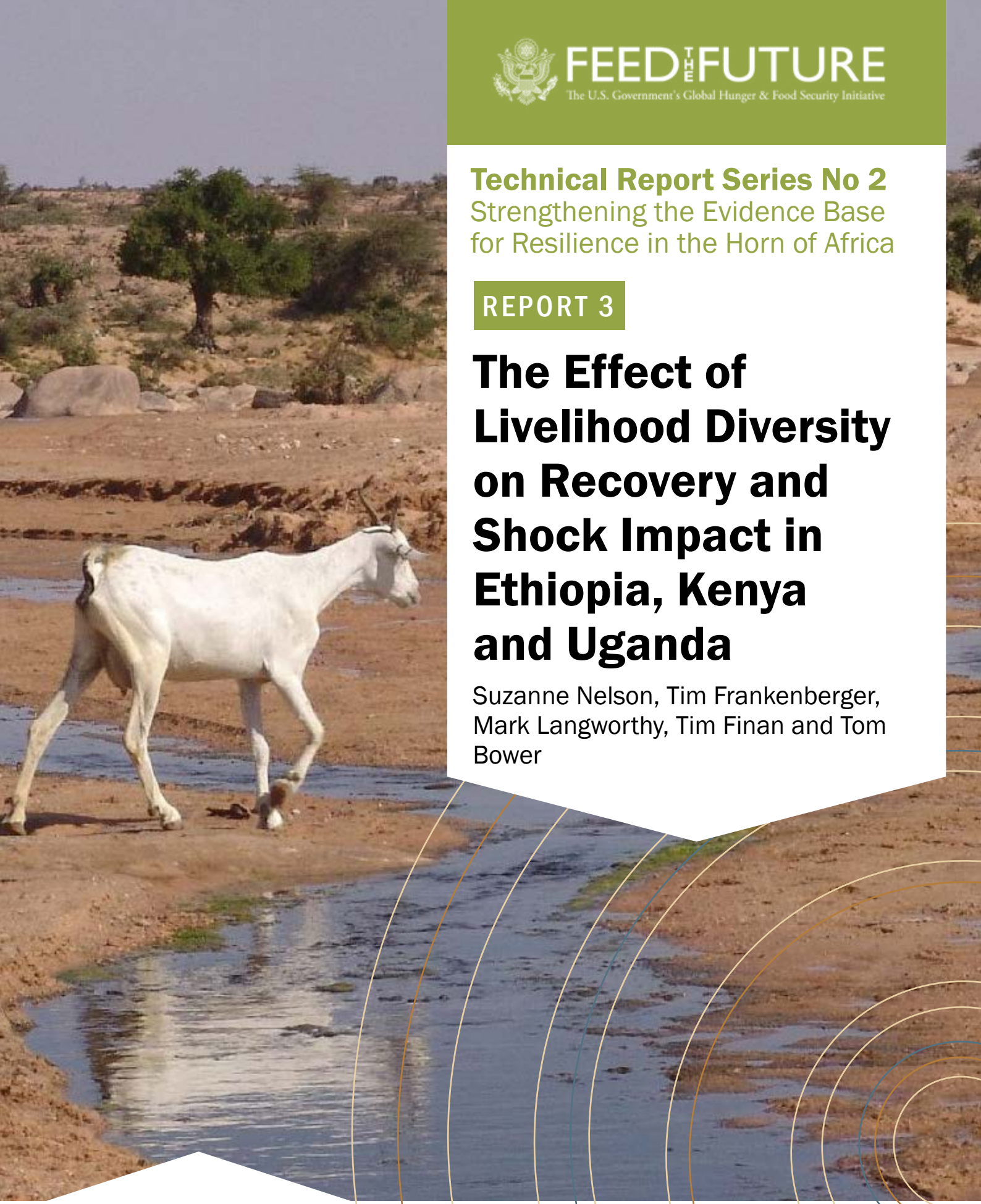

FEED THE FUTURE
The U.S. Government's Global Hunger & Food Security Initiative

Technical Report Series No 2
Strengthening the Evidence Base for Resilience in the Horn of Africa

REPORT 3

The Effect of Livelihood Diversity on Recovery and Shock Impact in Ethiopia, Kenya and Uganda

Suzanne Nelson, Tim Frankenberger, Mark Langworthy, Tim Finan and Tom Bower

technical consortium
Building Resilience in the Horn of Africa
ILRI
INTERNATIONAL LIVESTOCK RESEARCH INSTITUTE
TANGO INTERNATIONAL
TECHNICAL ASSISTANCE to NGOs
TOPS
Promoting excellence in food security programming
USAID
FROM THE AMERICAN PEOPLE

Authors: Suzanne Nelson[a], Tim Frankenberger[a], Mark Langworthy [a], Tim Finan[a] and Tom Bower[a]
[a]*TANGO International*

This report is prepared by experts for the Technical Consortium for Building Resilience in the Horn of Africa. For more information on the Technical Consortium contact Dr. Katie Downie - k.downie@cgiar.org.

Design and layout: Jodie Watt Media, Layout: Avocado Design Studio

Citation: Nelson, S., Frankenberger, T., Langworthy, M., Finan, T. & Bower, T. (2016). The Effect of Livelihood Diversity on Recovery and Shock Impact in Ethiopia, Kenya and Uganda. Report prepared by The Technical Consortium, a project of the CGIAR. Technical Report Series No 2: Strengthening the Evidence Base for Resilience in the Horn of Africa. Nairobi, Kenya: A joint International Livestock Research Institute (ILRI) and TANGO International publication.

List of **Acronyms**

ASALs	Arid and semi-arid lands
BRACED	Building Resilience and Adaptation to Climate Extremes and Disasters
DfID	Department for International Development (United Kingdom)
HH	Household
IUCN	International Union for Conservation of Nature
PRIME	Pastoralist Areas Resilience Improvement and Market Expansion
WISP	World Initiative for Sustainable Pastoralism

Table of **contents**

List of **tables**

1 Introduction

In a development context, livelihood diversification has been promoted as a pathway out of poverty for rural households for more than 20 years and is considered an important strategy for achieving sustainable livelihoods (Ellis, 2000a; Hussein & Nelson, 1999). Evidence suggests that livelihood diversification can result in increased income and productivity (Bezu, Barrett & Holden, 2012; Haggblade, Hazell & Reardon, 2007; Lanjouw & Lanjouw, 2001; Reardon, Berdegué & Escobar, 2001). Income from non-farm activities has been reported to contribute 30 – 60% towards total rural household earnings in sub-Saharan Africa, Asia, and Latin America (Ellis & Freeman, 2004; Reardon et al., 2001).

Livelihood diversification[1] is also a key element of resilience, and strengthens the capacity of households to deal with future shocks and stresses (Béné, Frankenberger & Nelson, 2015; Frankenberger, Spangler, Nelson & Langworthy, 2012). There are three types of livelihood diversification in which households can engage to help spread risk or gain income. ***Concurrent*** diversification involves engagement in more than one livelihood activity at the same time. ***Temporal*** diversification involves diversifying activities across time (e.g., seasonally, annually). ***Spatial*** diversification involves engaging in livelihood activities that are located in different geographic locations (e.g., rural, urban) (Goulden, Adger, Allison & Conway, 2013).

Livelihood strategies are not equally vulnerable to the different risks associated with specific shocks and stresses, suggesting that diversification into multiple livelihood activities, each with different risk profiles, will provide the most effective buffer against future unpredictability. However, a number of studies suggest that in some contexts, livelihood diversification may not always be the most effective nor preferred strategy for the rural poor (Liao, Barrett & Kassam, 2014; Goulden et al., 2013). Rather, certain socio-ecological contexts may favor more specialized livelihoods due to their comparative advantage under certain conditions such that diversification may actually be disadvantageous. Liao et al. (2014) suggest that socio-ecological conditions characterizing mobile pastoralist communities "predetermine" pastoralism as the preferred livelihood strategy, particularly in dryland areas, and that livelihood diversification does not necessarily result in improved welfare for many pastoral households.

To date, much of the discussion and research on livelihood diversification has focused on rural populations engaged in agricultural production, primarily crops, and with mixed results. Yet pastoralism is the main livelihood strategy for millions of rural people around the globe[2], and especially in arid and semi-arid land (ASAL) ecosystems; one-fourth of the world's land surface is managed through pastoralism.[3] Mobility and livelihood diversification are important mechanisms for adapting to climate variability, including extreme climate events and seasonal or inter-annual variation in climate (Liao et al., 2014; Goulden et al., 2013).

[1] Household diversification strategies take multiple forms. One is technology diversification within agriculture and livestock systems, such as diversifying cropping patterns, mixing food crops with cash crops, combining complementary crop and livestock production, and adjusting farm practices to on-farm eco-niche variation. Another strategy is the diversification of household labor pools into different livelihood activities. Households also use different forms of social capital to expand their ability to diversify away from the point of the disturbance and across spatial, social, and institutional boundaries. This paper primarily focuses on livelihood diversification.

[2] See de Jode (2014). An accurate figure for the number of pastoralists across the world is not known. Published data suggests 200 million, but this is far too low as India officially has 110 million, and China and Eastern Africa each have 50 million. The WISP estimate is approximately 500 million, but this remains a major knowledge gap.

[3] http://www.iucn.org/wisp/pastoralist_portal/pastoralism/.

According to the IUCN's World Initiative for Sustainable Pastoralism (WISP), there are at least 200 million pastoralists globally, including both nomadic and transhumance pastoralists.[4] The number is thought to rise sharply if more sedentary types of pastoralism are included (i.e., agro-pastoralists). Pastoralism – in one form or another – plays a key role in people's ability to adapt to the variable and unpredictable environment characterizing drylands around the world, including the ASALs in the Horn of Africa.

[4] *http://www.iucn.org/wisp/pastoralist_portal/pastoralism/.*

Mobile pastoralism may be the most viable form of production and land use in most of the world's fragile drylands, where it has been practiced for thousands of years (de Jode, 2014). It is an environmentally friendly and more sustainable food production system than crop production in drylands, which typically requires high inputs of water, fertilizers, and pesticides. Its sustainability is primarily due to livestock herd mobility, a strategy in which herds are moved from grazing area to grazing area in order to allow grasses and shrubs to regenerate. Pastoral landscapes provide other high-value ecosystem services, including protection of watersheds, conservation of biodiversity, and storage of greenhouse gasses.

Mobile pastoralism is also a crucial part of local, national and global economies; livestock provide 20 – 25% of agricultural GDP in Africa and 25 – 30% in Asia (Hatfield & Davies, 2006). In both Sudan and Niger livestock provide over 80% of agricultural GDP and in Mongolia it is as high as 90% (Liao et al., 2014). Although not typically included in national figures, the value of milk from pastoral systems greatly exceeds that of meat (Catley, Lind & Scones, 2013). In 2010, the livestock trade in East Africa was estimated at close to US $1 billion, and was considered undervalued (Catley et al., 2013). However, use of traditional economic models to compare productivity between pastoral and other production systems, such as intensified agricultural production systems that include irrigation and fertilization, may simply be misleading. That is, pastoral livelihoods exploit often marginal lands where returns can be had at fairly low costs of production (Hatfield & Davies, 2006). "Pastoralists use their indigenous knowledge about ecology and rangeland management to ensure optimal and consistent livestock productivity, often using diverse resources and different livestock species to ensure the most reliable flow of products during the year rather than to maximize output of a single product" (de Jode, 2014).

"Mobile pastoralism is clearly a viable and modern livelihood, and people are reverting to ways of living which a generation ago were thought to have disappeared."
IUCN WISP website

Pastoralism takes advantage of several types of livelihood diversification that are not as readily available to other production systems – geographic and product

diversification from the same production unit. Livestock can be moved to better pasture or water resources, or to avoid floods and other natural hazards. They also use production processes that differ in vulnerability to the same type of risk. For example, while livestock as a whole may be vulnerable to extreme drought, the degree to which household income is vulnerable varies with the product (e.g., transportation, milk, meat, fiber, hides, live animals). This allows pastoralists to more effectively maintain adequate levels of household food or income from livestock production.

Thus, pastoralism represents a production system that is uniquely suited for marginal lands, providing food and household income from a diversity of livestock products (Hatfield & Davies, 2006). Pastoralism also represents a natural resource management system that provides a wide range of ecosystem services and products (e.g., conservation of biodiversity, tourism, raw materials). Its inherently diversified and flexible nature is key to its resilience and durability. However, from a pro-growth development perspective, rural pastoral livelihoods – particularly mobile or non-sedentary pastoralism – present a somewhat unique challenge to the theory that livelihood diversification per se can lead to a pathway out of poverty or enable households to better cope with the primary shocks and stresses that characterize pastoral systems (Liao et al., 2014).

This paper explores the influence of livelihood diversification on resilience of households from the arid and semi-arid lands (ASALs) in the Horn of Africa. The study uses data from the USAID-funded Pastoralist Areas Resilience Improvement through Market Expansion (PRIME) and the DfID-funded Build the Resilience and Adaptation to Climate Extremes and Disasters (BRACED) programs to examine whether households that are diversified into different livelihood risk profiles are more resilient than those that are not. The study focuses on the following key research questions:

- Are households which have diversified their livelihood activities better able to recover from shocks than those households which have not? Diversification of livelihoods will be measured in two ways:
  - *The count of all different types of livelihoods engaged in by all household members,*
  - *The number of different categories of risk profiles into which household livelihoods fall.*
- What is the relationship between wealth and household livelihood diversification?

2 Background

A livelihood comprises the activities in which households engage their skills, capacities, and physical resources to create income or otherwise improve their way of life (Assan, 2014; Chambers & Conway, 1992). Rural livelihood diversification is described as the process by which households construct an increasingly diverse portfolio of activities, social support capabilities, and assets for survival or in order to improve their standard of living (Ellis, 1999; 2000a). Extensive literature emphasizes the importance and benefits of livelihood diversification and its determinants (Davis et al., 2010; Winters et al., 2009; Haggblade et al., 2007; Ellis & Bahiigwa, 2003; Ellis, 2000b; Barrett, Reardon & Webb, 2001).

Early discussions of livelihood diversification focused on diversifying beyond rural farm income to include off-farm income as a way of generating cash to cover not only household items which could not be produced on-farm, but also for investing in on-farm improvements that would then lead to increased productivity – and ultimately more income (Ellis, 1999). Off-farm income generating options are typically classified as 1) rural non-farm agricultural activities (e.g., value chains, marketing, input supply, services), 2) rural non-agricultural activities (e.g., small businesses, petty traders, vendors), and 3) urban-based activities (OECD, 2007). In the context of dwindling government subsidies for agricultural inputs (e.g., fertilizer) and lack of access to credit for small farmers, livelihood diversification was promoted as a way of providing the cash needed to invest in productivity-enhancing agricultural inputs (Bahiigwa, Mdoe & Ellis, 2005).

Evidence is mixed, however, regarding the influence of livelihood diversification on resilient economic growth among the rural poor. Although diversification seems to be the norm rather than the exception in rural areas, the nature of how households diversify varies, including by wealth status (OECD, 2007). The poor tend to diversify into other agricultural activities, including wage labor. Thus, they remain vulnerable to the risks associated with agriculture, including climate change and variability. In contrast, wealthier households tend to diversify into non-farm businesses, which make them less vulnerable to climate risks. Additionally, setting up a non-farm business requires capital, labor, financial literacy and other skills, access to markets for purchasing inputs and selling products, and enabling policies and infrastructure (e.g., roads, telecommunications), all of which are contributing factors to poverty when limited or lacking (Warren, 2002). Although wealthier households tend to rely less on agriculture than poorer households, they are also able to invest more heavily in agriculture and thus enjoy higher productivity and net income per hectare (Ellis & Freeman, 2004). While access to certain assets (physical, human, financial) and wealth influence how households diversify – or not – their livelihood activities, off-farm diversification occurs at least to some degree across all levels of welfare.

Households typically diversify their livelihood activities by engaging in more than one income-generating activity at the same time (**concurrent** diversification), by shifting between different activities over time (**temporal** diversification), or by engaging in livelihood activities in different locations (**spatial** diversification) (Goulden et al., 2013). Poor households may be highly diversified in terms of the total number of livelihood activities in which they are engaged, but that does not necessarily translate into "additional" household income (i.e., accumulation) or enhanced resilience. This is especially true for households engaged in non-farm activities that have limited or no constraints to entry but also low returns (Whitehead & Kabeer, 2001). Under such circumstances, diversification is primarily a means of survival, a way to temporarily deal with risk or to cope with the immediate effects of shocks and stresses (Assan, 2014). Temporal and spatial diversification may be driven in large part by seasonality and/or differences in where people live and where labor is needed (OECD, 2007). Thus, mobility may be critical for some types of livelihood diversification, though national policies often create barriers to migration.

Households can also diversify their livelihood activities through differential distribution of intra-household labor. For example, women often dominate many off-farm activities that have low entry constraints and low returns, such as food processing and preparation, trading and many other services (OECD, 2007). Men often migrate in search of work, either seasonally or in response to specific shocks and stresses. Overall, livelihood diversification by a household, regardless of which activity individual household members are engaged in, plays a key role in reducing the impact of seasonality on income, labor and/or food consumption, and of risks associated with shocks and stresses. This study focuses on this assumption and further explores the impact wealth has on livelihood diversification as an adaptive strategy.

HYPOTHESES

- Households with greater levels of livelihood diversity achieve greater levels of resilience than those who have less diversification, all else equal.
- Wealthier households are able to diversify their livelihood sources more than poorer households, all else equal.
- Poorer households are pushed into livelihoods with lower returns, and are less able to access livelihoods with greater and less risky returns.

3 Data sets

PRIME[5]

PRIME is a USAID Ethiopia Feed the Future Project with three objectives: (1) increase household incomes, (2) enhance resilience, and (3) bolster adaptive capacity to climate change. Program beneficiaries include pastoralists, agro-pastoralists, and non-pastoralists in 23 woredas within three pastoralist clusters: a Southern cluster (Borena, Guji, and Liban zones), a Somali cluster, and a cluster in Afar. PRIME activities are designed to foster the competiveness of livestock value chains, addressing the needs of the very poor and chronically food insecure through value chain interventions, improved policy environment, improved delivery of health services, and behavior change. Baseline data were collected from November 19 to December 24, 2013 in two of the three sub-regions, Borena and Jijiga, within the PRIME project area of implementation.

[5] *This section has been adapted from Smith et al., 2015.*

BRACED

Funded by the United Kingdom's Department for International Development (DFID), the Mercy Corps-led BRACED program enhances resilience to climate extremes in northern Kenya and Uganda through a community-led and systems-driven approach. The program focuses on vulnerable groups, particularly women and girls, and promotes improving public sector engagement and service delivery, broadening economic opportunity, and increasing community capacity to manage resources and prepare for disaster. Program beneficiaries include girls and boys between the ages of 12 and 19, and women and men aged 20 and over, with a priority on households living in poverty, female-headed households, families with chronically ill or disabled members, and households engaged in livelihood or market activities promoted through the project. The program operates throughout Wajir County and the urban center of Garissa on the Wajir/Garissa County border in Kenya, and throughout the Karamoja sub-region and its districts within Uganda. Both regions comprise arid/semi-arid landscapes that have traditionally been pastoral in Wajir and agro-pastoral in Karamoja.

The primary objective of the program is to increase resilience in men, women, girls, and boys: enhance their capacity to better absorb and adapt to shocks and stresses, which then contributes to improved household well-being. The theory of change that connects the outcome to outputs emphasizes meaningful and inclusive participation in four strategic areas: (1) good governance, (2) inclusive market systems, (3) natural and community resource management, and (4) empowerment of women and girls. These four outputs will build the ***absorptive***, ***adaptive***, and ***transformative*** capacities that are essential to increased resilience to shocks and stressors. BRACED data is currently limited to quantitative data. Qualitative data will be collected in the mid-term or during project implementation.

Table 1: Total number of households and communities in the project areas

	PROJECT AREA(S)	# OF HOUSEHOLDS	# OF COMMUNITIES
PRIME	Jijiga	1398	32
	Borena	1744	41
BRACED	Karamoja	553	24
	Wajir	563	10

4 Methodology

Data collected from PRIME and BRACED baselines are analyzed in this paper to examine how livelihood diversification affects a household's resilience from the effects of drought-related shocks and stresses. Shocks have been broken into four categories that are assumed to have different risk characteristics, based on the underlying causes of the shocks. The percent of households exposed to these four shock categories is provided in Table 2. This analysis focuses on climate-related shocks, and in particular the impact of droughts because it was identified as one of the most prevalent shocks across program areas in the last 12 months.

Table 2: Prevalence of shocks by type in the past 12 months by project area

	PRIME		BRACED	
TYPES OF SHOCKS (%)	**BORENA**	**JIJIGA**	**WAJIR**	**KARAMOJA**
Climate-related shock	46.1	61.9	97.5	96.9
Livestock disease and pests	46.7	46.1	54.2	54.6
Shock related to conflict and social issues	8.4	5.0	7.1	13.6
Market shock	76.4	71.1	88.5	85.5
Other natural causes	46.8	48.2	20.8	26.0
N	1744	1398	563	553

The dependent variable, 'recovery', for PRIME is derived from a question (q306) in the PRIME baseline survey asking households: "To what extent were you and your household able to recover from [a specific shock]?" The responses are coded with values ranging from 1 to 5, with 1 indicating that a household did not recover from the shock and 5 representing the highest level of recovery in which a household was not affected by (presumably immune to) the shock. Respondents were asked to rate their recovery using the above mentioned scale for drought-related shocks experienced by the household in the past year. The results from this analysis assesses whether a household with greater livelihood diversification is better able to recover from the impacts of a shock (equation 1).

$$1) \quad Recovery_{PRIME} = f \left\{ \begin{array}{c} \textbf{\textit{Livelihood diversity,}} \\ \textit{HH assets,} \\ \textit{HH exposure to shocks,} \\ \textit{HH human capital,} \\ \textit{HH demographic characteristics} \\ \textit{Community characteristics} \end{array} \right\}$$

Due to the variation in survey instruments, the BRACED analysis uses a different dependent variable, 'impact', to measure the relationship between livelihoods and drought-related shocks. The dependent variable used for BRACED is sourced from a question (q306) in the survey asking households to measures how severe the impact of the drought was on food consumption in the months following the shock. Respondents selected from a list of responses with the corresponding values: 1 = food consumption remained the same; 2 = moderate decline in food consumption; and 3 = severe decline in food consumption. Overall, this analysis looks to test whether livelihood diversification mitigates the effects of shocks (equation 2).

$$2)\quad \textit{Impact on food consumption}_{BRACED} = f\left\{\begin{array}{c}\textit{Livelihood diversity,}\\ \textit{HH assets,}\\ \textit{HH exposure to shocks,}\\ \textit{HH human capital,}\\ \textit{HH demographic characteristics}\\ \textit{Community characteristics}\end{array}\right\}$$

Because the dependent variables are ordinal, an ordered logit model is used. 'Recovery' and 'impact on food consumption' are run in a series of multivariate regression analyses as a function of livelihood diversity, which is quantitatively measured in the following ways:

1. Mean number of livelihoods across household

This analysis is used to measure if the number of livelihoods, regardless of risk profile categorization, has an effect on recovery or household food consumption.

2. Households engaged in only climate-sensitive livelihoods (crop and livestock)[6]

This analysis measures if diversifying into other risk profiles (market-sensitive or other)[7] in addition to climate-sensitive livelihoods has an effect on recovery or household food consumption.

3. Livelihood activities by type

This analysis measures the contribution each livelihood activity has on recovery and household food consumption, using climate-sensitive livelihoods (crop and livestock) as the comparison group.

[6] The sale of bush/wild products for the purposes of this analysis is not considered climate-sensitive because the majority of households engaged in this livelihood in both PRIME and BRACED are selling charcoal and/or firewood.

[7] Market-sensitive livelihoods include casual wage labor, self-employment, distress sales/ sell of non-livestock assets, and salary. Casual wage labor in PRIME and BRACED does not include agricultural wage labor. Other livelihoods include bush products, remittances and gifts/ assistance.

The models are restricted to households that have experienced drought in the last 12 months and are in climate-sensitive livelihoods, controlling for household demographics and community characteristics.[8]

Descriptive data in the paper compares livelihoods across wealth terciles for the entire sample population. Wealth-based poverty is used in lieu of income-based poverty because it is better at capturing long-lasting, structural poverty; wealth-based poverty is also more appropriate in pastoralist and shock-prone settings where income fluctuates widely over time.

[8] These include household wealth (assets), human capital, household size, age of household head, and female-headed household. Community characteristics include distance to the nearest town, access to public services, access to financial services, access to livestock market, and access to disaster preparation and mitigation.

5 Results

PRIME

The PRIME project area lies within the ASALs in the Horn of Africa, where pastoralism and agro-pastoralism are the dominant livelihoods. The ASALs have unpredictable and low rainfall (less than 600 mm/year), and are characterized by dispersed populations with little permanent infrastructure. Environmental degradation, climate change, and entrenched conflict are common in these areas. Traditionally, transhumance[9] was a common feature of pastoral livelihoods that enabled pastoralists and agro-pastoralists to be highly resilient to drought. Freedom of movement – including throughout cross-border pastoralist ecosystems – allowed them to seek out better pasture and water resources as necessary. However, this strategy has been made more difficult to carry out in this increasingly fragile environment due to rapid population growth, drought, and land degradation, as well as trans-border disputes and conflict. As a result, vulnerability has increased for pastoralists and agro-pastoralists in this region. The relative isolation of these communities, their lack of access to productive infrastructure, and their marginalized status adds to their vulnerability (AU, 2010). Although both PRIME project areas are similarly vulnerable, livelihood diversification as a coping mechanism shows varying benefits for Borena and Jijiga. The results in this section of the paper present findings from the PRIME analysis that looks at recovery as a function of livelihood diversity.

Recovery

As shown in Table 3, Borena has a greater mean of livelihood activities across wealth terciles than Jijiga. Of those activities, a vast majority of households in the PRIME project areas engage in climate-sensitive livelihoods, and more specifically in farming and livestock. When comparing across wealth categories, however, a significantly greater percentage of wealthier households participate in climate-sensitive livelihoods than poorer households. As for those households engaged in market-sensitive livelihoods, those in the highest wealth tercile engage in salaried work, or are self-employed in Borena. Poorer households, in contrast, are more likely to work in casual wage labor. In both project areas, wealthier households are significantly more likely to distress sell non-livestock assets. This suggests that wealthier households who have more assets to sell are more likely to use this as a coping strategy than poorer households. For other types of livelihood activities, a greater percentage of those in the lowest wealth tercile participate in remittances and assistance. In Borena only, more poor households sell bush products.

[9] *Transhumance is defined as: "...regular seasonal movements of livestock between well-defined pasture areas (dry to wet season, or low to highland)" (Niamir-Fuller, 1999).*

Table 3 also highlights the differences in livelihood activities in the two project areas. In Borena, a larger proportion of the sample engages in non-climate sensitive livelihoods than in Jijiga, particularly casual wage labor, but also salary, self-employment, and distress sales.

Table 3: Percent of households engaged in livelihood activities by type and wealth, PRIME

	BORENA			JIJIGA		
INDICATORS	**LOWEST A/**	**MIDDLE**	**HIGHEST**	**LOWEST A/**	**MIDDLE**	**HIGHEST**
Mean # lvhds	1.96	2.26***	2.24***	1.51	1.73***	1.90***
Climate-sensitive livelihoods (%)						
Crop	67.2	93.7***	91.6***	78.8	92.0***	92.2***
Livestock	74.6	94.6***	94.6***	48.0	65.9***	81.9***
Market-sensitive livelihoods (%)						
Casual wage labor	24.6	23.8	17.2***	8.1	8.3	7.1
Salary	1.2	1.3	3.2**	1.8	0.5	1.0
Self-employment	4.6	3.7	10.3***	5.1	1.7**	4.0
Other livelihoods (%)						
Distress sales	0.0	0.3***	17.2***	0.0	0.5***	7.1***
Bush products	3.0	0.9**	0.5***	1.0	2.4*	1.4
Remittances	8.2	3.2***	3.7***	1.2	0.0**	0.7
Gifts/assistance	13.2	5.2***	2.8***	9.5	2.4***	2.1***
N	724	725	725	293	297	295

Notes:

- Stars represent statistical significance at the 0.01 (***), 0.05 (**) and 0.1 (*) levels.
- a/ lowest wealth households are the comparison group for statistical tests of differences across groups.

As shown in Table 4, there is a positive and highly significant relationship between recovery and the mean number of livelihoods in Borena; that is to say, households are better equipped to recover from a drought when they are engaged in more livelihood activities. Likewise, in Borena, households that are engaged in more diverse livelihoods have better recovery. Those in climate-only livelihoods are negatively associated with recovery at the 0.01 level. When the data is run for all livelihood types, those households that also participate in casual wage labor, salaried work, or are self-employed have better drought recovery than those not participating in these activities. Households in Borena engaged in distress selling are negatively associated with recovery, which in this context is interpreted as a coping strategy associated with poor recovery rather than a measure of livelihood diversification.

The data for Jijiga in Table 4 shows that recovery is not significant for those in more and/or diverse livelihoods. When compared to climate-sensitive livelihoods, only households who are self-employed fare better in their recovery efforts than those not engaged in this activity. In contrast, households selling wild/bush products and receiving remittances are negatively associated with recovery at the 0.01 level; it can be inferred that because of poor recovery, these households were pushed into these activities as last-resort coping strategies.

Table 4: Relationship between recovery from drought and livelihood diversity, PRIME[10]

	BORENA			JIJIGA		
OLogit, D.V.: drought shock recovery	**(1)**	**(2)**	**(3)**	**(1)**	**(2)**	**(3)**
Livelihoods						
Mean # of lvhds	0.390***			0.303		
Climate-only lvhd		-0.660***			0.040	
Livestock and crops a/						
Casual wage labor			0.828***			0.301
Bush products			- 1.314			- 14.295***
Salary			1.896**			- 0.357
Self-employment			0.850*			1.136*
Distress sales			-12.656***			- 0.474
Remittances			0.129			- 14.167***
Gifts/Transfers/ Pensions			- 0.350			- 0.636
χ^2 D.F.	(12)**	(12)**	(19)N/A	(12)**	(12)**	(19)N/A
N	585	585	585	659	659	659

[10] Household and community characteristics are not reported in this table. The complete table is located in Annex 2.

Notes:

- Stars represent statistical significance at the 0.01 (***), 0.05 (**) and 0.1 (*) levels.
- a/ Livestock and crops (climate-sensitive) livelihoods are the comparison group for statistical tests of differences across groups.
- t-statistics are robust to heteroskedasticity.

Summary

- Jijiga has fewer livelihood options that are non-climate sensitive than households in Borena. Jijiga also has fewer mean livelihoods across wealth terciles.
- A significantly larger proportion of wealthier households in both Borena and Jijiga are engaged in crop and livestock livelihoods and distress selling of non-livestock assets. However, households in the lowest tercile are more likely to sell bush products, receive remittances and assistance, and work as casual wage laborers, especially in Borena.
- In Borena, recovery from drought shocks is greater for households that participate in more livelihood activities.
- Households in Borena that are engaged in climate-only activities (crops and livestock) were less likely to recover than those households that were more diversified.

- Recovery in Jijiga is not associated with an increased number of livelihood activities or livelihood diversification by risk profiles. This is due to the limited number of viable diversity options available.[11]

[11] *The qualitative data collected as part of the baseline indicated that there were few alternative livelihood options available.*

BRACED

Despite 50 years of aid, inhabitants of northern Kenya and Uganda struggle to survive in the face of chronic poverty and drought. Climate change is exacerbating vulnerability for these populations through recurrent, intensified drought and uncertain weather patterns. These regions are historically marginalized with a dearth of natural resources and investment. Both are traditionally pastoralist or agro-pastoralist; however, data from this analysis suggest that despite having similar household and community characteristics, the effects of livelihood diversification vary greatly between Karamoja and Wajir. This regional discrepancy is largely due to the history of conflict and government policies that have disrupted livelihood practices in Karamoja. The Government of Uganda's promotion of sedentarization has disrupted livelihood patterns among a historically pastoralist population. Disarmament campaigns limiting mobility, accelerated pressure on localized resource bases and concentrated large herds enforced by the government have resulted in mass loss of livestock, essentially pushing pastoralist households to find alternative livelihoods. Although more people have transitioned to agro-pastoralism, aid is the driving economy in Karamoja (Mercy Corps, 2015).

Impact

Table 5 provides a descriptive analysis of livelihood types by wealth category for the BRACED project areas. In Wajir, a majority of households participate in livestock activities. When comparing across wealth categories, more poor households in Wajir have livestock than those in the middle and highest wealth terciles. Wealthier households, in contrast, have a higher percentage engaged in salaried work, are self-employed, engage in the selling off of assets in times of distress and receive remittances.

In Karamoja, a greater percentage of households participate in crop-related activities than in livestock, as expected given recent history and policies. When comparing the wealth of households in climate-sensitive livelihoods, a larger percentage of Karamoja's wealthier households work in crops and livestock than poorer households. On the other hand, households in the lowest wealth tercile more often engage in livelihoods that are reliant on selling bush products, mostly charcoal, or work as casual wage laborers, having been pushed into these livelihoods as a result of government policies.

Table 5: Percent of households engaged in livelihood activities by type and wealth, BRACED

	WAJIR			KARAMOJA		
INDICATORS	**LOWEST A/**	**MIDDLE**	**HIGHEST**	**LOWEST A/**	**MIDDLE**	**HIGHEST**
Mean # lvhds	1.33	1.25	1.49**	1.96	2.10**	2.10***
Climate-sensitive livelihoods (%)						
Crop	1.1	1.6	1.6	53.0	71.7***	62.5*
Livestock	73.4	64.9*	59.8***	2.2	9.8***	26.6***
Market-sensitive livelihoods (%)						
Casual wage labor	34.8	40.5	27.7	49.2	44.0	33.7***
Salary	2.7	1.6	18.5***	0.0	0.5	6.5***
Self-employment	15.2	11.4	26.6***	26.8	32.1	39.1**
Other livelihoods (%)						
Distress sales	0.0	0.0	0.5***	0.0	0.5***	0.5***
Bush products	1.1	1.6	2.2	45.9	31.5***	21.7***
Remittances	1.6	1.1	9.2***	4.9	2.2	5.4
Gifts/assistance	2.7	2.2	1.6	14.2	18.5	16.8
N	184	185	184	183	184	184

Notes:

- Stars represent statistical significance at the 0.01 (***), 0.05 (**) and 0.1 (*) levels.
- a/ Lowest wealth households are the comparison group.

As can be seen in Table 6, households in Wajir show a significant and negative relationship between impacts on food consumption and the increased number of livelihoods. The relationships in the table demonstrate that more livelihood activities within a household help to negate the negative impacts of drought shocks. Comparatively, households in Wajir that engage in climate-only livelihoods suffer greater negative impacts after a shock than households that diversified into livelihoods with other risk profiles. When comparing across types of livelihoods in Wajir, households that participate in casual wage labor, bush products, salaried work, self-employment, and gifts/assistance fare better than those households not engaged in these activities. It can be said that these activities contribute to a positive diversification strategy. Remittances, on the other hand, are positively associated with impact. This may be because wealthier households are more likely to receive remittances than poorer households (Table 5), and wealthier households suffer greater impacts from shocks, since they are more likely to lose assets than poorer households.

Data from Karamoja were not significant across a number of analyses looking at impact and livelihood diversity. There is no relationship between the number of livelihoods and impact, and between climate-only livelihoods and impact. When comparing data across livelihood types, unlike in Wajir, those households receiving remittances are impacted less than those not receiving remittances.

Table 6: Relationship between recovery from drought and livelihood diversity, BRACED[12]

	WAJIR			KARAMOJA		
OLogit, D.V.: drought shock impacts on food consumption	**(1)**	**(2)**	**(3)**	**(1)**	**(2)**	**(3)**
Livelihoods						
Mean # of lvhds	-0.758***			0.421		
Climate-only lvhd		1.180***			-0.806	
Livestock and crops a/						
Casual wage labor			-0.787*			0.105
Bush products			-1.126**			0.810
Salary			-2.268**			0.000
Self-employment			-1.372**			0.580
Distress sales			-0.599			0.000
Remittances			2.190*			-2.717*
Gifts/Transfers/ Pensions			-1.228***			-0.201
χ^2 D.F.	(12)*	(12)**	(19)N/A	(12)**	(12)**	(19)N/A
N	318	318	318	208	203	208

Notes:

- Stars represent statistical significance at the 0.01 (***), 0.05 (**) and 0.1 (*) levels.
- a/ Livestock and crops (climate-sensitive) livelihoods are the comparison group.
- t-statistics are robust to heteroskedasticity.

Summary

- In Wajir, households with greater number of livelihood activities are better equipped to withstand the impact of droughts on household food consumption.
- A shock has a greater impact on households in Wajir that engage in climate-only livelihoods than households that are more diversified.
- A greater proportion of households in Karamoja, across wealth terciles, engage in other types of livelihoods outside of livestock and agriculture production than in Wajir. These include the selling of bush products (mostly charcoal), self-employment, casual wage labor, and receiving assistance/gifts.
- In Karamoja, impact on household food consumption was not associated with number of livelihood activities or livelihood diversification. This may be due to the fact that diversification is a result of a push into low-return livelihood activities that are not enough to reduce shock impact.

[12] Household and community characteristics are not reported in this table. The complete table is located in Annex 3.

6 Conclusion

When comparing livelihoods across the two project areas in BRACED, a greater proportion of the sample in Wajir is engaged in livestock activities as compared to Karamoja. This can be expected in the context in which the declining number of livestock-based livelihoods in Karamoja is occurring; as a result of Ugandan policies that aim to eradicate pastoralism in this region as a means to modernize and promote agricultural commercialism. From the data presented in this paper, a larger percentage of the households in Karamoja compared to Wajir, across wealth terciles, make their livelihoods by working as casual wage laborers, are self-employed, sell bush/wild products (mostly charcoal), or receive gifts/assistance. Although these households have more diverse livelihoods, many of these activities have low returns – especially the sale of charcoal, an activity in which more than 10 times the number of households in Karamoja are engaged than in Wajir. Thus, despite diversification in Karamoja, this has no impact on household food consumption in the face of drought.

In PRIME, data shows that there are limited livelihood options in Jijiga as compared to Borena that are non-climate sensitive. Borena has a greater number of households that engage in market-sensitive livelihoods, especially in casual wage labor. Borena households also report receiving more remittances and gifts/assistance. Because there is a lack of opportunities in Jijiga that exist outside of livestock and farming, the data shows that the number of livelihood activities and livelihood diversification has no effect on recovery.

The strategy of livelihood diversification as a mechanism in itself to better cope with shocks and stresses, needs to be better understood in the context[13] in which programs are being implemented. Diversification can work where there are opportunities to engage in high return activities and in areas where significant non-climate sensitive options exist. Livelihood diversification in areas where such opportunities do not exist will not necessarily lead to better adaptation.

RECOMMENDATIONS FOR FUTURE RESEARCH

Based on the findings of this report, further research should be conducted on livelihood return thresholds to determine whether a certain level of remuneration associated with a type of livelihood is necessary to make a difference in adapting to and recovering from shocks.

[13] Context in this case can be environment, accessibility of livelihood opportunities and market access.

References

7

African Union. (2010). Policy framework for pastoralism I Africa: securing, protecting and improving the lives, livelihoods and rights of pastoralist communities. Department of Rural Economy and Agriculture. Addis Ababa, Ethiopia. October 2010.

Assan, J. (2014). Livelihood diversification and sustainability of rural non-farm enterprises in Ghana. *Journal of Management and Sustainability*, 4 (4): 1-14. http://dx.doi.org/10.5539/jms.v4n4p1.

Bahiigwa, G., Mdoe, N., & Ellis, F. (2005). Livelihoods research findings and agricultural growth. *IDS Bulletin*, 36 (2): 115-120. http://dx.doi.org/10.1111/j.1759-5436.2005.tb00207.x.

Barrett, C., Reardon, T., & Webb, P. (2001). Nonfarm Income Diversification and Household Livelihood Strategies in Rural Africa: Concepts, Dynamics and Policy Implications. *Food Policy,* 26 (4).

Béné, C., Frankenberger, T., & Nelson, S. (2015). Design, monitoring and evaluation of resilience interventions: conceptual and empirical considerations. IDS Working Paper Vol. 2015 No. 459. Brighton: Institute of Development Studies.

Bezu, S., Barrett, C., & Holden, S. (2010). Does the nonfarm economy offer pathways for upward mobility? Evidence from a panel data study in Ethiopia. MPRA Paper No. 35754. http://mpra.ub.uni-muenchen.de/35754/.

Catley. A., Lind, J., & Scones, I. (2013), *Pastoralism and Development in Africa: Dynamic Change at the Margins*. Earthscan, Routledge.

Davis, B., Winters, P., Carletto, G., Covarrubias, K., Quinones, E., Zezza, A., … DiGiuseppe, S. (2010). Assets, Activities and Rural Poverty Alleviation: Evidence from a Multicountry Analysis. *World Development*, 38 (1): 48-63

de Jode, H. (2014). The green quarter: a decade of progress across the world in sustainable pastoralism. Nairobi: IUCN.

Ellis, F. (1999). Rural livelihood diversity in developing countries: evidence and policy implications. *Natural Resource Perspectives No. 40*. London: Overseas Development Institute.

Ellis, F. (2000a). *Rural livelihoods and diversity in developing countries.* Oxford: Oxford University Press.

Ellis, F. (2000b). The Determinants of Rural Livelihood Diversification in Developing Countries. *Journal of Agricultural Economics*, 51 (2): 289–302.

Ellis, F. (2004). Occupational diversification in developing countries and implications for agricultural policy. Hot Topic Paper drafted for the OECD POVNET Agriculture Task Team, Paris, 21-21 September. http://www.oecd.org/dac/povertyreduction/36562879.pdf.

Ellis, F., & Bahiigwa, G. (2003). 'Livelihoods and Rural Poverty Reduction in Uganda', *World Development*, 31 (6): 997–1013.

Ellis, F., & Freeman, H. (2004). *Rural livelihoods and poverty reduction policies.* London: Routledge.

Frankenberger, T., Spangler, T., Nelson, S., & Langworthy, M. (2012). Enhancing resilience to food security shocks in Africa. Discussion Paper. http://www.fsnnetwork.org/sites/default/files/discussion_paper_usaid_dfid_wb_nov._8_2012.pdf.

Goulden, M., Adger, W. N., Allison, E., & Conway, D. (2013). Limits to resilience from livelihood diversification and social capital in lake social-ecological systems. *Annals of the Association of American Geographers*, 103 (4): 906-924.

Haggblade, S., Hazell, P., & Reardon, T. (2007). In: Haggblade, S., Hazell, P. and Reardon, T. (eds), *Transforming the Rural Nonfarm Economy.* Johns Hopkins University Press.

Hatfield, R., & Davies, J. (2006). Global review of the economics of pastoralism. Prepared for the World Initiative for Sustainable Pastoralism (WISP). Nairobi: IUCN.

Hussein, K., & Nelson, J. (1999). Sustainable livelihoods and diversification. *IDS Working Paper 69*. London: Institute of Development Studies.

Lanjouw, J., & Lanjouw, P. (2001). The rural non-farm sector: issues and evidence from developing countries. *Agricultural Economics*, 26 (1): 1-23.

Liao, C., Barrett, C., & Kassam, K-A. (2014). Does diversification translate into improved livelihoods? Evidence from pastoral households in Altay and Tianshan Mountains of Xinjiang, China. http://dx.doi.org/10.2139/ssrn.2628701.

Mercy Corps. (2015). Climate Resilience: Vulnerabilities and capacities assessment in Wajir and Karamoja.

Niamir-Fuller, M. (1999). *Managing mobility in African rangelands: the legitimization of transhumance*. London: Intermediate Technology.

OECD. (2007). Promoting Diversified Livelihoods. In: *Promoting Pro-Poor Growth: Policy Guidance for Donors.* Paris: OECD Publishing. http://dx.doi.org/10.1787/9789264024786-17-en.

Reardon, T., Berdegué, J., & Escobar, G. (2001). Rural nonfarm employment and incomes in Latin America: overview and policy implications. *World Development*, 29 (3): 411-425.

Smith, L., Frankenberger, T., Langworthy, M., Martin, S., Spangler, T., Nelson, S., & Downen, J. (2015). Ethiopia Pastoralist Areas Resilience Improvement and Market Expansion (PRIME) Project Impact Evaluation: Baseline Survey Report. Feed the Future FEEDBACK project report for USAID.

Warren, P. (2002). Livelihoods diversification and enterprise development: An initial exploration of concepts and issues. Livelihood Support Program (LSP). Working Paper 4. Rome: FAO.

Winters, P., Davis, B., Carletto, G., Covarrubias, K., Quinones, E., Zezza, A., ...Stamoulis, K. (2009). Assets, Activities and Rural Income Generation: Evidence from a Multicountry Analysis. *World Development*, *37(9)*: 1435-1452.

8

Annex 1:
Indices for Resilience Capacity

1.1 INDEX OF ABSORPTIVE CAPACITY

The index of absorptive capacity is constructed from seven indicators, some of which are themselves indexes based on primary data collected in the household or community survey. The indicators are listed below.[15]

1. Informal Safety Nets
2. Shock Preparedness and Mitigation
3. Hazard Insurance
4. Household Perceived Ability to Recover
5. Bonding Social Capital
6. Whether a household currently holds savings
7. Asset Ownership

1.2 INDEX OF ADAPTIVE CAPACITY

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

1. Access to Financial Resources
2. Human Capital
3. Diversity of Livelihoods
4. Exposure to Information
5. Asset Ownership
6. Aspirations and Confidence to Adapt
7. Bridging Social Capital
8. Linking Social Capital

1.3 INDEX OF TRANSFORMATIVE CAPACITY

The index of transformative capacity is constructed from eight indicators, including:

1. Formal Safety Nets
2. Access to Markets
3. Access to Infrastructure
4. Access to Basic Services
5. Access to Livestock Services
6. Access to Communal Natural Resources
7. Bridging Social Capital
8. Linking Social Capital

[15] Refer to the PRIME baseline report (Smith, Frankenberger, Langworthy, Martin, Spangler, Nelson & Downen, 2015) for a full explanation of the calculations used for each component that comprise the three types of resilience capacities.

9

Annex 2: Recovery data (PRIME)

Table 7: Relationship between recovery from drought and livelihood diversity, Borena

OLOGIT, D.V.: DROUGHT SHOCK RECOVERY	(1)	(2)	(3)
LIVELIHOODS			
Mean # of livelihoods	0.390***		
Climate-only livelihood		-0.660***	
Livestock and crops a/			
Casual wage labor			0.828***
Bush products			-1.314
Salary			1.896**
Self-employment			0.850*
Distress sales			-12.656***
Remittances			0.129
Gifts/Transfers/Pensions			-0.350
HOUSEHOLD CHARACTERISTICS			
Wealth (asset) index	-0.002	0.006	0.001
Number of shocks	0.006	0.007	0.009
Human capital	0.197	0.217	0.078
HH size	-0.014	-0.013	-0.016
Age of HHH	-0.014***	-0.013***	-0.011**
Female headed HH	-0.107	-0.086	-0.072
COMMUNITY CHARACTERISTICS			
Distance to nearest town	0.008	0.006	0.006
Public services access	-0.273*	-0.277*	-0.330**
Financial services access	-0.542***	-0.541***	-0.527***
Livestock market access	0.109	0.092	0.091
Disaster prep and mitigation access	0.324**	0.330**	0.373**
χ^2 D.F.	(12)**	(12)**	(19)N/A
N:	585	585	585

Notes:

- Stars represent statistical significance at the 0.01 (***), 0.05 (**) and 0.1 (*) levels.
- a/ Livestock and crops (climate-sensitive) livelihoods are the comparison group.
- t-statistics are robust to heteroskedasticity.

Table 8: Relationship between recovery from drought and livelihood diversity, Jijiga

OLOGIT, D.V.: DROUGHT SHOCK RECOVERY	(1)	(2)	(3)
LIVELIHOODS			
Mean # of livelihoods	0.303		
Climate-only livelihood		0.040	
Livestock and crops a/			
Casual wage labor			
Bush products			0.301
Salary			-14.295***
Self-employment			-0.357
Distress sales			1.136*
Remittances			-0.474
Gifts/Transfers/Pensions			-14.167***
HOUSEHOLD CHARACTERISTICS			
Wealth (asset) index	0.037	0.039	0.041
Number of shocks	-0.008	-0.006	-0.009
Human capital	0.361	0.389	0.433
HH size	-0.062	-0.060	-0.068*
Age of HHH	-0.003	-0.003	-0.003
Female headed HH	-0.305	-0.306	-0.301
COMMUNITY CHARACTERISTICS			
Distance to nearest town	-0.008	-0.006	-0.005
Public services access	-0.018	-0.043	-0.052
Financial services access	-0.140	-0.139	-0.139
Livestock market access	-0.244*	-0.269*	-0.293*
Disaster prep and mitigation access	0.596	0.618	0.657
χ^2 D.F.	(12)**	(12)**	(19)N/A
N:	659	659	659

Notes:

- Stars represent statistical significance at the 0.01 (***), 0.05 (**) and 0.1 (*) levels.
- a/ Livestock and crops (climate-sensitive) livelihoods are the comparison group.
- t-statistics are robust to heteroskedasticity.

Annex 3: Impact data (BRACED)

10

Table 9: Relationship between impacts from drought and livelihood diversity, Wajir

OLOGIT, D.V.: DROUGHT SHOCK RECOVERY	(1)	(2)	(3)
LIVELIHOODS			
Mean # of livelihoods	-0.758***		
Climate-only livelihood		1.180***	
Livestock and crops a/			
Casual wage labor			-0.787*
Bush products			-1.126**
Salary			-2.268**
Self-employment			-1.372**
Distress sales			-0.599
Remittances			2.190*
Gifts/Transfers/Pensions			-1.228***
HOUSEHOLD CHARACTERISTICS			
Wealth (asset) index	-0.013	-0.013	-0.011
Number of shocks	0.021	0.021	0.013
Human capital	0.025*	0.022	0.029**
HH size	0.073	0.070	0.060
Age of HHH	-0.002	-0.004	-0.005
Female headed HH	0.003	0.004	0.002
COMMUNITY CHARACTERISTICS			
Distance to nearest town	-0.004	-0.005	-0.005
Public services access	0.304	0.432	0.063
Financial services access	0.001	0.000	0.001
Livestock market access	-0.715*	-0.738*	-0.829*
Disaster prep and mitigation access	-0.008	-0.005	0.001
χ^2 D.F.	(12)*	(12)**	(19)N/A
N:	318	318	318

Notes:

- Stars represent statistical significance at the 0.01 (***), 0.05 (**) and 0.1 (*) levels.
- a/ Livestock and crops (climate-sensitive) livelihoods are the comparison group.
- t-statistics are robust to heteroskedasticity.

Table 10: Relationship between impacts from drought and livelihood diversity, Karamoja

OLOGIT, D.V.: DROUGHT SHOCK RECOVERY	(1)	(2)	(3)
LIVELIHOODS			
Mean # of livelihoods	0.421		
Climate-only livelihood		-0.806	
Livestock and crops a/			
Casual wage labor			0.105
Bush products			0.810
Salary			0.000
Self-employment			0.580
Distress sales			0.000
Remittances			-2.717*
Gifts/Transfers/Pensions			-0.201
HOUSEHOLD CHARACTERISTICS			
Wealth (asset) index	-0.031	-0.023	-0.023
Number of shocks	0.050***	0.055***	0.055***
Human capital	-0.026*	-0.028**	-0.024*
HH size	0.202*	0.220*	0.170
Age of HHH	0.019	0.019	0.026*
Female headed HH	0.014**	0.015***	0.017***
COMMUNITY CHARACTERISTICS			
Distance to nearest town	-0.026	-0.027	-0.022
Public services access	0.019	0.017	0.016
Financial services access	-0.001	0.000	0.001
Livestock market access	-1.065*	-0.971*	-1.203*
Disaster prep and mitigation access	-0.025**	-0.024**	-0.027**
χ^2 D.F.	(12)**	(12)**	(19)N/A
N:	208	203	208

Notes:

- Stars represent statistical significance at the 0.01 (***), 0.05 (**) and 0.1 (*) levels.
- a/ Livestock and crops (climate-sensitive) livelihoods are the comparison group.
- t-statistics are robust to heteroskedasticity.

The International Livestock Research Institute (ILRI) works to improve food security and reduce poverty in developing countries through research for better and more sustainable use of livestock. ILRI is a member of the CGIAR Consortium, a global research partnership of 15 centres working with many partners for a food-secure future. ILRI has two main campuses in East Africa and other hubs in East, West and Southern Africa and South, Southeast and East Asia. www.ilri.org

CGIAR is a global agricultural research partnership for a food-secure future. Its science is carried out by 15 research centres that are members of the CGIAR Consortium in collaboration with hundreds of partner organizations. www.cgiar.org

The Technical Consortium for Building Resilience in the Horn of Africa provides technical support to IGAD and member states in the Horn of Africa on evidence-based planning and regional and national investment programs, for the long-term resilience of communities living in arid and semi-arid lands. It harnesses CGIAR research and other knowledge on interventions in order to inform sustainable development in the Horn of Africa. www.technicalconsortium.org