

# Measuring Resilience in Ethiopia

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Based on the USAID Feed the Future FEEDBACK Baseline Results Report  
of the Resilience Impact Evaluation of the USAID Prime Project

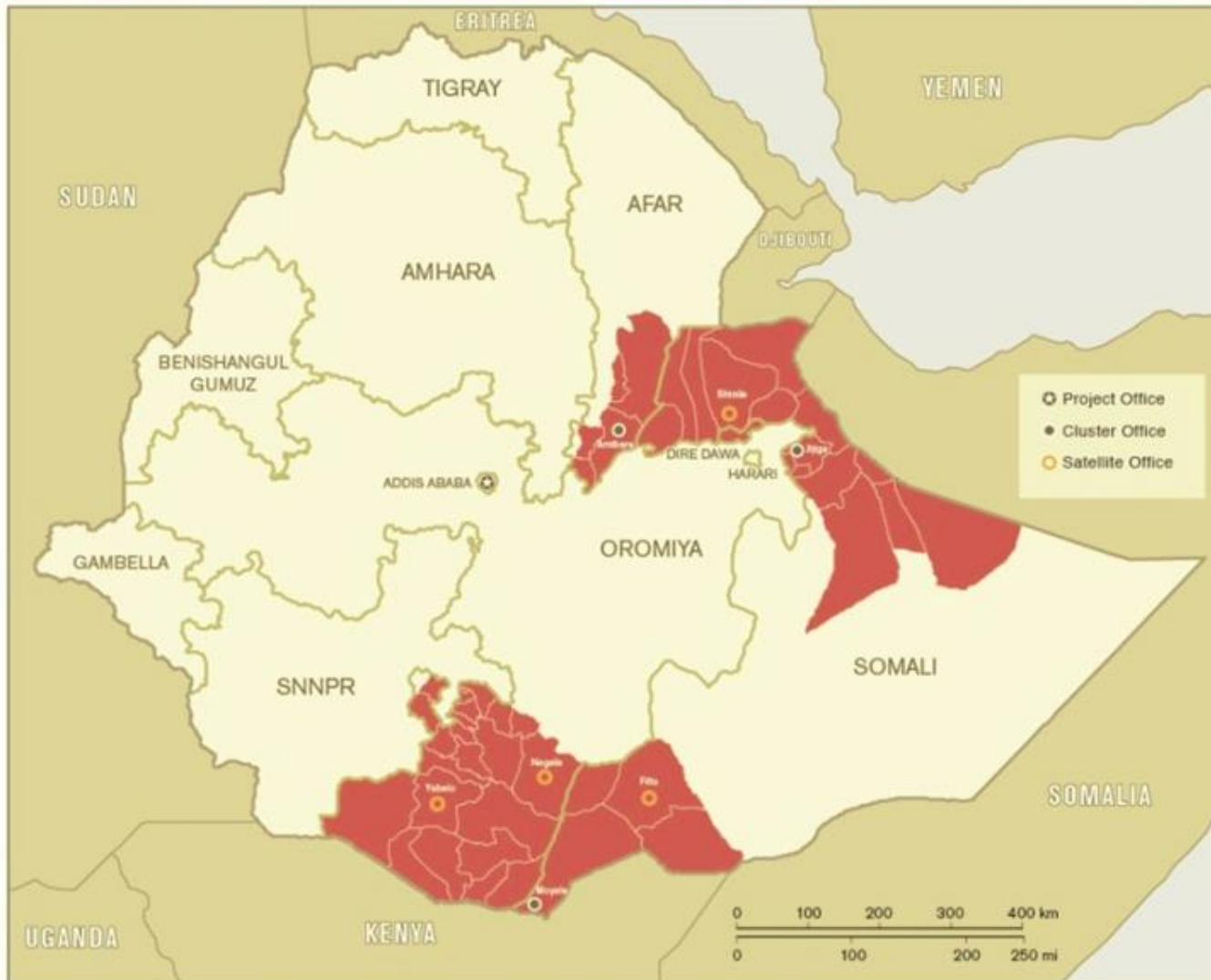
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# Background

- Pastoral Ethiopia is one of the most shock prone areas in the world.
- The pastoral zones of Ethiopia within which the PRIME project's intervention areas are located (Somali, Borena, and Afar regions) are characterized by high mean temperatures, erratic and unpredictable rainfall, and patchy vegetation.
- In Ethiopia, pastoral systems are under increasing pressures due to natural and man-made shocks that are leading to imbalance between these populations and the resources they depend on to sustain themselves.



**ETHIOPIA PRIME Intervention Areas**



# Background

- Ongoing climate change is expected to increase the unpredictability of rainfall, leading to more frequent droughts and floods.
- A diminishing natural resource base due to overgrazing, increased sedentarization, and the increased presence of agriculture has reduced pastoralists' mobility, a key foundation of traditional risk management strategies.
- Poor access to financial services (savings and credit) also reduces households' ability to cope with shocks and to recover their livelihoods when conditions improve.
- The area is characterized by fragmented markets for inputs and supply services and underdeveloped output markets.
- An additional challenge is that increased competition for pasture and water has led to conflict in a number of locations, including locations within the PRIME project's operational area.

# Pastoralist Areas Resilience Improvement through Market Expansion (PRIME)

- USAID Ethiopia Feed the Future Project
- Implemented by Mercy Corps with CARE, Kimetrica, Haramaya University, Pastoral Concern, Aged and Children Pastoralist Association, and SOS Sahel Ethiopia
- **Three objectives:**
  1. Increase household incomes
  2. Enhance resilience
  3. Bolster adaptive capacity to climate change
- **Beneficiaries:** Pastoralists in 23 woredas within three pastoralist clusters (PC): Southern (Borena, Guji, and Liban zones) PC, Somali PC, Afar PC
- **Activities:** Fostering the competitiveness of livestock value chains addressing the needs of the very poor and chronically food insecure through value chain interventions, improving policy environment, improving delivery of health services and behavior change

# Defining Resilience

- This evaluation conceptualizes resilience according to the USAID definition, which states that resilience is:

*“The ability of people, households, communities, countries, and systems to mitigate, adapt to, and recover from shocks and stresses in a manner that reduces chronic vulnerability and facilitates inclusive growth”*

- Definition used by the Resilience Technical working Group of FSIN:

*“Resilience is defined as a capacity that ensures stressors and shocks do not have long-lasting adverse development consequences”*

- In this evaluation, resilience is viewed as a set of capacities that enable households and communities to effectively function in the face of shocks and stresses and still meet a set of well-being outcomes.

# Three Capacities of Resilience

- **Absorptive capacity:** The ability to minimize exposure to shocks and stresses through preventative measures and appropriate coping strategies to avoid permanent, negative impacts
- **Adaptive capacity:** Making proactive and informed choices about alternative livelihood strategies based on an understanding of changing conditions
- **Transformative capacity:** The governance mechanisms, policies/regulations, infrastructure, community networks, and formal and informal social protection mechanisms that constitute the enabling environment for systemic change

# Objectives of the Study

- The overall objective of the IE is to determine the impact of the project's interventions on households' resilience to shocks and, thus, on well-being outcomes including poverty, food security, and children's nutritional status.



# Objectives of the Study

- The baseline survey analysis in this report has four objectives:
  1. To understand the livelihood environment in which households' resilience is determined in the evaluation areas
  2. To provide baseline estimates of indicators of household well-being outcomes, shock exposure, and resilience capacities
  3. To explore baseline differences across the IE comparison groups that will be used to measure the PRIME project's impact at the time of the endline survey
  4. To investigate the relationships between household outcomes, shock exposure, and resilience capacities in the PRIME project area

# The IE Baseline Study

- The baseline survey was administered from November 19 to December 24, 2013 in two of the three sub-regions within the PRIME project's area of implementation, Borena and Jijiga.
- The evaluation design team was encouraged by the USAID Ethiopia Mission to select these areas to carry out a dual-focused IE, where one dimension would focus on natural resource management in Borena and the second would focus on improvements in livelihoods and market enabling conditions in the Somali region.

# Mixed Method Methodology

- It used two quantitative components—a household survey and a community survey.
- The qualitative data were collected through focus group discussions, key informant interviews, and positive deviant interviews.
- Sample:
  - 3,142 households, 75 communities
  - Sample stratified by:
    - Intervention region: Borena and Jijiga
    - High intensity vs. low intensity intervention areas

# Qualitative Component

- The qualitative component of data collection focused on capturing contextual information about resilience and the impact of shocks in order to understand and explain outcomes, as well as to interpret the quantitative findings.
- Qualitative findings help explain how households and communities perceive change, how they define resilience and how they view the challenges to livelihoods posed by shocks and stresses.
- Topical outlines included questions on coping strategies, social capital, and aspirations in order to provide in-depth information about how households use community resources to manage shocks.

# Quantitative Components

- Quantitative resilience measurement for the PRIME IE had two primary objectives.
- The first was to create valid measures of resilience and of its three dimensions—absorptive capacity, adaptive capacity, and transformative capacity—that are solidly aligned with the definitions of these concepts.
- The second was to create valid measures of shock exposure and food security outcomes.

# Common Analytical Framework

- This approach followed the common analytical model for resilience measurement proposed by Conostas, Frankenberger and Hoddinott (2014).
- The baseline combined data on resilience capacity, shocks and outcomes into an integrated framework for resilience measurement so that measures of resilience can be used to assess how resilience capacities mediate the consequences of shocks to enable the achievement of well-being outcomes.

# Measuring Shock Exposure

- Resilience measures should be sensitive to the specific types of shocks and/or stressors that are seen as threatening a given development outcome.
- The necessity of highly detailed, technically sound shock modules is therefore central to resilience measurement.
- Measurement of shock exposure for the study area started with a shock module containing questions about whether respondents had experienced 18 different shocks, including climatic shocks, conflict shocks, and economic shocks, in the last year.
- They were also asked to rank the severity of each shock experienced in response to the following question: “How severe was the impact on your income and food consumption?” The possible responses were:
  1. None
  2. Slight Impact
  3. Moderate Impact
  4. Strong Impact
  5. Worst Ever Happened

# Measuring Shock Exposure

- Attesting to the fact that the PRIME IE area is one of the most shock-prone areas of the world, 87 percent of all households had experienced a shock in the previous year.
- The most common shocks were sharp food price increases, livestock or crop disease, drought, “very bad harvest”, and an increase in the price of livestock or agricultural inputs.
- The most common type of conflict shock was the theft of livestock, affecting nearly five percent of pastoralist households.



# Measuring Shock Exposure

- To measure the overall degree of shock exposure for each household, an index taking into account both the number of shocks exposed to and the perceived severity of the shocks was created.
- The index is calculated as a weighted average of the incidence of each shock (a dummy variable equal to 0 if not experienced and 1 if experienced) and its perceived severity (as measured on the 5-point scale), as follows:

$$shock\_exposure = \sum_{i=1}^{18} shock_i * PS\_shock_i$$

Where  $shock_i$  is the shock exposure dummy variable and  $PS\_shock_i$  is the perceived severity of the shock. For this population, the shock exposure index ranged from 0 to 57 with a mean of 11.5.

# Measuring Well-Being Outcomes

- Food insecurity is of concern in the PRIME IE area
- It was measured using two types of indicators:
  1. Those based on reports of food consumption
  2. Those reflecting respondents' perceptions of and experiences with food insecurity and hunger
- The consumption indicators are per-capita calorie consumption and the dietary diversity score (DDS).
- Per capita calorie consumption is the total calorie content of the food consumed by household members daily divided by household size, an indicator of the *quantity* of food consumed by household members.
- The DDS reflects the *quality* of households' diets and is the total number of food groups, out of 12, from which household members consumed food in the last day

# Measuring Well-Being Outcomes

- The experiential indicators are the Household Food Insecurity Access Scale (HFIAS) and the Household Hunger Scale (HHS).
- The HFIAS is an index constructed from the responses to nine questions regarding people's experiences of food insecurity.
- Responses range from worry about not having enough food to actual experiences of food deprivation associated with hunger.
- Respondents indicate whether or not they or another household member experienced the event or feeling in question and, if yes, how often in the last 30 days (rarely, sometimes or often).
- The HHS is a similar to the HFIAS but is only based on the three HFIAS questions pertaining to the most severe forms of food insecurity.

# Measurement of Resilience Capacity

- Resilience is a set of capacities that enable households and communities to effectively function in the face of shocks and stresses and still meet a set of well-being outcomes.
- For the PRIME IE resilience capacities are being measured as a set of indexes, one for each of the three dimensions of resilience capacity—absorptive capacity, adaptive capacity, and transformative capacity—and one overall index combining these three indexes.

# Indicators of Resilience Capacity Employed for the PRIME Project Impact Evaluation

## Indicators of Resilience Capacity

### Absorptive Capacity

- Household perceived ability to recover from shocks
- Social capital (bonding)
- Access to informal community safety nets
- Asset ownership
- Cash savings
- Availability of hazard insurance
- Availability of a disaster preparedness and mitigation program

### Adaptive Capacity

- Household aspirations and confidence to adapt
- Exposure to information
- Human capital
- Social capital (bridging and linking)
- Diversity of livelihoods
- Access to financial resources
- Asset ownership

### Transformative Capacity

- Availability of formal safety nets in communities
- Access to markets
- Access to infrastructure
- Access to basic services
- Access to livestock services
- Access to communal natural resources
- Social capital (bridging and linking)

# Measurement of Resilience Capacity

- As each of these capacities is not mutually exclusive, some of the indicators are used to measure more than one of the capacities.
- Social capital appears as an indicator for all three dimensions of resilience capacity.
- Social capital is the quantity and quality of social resources (e.g., networks, membership in groups, social relations, and access to wider institutions in society) upon which people draw in pursuit of livelihoods.
- It has often been described as the “glue” that binds people in society together. It is based on strong perceptions of local embeddedness, self-regulating moral codes, and the norms, reciprocity, and trust that exist between individuals and groups at the community level.
- The three sub-types of social capital—bonding, bridging, and linking are all critical to the different types of resilience capacities.

# Measuring Absorptive Capacity

- *Absorptive capacity* is the ability to minimize the extent of exposure to shocks and stresses (*ex ante*) and to recover quickly when exposed (*ex post*). It can be thought of as the ability to manage shocks or stressors in the short term.
- The index of absorptive capacity for the PRIME IE is composed of an experiential indicator of the perceived ability of households to recover from shocks.
- It also includes indicators of factors that assist households in minimizing the extent of exposure to shocks and recovering from them (bonding social capital, access to informal safety nets, supportive economic factors (assets holdings, cash savings, and hazard insurance), and the availability of a disaster preparedness and mitigation program).

# Index of Absorptive Capacity: Descriptive Statistics and Factor Loading

a/ All means are corrected for the survey sampling design.

b/ Factor loadings from polychoric factor analysis. These loadings are the correlations between the index of absorptive capacity and each index component.

	Descriptive Statistics				Factor Loading b/
	Mean a/	Standard Deviation	Minimum	Maximum	
Index of absorptive capacity	58.8	24.2	0	100	--
<b>Index components:</b>					
Perceived ability to recover from shock	2.3	0.9	0.8	5.0	0.283
Bonding social capital	63.4	34.7	0.0	100	0.464
Access to informal safety nets	3.6	1.8	1.0	7.0	0.915
Asset ownership	49.3	7.4	0.0	100	0.287
Holdings of cash savings	0.14	0.32	0.0	1.0	0.429
Availability of hazard insurance	0.23	0.39	0.0	1.0	0.674
Availability of a disaster preparedness and mitigation program	0.41	0.48	0.0	1.0	0.742



# Measuring Adaptive Capacity

- *Adaptive capacity* involves making proactive and informed choices about alternative livelihood strategies based on changing conditions.
- Households with strong adaptive capacity are able to respond flexibly to longer-term social, economic, and environmental change, relying on solid foundations of human, social and economic capital.
- To measure adaptive capacity, we start with an experiential indicator describing households' aspirations and confidence to adapt in the face of change.
- Other indicators used in the index include households' exposure to information, human capital, social capital (bridging and linking), and economic capital, including diversity of livelihoods, access to financial resources, and asset ownership.

# Measuring Adaptive Capacity

- **Household aspirations and confidence to adapt**  
Psychosocial capabilities, such as by self-esteem and agency, are important traits that are hypothesized to give people greater resilience in the face of shocks.
- Recent research in Ethiopia has pointed to low self-esteem, low aspirations, and a fatalistic view among the poor as intrinsically linked with their inability to take action to improve their material well-being.
- To measure of aspirations and confidence to adapt an index is constructed based on indicators of three underlying concepts:
  - **Absence of fatalism:** The *absence* of the sense of being powerless to enact change and that one has no control over life's events
  - **Sense of individual power:** A sense of having power to enact change as an individual rather than being subject to the decisions of more powerful people
  - **Exposure to alternatives to the status quo:** The degree to which a person has been exposed to alternative ways of life than one's own

# Index of Absorptive Capacity: Descriptive Statistics and Factor Loading

a/ All means are corrected for the survey sampling design.

b/ Factor loadings from polychoric factor analysis. These loadings are the correlations between the index of adaptive capacity and each index component.

	Descriptive Statistics				Factor Loading b/
	Mean a/	Standard Deviation	Minimum	Maximum	
Index of adaptive capacity	46.7	18.3	0	100	--
<b>Index components:</b>					
Household aspirations and confidence to adapt	28.9	14.0	0.0	100	0.185
Exposure to information	5.5	4.1	0.0	13.0	0.718
Human capital	0.5	0.4	0.0	2.0	0.618
Bridging social capital	46.8	34.7	0.0	100	0.394
Linking social capital	41.9	18.0	0.0	100	0.546
Diversity of livelihoods	2.1	0.7	1.0	6.0	0.480
Access to financial resources	1.0	0.9	0.0	2.0	0.512
Asset ownership	49.4	7.5	0.0	100	0.406

# Measuring Transformative Capacity

- *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.
- An index for transformative capacity is created using indicators of the availability of formal safety nets in communities, of the two aspects of social capital that draw on relationships with entities outside of households' communities (bridging and linking).
- The index also incorporates access to key resources that are part of the wider system in which households communities are embedded: markets, infrastructure, basic services, including livestock services, and communal natural resources.

# Index of Transformative Capacity: Descriptive Statistics and Factor Loading

a/ All means are corrected for the survey sampling design.

b/ Factor loadings from polychoric factor analysis. These loadings are the correlations between the index of transformative capacity and each index component.

	Descriptive Statistics				Factor Loading b/
	Mean a/	Standard Deviation	Minimum	Maximum	
Index of transformative capacity	46.5	17.2	0	100	--
<b>Index components:</b>					
Availability of formal safety nets in community	1.2	1.1	0.0	3.0	0.794
Bridging social capital	46.4	34.7	0.0	100.0	0.286
Linking social capital	41.9	18.0	0.0	100.0	0.626
Access to markets	1.2	1.3	0.0	3.0	0.534
Access to infrastructure	1.0	0.6	0.0	2.0	0.288
Access to basic services	4.3	1.0	0.0	6.0	0.728
Access to livestock services	1.7	1.1	0.0	7.0	0.409
Access to communal natural resources	2.4	1.1	0.0	3.0	0.751

# Descriptive Analysis

- The quantitative data were first used to understand how overall resilience capacity and its three sub-dimensions, as well as shock exposure and the food security outcomes, vary across key population groups.
- Three key population groups were of interest: Geographic areas (Borena and Jijiga), pastoralist status groups (pastoralist, agro-pastoralist, non-pastoralists), and the intervention groups formed for evaluating the impact of the project.
- The two intervention groups for the project are households residing in communities where the project's interventions are projected to be implemented with low intensity and those residing in communities where its interventions are projected to be implemented with high intensity.

# Descriptive Analysis

- In the future, the data will also be used for looking at how resilience capacity, shock exposure and food security change over the course of the project, that is, between the baseline and endline surveys. Because panel data are being collected, it will be possible to trace the trajectory of change for each survey household.
- Data are also being collected in interim monitoring surveys that are being implemented between the baseline and endline surveys that allow analysis of how resilience capacity and food security differ before and after real-time shocks.

# Multivariate Analysis

- Multivariate regression analysis was used to investigate the structural relationships that are hypothesized to exist between household food security, shock exposure, and resilience capacities.
- Specifically, the following questions were investigated:
  - How is household food security affected by household resilience capacities, including overall resilience capacity and its three dimensions: absorptive capacity, adaptive capacity, and transformative capacity?
  - How is household food security affected by household shock exposure?
  - Does greater resilience capacity reduce the negative impact of shocks on food security?



# Multivariate Analysis

- To investigate these questions, a “community fixed effects” regression model was employed.
- The community of residence of each household is controlled for and thus factors at the community level that influence each dependent variable.
- Additionally, the following household-level characteristics were controlled for:
  - Number of household adult equivalents
  - The percent of females and males in three age groups (0-16 years, 16-30 and 30+)
  - Educational attainment of household adults (whether none, primary or secondary)
  - Whether the household is a female-adult-only household
  - Pastoralist status of the household
  - An asset index to control for household wealth

# Estimation Models

- To determine how are household food security and child malnutrition affected by household shock exposure the following equation can be used.

$$hh \text{ outcome} = f(SE, \text{household characteristics}, \text{community of residence})$$

- Where SE is a shock exposure index and the household characteristics controlled for are household demographic characteristics (adult equivalents, age-sex composition, gendered household type), education, and an index of asset ownership.
- This is a “community fixed effects” model, whereby community of residence is controlled for and thus factors at the community level that influence the outcome variable.

# Estimation Models

- To determine how are these well-being outcomes affected by household and community resilience capacities the following equation can be used.

$$hh\ outcome = f(HRC, household\ characteristics, community\ of\ residence)$$

$$hh\ outcome = f(CRC, household\ characteristics)$$

where HRC is household resilience capacity and CRC is community resilience capacity

# Regression Analysis: Relationship between Food Security Outcomes and Household Resiliency Capacity

	Per-Capita Calorie Consumption		Dietary Diversity Score		Household Food Insecurity Access Scale		Household Hunger Scale	
Resilience capacity	13.0	***	0.021	***	-0.112	***	-0.010	***
R-squared	0.27		0.23		0.2		0.17	
Absorptive capacity	5.8	***	0.006	**	-0.070		-0.009	***
R-squared	0.26		0.23		0.19		0.18	
Adaptive capacity	10.6	***	0.020	***	-0.089		-0.006	***
R-squared	0.28		0.240		0.19		0.16	
Transformative capacity	14.3	***	0.025	***	-0.120		-0.009	***
R-squared	0.27		0.24		0.19		0.160	

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

Community fixed-effects regression. t-statistics are robust to heteroskedasticity. Independent variables controlled for are listed in the text. The number of observations for each set of results ranges from 2,617 to 2,997.

# Findings

- The results suggest that resilience capacity has a positive influence on household food security in the project area.
- Greater resilience capacity is associated with higher calorie consumption, higher dietary diversity, lower food insecurity overall (a negative coefficient on the HFIAS), and less hunger (a negative coefficient on the HHS).
- Transformative capacity has a stronger impact than adaptive capacity, and adaptive capacity a stronger impact than absorptive capacity for all of the indicators except the HHS.

# PRIME Impact Evaluation Results: Community Resilience Capacities

	Food Security (Consumption Indicators)		Food Insecurity (Experiential Indicators)		Child Nutritional Status (< 5 years)
	Per-Capita Calorie Consump- tion	Dietary Diversity Score	Household Food Insecurity Access Scale	Household Hunger Scale	Weight-for-Height Z-Score
Community resilience capacity	-4.3*	0.006	-0.024	-0.007**	0.004
R-squared	0.20	0.14	0.06	0.09	0.13

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

# Community Resilience Findings

- Community resilience does not appear to aid households in avoiding the less extreme forms of food insecurity, as indicated by statistically insignificant associations with calorie consumption, dietary diversity and the HFIAS.
- However the data imply that it does play a role in helping them to avoid hunger (a significant association was found with the HHS).
- Community resilience as measured in the report has no statistically significant association with WAZ.
- The limited influence of community resilience found is probably due to the fact that the strength of collective action is relatively low.

# Resilience Measurement Estimation Models

- To determine whether greater resilience capacity reduces the negative impact of shocks on well-being outcomes the following regressions can be used:

$$hh\ outcome = f\left(\begin{array}{l} SE, HRC, SE * HRC, household\ characteristics, \\ community\ of\ residence \end{array}\right)$$

$$hh\ outcome = f(SE, CRC, SE * CRC, household\ characteristics)$$

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



# Regression Analysis: Does greater resilience capacity reduce the negative impact of shocks on well-being outcomes?

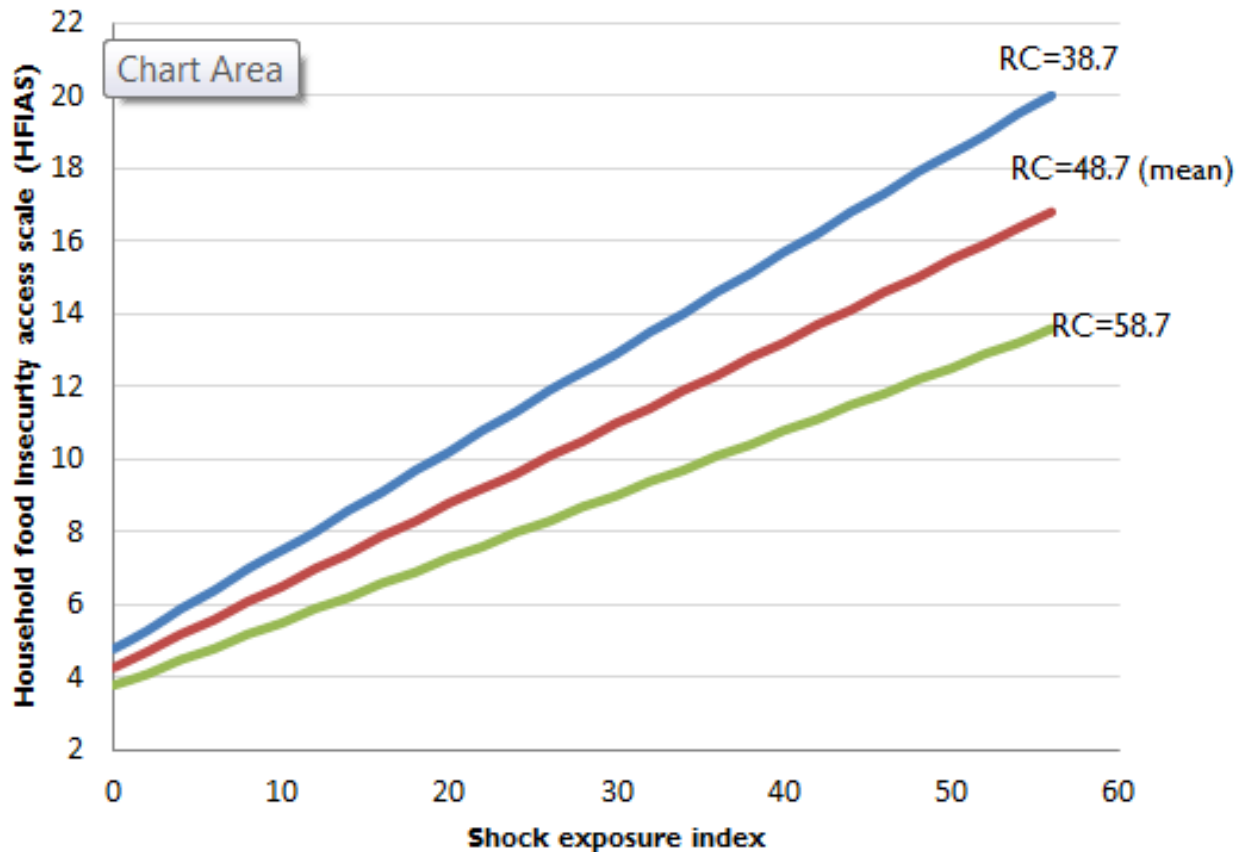
	Per-Capita Calorie Consumption		Dietary Diversity Score		Household Food Insecurity Access Scale		Household Hunger Scale	
Household resilience capacity	13.1	***	0.022	***	-0.051	***	0.005	
Shock exposure	-1.3		0.012		0.459	***	0.083	
Resilience capacity*Shock exposure	-0.007		0.000		-0.005	***	-0.001	
Number of observations	2,696		2,640		2,591		2,657	
R-squared	0.27		0.2		0.3		0.24	

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

# Findings

- The results suggest that resilience capacity somehow alters the impact of shock exposure on households.
- The interaction term is statistically significant for both the HFIAS and the HHS.
- The results suggest that shock exposure increases food insecurity, but less so the higher is a household's resilience capacity.
- This is consistent with the theory of resilience: In the PRIME IE area resilience capacity shields households from the negative impacts of shocks.

# Resilience Capacity-Mediated Relationship between Shock Exposure and Household Food Insecurity



# Findings

- The resilience capacity-mediated relationship between shock exposure and household food insecurity implied by the regression results is illustrated by this Figure.
- It shows the implied impact of shock exposure on the HFIAS at three values of the resilience capacity index: the mean, the mean minus ten points, and the mean plus ten points.
- The slope of the line is smaller the higher is the level of resilience capacity.
- Further, any given level of shock exposure (for example, 30) is associated with a lower level of food insecurity the higher is resilience capacity.

# Conclusion

- The baseline study indicates resilience appears to be higher in Borena than Jijiga and higher among pastoralist than agro-pastoralist and non-pastoralists.
- The baseline survey also shows that all these groups of households are highly food insecure and vulnerable to a multiple types of shocks and stresses.
- Household and community resilience needs to be strengthened to avoid further deprivation due to such disturbances.
- The PRIME project has been designed to strengthen the capacities of households and communities to manage shocks and stresses in the future.
- Follow up surveys will be designed to capture changes in resilience capacity over the life of the project and evaluate the impact of the project on resilience capacities and well-being outcomes.

# Next Steps

- We have set up an interim monitoring system to capture real-time household and community responses to shocks and stresses as they occur over the next four years.
- Information related to shocks and stresses is being collected such as climate variables (rainfall), price levels, animal disease levels, and conflict.
- Quantitative and qualitative data collection activities using short survey instruments and topical outlines are being carried out every month over a six month period. The main focus of these interim monitoring activities is to assess household and community capacity to manage risk in real time.

This presentation will be available on  
the FSN Network website...

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