventions.** Along with their strong impact on resilience itself, exposure to and participation in the CCA interventions had positive impacts on all three dimensions of resilience capacity and many individual capacities, including:

- Linking social capital
- Economic capacities: Asset ownership and cash savings
- Livelihood diversity
- Human capital and exposure to information
- Disaster preparedness and mitigation

- Availability of hazard insurance
- Access to basic services
- Access to infrastructure
- Access to informal safety nets
- Access to markets.

CCA is the only set of interventions that had a positive (if small) impact on the availability of hazard insurance.

When not combined with other interventions, the CCA interventions had a negative impact on some capacities: bonding and bridging social capital, support for conflict mitigation, access to financial resources and access to communal natural resources.<sup>32</sup> The latter may be due to the greater restrictions placed on the use of these increasingly degraded resources by newly-initiated rangeland management committees and to continued land privatization associated with some interventions.

### 9.2.3 Differences across the Project Areas

The detailed results for participation in the intervention sets for Borena and Jijiga are presented in Appendix 3 (Table A3.2); they are summarized in Table 9.8. Note again that it was not possible to estimate impacts of exposure for the project areas separately.

**Livestock productivity and competitiveness interventions.** Participation in this set of interventions had its strongest positive impact on adaptive capacity in both project areas. It had a positive impact on transformative capacity in Borena only. It strengthened five individual capacities in Borena and four in Jijiga. A negative impact was found for bridging social capital in Borena and (though small) the availability of hazard insurance in Jijiga.

**Pastoral Natural Resource Management.** Participation in the PNRM interventions also had its strongest impact on adaptive capacity in both project areas. It had no impact on absorptive and transformative capacity in either area. It had positive impacts on five individual capacities in Borena and three in Jijiga. Similar to the results for the project area as a whole (see Table 9.7), participation in the interventions had some negative impacts as well. In Borena it had a negative impact on bonding and bridging social capital as well as a small negative impact on access to infrastructure. In Jijiga, it had a negative impact on human capital and a small negative impact on livelihood diversity.

**Financial services.** It was not possible to estimate impacts using DID-PSM for Jijiga because of the small number of treatment households (N=42). Participation in financial services interventions had a positive impact on four capacities in Borena, including a large positive impact on the percent of households with cash savings.

**Climate Change Adaptation.** Direct participation in the CCA interventions had a positive impact on adaptive capacity in both project areas, on absorptive capacity in Jijiga, and on transformative capacity in Borena. It had a positive impact on six individual capacities in Borena and four in Jijiga. Substantial negative

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<sup>32</sup> The negative impact of exposure to CCA interventions on livestock services is cancelled out by the positive impact of participation, leaving a very small overall impact.

impacts were found on bonding and bridging social capital in Borena. Smaller negative impacts on support for conflict mitigation in Borena, and on aspirations/confidence to adapt and access to communal natural resources in Jijiga, were found.

**Table 9.8 Impact of participation in the four intervention sets on resilience capacity for Borena and Jijiga (summary): Difference-in-Difference Propensity Score Matching estimates (kernel matching)**

	Livestock productivity		PNRM		Financial services		CCA	
	Borena	Jijiaga	Borena	Jijiaga	Borena	Jijiaga a/	Borena	Jijiaga
<b>Absorptive capacity</b>								
Bonding social capital			-6.86				-7.88	
Cash savings					31.45		--	6.38
Access to informal safety nets					0.263		--	0.19
Availability of hazard insurance		-4.21					--	
Disaster preparedness and mitigation				0.21			--	
Conflict mitigation support							-3.95	
Asset ownership	3.19		1.28		1.01		2.80	1.89
Index					5.22			2.76
<b>Adaptive capacity</b>								
Bridging social capital	-7.03		-5.48	9.69			-10.42	
Linking social capital	5.90		6.41				7.90	
Aspirations/confidence to adapt	3.31	2.86					2.53	-2.18
Livelihood diversity		0.23		-0.17				0.29
Access to financial resources	0.17				0.119			
Human capital		9.61	5.26	-5.82				
Exposure to information	2.36	1.77	2.42	1.42			2.43	
Asset ownership	3.19		1.28		1.01		2.80	1.89
Index	6.85	5.23	6.17	2.29			6.16	2.71
<b>Transformative capacity</b>								
Bridging social capital	-7.03		-5.48	9.69			-10.42	
Linking social capital	5.90		6.41				7.90	
Access to markets			0.114					
Access to basic services							--	
Access to livestock services							0.06	0.03
Access to infrastructure			-0.20					
Access to communal natural resources								-0.14
Access to formal safety nets								
Index	3.71				1.50		3.19	

Note: Green-shaded cells indicate a positive impact significant at the 10% level; red-shaded cells indicate a negative impact. Estimates that are significant at the 10% level are only highlighted if their magnitude is deemed to be practically significant given the range of the indicator.

### 9.3 Evidence on Attribution to the PRIME Project

As noted in Chapter 8, it was not possible to directly measure the engagement of households in the interventions implemented specifically by the PRIME project. The impact evidence presented so far represents that of resilience-strengthening activities regardless of the implementing agency. In this section, data on the number of PRIME resilience-strengthening interventions implemented in each of the seven woredas of the IE area are used to provide some evidence on the whether the impacts found can be attributed distinctively to the PRIME project.

The number of interventions implemented in the two project areas over the life of the project is given in Table 9.9. These data come from activity sheets provided by Mercy Corps. Interventions are broken down into three categories corresponding to the PRIME project's Intermediate Results (IR1, IR2, and IR3—see Chapter 1). Consistent with the engagement data from the household and community surveys for resilience-strengthening interventions regardless of implementing agency (see Chapter 8), interventions were somewhat more concentrated in Borena.

**Table 9.9 Household exposure to PRIME resilience-strengthening interventions in the last four years (Woreda-based measure), by project area and pastoralist status**

Indicator	All	Project area	
		Borena	Jijiga
Livestock productivity and competitiveness (IR-1)	99	57	42
Climate change adaptation/Pastoral Natural Resource Management (IR-2)	109	60	49
Alternative livelihoods for households transitioning out of pastoralism (IR-3)	74	36	38
<b>TOTAL</b>	<b>282</b>	<b>153</b>	<b>129</b>

Note: Values reported are the number of PRIME project activities (from Woreda-level activity spreadsheets).

The “treatment group” for this analysis is based on a measure of high exposure to PRIME interventions. It is a dummy variable equal to one if the woreda had at least 10 interventions in each of the three categories and zero otherwise.<sup>33</sup> It is important to note that this measure can be expected to reveal weaker household-level impacts simply because the interventions are enumerated at the woreda (rather than community or household) level. Thus, any that are not statistically significant should not be taken to imply that the project had no impact on an outcome.

With regards to resilience itself, no statistically significant impacts can be detected (Table 9.10), although the impact estimates are close to being significant at the 10% level (see reported p-values). However, the results confirm that the PRIME project's interventions had a positive impact on all three dimensions of resilience capacity and a wide variety of important individual capacities.

<sup>33</sup> The matching diagnostic criteria are met: 78.1 percent of treated households are on the common support, and the mean standardized percent bias is 7.3.

**Table 9.10 Impact of exposure to PRIME project interventions: Difference-indifference Propensity Score Matching estimates (kernel matching)**

	Average treatment effect on the treated	z-stat	p-value	
<b>Resilience</b>				
Change in food security	0.706	1.33	0.184	
Change in perceived ability to recover	0.156	1.58	0.111	
<b>Absorptive capacity</b>				
Bonding social capital	-2.10	-0.66	0.507	
Cash savings	1.27	0.35	0.724	
Access to informal safety nets	1.00	6.22	0.000 ***	
Availability of hazard insurance	15.2	3.06	0.002 ***	
Disaster preparedness and mitigation	0.577	6.21	0.000 ***	
Conflict mitigation support	-5.570	-3.05	0.000 ***	
Asset ownership	1.93	3.01	0.003 ***	
Index	12.50	8.57	0.000 ***	
<b>Adaptive capacity</b>				
Bridging social capital	-1.80	-0.57	0.569	
Linking social capital	11.30	5.09	0.000 ***	
Aspirations/confidence to adapt	4.80	3.35	0.001 ***	
Livelihood diversity	-0.201	-2.60	0.009 ***	
Access to financial resources	0.509	5.72	0.000 ***	
Human capital	-0.780	-0.33	0.745	
Exposure to information	-0.548	-1.68	0.092 *	
Asset ownership	1.93	3.01	0.003 ***	
Index	3.52	2.89	0.004 ***	
<b>Transformative capacity</b>				
Bridging social capital	-1.80	-0.57	0.569	
Linking social capital	11.30	5.09	0.000 ***	
Access to markets	0.352	6.10	0.000 ***	
Access to basic services	1.22	11.45	0.000 ***	
Access to livestock services	0.172	9.70	0.000 ***	
Access to infrastructure	0.824	12.93	0.000 ***	
Access to communal natural resources	-0.601	-6.66	0.000 ***	
Access to formal safety nets	0.317	4.06	0.000 ***	
Index	14.01	9.28	0.000 ***	

Stars indicate statistical significance at the 10%(\*), 5%(\*\*), and 1%(\*\*\*) levels.

These individual capacities include:

- Linking social capital
- Aspirations and confidence to adapt
- Economic capacities: asset ownership and access to financial resources
- Disaster preparedness and mitigation

- Availability of hazard insurance
- Access to services, including livestock services
- Access to infrastructure
- Access to markets
- Access to formal and informal safety nets.

The results indicate small negative impacts of exposure to PRIME interventions on support for conflict mitigation, livelihood diversity, and access to communal natural resources.<sup>34</sup>

## 9.4 A Note on Humanitarian Assistance

From Chapter 8, 63 percent of households in the PRIME IE area received food aid at some time over the four years of the PRIME project. Over half (52.9 percent) participated in food-for-work, 14.6 percent received cash assistance, and 32 percent participated in cash-for-work. Investigating the impact of this humanitarian assistance on households' ability to recover from shocks, or of the project's activities on the volume of that assistance, is beyond the scope of this report.

However, humanitarian assistance was a major element of the response to the drought along with the resilience-strengthening interventions implemented by PRIME and other agencies. If households that engaged in resilience-strengthening activities were also more likely to receive humanitarian assistance, then it is possible that the impact estimates reported here are biased upwards.

From Table 9.II, households participating in CRP were indeed more likely to receive food aid than those who didn't. Seventy-five percent of treatment households received food aid compared to 58 percent of control-group households. To see if this difference affects the DID-PSM estimates of the impact of CRP, the percent of households receiving food aid over the project period was added as a matching variable in the participation treatment probit regression model.<sup>35</sup> While this percent does have a significant and positive coefficient in this regression (confirming that it is associated with participation in CRP), including the food aid variable does not lower the estimated impact of participation in CRP.<sup>36</sup> We also included food aid as an independent (control) variable in the panel growth regressions of Section 9.2.3 above to see if doing so alters estimates of the impact of CRP. It does not.

We can thus be assured that the impact estimates presented here are not biased upwards due to the greater food aid received by households engaged in resilience-strengthening interventions.

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<sup>34</sup> The negative impact estimates for livelihood diversity and exposure to information are statistically significant but negligible.

<sup>35</sup> Variables measuring humanitarian assistance received during the project period are not already included in the treatment models because they could have been affected by the project itself, violating the conditions for implementing PSM.

<sup>36</sup> The estimate when the food aid variable is included rises from 1.53 to 1.63.

**Table 9.11 Percent of households receiving humanitarian assistance in the Comprehensive Resilience Programming control and treatment groups**

Shock exposure measure	Exposure		Participation	
	Control	Treatment	Control	Treatment
Food aid	60.3	63.9 *	57.7	75.0 ***
Cash assistance	18.7	15.2 **	16.6	18.2
Food-for-work	51.1	58.7 ***	54.0	53.8
Cash-for-work	32.0	32.6	32.4	30.0

Stars indicate statistical significance at the 10%(\*), 5%(\*\*), and 1%(\*\*\*) levels.

## 9.5 Summary: Impact of PRIME on Households' Resilience and Resilience Capacities

In this chapter the impact of the PRIME project was evaluated using a rigorous impact evaluation technique, Difference-in-Difference Propensity Score Matching. All DID-PSM models employed were carefully tested to ensure they meet the two criteria for applying this method (common support and adequate balancing). The results indicate a largely positive impact of resilience-strengthening interventions on households' ability to recover from shocks and their resilience capacities.

### Impact of Comprehensive Resilience Programming

**Impact on resilience.** Households' exposure to and direct participation in resilience-strengthening interventions did indeed strengthen their resilience to shocks. The impact was stronger when households participated directly in interventions than if they were just exposed to them. Households exposed to CRP experienced an 18 percent lower decline in their food security over the project period than their unexposed counterparts. Households that directly participated in CRP experienced a full 40 percent lower decline than those that did not, evidence that they were much more resilient. The positive impact of direct participation was greater for Borena than Jijiga households, roughly double.

Households' engagement in CRP had a strong preventative effect on severe food insecurity. Exposure to CRP led to a 15.6 percentage-point drop in severe food insecurity at endline. In the absence of exposure to the variety of resilience-strengthening interventions made available, the prevalence would have risen to 72.1 percent (versus 56.5 for the exposed households). Direct participation in CRP had a further preventative effect.

**Impact on the three dimensions of resilience capacity.** CRP strengthened all three dimensions of resilience capacity—absorptive capacity, adaptive capacity, and transformative capacity. In the absence of households' engagement in CRP, the average household in the PRIME area would have experienced a reduction in their resilience capacities during this period of extreme drought. However, the resilience capacities of those engaged in multiple, cross-sectoral resilience-strengthening interventions were strengthened, enabling them to recover and preparing them to cope

with future shocks. Similar to resilience itself, participation in CRP had a stronger positive impact on the capacities for Borena than Jijiga.

**Impact on the 20 individual resilience capacities.** The impacts on the individual resilience capacities are summarized in the following table, with green shading indicating a positive impact and red shading a negative impact. As can be seen, where resilience-strengthening interventions have had an impact, it has been positive with a few exceptions. The capacities strengthened by CRP span beyond the economic capacities of traditional focus to include human and social capital, psycho-social capabilities, safety nets, disaster risk reduction, and access to markets, services, and infrastructure.

### ***Impact of Comprehensive Resilience Programming on resilience capacities***

	All	Borena (Participation only)	Jijiga
<b>Social capital</b>			
Bonding social capital			
Bridging social capital	+		+
Linking social capital		+	
<b>Aspirations/confidence to adapt</b>	+	+	
<b>Economic sources of resilience capacity</b>			
Asset ownership	+	+	+
Livelihood diversity	+		+
Access to financial resources	+		
Cash savings			
<b>Human capital and exposure to information</b>			
Human capital	+	+	
Exposure to information	+	+	+
<b>Disaster risk reduction</b>			
Disaster preparedness & mitigation	+		
Availability of hazard insurance	+		
Conflict mitigation support		-	
<b>Access to safety nets</b>			
Access to informal safety nets	+		
Access to formal safety nets	+		
<b>Access to markets, services, infrastructure, and communal natural resources</b>			
Access to markets	+		
Access to basic services		+	
Access to livestock services	+		+
Access to infrastructure	+	+	
Access to communal natural resources	-		

Note: Positive impacts are in green; negative impacts are in red.  
The results for the project area as a whole summarize those for exposure and participation

### **What worked? Impact of the four types of interventions**

Which sets of interventions strengthened households' resilience and resilience capacities? Focusing on the project-area-wide results for resilience itself and the three dimensions of resilience capacity, the following are the main findings.

**Impact on resilience:** The evaluation found that the livestock productivity and competitiveness interventions, followed by the CCA interventions, had the strongest impacts on households' resilience. The financial services interventions had no impact on resilience itself. The PNRM interventions had mixed impacts: they had a negative impact on the small minority of households that were only exposed to them with no active participation. Those that did participate in them experienced induced improvements in their resilience to shocks.

**Impact on resilience capacity:** Despite not improving households' resilience over the short time span of the project, the financial services interventions had the most powerful impact on the three dimensions of resilience capacity. They had a particularly strong effect on households' absorptive capacity. In all, they served to strengthen 14 out of the 20 individual capacities. The livestock productivity & competitiveness interventions had the second-strongest impact on the three dimensions of resilience capacity, strengthening a full 17 of the individual capacities. The CCA interventions had the third-strongest impact on the capacity dimensions, having a positive (though lower) impact on all three, and strengthening 12 of the capacities. Finally, the PNRM interventions strengthened only adaptive capacity. They had a positive impact on 7 individual capacities.

The CCA and PNRM interventions did not strengthen households' resilience as much as they could have because they had negative effects on some capacities (4 for CCA and 5 for PNRM). The evaluation also found that CRP itself, and financial services and CCA interventions in particular, had a negative impact on access to communal natural resources, including rangeland, water, and firewood. Avoiding such negative impacts on resilience capacities is obviously important for leveraging the greatest resilience impacts. To do so, efforts should be made to understand why they are occurring and who is being affected so that appropriate shifts in programming can take place.

## 10. PROGRAM IMPLICATIONS

During the last four years of the PRIME project, both the Borena and Jijiga project areas experienced a continuous cycle of multiple, back-to-back droughts. The cumulative drought exposure over the project period was more severe in Borena than Jijiga. The quantitative and qualitative data show that households experienced numerous downstream shocks and stressors as well. Problems of insufficient fodder and water for livestock and consequent livestock disease, unplanned deaths, and crop failures were widespread. Household income and consumption were negatively affected as well as local economies, leading to unemployment and business failures.

It is in this shock-prone context that the PRIME project was implemented. Using a multi-sectoral, systems strengthening approach, resilience interventions were designed to have a broader systems-level impact. However, households could make decisions to take advantage of these interventions, and some were directly targeted to them. For the purposes of this impact evaluation, interventions were grouped into four sector-specific sets—livestock productivity and competitiveness, pastoral and natural resource management (PNRM), financial services, and climate change adaptation (CCA). Survey households were classified as either being exposed to these interventions sets and/or directly participating in them. Descriptive analysis shows that the livestock productivity and competitiveness interventions were more heavily targeted to the Jijiga area, whereas the PNRM interventions were more prominent in Borena. Financial services and CCA were equally targeted to both areas.

### 10.1 Enhancing Resilience Impacts

As shown here, the resilience-strengthening interventions implemented in the PRIME area had a positive impact on households' resilience to shocks. What is striking about the results is that greater impact was achieved when interventions from multiple sectors are combined than when they are implemented separately. The positive impacts of "Comprehensive Resilience Programming" (CRP), defined as being engaged in at least three of the four interventions sets, is a lesson to be learned for future resilience-strengthening projects.

Another lesson is that direct participation of households in interventions had a greater impact than only indirect exposure to them. Households exposed to CRP experienced an 18 percent lower decline in their food security than their limited-exposure counterparts. However, households that directly participated in CRP experienced a 40 percent lower decline in food security than those that did not, a much greater impact. Future projects with interventions implemented mainly at the systems level should plan for opportunities for such direct participation of households.

For projects to leverage the greatest impacts on households' resilience to shocks, focus should be placed on the interventions that have been shown to bolster households' ability to recover from shocks the most. In the case of resilience-strengthening interventions implemented in the PRIME project's operational area, these were the livestock productivity and competitiveness and CCA interventions, the latter only when households directly participated in them. Although they had a strong impact on households' resilience capacity (see below), the financial services interventions did not have a positive impact on resilience during the relatively short period of measurement of this impact evaluation. The PNRM

interventions had a mixed impact on resilience, with exposure having a negative impact but direct participation having a positive impact.

## 10.2 Strengthening the Resilience Capacities

This IE analysis has shown that households' engagement in CRP and three of the intervention sets—livestock productivity, financial services, and CCA—strengthened all three dimensions of resilience capacity: absorptive capacity, adaptive capacity and transformative capacity. The PNRM interventions strengthened adaptive capacity. But the most important findings from a programming standpoint center on the 20 individual resilience capacities, around which practical planning and action can take place.

Households' engagement in CRP strengthened three **economic sources of resilience capacity**: asset ownership, livelihood diversity, and access to financial resources. Further, the financial services, livestock productivity and CCA interventions bolstered households' **cash savings**. These are all important capacities for recovering from shocks. Given the changing livelihood context for pastoralists in this region of Ethiopia, the focus needs to be on how we can strengthen alternative livelihoods as pastoralists and agro-pastoralists transition out of pastoralism. The economic capacities will be important to continue to strengthen to enable households to diversify and manage shocks of all kinds in the future.

For households that stay in livestock production, a major shift to commercialization of livestock rearing and marketing is taking place Ethiopia-wide; evidence was presented in this report that it is taking place among households in Borena and Jijiga. The changes include shifting away from communal pasture browse to private pastures, fodder purchased from markets and reliance on crop residue. As a form of diversification, non-pastoralists in Jijiga are also engaging in livestock rearing, presumably for commercial purposes. **Access to markets, infrastructure and livestock services**, all of which as we have seen here were strengthened by the resilience-strengthening interventions implemented by PRIME and other agencies, will be important transformative capacities to continue to focus on. It will be particularly important to consider strengthening services that were declining over the PRIME project's operational period, such as access to veterinary services in Borena.

The PRIME project also increased **aspirations and confidence to adapt** across the project area. Improvements of such psycho-social factors have been found to be extremely important for households to manage shocks and stresses and to invest in future livelihood opportunities. Ways should be sought in future programs to see how aspiration windows can be expanded through exposure to videos and cross visits to encourage households to be more forward looking in their investments (See Benard, T. S., Dercon, and A. Taffesse 2017).

Given the severe droughts that households faced, some erosion of social capital over time was documented here, including bonding, bridging and linking social capital in Borena, and linking social capital in Jijiga. CRP had a positive impact on **bridging and linking social capital**, thus attenuating this erosion. The IE analysis shows that all four of the intervention sets contributed to this positive effect. One of the ways they were likely brought about was by building social capital through group formation, and this is an investment that should be continued. Future programming needs to track changes in social capital brought about from the formation of community groups such as savings groups, water user's groups, livestock marketing groups, disaster planning groups, and grazing associations.

The only resilience capacity on which CRP had no registered impact was **bonding social capital**. This finding is due to the fact that the positive impacts of livestock productivity and financial services interventions were canceled out by the negative impacts of PNRM and CCA. Bonding social capital should be protected to avoid reliance on formal sources of assistance, which we saw increased as a coping strategy over the project period.

**Formal and informal safety nets** will continue to be important to households facing multiple covariate and idiosyncratic shocks. Ways to strengthen informal safety nets as a first line of defense so that reliance on formal safety nets can be reduced should be an important focus. The timing, amount and duration of the transfer in a formal safety net are critical to protecting livelihood investments. Lessons learned from on-going evaluations of the Productive Safety Net Program will be important to factor in future programming in these areas.

Engagement in CRP also had a positive impact on **human capital** and **exposure to information** in both regions. Human capital improvements will enable households to diversify more effectively into alternative livelihoods, and good access to information will enable households to make better marketing decisions and climate change adaptations. Three of the four intervention types improved access to information.

Investment in **disaster risk reduction**, including disaster preparedness and mitigation, hazard insurance, and support for conflict mitigation, will continue to be important to improve household and community absorptive capacity to manage shocks. CRP and all four of the intervention sets had a positive impact on disaster preparedness and mitigation. While two of the intervention sets had a positive impact on the availability of hazard insurance (financial services and CCA), PNRM had a large negative impact on it. Similarly, while the livestock productivity and PNRM interventions had a positive impact on support for conflict mitigation, CCA interventions had a negative impact on it.

As for resilience itself, for projects to leverage the greatest impacts on the resilience capacities focus should be placed on the interventions shown to bolster them the most. Overall, the two intervention sets that had the biggest impacts on the resilience capacities are financial services and livestock productivity and competitiveness. These should continue to be emphasized in resilience-strengthening programs in this pastoralist setting.

CCA and PNRM had important positive impacts on some capacities. However, they had some negative impacts as well, including on bonding social capital (mentioned above), linking social capital, access to financial resources, access to infrastructure, access to formal safety nets and, as also mentioned above, the availability of hazard insurance and support for conflict mitigation.

CRP and, in particular, financial services and CCA interventions, had a negative impact on access to communal natural resources, including rangeland, water, and firewood. As noted, this may be due to the greater restrictions placed on the use of these increasingly degraded resources by newly-initiated rangeland management committees and to land privatization.

Avoiding such negative impacts on resilience capacities is obviously important for leverage the greatest resilience impacts. To do so, efforts should be made to understand why they are occurring so that appropriate shifts in programming can take place. Also, it is important to understand who is being

affected, for example, by reductions in access to communal natural resources, and find ways to help them adjust while preserving their livelihoods.

### 10.3 The Need for Interim Monitoring and Evaluation to Inform Adaptive Management

A disconcerting finding is that food security deteriorated much more in the Borena area over the course of the project than in the Jijiga area. Further, the analysis of trends in resilience capacities in Chapter 5 showed that only five resilience capacities improved in Borena while eight got worse. By contrast, fourteen resilience capacities actually improved in Jijiga whereas only one got worse. We know that drought exposure was more severe in Borena than Jijiga, and this could explain why food security and so many resilience capacities deteriorated so much more in Borena and why households were less resilient there. In addition, because pastoralism was the dominant livelihood in Borena, the severe shocks impacted this livelihood group the most.

Given these big differences between the program areas, one question that should be considered is why livestock productivity and competitiveness interventions were more concentrated in Jijiga than in Borena. As we have seen, these interventions had a strong, positive effect on resilience and strengthened 17 resilience capacities. Further, PNRM interventions, which had a much weaker impact, were more concentrated in Borena than Jijiga. It is possible that the difference in outcomes could be accounted for, at least in part, by this difference in programming. Another possibility is that fewer resources were put into interventions in Borena.

One other distinction that stands out between the two areas is that Jijiga received more humanitarian assistance in the form of cash transfers than Borena. While only 9.0 percent of households in Borena received cash assistance at some point over the project period, 28.3 percent did so in Jijiga. Further, only 10.8 percent of households in Borena engaged in cash-for-work while a full 56.8 percent did so in Jijiga. The percent receiving food aid from the government and NGOs over the period is roughly equal across the areas. The difference in cash transfers may explain why livelihood diversity has increased in Jijiga, as well as why there have been improvements in social capital in Jijiga but declines in Borena.

An important lesson to draw from these differences in trends in food security and in resilience in the two areas is that the information generated from the Recurrent Monitoring Surveys (RMS-1 and RMS-2) could have been used more effectively to trigger an adaptive change in programming in Borena. Evidence was being gathered on the deteriorating conditions in Borena, and more could have been done to respond to this situation. Future work, especially RMSs, should more clearly outline feedback loops and evidence-based adaptive management plans at the beginning of evaluation activities, so that data and learnings can be more effectively integrated into real-time programming decisions. A clear understanding and mapping of which interventions are being implemented where will also allow for better adaptive management; this information is needed for determining what is making a difference before administration of an endline survey.

## 10.4 Other Implications for Programming

Initial comments on this report raised some additional implications for future resilience programming in the drylands of Ethiopia. First, the qualitative data revealed issues of sufficiency and timeliness of government-led formal safety nets like food aid during the recurrent droughts. Future projects should consider providing technical support to such government safety net programs to best enhance households' resilience. Second, the qualitative data also raised issues of pastoralists' access to markets. Future projects should seek ways to address impediments to pastoralists' market mobility (particularly that of women), so they will have better opportunities to market raw goods like milk and dairy products. Finally, together the qualitative and quantitative data suggest that poor water and sanitation quality, as well as reduced access to health care (perhaps related to drought conditions), may have contributed to the increase in wasting among children under five in Jijiga. Young child caring practices related to the use of food assistance may have also been an issue. Future projects should integrate considerations of health and caring practices (not just food security) in resilience programming in order to protect children's nutritional status during drought,

## 10.5 Questions for Future Research

The information presented in this report raises numerous questions for future research, the answers to which will be useful for future programming.

- How can future resilience-strengthening projects promote direct participation of households in system-wide interventions to best enhance resilience?
- Why did the CCA and PNRM interventions have negative impacts on some resilience capacities, and what can be done to prevent these?
- Why did project interventions have a negative impact on access to communal natural resources? What are the effects on households of loss of communal pasture browse? What are the benefits and costs of privatization? Do long-term eco-system improvements brought about by interventions come at the expense of short-term restrictions to access? How can these negative impacts be addressed
- How can programming be improved so that increased resilience capacities are translated into resilience itself as quickly as possible? For example, how can the positive effects of financial services interventions on resilience capacities be translated into more immediate positive effects on resilience?
- Why did wasting increase in Jijiga? What are the roles of water/sanitation and access to health services? What is the role of caring practices related to the use of food assistance? How can programs take a more integrative approach, taking into account all three underlying determinants (food security, health, and quality of caring practices), to protect children's nutritional status during droughts?
- How can resilience-strengthening projects like PRIME address the issue of food price inflation? How do price changes, and terms-of-trade changes in general, differentially affect groups of households (e.g., pastoralists vs. non-pastoralists)?

- How do droughts affect land quality (e.g., land degradation, the spread of invasive species). How can these downstream effects be addressed?
- How has the Oromiya-Somalie border conflict affected households' lives vis-à-vis resilience to drought? What are the perspectives of the involved populations? Can this information be used for better resilience programming?
- What explains the divergent trends in households' asset wealth and income (as measured using total expenditure) over the project period? How can the constraints to poor households' access to commercial feed for cattle be addressed?
- What explains the increase in livestock production and marketing among non-pastoralists over the course of the PRIME project?
- What are the differential effects of commercialization of livestock production on the poor and wealthy in terms of employment, income, wealth and resilience?
- Is agriculture a viable option for households in dryland areas transitioning out of pastoralism? What can be done to make agricultural extension systems more "pastoral friendly?"
- Why were pastoralists as a group the least resilient to the droughts that took place over the PRIME project's operational period? What can be done to help them better cope with drought? More generally, what drives households in and out of pastoralism? What are the conditions that are more or less favorable for pastoralism? What can programs do to specifically support pastoralist' resilience in terms of providing opportunities for pastoralist livelihoods?

## 10.6 Summary: Program Implications

The following are the implications for programming based on the findings:

- Greater impacts are achieved when interventions from multiple sectors are combined than when they are implemented separately. **Comprehensive, multi-sectoral programming optimizes resilience impacts.**
- Participation of households in the PRIME project's interventions had a greater impact than only indirect exposure. **Projects with “system-level” interventions should proactively plan for direct household participation.**
- Important knowledge was gained from this impact evaluation: livestock productivity, financial services, and CCA interventions had the strongest impact. **Projects can leverage the greatest impact by determining early on which interventions bolster resilience and resilience capacities the most and focusing on them.**
- The positive resilience impacts were brought about by strengthening a wide range of resilience capacities spanning beyond the economic to include human and social capital, psycho-social capacities, safety nets, disaster risk reduction, and access to markets, services, and infrastructure. **Shocks are not going away: continue to strengthen a wide range of capacities to protect households' well-being and development investments.**
- **The CCA and PNRM interventions had negative impacts on some resilience capacities, hindering resilience progress. Avoid negative impacts through understanding why they occur, who they affect, and shifting programming accordingly.**
- The sharp deterioration of food security and resilience capacities seen in Borena could have been prevented with earlier information on food security trends, where interventions were concentrated, and which are likely to have the greatest impact. **To leverage optimal impacts in shock contexts, conduct interim monitoring and evaluation and use the information gained for adaptive management.**

# APPENDIX I. Selection of Control Groups and PSM Diagnostic Tests

From Chapter 2, the main method employed for conducting this impact evaluation is Difference-in-Difference Propensity Score Matching (DID-PSM). This appendix describes the selection of control and treatment groups for the analysis and conducts an assessment of the applicability of DID-PSM to the evaluation of the PRIME project.

The first step in selecting the control and treatment groups is to estimate a probit engagement or “treatment” model in order to compute a propensity score for each household conditional on observed characteristics. Following, treated households are matched with a group of non-treated households based on similarity of propensity scores, and diagnostic tests are undertaken to ensure that there are sufficient control group households to match with treatment households (the common support condition is met) and the groups are sufficiently similar after matching (balancing conditions are met). These processes are described herein, starting with the main treatment of focus, Comprehensive Resilience Programming (Section A1.1), and followed by the four intervention sets (Section A1.2).

## A1.1 Engagement in Comprehensive Resilience Programming (CRP)

### A1.1.1 Estimation of Propensity Scores

Propensity scores are real numbers between 0 and 1 that are estimates of the probability that a household engaged in CRP. These scores are estimated using a probit model. The independent or “matching” variables employed include a wide variety of household and community characteristics that are hypothesized to affect household’s engagement in CRP and/or their resilience to shocks, the ultimate outcome of interest.

The matching variables for estimating the propensity scores for exposure to CRP are listed in Table A1.1. They include baseline food security, household’s resilience capacities, shock exposure, various household socio-demographic characteristics, economic status, community characteristics, and the number of government and NGO programs at baseline. Additional matching variables employed for the participation model (listed in Table A1.2) include ownership of a radio and television, variables affecting households’ aspirations and confident to adapt, social capital, women’s decision making power and women’s leisure time, the latter representing time constraints influencing households’ ability to participate.<sup>37</sup>

A requirement for implementing PSM is that all matching variables not be affected by the treatment, in this case by households’ exposure to or participation in resilience-strengthening interventions. To satisfy this requirement, all variables are measured at baseline with the exception of the climate shock variables, which are exogenous to the PRIME project’s interventions. The specifics of how each matching variable is measured are laid out in Chapters 2, 3, 5 and 7.

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<sup>37</sup> Data on men’s time constraints were also collected, but they were missing for 37 percent of sample households and so were not usable for this analysis.

Note that the range of matching variables employed here goes far beyond those typically included in PSM impact evaluations to include many that are considered “unobserveables” simply because data are not available for measuring them, for example, resilience capacities, shock exposure, aspirations, social capital, decision making power, and time constraints. Data for the latter two variables were collected at endline specifically for the purposes of ensuring good matches for constructing the control groups for this PSM analysis.<sup>38</sup>

Following Heinrich, Maffioli and Vazquez (2010), a flexible functional form is used that allows for non-linearities in the influence of key matching variables on households’ engagement in CRP.<sup>39</sup> Additionally, differences in the influence of variables by project area are allowed by including and testing for the statistical significance of interactions between a project area dummy variable and these matching variables.

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<sup>38</sup> The *baseline* values of the two measures, which are necessary for this analysis, were estimated using a “ladder retrospective recall” method whereby data for endline values are collected employing conventional methods and, following, respondents were asked to point to the current step they are on (out of ten steps) and then the step they were on “four years ago”.

<sup>39</sup> These matching variables are: baseline food security, the three indexes of resilience capacity, all shock exposure variables, the asset indexes, expenditures per capita, number of adult equivalents, and the number of government and NGO programs.

**Table A1.1 Probit model for exposure to comprehensive resilience programming and post-matching balance (Kernel matching)**

	Probit exposure model		Balance after matching		
	Coeff- icient	z-stat	Mean		% bias a/
			Treated	Control	
<b>Baseline food security</b>	0.015	2.67 ***	19.5	19.8	-3.3
<b>Baseline resilience capacity</b>					
Absorptive capacity	-0.148	-14.3 ***	35.9	38.6	-11.9
Absorptive capacity-squared	0.001	8.31 ***	1914.7	1946.0	-1.7
Adaptive capacity	0.004	1.11	35.6	37.6	-13.9
Transformative capacity	0.094	7.92 ***	63.5	66.4	-13.6
Transformative capacity-squared	-0.001	-5.31 ***	4405.5	4700.2	-12.2
<b>Shock exposure</b>					
Hhold shock exposure index (baseline)	0.011	2.37 **	12.0	10.9	10.9
Number of shocks in last 5 years	-0.430	-2.08 **	30.4	30.9	-18.2
Number of shocks in last 5 years-squared	0.007	2.12 **	931.1	960.4	-18.1
Total rainfall deficit	0.861	11.71 ***	32.1	32.3	-2.7
Total rainfall deficit-squared	-0.013	-12.3 ***	1059.4	1063.9	-1.1
Soil moisture deficit	0.044	9.56 ***	1348.0	1333.4	6.0
Soil moisture deficit-squared	-0.00002	-9.55 ***	1.90E+06	1.80E+06	7.0
Soil moisture deficit*Borena	-0.039	-8.25 ***	833.4	1007.9	-25.8
Soil moisture deficit*Borena-squared	0.00001	7.77 ***	1.10E+06	1.40E+06	-22
<b>Household socio-demographic characteristics</b>					
Project area: Jijiga a/					
Borena	25.9	8.24 ***	63.6	77.0	-25.8
Female-adult-only household	-0.057	-0.36	11.10	10.90	0.6
Number of adult equivalents	0.245	2.67 ***	4.17	4.32	-8.3
Number of adult equivalents-squared	-0.020	-2.3 **	20.38	22.12	-10.2
Percent males 0-16 a/					
Males 16-30	-0.002	-0.53	10.28	9.77	3.5
Males 30 plus	-0.005	-1.41	13.40	13.33	0.5
Females 0-16	-0.0003	-0.14	25.14	26.20	-5.8
Females 16-30	0.005	1.58	11.96	11.89	0.5
Females 30 plus	0.003	0.84	13.56	12.76	5.3
Any member has a formal education	0.020	0.27	63.10	66.10	-6.1
Pastoral status: Pastoralist a/					
Agro-pastoralist	0.050	0.62	40.10	41.80	-3.4
Non-pastoralist	0.019	0.2	23.90	18.90	11.5
<b>Household economic status</b>					
Consumption asset index	0.224	7.55 ***	1.33	1.52	-14.1
Agricultural productive asset index	-0.009	-0.99	7.12	7.74	-15.0
Tropical Livestock Units	0.005	1.17	6.42	7.37	-11.0
Total pc daily expenditures	-0.0001	-0.04	17.11	14.56	13.5
Poverty gap	-0.004	-2.62 ***	20.62	22.77	-8.7

(Continued)

**Table A1.1 Continued.**

<b>Village characteristics</b>						
Population	-0.00001	-1.1		5,563	4,893	18.0
Distance from nearest town	-0.030	-3.43 ***		24.26	23.06	7.2
Distance from nearest town*Borena	0.064	7.25 ***		19.53	20.12	-3.1
Cell phone service available b/	--					
Paved road available b/	--					
Number of community organizations	-0.003	-0.09		5.69	6.12	-13.8
<b>Baseline number of gov't and NGO programs</b>						
Number of government programs	-0.109	-2.95 ***		2.78	2.60	8.7
Number of government programs*Borena	0.489	9.61 ***		2.34	2.29	2.3
Number of NGO programs	0.527	11.61 ***		1.80	2.21	-23.1
Pseudo R-squared	0.418					
Number of observations	2,750					
Mean %bias						10.0
Percent treated hholds on common support						87.6

Stars indicate statistical significance at the 10%(\*), 5%(\*\*), and 1%(\*\*\*) levels.

a/ Highlighted cells indicate values outside of the 20% cut-off for minimum balance

**Table A1.2 Probit model for participation in comprehensive resilience programming and post-matching balance (Kernel matching)**

	Probit participation model		Balance after matching		
	Coeff- icient	z-stat	Mean		% bias
			Treated	Control	
<b>Baseline food security</b>	-0.0032	-0.69	19.76	19.72	0.6
<b>Baseline resilience capacity</b>					
Absorptive capacity	-0.0141	-2.65 ***	37.94	37.44	2.2
Adaptive capacity	8.6E-06	0.000	35.89	35.80	0.6
Transformative capacity	0.0173	4.73 ***	63.27	62.89	1.7
<b>Shock exposure</b>					
Hhold shock exposure index (baseline)	-0.0034	-0.85	11.32	11.35	-0.3
Number of shocks in last 5 years	0.0044	0.34	30.45	30.45	0.1
Total rainfall deficit	0.1612	2.91 ***	31.91	31.87	0.7
Total rainfall deficit-squared	-0.0022	-2.72 ***	1057.5	1054.6	0.7
Soil moisture deficit	-0.0008	-4.73 ***	1299.7	1297.8	0.8
<b>Household socio-demographic characteristics</b>					
Project area: Jijiga a/					
Borena	-0.3344	-2.14 **	65.6	64.9	1.3
Female-adult-only household	-0.1452	-1.13	9.8	10.2	-1.4
Number of adult equivalents	-0.0044	-0.22	4.17	4.18	-0.6
Percent males 0-16 a/					
Males 16-30	-0.0006	-0.23	10.62	10.78	-1.1
Males 30 plus	-0.0063	-1.99 **	12.91	12.77	1.2
Females 0-16	0.0015	0.87	25.99	25.64	1.9
Females 16-30	0.001	0.38	12.61	12.54	0.5
Females 30 plus	-0.0023	-0.89	12.49	12.79	-2.0
Any member has a formal education	-0.0801	-1.29	59.70	59.60	0.1
Pastoral status: Pastoralist a/					
Agro-pastoralist	0.0134	0.19	44.60	45.20	-1.2
Non-pastoralist	-0.0821	-0.99	21.10	20.90	0.3
<b>Household economic status</b>					
Consumption asset index	0.0272	0.85	1.32	1.30	1.5
Agricultural productive asset index	0.0086	1.08	7.47	7.55	-1.9
Tropical Livestock Units	0.0087	2.24 **	6.66	6.73	-0.8
Total pc daily expenditures	-0.0011	-0.53	17.74	18.03	-1.5
Total pc daily expenditures* Borena	0.0093	1.94 *	7.68	7.58	1.1
Poverty gap	-0.0016	-1	19.49	19.54	-0.2
<b>Other household characteristics</b>					
Household owns radio	0.0704	0.78	14.5	14.2	1.1
Household owns phone	-0.0238	-0.34	43.3	43.2	0.3
Absence of fatalism	-0.0004	-0.53	43.96	43.95	0.0
Individual power	-0.0001	-0.08	64.66	64.54	0.6
Exposure to alternatives	-0.0045	-1.06	5.28	5.37	-1.4
Bonding social capital	0.0012	0.94	62.01	61.85	0.4
Bridging social capital	-0.0005	-0.39	45.14	44.74	1.1
Linking social capital	-0.0056	-1.84 *	41.23	41.10	0.7
Women's decision making power	0.0831	1.82 *	0.93	0.92	2.1
Women's decision making over whether can join groups	0.0783	0.67	0.95	0.95	-0.1
Women's leisure time	0.0601	3.56 ***	1.08	1.05	2.0

(Continued)

**Table A1.2 Continued.**

Village characteristics						
Population	-6E-06	-0.72		5541.7	5538.6	0.1
Distance from nearest town	0.0013	0.63		22.04	21.89	1.0
Cell phone service available	0.1927	2.35 **		75.90	75.50	1.0
Paved road available	-0.1812	-2.49 **		29.60	29.80	-0.4
Number of community organizations	0.0527	1.67 *		5.95	5.88	2.2
<b>Baseline number of gov't and NGO programs</b>						
Number of government programs	0.0565	2.69 ***		2.70	2.66	2.0
Number of NGO programs	0.3518	2.32 **		1.85	1.83	1.1
Number of NGO programs*Borena	-0.3014	-1.92 *		1.80	1.78	1.2
Pseudo R-squared		0.057				
Number of observations		2,750				
Mean %bias						1.00
Percent treated hholds on common support						98.8

Stars indicate statistical significance at the 10%(\*), 5%(\*\*), and 1%(\*\*\*) levels.

From Table A1.1, the matching variables found to have a statistically significant influence (at least at the 10% level) on exposure to CRP are:

- Baseline food security
- Absorptive and transformative capacities
- Households shock exposure at baseline and climate shock over the project period
- Project area (Borena or Jijiga)
- Number of adult equivalents
- Ownership of consumption (domestic) assets
- Poverty gap
- Distance from the nearest town
- Number of government and NGO programs.

These factors likely affected project administrators' intervention allocation decisions.

Household participation in CRP would have been influenced not only by project administrators' decisions but also by household decisions. In fact, a broader set of matching variables is found to have a statistically significant influence on participation in CRP (Table A1.2):

- Absorptive and transformative capacities
- Climate shock over the project period
- Project area
- Households' demographic composition
- Livestock ownership
- Total expenditures per capita
- Linking social capital
- Women's decision making power

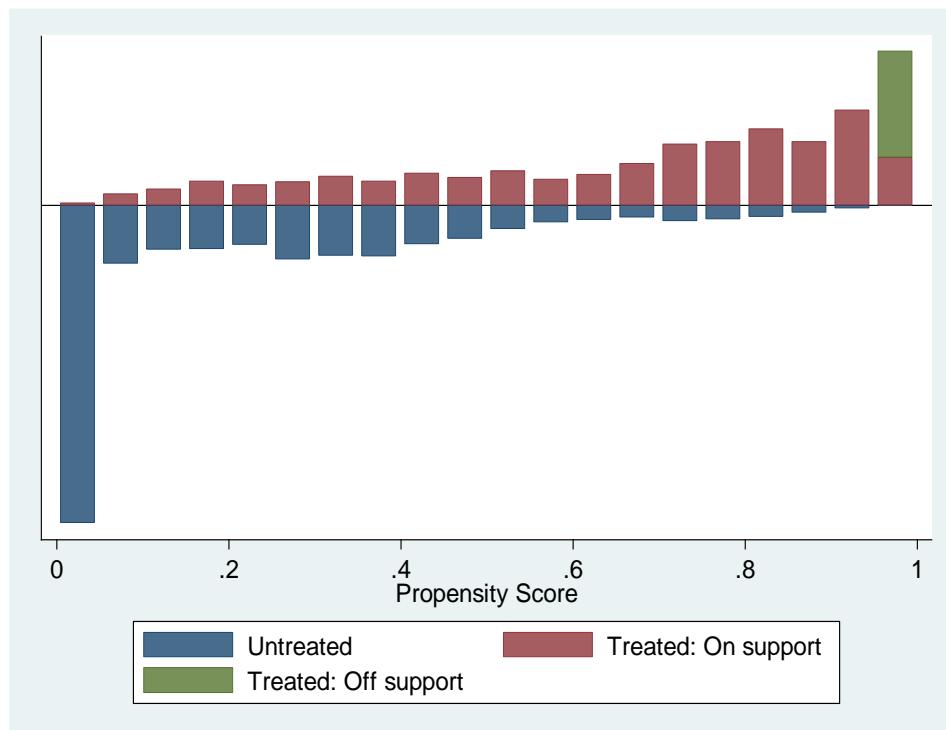
- Women's leisure time
- Availability of cell phone service
- Availability of a paved road
- Number of community organizations
- Number of government and NGO programs.

### A1.1.2 Matching Diagnostics for Kernel Matching

DID-PSM is initially implemented for three alternative matching methods: kernel matching, nearest-neighbor matching (1:1), and radius matching. The impact results are compared for each to assess their robustness to choice of matching method. This section illustrates the assessment of common support and balancing for the preferred method (see Section A1.1.3), kernel matching.

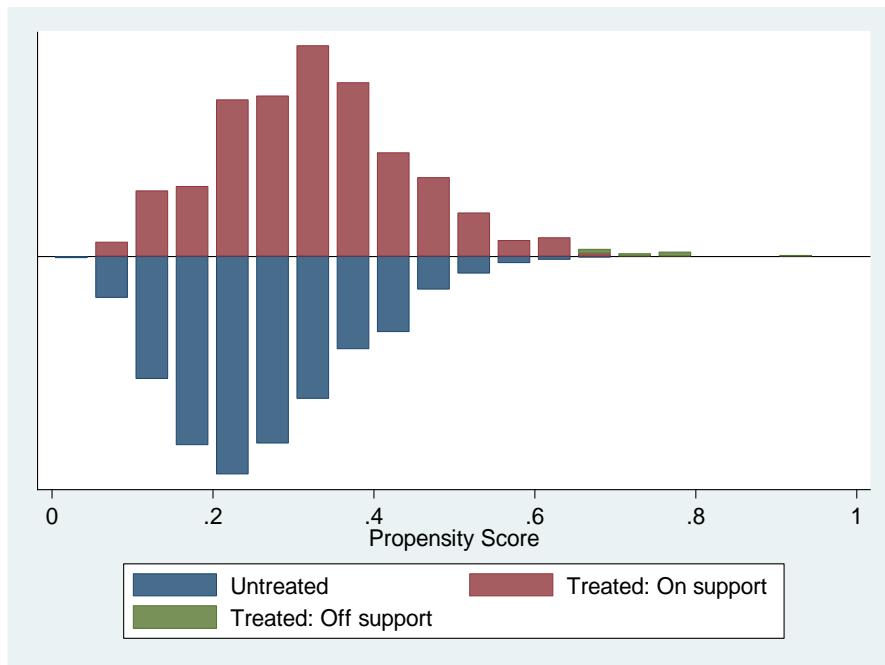
**Common support.** For PSM to produce impact estimates relevant to the population (here, households residing in the PRIME IE areas), non-treated household matches must be available for a sufficient number of treatment households, that is there must be adequate “common support”. Figure A1.1 and Figure A1.2 show the kernel matching treatment and control groups’ propensity score distributions for exposure to and participation in CRP, respectively. While common support is better for the participation model, for both models the large majority of treated households are on the common support, 87.6 percent for exposure and 98.0 percent for participation (see bottom of Tables A1.1 and A1.2).

**Figure A1.1 Common support for Comprehensive Resilience Programming exposure model: Propensity scores of treated and control households**



Note: Kernel matching.

**Figure A1.2 Common support for Comprehensive Resilience Programming participation model: Propensity scores of treated and control households**



Note: Kernel matching.

**Balancing tests.** The basic requirement for a good estimate of the counter-factual is that the control group must be similar to the treatment group in all relevant characteristics except for the fact that treatment group households are engaged in the interventions and control group households are not. Balancing tests evaluate whether this requirement is met.

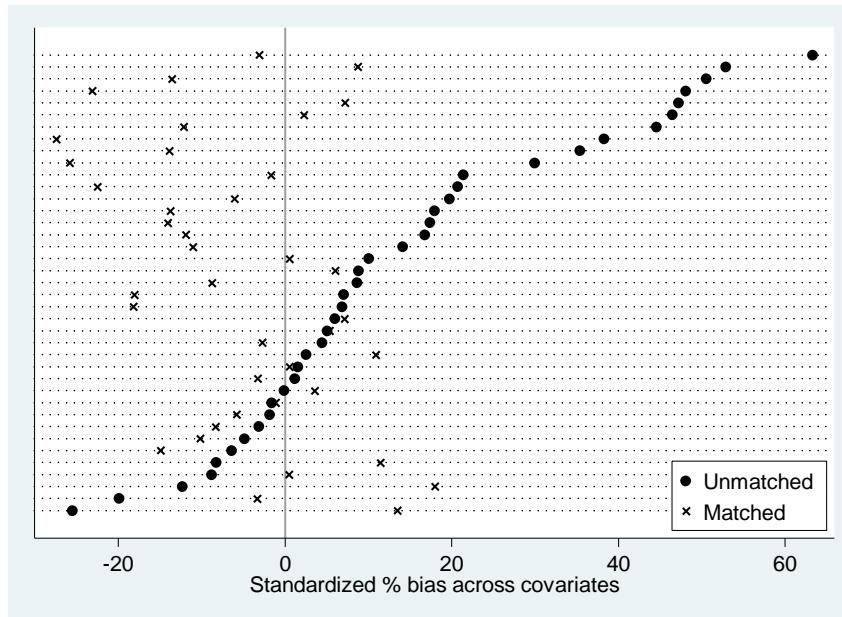
The criteria used here for adequate balancing is that the mean standardized percentage bias across all matching variables post matching is less than 10.0 and all matching variables have an individual bias less than 20.0 (see Chapter 2, Section 2.2.2.1). Here the mean percentage bias for the exposure model is 10.0; for the participation model it is 1.0. Although balance is better for the participation model, they thus both satisfy the criteria. This difference can be seen in Figures A1.3 and A1.4, which compare the percent biases before and after matching for all of the matching variables. The control group is essentially the same as the treatment group before the resilience-strengthening interventions were implemented.

Note, however, that for the exposure model, three of the matching variables have percent biases greater than 20.0: the soil moisture deficit-Borena interaction variable, the dummy variable indicating whether a household resides in Borena, and the number of NGO programs. Both of the first two differences are due to the percent of households in the treatment group residing in Borena being lower than in the control group (63.7 versus 77.0 percent). Given good matching on other variables that might distinguish Borena from Jijiga households, and households with greater or fewer NGO's,<sup>40</sup> such as baseline food security, economic status, shock exposure, and resilience capacities, the differences will be unlikely to bias impact estimates one way or the other. Overall, the large majority of the variables are well balanced across the

<sup>40</sup> Having a greater number of NGOs at baseline (which the control group has) could indicate better conditions stemming from the positive effects of the NGOs' activities or worse conditions, which may have attracted more NGOs in the first place.

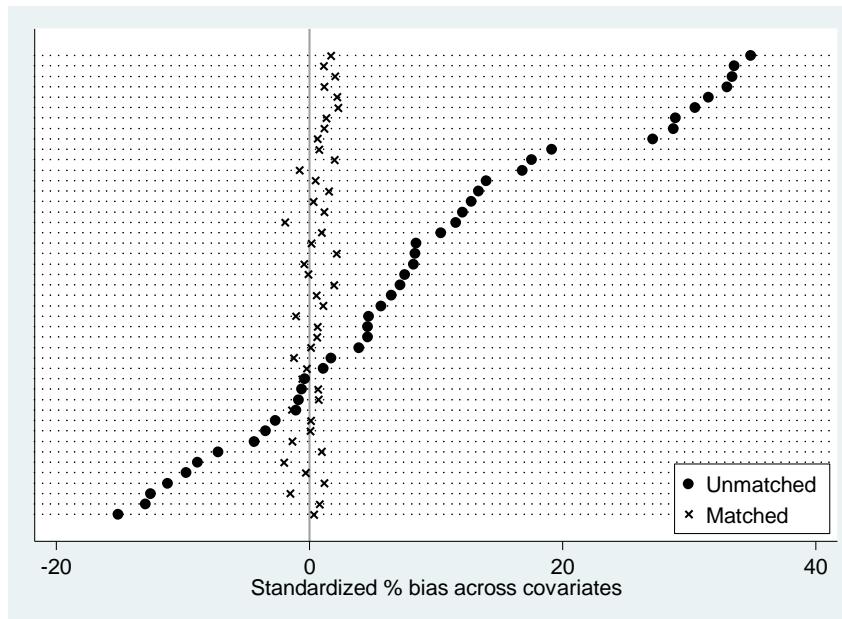
treatment and control groups. The control group has a slight advantage in better starting absorptive and adaptive capacities and asset ownership. Thus, if there were any bias in the reported impact estimates on resilience and resilience capacities, it is likely to be downwards. That is, impacts would be under-estimated.

**Figure A1.3 Balance for Comprehensive Resilience Programming exposure model:  
Standardized percent bias across matching variables**



Note: Kernel matching.

**Figure A1.4 Balance for Comprehensive Resilience Programming participation model:  
Standardized percent bias across matching variables**



Note: Kernel matching.

### A1.1.3 Matching Diagnostics: Comparison across Matching Algorithms

Table A1.3 compares common support and balance across the three matching algorithms for which the CRP estimates are reported in Chapter 9. They are compared when the data are for the PRIME project area as a whole, and for Borena and Jijiga individually.

**Exposure models.** Kernel matching provides the best common support for the exposure models. Note, however, that only 63.8 percent of exposed households in Jijiga are on the common support. There are no obvious differences in the resilience capacities of the treated households that are on the support versus off of the support.<sup>41</sup> However, the on-support treated households were somewhat less resilient over the project period, with their change in food security being 0.19 versus 1.06 for the off-support treated households, which means results for this region may be biased downwards.

In terms of balance, kernel matching provides acceptable and superior balance across the treatment and control groups for the IE area as a whole and for the Borena sample. For Jijiga, radius matching gives better balance than the other algorithms, but that for Kernel matching is still acceptable, with the mean percent bias of 8.0 being well below the criterion of 10.

**Participation models.** For the participation models, all three matching algorithms provide high common support and very good balance, however kernel matching is superior overall.

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<sup>41</sup> The treated households on the support had higher absorptive capacity and higher number of government programs at baseline than those off the support. However, they had lower asset wealth and a lower number of NGO programs.

**Table A1.3 Exposure to and participation in Comprehensive Resilience Programming: Difference-in-difference Propensity Score Matching Diagnostics**

	Common support		Standardized percent bias		Remaining unbalanced matching variables a/
	# treated hhds	% on common support	Mean	Median	
<b>Exposure to Comprehensive Resilience Programming</b>					
<b>All households</b>					
Kernel matching	1,020	87.6	10.00	8.70	*Percent Borena hhs (63.3 vs. 77) *NGO programs (1.8 vs 2.2)
Nearest neighbor	997	85.7	11.40	11.30	*Percent Borena hhs (63.7 vs. 76.3) *Consumption asset index (1.33 vs 1.6) *Village size (5,567 vs 4,568) *NGO programs (1.8 vs 2.2)
Radius matching	997	85.7	10.30	10.10	*Percent Borena hhs (63.7 vs. 76.0) *Consumption asset index (1.33 vs 1.6)
<b>Borena</b>					
Kernel matching	555	71.6	7.90	6.30	*Village size (5344 vs. 4700) *Index of productive assets (7.9 vs. 7.0)
Nearest neighbor	555	71.6	10.20	8.50	*Percent female-only hhs (11.9 vs. 19.6) *Absorptive capacity (51.0 vs. 47.4)
Radius matching	555	71.6	9.10	5.80	*Number of gov't programs (3.7 vs. 3.2) *Percent female-only hhs (11.9 vs. 18.7) *Absorptive capacity (51.0 vs. 47.3)
<b>Jijiga</b>					
Kernel matching	248	63.8	8.00	6.60	*Number of gov't programs (1.3 vs 1.1) *Percent males 16-30 (11.3 vs. 14.6) *Soil moisture deficit (1405 vs. 1467)
Nearest neighbor	229	58.9	8.30	7.10	*Consumption asset index (0.88 vs. 1.10) *Percent agro-pastoral (50.2 vs. 60.7) *Soil moisture deficit (1402 vs. 1451)
Radius matching	229	58.9	6.00	4.40	*Soil moisture deficit (1402 vs. 1460)
<b>Participation in Comprehensive Resilience Programming</b>					
<b>All households</b>					
Kernel matching	764	98.8	1.00	1.00	None
Nearest neighbor	762	98.6	3.10	2.20	None
Radius matching	762	98.6	1.10	0.90	None
<b>Borena</b>					
Kernel matching	499	97.8	1.50	1.20	None
Nearest neighbor	484	94.9	4.20	3.70	None
Radius matching	484	94.9	1.20	0.90	None
<b>Jijiga</b>					
Kernel matching	263	100	2.00	2.10	None
Nearest neighbor	263	100	5.50	5.20	None
Radius matching	263	100	2.40	2.20	None

a/ Remaining imbalances lists variables with bias greater than 20. Values are treatment vs. control group.

## A1.2 Engagement in the Four Intervention Sets

The DID-PSM procedures for the four intervention sets are the same as that used for CRP as described in the last section, including the same matching variables. Matching diagnostics for exposure to and participation in the four intervention sets are given in Table A1.4.

In the case of exposure (see top panel), **for the PRIME project area as a whole** adequate common support and balance are achieved for livestock productivity and competitiveness, financial services, and Climate Change Adaptation (CCA). However, the Pastoral Natural Resource Management (PNRM) intervention set does not meet the mean standardized bias criterion for balance ( $11.9 > 10.0$ ). Examination of the treatment and control group values for the seven remaining imbalanced variables shows no obvious bias one way or the other.<sup>42</sup> Thus impact estimates for the set are reported in Chapter 9. **For Borena and Jijiga**, either common support is very poor (in which case balancing statistics are not reported) or the mean standardized bias criterion for balance is seriously violated. Thus, in Chapter 9 separate exposure impact estimates for the project areas are not reported.

In the case of participation in the four intervention sets, common support and balance are well achieved for the project area as a whole and both Borena and Jijiga (see bottom panel of Table A1.4).

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<sup>42</sup> Treatment households were more exposed to CCA interventions, but they were less exposed to financial services interventions. They are more remote than control group households but have greater access to cell phone services. Finally, whether their greater number of government and NGO programs at baseline is an advantage or disadvantage is not discernable.

**Table A1.4 Exposure to and participation in the four intervention sets: Difference-in-difference Propensity Score Matching Diagnostics**

	Common support		Standardized percent bias		Remaining unbalanced matching variables a/	
	# treated hds	% on common support	Mean	Median		
<b>Exposure</b>						
<b>Livestock productivity and competitiveness</b>						
All	654	72.4	7.7	6.0	Village size (6258 vs. 7407) Cell service (86.5 vs. 94.2)	
Borena	159	45.8	-	-	--	
Jijiga	237	55.4	-	-	--	
<b>Pastoral Natural Resource Management</b>						
All	666	99.3	11.9	7.7	High exp fin. services (25.5 vs. 39.7) High exp CCA (29.3 vs. 17.0) Village size (5,617 vs. 4,109) Distance to nearest town (27.5 vs. 22.7) Cell service (61.1 vs. 50.6) Number of govt programs (3.5 vs. 3.9) Number of NGO programs (3.0 vs. 3.4)	
Borena	649	96.7	15.9	12.8	--	
Jijiga d/	0	0	-	-	--	
<b>Financial services</b>						
All	607	79.1	5.2	2.9	Distance to town (22.3 vs. 30.2) Borena (60.1 vs 43.6) c/ Absorptive capacity (24.9 vs 30.6) c/	
Borena	119	24.1	-	-	--	
Jijiga b/	-	-	-	-	--	
<b>Climate change adaptation</b>						
All	878	97.5	7.1	6.0	Exposure fin. services (36.5 vs. 46.8) Village size (6094 vs. 6976) Paved road (25.4 vs. 11.8)	
Borena	297	60.7	-	-	--	
Jijiga	379	92.0	20.3	15.4	--	
<b>Participation</b>						
<b>Livestock productivity and competitiveness</b>						
All	890	97.3	2.6	2.5	None.	
Borena	597	98.2	3.5	2.3	None.	
Jijiga	294	92.5	2.9	2.6	None.	
<b>Pastoral Natural Resource Management</b>						
All	888	97.4	3.5	3.4	None.	
Borena	547	97.2	4.4	3.6	None.	
Jijiga	346	99.1	3.3	2.9	None.	
<b>Financial services</b>						
All	312	100	1.7	1.1	None.	
Borena	267	99.6	1.9	1.7	None.	
Jijiga	e/	-	-	-	None.	
<b>Climate change adaptation</b>						
All	902	99.6	1.5	1.2	None.	
Borena	551	98.6	2.2	1.8	None.	
Jijiga	346	99.7	3.2	3.0	None.	

a/ Remaining imbalances lists variables with bias greater than 20. Values are treatment vs. control group.

b/ Probit will not run because model is completely determined.

c/ These are variables that were left out of the matching process in order to preserve either common support or balance.

d/ No households were exposed to PNRM interventions in Jijiga.

e/ Insufficient number of treatment households for analysis (N=42)

Note: All diagnostics refer to kernel matching estimations.

## APPENDIX 2. Summary Statistics for the Resilience Capacity Indicators

**Table A2.1 Summary statistics for the resilience capacity indicators**

	Mean	Standard deviation	Minimum	Maximum
<b>Absorptive capacity</b>				
Bonding social capital	57.5	35.7	1.7	101.2
Cash savings	0.16	0.37	0	1
Access to informal safety nets	3.03	1.79	0	7
Availability of hazard insurance	0.15	0.36	0	1
Disaster mitigation and preparedness	1.64	1.19	0	4
Conflict mitigation support	0.95	0.22	0	1
Asset ownership	13.6	7.8	0.0	87.9
Index	37.2	18.9	-9.4	89.4
<b>Adaptive capacity</b>				
Bridging social capital	40.8	34.3	0.9	101.2
Linking social capital	28.0	18.1	-16.9	92.4
Aspirations/confidence to adapt	39.4	12.1	1.0	106.5
Livelihood diversity	2.17	0.83	0	5
Access to financial resources	1.28	0.78	0	2
Human capital	48.0	30.5	5.6	100.4
Exposure to information	5.45	4.15	0	13
Asset ownership	13.6	7.8	0.0	87.9
Index	36.0	13.3	3.1	93.4
<b>Transformative capacity</b>				
Bridging social capital	40.8	34.3	0.9	101.2
Linking social capital	28.0	18.1	-16.9	92.4
Access to markets	1.94	1.35	0	3
Access to services	4.42	1.18	1	6
Access to livestock services	1.82	0.44	1	3.33
Access to infrastructure	1.61	0.90	0	4
Access to communal natural resources	2.17	1.01	0	3
Access to formal safety nets	1.37	0.59	1	3
Index	57.2	16.0	11.6	94.4

Note: The numbers in this table are unweighted values calculated from endline data.

## APPENDIX 3. Impact of the Four Intervention Sets on the Resilience Capacities: Supplementary Tables

(See next page)

**Table A3.1 Impact of the four intervention sets on resilience capacity: Difference-in-Difference Propensity Score Matching estimates (kernel matching)**

	Livestock productivity & competitiveness		PNRM		Financial services		CCA	
	Exposure	Participation	Exposure	Participation	Exposure	Participation	Exposure	Participation
<b>Absorptive capacity</b>								
Bonding social capital	9.249 ***	-0.955	-7.581 *	-4.810 *	3.53	4.412 *	5.219	-5.979 ***
Cash savings	14.100 ***	0.800	-5.200	0.600	11.50 ***	30.7 ***	-3.400	4.9 **
Access to informal safety nets	1.036 ***	0.025	0.047	0.052	2.54 ***	0.438 ***	0.198 **	0.036
Availability of hazard insurance	-3.600	-3.6	-52.4 ***	-4.3	6.41 ***	3.3	5.8 **	-1.6
Disaster mitigation and preparedness	0.609 ***	0.014	0.469 **	0.127	0.051	0.193 ***	1.722 ***	0.020
Conflict mitigation support	3.8 **	-1.3	1.2 **	0.800	0.525	-0.100	-12.1 ***	-2.600 ***
Asset ownership	0.152	2.526 ***	1.598 **	0.008 *	2.84 ***	1.099 **	0.199	2.554 ***
Index	12.890 ***	0.956	-1.673	0.652	23.10 ***	7.44 ***	10.461 ***	0.969
<b>Adaptive capacity</b>								
Bridging social capital	7.455 ***	-3.310	-3.619	-1.655	4.21	3.99 *	2.120	-4.458 **
Linking social capital	6.657 ***	-1.377 ***	4.369 ***	5.698 ***	3.30 **	0.630	6.715 ***	5.254 ***
Aspirations/confidence to adapt	0.701	2.647 ***	-0.170	0.682	1.97 **	0.830	0.868	0.983 *
Livelihood diversity	0.204 ***	0.084	0.034	-0.029	0.027	0.031	0.040	0.129 ***
Access to financial resources	0.282 ***	0.118 **	-0.548 ***	-0.011	1.81 ***	0.190 ***	-0.232 ***	-0.007
Human capital	0.934	5.338 ***	-1.879	0.824	3.990	-0.021	-1.506	2.803 *
Exposure to information	-0.364	2.235 ***	1.290 ***	2.002 ***	-0.086	-0.301	0.348	1.734 ***
Asset ownership	0.152	2.526 ***	1.598 **	0.008 *		1.10 **	0.199	2.554 ***
Index	3.506 ***	6.428 ***	1.487	4.358 ***	9.17 ***	1.47 *	1.529	5.424 ***
<b>Transformative capacity</b>								
Bridging social capital	7.455 ***	-3.310	-3.619	-1.655	4.21	3.99 *	2.120	-4.458 **
Linking social capital	6.657 ***	-1.377 ***	4.369 ***	5.698 ***	3.30 **	0.630	6.715 ***	5.254 ***
Access to markets	0.530 ***	0.085	-0.003	0.048	0.766 ***	0.156 ***	0.675 ***	0.028
Access to services	0.410 ***	0.075	0.304 **	0.076	1.11 ***	0.060	0.189 ***	0.010
Access to livestock services	-0.009	0.042 **	-0.048	-0.034 *	0.168 ***	0.017	-0.053 **	0.070 ***
Access to infrastructure	0.095	0.072	-0.087	-0.131 **	-0.081	0.066	0.195 ***	0.044
Access to communal natural resources	-0.052	-0.032	0.263 ***	0.072	-0.474 ***	-0.022	-0.323 ***	-0.094 **
Access to formal safety nets	0.359 ***	-0.004	-0.631 ***	-0.157 ***	0.202 ***	0.051	-0.012	0.049
Index	5.50 ***	1.79 *	0.236	0.496	9.90 ***	1.02	0.521	2.410 ***

Note: Values reported are the Average Treatment Effect on the Treated (ATT)

Stars indicate statistical significance at the 10%(\*), 5%(\*\*), and 1%(\*\*\*) levels.

**Table A3.2 Impact of participation in the four intervention sets on resilience capacity for Borena and Jijiga: Difference-in-Difference Propensity Score Matching estimates (kernel matching)**

	Livestock productivity & competitiveness		PNRM		Financial services		CCA		
	Borena	Jijiiga	Borena	Jijiiga	Borena	Jijiiga a/	Borena	Jijiiga	
<b>Absorptive capacity</b>									
Bonding social capital	-5.58	2.80	-6.86 **	3.11	3.78	--	-7.88 ***	-4.04	
Cash savings	-0.14	3.06	-3.24	4.05	31.45 ***	--	6.38 *	1.66	
Access to informal safety nets	0.06	0.11	-0.09	0.04	0.263 ***	--	-0.11	0.19 **	
Availability of hazard insurance	-2.36	-4.21 *	-5.44	-0.20	4.90	--	-3.90	3.29	
Disaster mitigation and preparedness	0.15	0.05	-0.06	0.21 **	0.020	--	0.01	0.10	
Conflict mitigation support	-2.13	-0.23	0.53	0.73	-0.798	--	-3.95 **	-0.40	
Asset ownership	3.19 ***	0.73	1.28 **	-0.24	1.01 *	--	2.80 ***	1.89 ***	
Index	1.74	1.57	-1.70	1.80	5.22 ***	--	-0.50	2.76 ***	
<b>Adaptive capacity</b>									
Bridging social capital	-7.03 **	-0.04	-5.48 *	9.69 ***	3.23	--	-10.42 ***	3.69	
Linking social capital	5.90 ***	0.76	6.41 ***	2.16	0.837	--	7.90 ***	-0.42	
Aspirations/confidence to adapt	3.31 ***	2.86 **	1.52	-1.87	1.15	--	2.53 ***	-2.18 **	
Livelihood diversity	0.01	0.23 ***	0.13	-0.17 **	-0.020	--	-0.003	0.29 ***	
Access to financial resources	0.17 ***	0.05	0.01	0.05	0.119 *	--	-0.004	0.05	
Human capital	1.32	9.61 ***	5.26 *	-5.82 **	-2.25	--	2.51	3.60	
Exposure to information	2.36 ***	1.77 ***	2.42 ***	1.42 ***	-0.038	--	2.43 ***	0.03	
Asset ownership	3.19 ***	0.73	1.28 **	-0.24	1.01 *	--	2.80 ***	1.89 ***	
Index	6.85 ***	5.23 ***	6.17 ***	2.29 **	1.25	--	6.16 ***	2.71 ***	
<b>Transformative capacity</b>									
Bridging social capital	-7.03 **	-0.04	-5.48 *	9.69 ***	3.23	--	-10.42 ***	3.69	
Linking social capital	5.90 ***	0.76	6.41 ***	2.16	0.837	--	7.90 ***	-0.421	
Access to markets	0.027	0.013	0.114 *	0.05	-0.038	--	-0.076	0.094 ***	
Access to services	0.187 *	-0.002	-0.019	0.151	0.044	--	0.016	-0.010	
Access to livestock services	0.055 *	0.006	-0.038	0.004	0.023	--	0.060 ***	0.034 **	
Access to infrastructure	0.014	0.094 *	-0.202 **	-0.002	0.100	--	0.009	-0.005	
Access to communal natural resources	0.092 *	-0.052	0.028	-0.049	0.033	--	0.049	-0.138 **	
Access to formal safety nets	0.027	0.006	-0.131 *	0.003	0.084	--	0.033	0.046	
Index	3.71 ***	0.30	-0.07	1.64	1.50 *	--	3.19 ***	0.081	

Note: Values reported are the Average Treatment Affect on the Treated (ATT)

Stars indicate statistical significance at the 10%(\*), 5%(\*\*), and 1%(\*\*\*) levels.

a/ The number of treatment observations is insufficient for estimating the ATT (N=44).

## APPENDIX 4. TANGO Method for Calculating and Updating Resilience Capacity Indexes

This section 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 represent 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 1. 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>43</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>44</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:

```
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*
```

<sup>43</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>44</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>.

## 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>45</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>46</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 +
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.

<sup>45</sup> KMO values less than 0.5 are considered to be “unacceptable”. (see <https://www.stata.com/manuals13/mvfactorpostestimation.pdf>).

<sup>46</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>).

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