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Abraham Ali

ECONOMICS OF RESILIENCE TO DROUGHT

SOMALIA ANALYSIS

This report was prepared by Courtenay Cabot Venton for the USAID Center for Resilience
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ACRONYMS

ASALs	Arid and Semi-Arid Lands
BCR	Benefit to Cost Ratio
DFID	Department for International Development (UK)
FEWSNET	Famine Early Warning Systems Network
HEA	Household Economy Approach
IDP	Internally Displaced Person
KG	Kilogram
LPT	Livelihood Protection Threshold
MT	Metric Tons
USG	United States Government
WASH	Water, sanitation and hygiene
WHO	World Health Organization
WFP	World Food Programme

SUMMARY OF KEY FINDINGS

AIM

The aim of this study is to investigate the impact of an early humanitarian response and resilience building on humanitarian outcomes in Somalia, both in terms of cost savings, as well as the avoided losses that can result from a more proactive response. The study investigates existing data and empirical evidence, and uses this to model the relative costs of different response scenarios.

KEY FINDINGS

The impacts of drought on households are complex and interrelated, with spikes in need arising from a combination of physical changes to rainfall, fodder and vegetation, price changes in local markets, as well as other factors such as the quality of institutional response and conflict, for example. Further, high impacts of drought in one year can have strong effects on households' abilities to cope in subsequent years.

It is very hard to measure this complex web of interactions and outcomes empirically. Hence, this analysis combines empirical evidence with the Household Economy Approach (HEA) to model the potential impact of different response scenarios over 15 years, for a population of 3.4 million across Somalia. The model is dynamic, allowing impacts in one year to carry forward into subsequent years, and hence gives a nuanced prediction of how different interventions may affect humanitarian need over time.

Key Findings:

- An early humanitarian response would save an estimated US$220 million on cost of humanitarian response alone over a 15-year period. When avoided income and livestock losses are incorporated, **an early humanitarian response could save US$460 million, or an average of US$31 million per year**.

- Safety net programming at a transfer level of US$270 per household reduces the net cost of humanitarian response, saving an estimated US$115 million over 15 years over the cost of a late response. When this figure is adjusted to account for the benefits of the transfer beyond filling the food deficit, a safety net scenario saves US$318m over the cost of a late response. When avoided losses are incorporated, **a safety net transfer could save US$595 million, or an average of US$40 million per year.**

- A resilience building scenario that results in an increase in income of US$405 per household reduces the net cost of humanitarian response by an estimated US$155 million over 15 years over the cost of a late response. When this figure is adjusted to account for the benefits of the transfer beyond filling the food deficit, a resilience scenario saves US$494 million over the cost of a late response.

- When avoided losses are incorporated, **resilience building could save US$794 million, or an average of US$53 million per year.**

- **Investing in early response and resilience measures yields average benefits of $2.8 for every $1 invested.**

- **When these estimates are applied to total U.S. Government (USG) spending on emergency food aid in Somalia, the USG could have saved on average US$153 million over 15 years in direct cost savings, a savings of 16 percent of total emergency spend.**

Figure E1: Total Net Cost of Response, Somalia, US$ Million

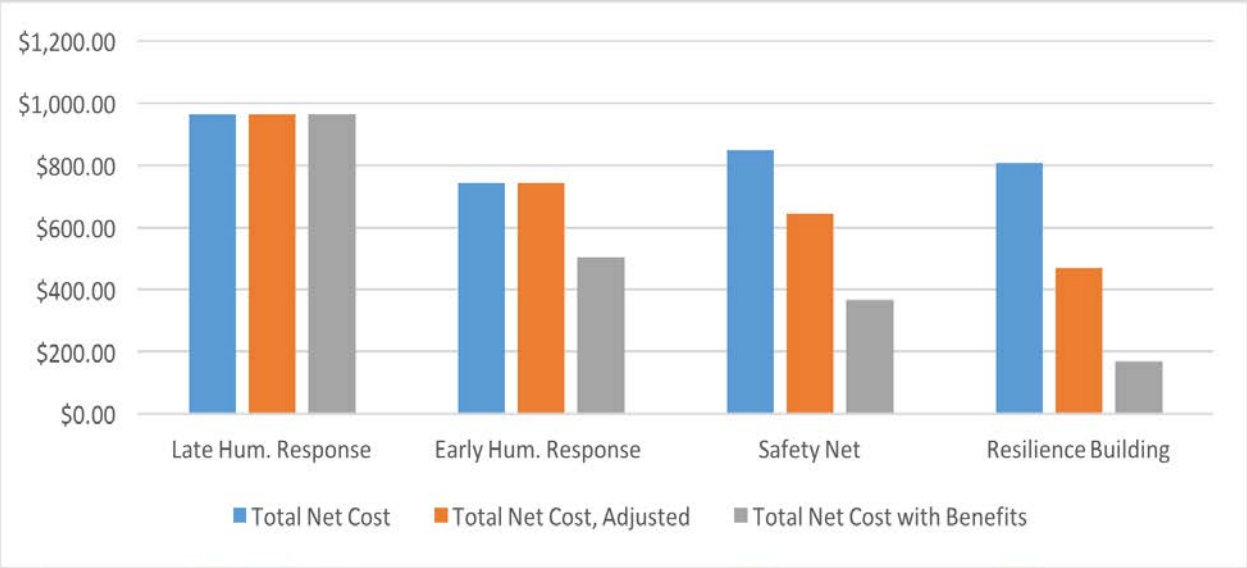

TABLE E1: SUMMARY OF COSTS, SOMALIA, USD MILLION

INTERVENTIONS	LATE HUM. RESPONSE	EARLY HUM. RESPONSE	SAFETY NET	RESILIENCE BUILDING
Total Net Cost, 15 years	$963.1	$742.6	$848.3	$807.9
Savings		*$220.4*	*$114.8*	*$155.1*
Total Net Cost, adjusted, 15 years	$963.1	$742.6	$644.7	$469.0
Savings		*$220.4*	*$318.4*	*$494.1*
Total Net Cost with Benefits, 15 years	$963.1	$503.1	$367.9	$169.4
Savings		*$460.0*	*$595.2*	*$793.7*
Average Net Cost with Benefits per year	$64.2	$33.5	$24.5	$11.3
Savings		*$30.7*	*$40.0*	*$52.9*

DISCUSSION OF FINDINGS AND POLICY IMPLICATIONS

The findings presented above clearly indicate that a scenario that seeks to build people's resilience to drought through a mixture of activities that build income and assets is significantly more cost effective than continuing to provide an emergency response.

This finding is amplified by evidence on the impact of a more proactive approach to drought risk management. The analysis presented here was able to account for the cost of meeting people's immediate needs, as well as the impact on household income and livestock (measured as 'avoided losses'). However, the estimated savings are likely to be very conservative, as evidence globally is clear that investing in the types of activities that can allow people to cope in crisis times can also bring much wider gains in 'normal' times, and these gains would substantially increase the economic case for a proactive investment.

Investment in shock responsive and adaptive management approaches that can respond to the particular context and changing circumstances of households should help to realize outcomes most effectively. The analysis presented here makes the case for greater investment in resilience building, by demonstrating that initiatives to increase household income in advance of a crisis or shock are more cost effective than waiting and responding to a humanitarian need. However, this increase in income can be achieved by a variety of combinations of interventions. Further work is required to monitor the impact, and cost effectiveness, of packages of resilience building interventions. Even more so, a much broader perspective on adaptive investment that can respond to the multiple and changing needs of households and communities may be required to truly address resilience in an effective and sustained manner.

Intervening early to respond to spikes in need – i.e. before negative coping strategies are employed - can deliver significant gains and should be prioritized.

While building resilience is the most cost effective option, there will always be spikes in humanitarian need, and having the systems in place to respond early when crises do arise will be critical, and result in substantial cost savings.

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1 INTRODUCTION

1.1 OVERVIEW OF THE STUDY

The aim of this study is to investigate the impact of an early humanitarian response and resilience building on humanitarian outcomes, both in terms of cost savings, as well as the avoided losses that can result from a more proactive response.

The study investigates the evidence for four broad scenarios. The late humanitarian response scenario is the counterfactual. The early response, safety net, and resilience scenarios build on each other from one scenario to the next, layering in additional changes with each scenario:

- **LATE HUMANITARIAN RESPONSE (COUNTERFACTUAL):** This scenario estimates the cost of response and associated losses of a humanitarian response that arrives after negative coping strategies have been employed and after prices of food and other items have begun to destabilize.

- **EARLY HUMANITARIAN RESPONSE:** This scenario estimates the cost of response, as well as the reduction in humanitarian need and avoided losses, as a result of an earlier response. This response is assumed to occur before negative coping strategies have been employed, and before prices of food and other items have destabilized, thereby reducing household deficits and avoiding some income and livestock losses.

- **SAFETY NET:** This scenario integrates a safety net transfer into the early humanitarian response scenario. An increase in income, equivalent to the value of existing safety net transfers, is provided to all very poor and poor households in every year of the model. Combined with the effects of the early response, this transfer can be used to fill household deficits and reduce income and livestock losses even further.

- **RESILIENCE:** This scenario incorporates an additional increase in household income, on top of the safety net transfer, as a result of resilience building. This scenario is defined by the outcome – namely an increase in income - as a result of investment in resilience building; it does not specify the activities that lead to this change, or the resilience capacities (i.e. sources of resilience) that enable this outcome to be sustained over time in the face of shocks and stresses.

This report presents the analysis for Somalia. It is complemented by reports for Ethiopia and Kenya, as well as a summary report for all three countries. The full set of reports can be found here.

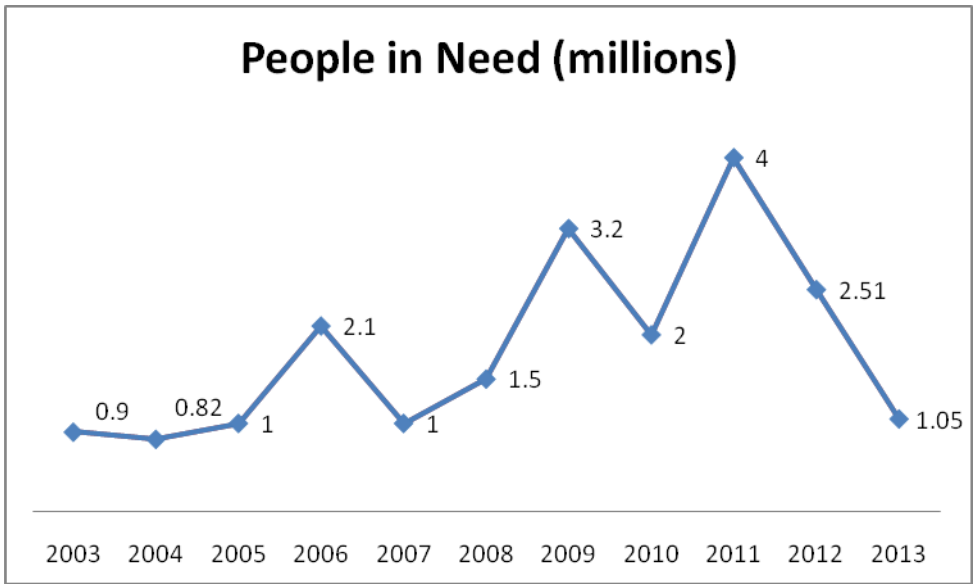
1.2 DROUGHT IN SOMALIA

The Horn of Africa is dominated by arid and semi-arid lands (ASALs). These areas are characterized by low and irregular rainfall as well as periodic droughts. The droughts can vary in intensity, but the region is no stranger to devastating conditions brought on by weather, conflict, government neglect or a combination of each. Between 1900 and 2011, more than 18 famine periods were registered in the region's history.[1] In 1985 a highly destructive drought in the area killed nearly 1 million people and in the last decade major droughts have occurred in 2001, 2003, 2005/06, 2008/09 and 2011, and 2015/2016.

Somalia is chronically food insecure, as a result of a complex web of factors, including not only drought and a heavy reliance on rainfall fed agriculture and pastoralism, but also conflict and a lack of services. The 2011 drought in the region resulted in famine in Somalia, with a heavy death toll. While steady rainfall and a massive increase in humanitarian assistance have returned the country to a more stable state, the 2017 drought has resulted in a return to near-famine conditions.

Demographic data estimates a caseload of approximately one million chronically vulnerable people in south Somalia. These communities are highly susceptible to the most minor shock or change in their situation as a result of the erosion of coping mechanisms over two decades of conflict and climate variation. In a normal season, assets can be sufficiently husbanded to ensure a degree of household subsistence, however, when this delicate equilibrium is threatened, through a delay or reduction in the rains, the risk of widespread food insecurity precipitating drought and famine is heightened.[2]

Figure 1: People in Need of Humanitarian Assistance



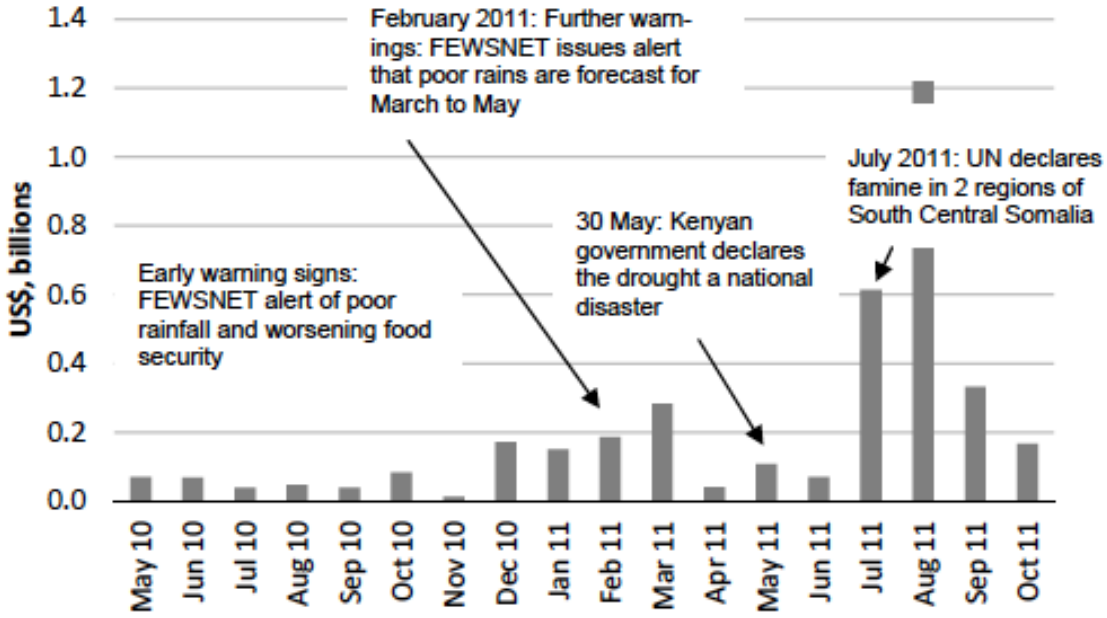
Source: DFID, "Somalia Humanitarian Business Case, 2013-2017

[1] HTTP://WWW.GLOBALHUMANITARIANASSISTANCE.ORG/WP-CONTENT/UPLOADS/2011/07/GHA-FOOD-SECURITY-HORN-AFRICA-JULY-20111.PDF

[2] DFID, "SOMALIA HUMANITARIAN BUSINESS CASE, 2013-2017

During the 2006 drought, despite warnings that came as early as July 2005, substantial interventions did not start until February 2006. Additionally, during the recent 2011 drought, early warnings of poor rainfall were noted as early as May 2010. In February of 2011, the Famine Early Warning Systems Network (FEWSNET) issued a further warning that poor rains were forecasted for March to May. However, as Figure 2 shows, humanitarian funding did not increase significantly until the UN declared a famine in Somalia in July 2011. At this point, thousands had already suffered.

Figure 2: Humanitarian Funding for Ethiopia, Somalia and Kenya, 2010/2011[3]



1.3 STRUCTURE OF THIS REPORT

This report is structured as follows:

- Section 2 presents details on the overall approach to the analysis.
- Section 3 presents the findings from modelling across 15 livelihood zones representing a population of approximately 3.4 million people.
- Section 4 presents a discussion of the key findings and policy implications.
- Annex A summarizes an overview of empirical evidence on the impact of early response and resilience on humanitarian and longer term outcomes in Somalia.
- Annex B contains full details of the HEA modelling and underlying assumptions.

[3] SAVE THE CHILDREN, OXFAM (2012). "A DANGEROUS DELAY: THE COST OF LATE RESPONSE TO EARLY WARNING IN THE 2011 DROUGHT IN THE HORN OF AFRICA". DATA TAKEN FROM OCHA FINANCIAL TRACKING SERVICE (FTS)

2 OVERALL APPROACH AND METHODOLOGY

2.1 OVERVIEW

Review of Existing Evidence

A review of empirical evidence was conducted to identify any completed or ongoing data collection that specifically aims to understand the impact of early intervention and resilience building on outcomes in a crisis. It was not within the scope of this study to conduct new primary data collection. Further, understanding the shifts in outcomes in different disaster contexts requires the collection of longitudinal data over multiple years to observe change, and a multi-year study was outside of the scope of this study. Therefore, the aim was to investigate whether other ongoing data collection efforts are able to identify the impacts of a more proactive response.

We also reviewed the literature to look for any studies that have already sought to understand the impact of an early response and/or resilience building, specifically on humanitarian outcomes. This review is presented in Annex A.

Modelling the Economics of Resilience

The second part of the analysis used the available empirical evidence, combined with the Household Economy Approach (HEA), to build an economic model that estimates the cost effectiveness of an earlier response.

The empirical evidence provides a useful snapshot in time of the potential impact of investments on food security and other outcomes. However, we also know that the impacts on households are complex and interrelated, with spikes in need arising from a combination of physical changes to rainfall, fodder and vegetation, price changes in local markets, as well as other factors such as the quality of institutional response and conflict, for example. Further, high impacts in one year can have strong effects on the ability of households to cope in subsequent years.

It is very hard to measure this complex web of interactions and outcomes empirically. Hence, this part of the analysis uses the Household Economy Approach (HEA), underpinned by empirical data where relevant, to model the potential impact of different response scenarios over 15 years. The model is dynamic, allowing impacts in one year to carry forward into subsequent years, and gives a more nuanced understanding of how different interventions may affect humanitarian need over time as a result.

The methodology can be summarized as follows – each of these steps is described in greater detail below:

- The HEA model uses actual baseline data on household economies, combined with actual price, production and rainfall data for the last 15 years, to estimate the size of the household food deficit whenever there is a change in any of these three variables.

- The HEA model is first run assuming a late humanitarian response, at the point where prices have destabilized, and negative coping strategies have been engaged. The model is the run three more times, each time accounting for a different set of parameters for early response, a safety net transfer, and a resilience scenario.

- The HEA model provides estimates of the number of people with a food deficit and the size of that deficit for each of the 15 years modelled, for each of the four scenarios. This shows how humanitarian need changes with each scenario.

- The HEA model also generates estimates of total household income and average livestock holdings for each scenario. Differences in these outcomes from one scenario to the next are then used to measure avoided losses.

- The economic model then estimates the economic cost of each scenario. While humanitarian need is reduced under each successive scenario, this needs to be offset by the cost of providing the safety net transfer and resilience inputs, to determine the scenario that is most cost effective. Data on the cost of humanitarian response (differentiated depending on whether it is provided late or early), and the cost of safety net transfer/resilience programming, is combined with the HEA data on estimated deficits to create an economic model that estimates the total net cost of each scenario considered.

2.2 HOUSEHOLD ECONOMY ANALYSIS

2.2.1 OVERVIEW

HEA is a livelihoods-based framework for analyzing the way people obtain access to the things they need to survive and prosper. It was designed to help determine people's food and non-food needs, and identify appropriate means of assistance, whether related to short-term emergency needs or longer term development program planning and policy changes.

HEA is based on the principle that an analysis of local livelihoods and how people make ends meet is essential for a proper understanding of the impact – at household level – of hazards such as drought or conflict or market dislocation.

The objective of HEA-based analysis is to investigate the effects of external hazards and shocks (whether negative or positive) on future access to food and income. Three types of information are combined: (i) information on baseline access to food and income; (ii) information on hazard (i.e. factors affecting access to food/income, such as livestock production or market prices) and (iii) information on household level coping strategies (i.e. the strategies households can use to increase access to food or income when exposed to a hazard).

HEA Scenario Analysis compares conditions in the reference year to conditions in the current or modelled year, and assesses the impact of such changes on households' ability to meet a set of defined minimum survival and livelihoods protection requirements.

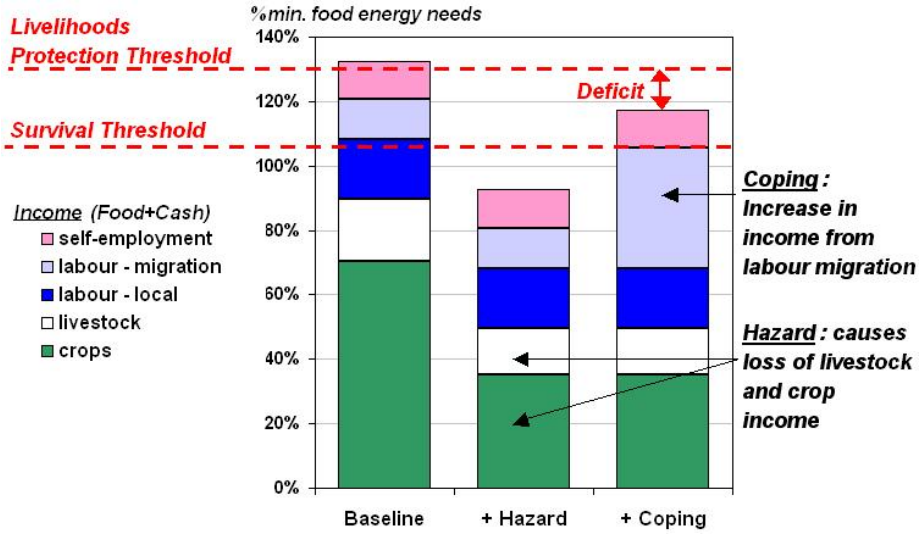
In HEA outcome analysis, projected 'total income' – or the sum of all food and cash income households secure, converted into a common unit or currency (either %kcals or cash) – is compared against two thresholds. These thresholds are defined on the basis of local patterns of expenditure, and in the case of the analysis presented here, the Livelihoods Protection Threshold (LPT) is used as the level required for households to be able to meet their own needs and not incur a deficit. Figure 3 shows the steps in an outcome analysis.

Figure 3: An Example of Outcome Analysis

First, the effects of the hazard on baseline sources of food and cash income are calculated (middle bar in the chart).

Then the effect of any coping strategies is added (right-hand bar).

Finally, the result is compared against the two thresholds to determine the size of any deficit.



Note: *This graphic shows changes in total income, i.e. food and cash income added together and, in this case, expressed in food terms.*

2.2.2 HEA ASSUMPTIONS

The HEA model uses actual rainfall and price data (adjusted for inflation) from 2000 to 2015 and is conducted for livelihood zones where baseline data has been collected[4] across a population of 3.4 million in 13 livelihood zones, four of which are agropastoral and 11 of which are pastoral.

The HEA model provides the following output by year, livelihood zone, and wealth group:

- Number of people with a food deficit and therefore in need of humanitarian assistance;
- The magnitude of the food deficit measured in Metric Tons (MT); and
- The total income and livestock value for the population modelled.

This data can then be used to estimate the number of people in need, and the size of that need, and how this deficit changes when the model considers different types of response.

The hypothesis is that early intervention reduces the amount of assistance that is required to fill household deficits. In other words, if you intervene early, you will not need to provide as much assistance as if you intervene late. The assumptions that underlie this hypothesis are described below. It should be noted that there is very little concrete data on these putative effects, and the early and late intervention scenarios are based primarily upon logical deduction, not field data.

Early intervention can also reduce the deficit in post-shock years, which is why it is important to run the analysis over a sequence of years, to assess the full effects of early versus late intervention. These carry-over effects are linked to reductions in the use of medium- and high-cost coping strategies in the 'shock' year[5].

In general terms, the main expected effects of early compared to late intervention are to:

- allow purchase of staple food earlier in the year, at lower prices than in the case of late intervention,
- reduce the use of certain types of coping (e.g. increased casual labor and self-employment[6])
- counter any decline in prices for livestock, labor and self-employment products.
- increase expenditure on crop and livestock inputs, with positive effects on next year's production.

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4 SOURCES OF BASELINE DATA ARE AS FOLLOWS: ADESO/ACTED/KASMODEV (WWW.ADESOAFRICA.ORG, WWW.ACTED.ORG, AND KASMODEV.COM), FSNAU/FEWS NET (WWW.FSNAU.ORG AND WWW.FEWS.NET)

5 NOTE: VERY HIGH COST COPING STRATEGIES, SUCH AS DISTRESS MIGRATION, SALE OF ALL ANIMALS OWNED, SALES OR MORTGAGING OF LAND, ARE GENERALLY EXCLUDED FROM AN HEA OUTCOME ANALYSIS. THIS IS BECAUSE THE OBJECTIVE OF THE ANALYSIS IS TO DETERMINE THE LEVEL OF DEFICIT BEFORE THESE STRATEGIES ARE USED, I.E. TO ESTIMATE THE AMOUNT OF ASSISTANCE THAT SHOULD BE PROVIDED TO PREVENT PEOPLE TURNING TO THESE DAMAGING STRATEGIES.

6 SELF-EMPLOYMENT INCLUDES ACTIVITIES SUCH AS FIREWOOD AND CHARCOAL COLLECTION, BRICK-MAKING, SMALL-SCALE PETTY TRADE AND CARPENTRY.

- increase expenditure on human health and food, increasing labor productivity compared to late intervention

In the case of resilience, the model considers a scenario where a safety net transfer is complemented by investments that increase household income by a set amount. Household incomes could be increased by a wide range of resilience interventions, as investments in health, education, income diversification, roads, markets, etc. ultimately all result in a change in household incomes, whether directly through improvements to household income, or indirectly through cost savings on health or other expenses. Any type of intervention that improves disposable income could be considered here and further work on the cost effectiveness analysis of different types of interventions will help to build this analysis.

Annex B contains a full description of the HEA assumptions and data used for this analysis.

2.3 ECONOMIC MODEL: DATA COMPONENTS

The following section describes each of the data components that underpin the economic model. Table 3, presented at the end of this section, summarizes these data for easy reference, and the findings are presented in Section 3. All figures are presented in 2015/2016 dollars.

2.3.1 COST OF HUMANITARIAN RESPONSE

The total cost of humanitarian response is measured by combining the total number of people with a food deficit (as predicted by the HEA model) with the unit cost of filling that deficit. Further, to reflect the fact that the size of the deficit varies between scenarios, the cost of humanitarian response is weighted by the relative magnitude of the overall deficit.

Number of people affected: HEA measures the total number of people with a food deficit for each year of the model.

Magnitude of the deficit: HEA also measures the magnitude of that deficit, measured in terms of the number of Metric Tons (MT) required per person to fill the food deficit. We refer to this as the MT weighting factor. This measure is very important, because it reflects the fact that while some people may still require assistance, the level of the assistance required may have decreased.

The overall model is built on the number of people facing a deficit, as this is how aid is normally delivered. However, to reflect the fact that there are substantial declines in the amount of aid required per person, we weight the total food aid required each year downwards according to the ratio of the deficit compared with the late response scenario (see Table 1). For example, the deficit decreases from an average of 42 Kilograms (KG) to 36 KG per person between the late and the early response scenarios. We therefore weight the cost of response under the early scenario downwards by a factor of 0.85 (the ratio of 42 to 36).

TABLE 1: FOOD DEFICIT, AVERAGE KG REQUIRED, PER PERSON PER YEAR	
	DEFICIT
Late	42.10
Early	35.91
Safety Net	35.85
Resilience Building	34.19

Unit Cost of Humanitarian Response: A typical food basket is made up of cereals, pulses and oil. The full cost is estimated using data from the UN World Food Programme (WFP) on the cost of commodity procurement, transport and storage, as well as all administrative and overhead costs. Data from WFP Somalia was not available. However, data from WFP Kenya was estimated in detail. Further, a recent analysis of the costs of Kenya and Somalia food aid provided evidence on the price differential between the two. Specifically, the document estimates that food aid in Somalia is between 2.7% and 7.5% more expensive than food aid in Kenya.[7] The Kenya estimates on the cost of humanitarian aid are inflated by 5% (using the midpoint of the figures cited above) to estimate the equivalent costs for Somalia.

It should be noted that approximately 65% of the emergency response in Somalia is comprised of cash, not in-kind food aid, and therefore the estimates presented here could be significantly less as cash is typically cheaper to deliver than food. Data on the cost of cash, and the cost of a comparable unit of food, were not available, and hence the analysis relies on the cost of food aid. It is also important to note that changing the cost of response using data on the cost of cash would affect the absolute number, but would not change the magnitude of change estimated between scenarios in this analysis.

As a result, the following assumptions are made:

- For a late response, cereals and pulses are purchased internationally at peak prices. The WFP cost estimates suggest a cost of US$833 per MT of food aid, or US$85 per person for a 6-month package of support using a full ration.
- For an early response, it is assumed that cereals, pulses and oil continue to be purchased internationally, but in advance when prices are optimized, estimated at US$802 per MT, or US$82 per person, equivalent to a 9 percent reduction in costs over a late response.

7 COFFEY INTERNATIONAL DEVELOPMENT (2011). "VALUE FOR MONEY IN HUMANITARIAN AID FOR KENYA AND SOMALIA." DFID KENYA AND SOMALIA. THE STUDY PROVIDES TWO ESTIMATES, THE FIRST OF WHICH RECORDS A COST OF US$880 PER MT FOR FOOD AID IN KENYA COMPARED WITH US$946 PER MT IN SOMALIA, EQUIVALENT TO A 7.5% INCREASE. THE SECOND ESTIMATES A COST OF US$889 PER MT IN KENYA, AND US$913 PER MT IN SOMALIA, OR A 2.7% INCREASE.

- The same set of assumptions is used for an early response using a safety net approach and for the resilience building scenarios. However, it should be noted the use of cash and local procurement could significantly reduce this cost further. The lack of data on the cost of cash versus in kind food aid limits our ability to incorporate this into the analysis.

TABLE 2: UNIT COST OF RESPONSE		
	COST PER MT	COST PP
Intl Purchase, peak	$833	$85
Intl Purchase, optimized	$802	$82

The cost of response is applied to the total number of people in need of assistance as modelled by the HEA.

Food aid is not the only component of a humanitarian response. Aid can also include malnutrition treatment, WASH, shelter and other items. In the latest Humanitarian Response Plan for Somalia, food aid is 50% of the total cost required,[8] and hence the figures presented here are doubled to represent the full cost of a humanitarian response.

2.3.2 COST OF PROGRAMMING

In the case of an early response, the model assumes that assistance arrives before market prices have increased, and before negative coping strategies have set in, and then estimates the resulting food deficit. As such there is not a specific additional cost associated with an early humanitarian intervention. However, in the case of the safety net and resilience building scenarios, specific interventions with additional associated costs are layered into the model.

Safety Net

Somalia does not have an established national safety net program, therefore data are lacking as to the likely transfer amount, and the cost of providing that transfer. However, anecdotal evidence[9] suggests that the amount is typically around US$30 per household per month, for anywhere between 6 and 12 months. Taking a mid-point estimate, the model assumes that a cash transfer of US$30 per household per month is made for 9 months, equivalent to a total transfer per household of US$270, or US$45 per person. Since the cost of food varies from one year to the next, the amount of food that can be purchased with the transfer varies from year to year, and is lower when prices are high. The model assumes that this transfer is made every year to all very poor and poor people, across all 15 years modelled.

8 SOMALIA, HUMANITARIAN RESPONSE PLAN REVISION, MAY 2017.

9 CONCERN WORLDWIDE (2017), "ADDED VALUE OF RESILIENCE PROGRAMMING TO THE ONGOING 2017 DROUGHT RESPONSE." PERSONAL COMMUNICATION, DUSTIN CANIGLIA, CONCERN WORLDWIDE.

Using data from the Kenya and Ethiopia studies with this series of reports, it is assumed that the administrative, monitoring and evaluation, and all associated costs are 16 percent of the total cost of providing a transfer. This data is used as a proxy for what it may cost in Somalia, and therefore the total cost of the transfer is US$313 (e.g. US$43 administrative costs; the remainder is the transfer itself). This estimate reflects the 5% cost inflation for Somalia already accounted for in the estimated direct cost of aid.

Impact of Resilience Building

A wide variety of measures can be used to build resilience to shocks and stresses. Critically, these investments are interdependent. For example, investment in income diversification or animal strengthening will not raise household incomes unless investment in markets and roads come alongside.

For the purposes of this analysis, we assess the impact of an increase in income on household outcomes. **We do not specify the type of intervention that could be used to achieve this increase in income.** Different interventions will have different and wide ranging impacts on the community, and the relative cost effectiveness of different interventions at achieving a certain level of income would be an important next step.

Rather, we look at what a specific increase in income will do to household deficits and longer term ability to cope with crises, and then we estimate the cost that will be required to achieve that increase in income based on existing intervention data.

For this analysis, the studies available were used to get an approximate idea of the cost of delivering an increase of US$135 income per household.[10] The most applicable study contained in the review of empirical evidence (Annex A) is the Concern analysis of a fodder production scheme, specifically in relation to the drought, that generated estimated returns of US$5.8:1. This estimate is in line with wider studies that measure the cost effectiveness of disaster risk related interventions. The other studies reviewed revealed much higher benefit to cost ratios, but in contexts that were less applicable (e.g. context specific, flooding). It follows that an increase of US$135 would require an investment of US$23 per household. It is assumed that this investment is made every three years, though it is likely that the benefits of this investment in year one could sustain benefits well beyond three years, and therefore this assumption is assumed to be conservative.

We follow a graduation-type model (see Figure 4), in which it is assumed that households will need to fulfill their food deficit, through a safety net or similar transfer, after which they can then begin to invest in productive activities. It is therefore assumed that the additional income is layered onto the safety net transfer. This is important, as graduation programming is believed to work best when consumption support – via a safety net transfer – underpins savings and skills training, allowing households to invest in more productive activities. These income gains may also result from decreased costs – for example through better health.

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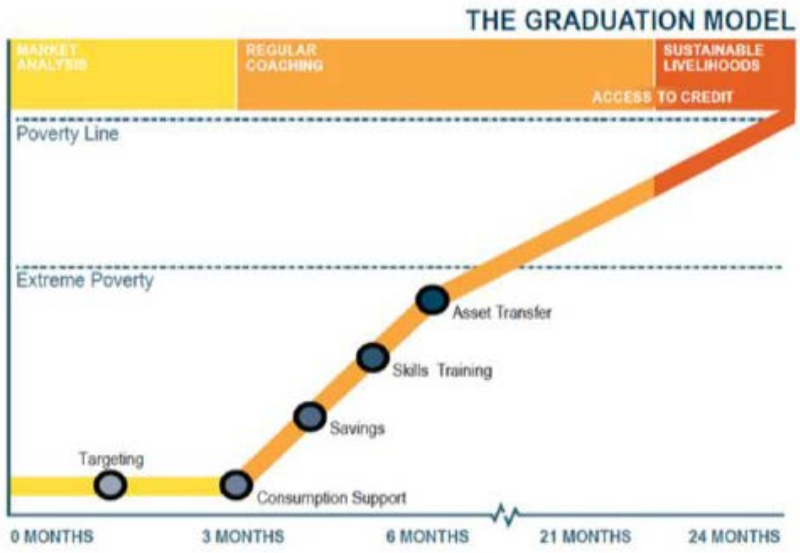
[10] THIS INCREASE EQUATES TO AN ADDITIONAL 50 PERCENT OF THE VALUE OF THE SAFETY NET TRANSFER. THE VALUE OF 50 PERCENT WAS SELECTED AS A HIGH ENOUGH AMOUNT TO MAKE A NOTICEABLE IMPACT ON HOUSEHOLD ECONOMIES WITHOUT BEING AN UNACHIEVABLE LEVEL OF INCREASE.

Figure 4: Graduation Model



2.3.3 AVOIDED LOSSES – INCOME AND LIVESTOCK

The HEA model estimates the change in income and the value of livestock holdings as a result of early humanitarian response.

Some of this income is used to maintain consumption, thereby reducing the food deficit. In order to avoid double counting with the reduction in humanitarian aid costs, the total increase in income as a result of an early/resilience scenario is reduced by the avoided cost of humanitarian aid. As a result, **the avoided losses to income only estimates the additional income as a result of early response that is surplus to the food deficit**. Along the same lines, the estimated cost of response also accounts for any surplus income.

Livestock values increase for a number of reasons as a result of an earlier response, based on a reduction in the number of animal deaths, as well as greater investment in animals to maintain their condition. The HEA estimates the change in livestock value under each of the four scenarios.

2.3.4 MULTIPLIER EFFECT ON THE LOCAL ECONOMY

The Ethiopia and Kenya studies account for the multiplier effect that a safety net transfer and/or increase in income can have on the local economy. However, similar evidence is not available for Somalia, and therefore any potential multiplier effect is left out of the analysis. Adding a multiplier effect would only strengthen the findings below.

2.4 LIMITATIONS TO THE ANALYSIS

Throughout the analysis, conservative assumptions have been used to ensure that the findings are representative but do not overstate the case for each of the scenarios considered. Therefore, it is likely that any changes to the assumptions will only strengthen the case for early investment and resilience building. The following limitations should be considered when reviewing the findings:

- The model does not account for population growth. Rather, it estimates the deficit for the full population modelled based on total population figures in 2015/2016 as reflected in the baseline data. Total net savings would increase as population increases.

- All analysis is based on actual price and rainfall data for the past 15 years. Studies indicate that drought occurrence and intensity is worsening as a result of climate change and other factors, and therefore it is possible that the deficits estimated here will worsen over time.

- It is very likely that investments in resilience will grow in their impact over time. In other words, if incomes increase by a certain amount in year one, some of this can be invested so that the income in the next year may have increased slightly, and so on. The model presented looks at an increase in income that is constant and does not account for any growth in that income.

- Conflict in Somalia intensifies the impacts of drought, but also can disrupt and undermine efforts to build resilience. The analysis accounts for the effects of conflict implicitly – e.g. conflict will be reflected in increased prices which are an input to the model. However, the model is unable to account for all impacts of conflict and this should be considered when reviewing the findings.

- Along similar lines, the livelihood zones modeled for this analysis are entirely in rural populations. Urban vulnerability, especially in relation to displacement within Somalia, is a significant issue. There are over one million internally displaced people (IDPs) in Somalia and the majority are in urban centers.[11] The costs of displacement – both direct and indirect – are likely to be significant, and avoiding some of these costs through earlier response and better resilience building would only add to the analysis.

[11] HTTP://WWW.INTERNAL-DISPLACEMENT.ORG/COUNTRIES/SOMALIA

TABLE 3: SUMMARY OF SCENARIOS AND ASSUMPTIONS		
SCENARIO	DESCRIPTION	ASSUMPTIONS
Late humanitarian response	Used as the counterfactual, HEA is used to estimate the cost of response of a typical humanitarian response that arrives once a crisis has been declared. The number of people with a food deficit, and hence requiring humanitarian assistance, is combined with the cost of response, to estimate the total cost.	Number of people with a deficit: Modelled by HEA Unit cost of aid: $833 per Metric Ton (MT); $85 per person
Early humanitarian response	The total number of people requiring a transfer, as well as the magnitude of the deficit, is reduced, as a result of stabilized food prices, as well as the ability of households to maintain productive activities such as wage labor. These data are combined with the cost of response based on optimized food prices, to estimate the total cost of humanitarian response. The HEA is also used to estimate the avoided income and livestock value losses as a result of an earlier response.	Number of people with a deficit: Modelled by HEA Unit cost of aid: $802 per Metric Ton (MT); $82 per person Deficit Weighting: Cost of humanitarian aid revised downwards based on decrease in food deficit modelled by HEA: All LZs – 0.85. Avoided Losses: Increase in income and livestock value as modelled in HEA
A safety net only response	This scenario assumes that a safety net transfer for consumption support is used to help prevent a food deficit. In some years, the total amount of consumption support transferred to households exceeds the food deficit, and therefore it is assumed that the difference is surplus income that could be used for productive and other purposes. This surplus is deducted from the total cost of response under this scenario.	Number of people with a deficit: Modelled by HEA Unit cost of aid: $802 per Metric Ton (MT); $82 per person Deficit Weighting: Cost of humanitarian aid revised downwards based on decrease in food deficit modelled by HEA: All LZs – 0.85. Cost of Transfer Program: $313 per household ($45 per person, or $270 per household transfer amount plus 16% admin and overhead costs). Avoided Losses: Increase in income and livestock value as modelled in HEA
Resilience Building (Safety Net + Other Resilience Strengthening Activities)	This scenario assumes that investments in resilience building increase household income by an amount that is additional to the safety net transfer.	Number of people with a deficit: Modelled by HEA Unit cost of aid: $802 per Metric Ton (MT); $82 per person Deficit Weighting: Cost of humanitarian aid revised downwards based on decrease in food deficit modelled by HEA: All LZs – 0.81. Cost of Transfer Program: $313 per household ($270 transfer plus 16% admin and overhead costs). Cost of resilience program: $23 per person (based on return of 5.8:1) Avoided Losses: Increase in income and livestock value as modelled in HEA

3 COST COMPARISON OF DROUGHT RESPONSE

The following sections summarize the findings from the modelling for Somalia, across a modelled population of approximately 3.4 million people.

The costs and benefits of each scenario are modelled over 15 years, using a discount rate of 10%. Discounting is used to reduce the value of a stream of costs and benefits over time, back to their present value to allow comparability, particularly where a large up-front investment cost may be required that yields benefits over many years to come. However, in this model costs and benefits are distributed proportionally across time. Therefore, if a discount rate were not applied, the percentage change between scenarios would be similar; in other words, if the cost of an early response was 20% less than the cost of a late response, this would hold true whether or not discounting was applied. However, the absolute net cost of each scenario would be significantly higher without discounting; in other words, if the discounted net cost of a scenario is US$400 million, the undiscounted cost might be double this.

Four estimates are presented for each of the four scenarios:

- **Total Net Cost:** This estimate sums together the cost of humanitarian response and the cost of programming (e.g. safety net and resilience) for each of the scenarios. In this estimate, a uniform increase in income is assumed for all very poor and poor households (safety net and resilience scenarios). As a result, in many cases the transfer amount is more than households require to fill their food deficit, and therefore this scenario can look more expensive, but is the more accurate representation of the full cost to donors. This figure represents the total net cost over 15 years.

- **Total Net Cost, adjusted:** This estimate adjusts for the transfer amount that is additional to household deficits. The surplus income that arises as a result of the safety net and resilience building interventions is added in as a benefit, to account for the fact that this amount is not only a cost to a donor, but also a benefit for those households. This estimate is conservative, as it assumes that every $1 transferred is a $1 benefit to the household; it is highly likely that the benefit to the household would be greater than the actual transfer amount. This figure presents the total net cost, adjusted for surplus income, over 15 years.

- **Total Net Cost with Benefits:** This estimate sums together the costs of humanitarian aid, cost of programming, as well as the avoided income and livestock losses estimated by the model. As a result, this estimate represents a more complete picture of both the costs to donors as well as the benefits to households. This figure represents the total net cost with benefits over 15 years.

- **Average Net Cost with Benefits per Year:** This estimate averages the previous figure over 15 years, to give an average cost per year.

3.1 SUMMATIVE FINDINGS

Key Findings - Early Humanitarian Response:

- An early humanitarian response would save an estimated US$220 million in humanitarian aid costs over a 15-year period on the cost of humanitarian response alone.
- When avoided losses are incorporated, an early humanitarian response could save US$460 million, or an average of US$31 million per year.

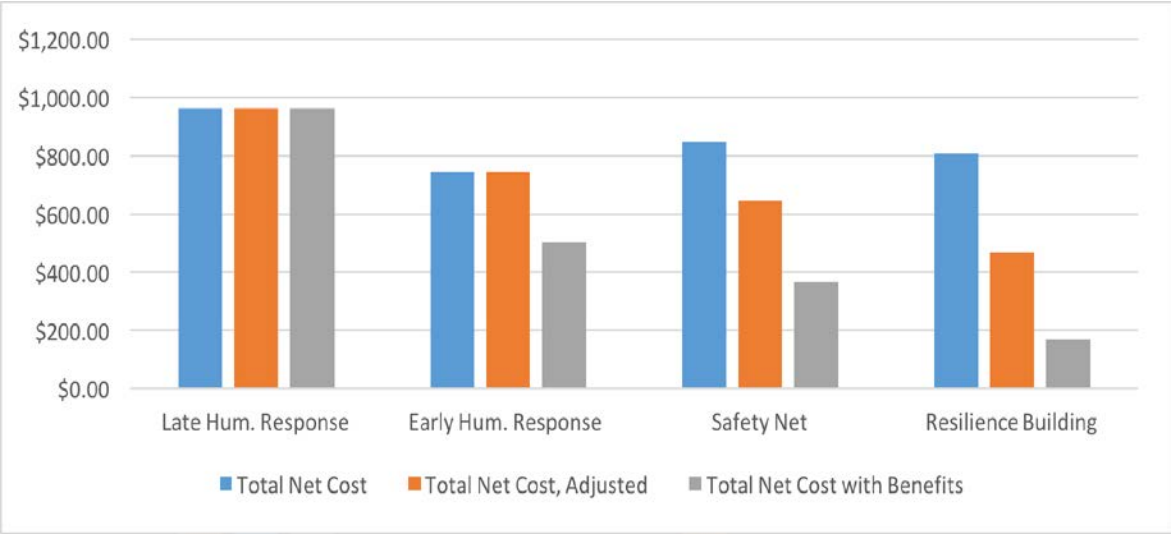
Key Findings – Safety Net:

- Safety net programming at a transfer level of US$270 per household reduces the net cost of humanitarian response, saving an estimated US$115 million over 15 years over the cost of a late response. When this figure is adjusted to account for the benefits of the transfer beyond filling the food deficit, a safety net scenario saves US$318 million over the cost of a late response.
- When avoided losses are incorporated, a safety net transfer could save US$595 million, or an average of US$40 million per year.

Key Findings – Resilience Building:

- Safety net programming at a transfer level of US$270 per household, plus an increase in income of an additional US$135 per household, reduces the net cost of humanitarian response by an estimated US$155 million over 15 years over the cost of a late response. When this figure is adjusted to account for the benefits of the transfer beyond filling the food deficit, a resilience scenario saves US$494 million over the cost of a late response.
- When avoided losses are incorporated, a resilience building scenario could save US$794 million, or an average of US$53 million per year.

Figure 5: Total Net Cost of Response, Somalia, US$ Million



Investing in early response and resilience measures yields benefits of US$2.8 for every US$1 invested. When the costs of investing in early response and resilience are offset against the benefits (avoided humanitarian aid and avoided income and livestock losses), the benefits exceed the costs by US$2.8 for every US$1 spent.

Total U.S. Government (USG) expenditures on emergency food aid in Somalia for the years 2001 to 2016 equated to US$951 million. **Applying the same ratios as estimated in this analysis of savings to total USG spend, the USG could have saved US$153 million over 15 years, a savings of 16 percent of total emergency spend.** These are estimated direct cost savings by investing in resilience building measures, net of the cost of implementing a resilience building package of interventions. **Incorporating the avoided losses to households, the model estimates net savings of US$784 million.**

TABLE 4: SUMMARY OF COSTS, SOMALIA, USD MILLION

INTERVENTIONS	LATE HUM. RESPONSE	EARLY HUM. RESPONSE	SAFETY NET	RESILIENCE BUILDING
Total Net Cost, 15 years	$963.1	$742.6	$848.3	$807.9
Savings		*$220.4*	*$114.8*	*$155.1*
Total Net Cost, adjusted, 15 years	$963.1	$742.6	$644.7	$469.0
Savings		*$220.4*	*$318.4*	*$494.1*
Total Net Cost with Benefits, 15 years	$963.1	$503.1	$367.9	$169.4
Savings		*$460.0*	*$595.2*	*$793.7*
Average Net Cost with Benefits per year	$64.2	$33.5	$24.5	$11.3
Savings		*$30.7*	*$40.0*	*$52.9*

The benefits of early humanitarian action and resilience building can be measured against the costs. For this analysis, three Benefit to Cost Ratios (BCRs) are provided.

- (1): The costs of investment (safety net transfer, resilience interventions) are offset against the benefits, measured in terms of the avoided costs of humanitarian aid. A BCR above one indicates that the avoided cost of aid required to fill the humanitarian deficit is greater than the additional cost of safety net/resilience programming.
- (2): This figure is adjusted to account for the benefit of any transfer to households that is above their food deficit.

- (3): The cost of investment is offset against the avoided cost of humanitarian aid as well as the avoided income and asset losses.

TABLE 5: BCRS, SOMALIA			
	BCR: AVOIDED COST OF AID (1)	BCR: AVOIDED COST OF AID, ADJUSTED (2)	BCR: AVOIDED COST OF AID + AVOIDED LOSSES (3)
SAFETY NET	1.30	1.83	2.56
RESILIENCE BUILDING	1.40	2.26	3.03

These findings are modelled for a rural population of 3.4 million. The total rural population in Somalia is 6.2 million[12]. Clearly, different regions are impacted differently depending on their specific characteristics, and some regions will fare better than others. However, as a rough indication of the magnitude of impact, **we can estimate that the savings from resilience building will be two times those represented here when calculated for the whole of rural Somalia.**

3.1.1 ANALYSIS BY LIVELIHOOD GROUP AND REGION

The analysis presented above aggregates the data across a range of livelihood zones and regions. While this aggregate gives a useful estimate for the value for money of different scenarios for the country, it is also useful to look more closely at the different livelihood groups and regions.

The HEA analysis is presented below for the North/Central Pastoral livelihood groups, for the South Pastoral, and for the South Agro-Pastoral. Each of the graphs is presented for the poor wealth group, under a late intervention scenario to give an indication of baseline conditions.

Figure 6 shows the household economy for the North/Central pastoralists, and indicates that in most years, poor households are able to maintain their household economies without a deficit; 2008 is the main exception.

The South Pastoral group, however, shows a very different story (Figure 7). Households struggle to meet their livelihoods protection threshold much more frequently, with severe drops in both 2005/06 and 2011. Even more so, the South Agro-Pastoral households show severe deficits in the majority of years, with the 2000, 2005/05 and 2010/11 events clearly showing (Figure 8).

The implication is that the Southern groups require a layering of consumption support to underpin any productive activities, as they are struggling to meet their basic household needs on a regular basis. By contrast, the Northern/Central groups appear to be further along the graduation pathway and may be more able to invest in productive activities.

[12] UNFPA 2014 POPULATION ESTIMATE PLUS 2.8% ANNUAL GROWTH TO ARRIVE AT THE 2015 POPULATION

Figure 6: Household Economy Modelling for North/Central Pastoral Livelihood Zones

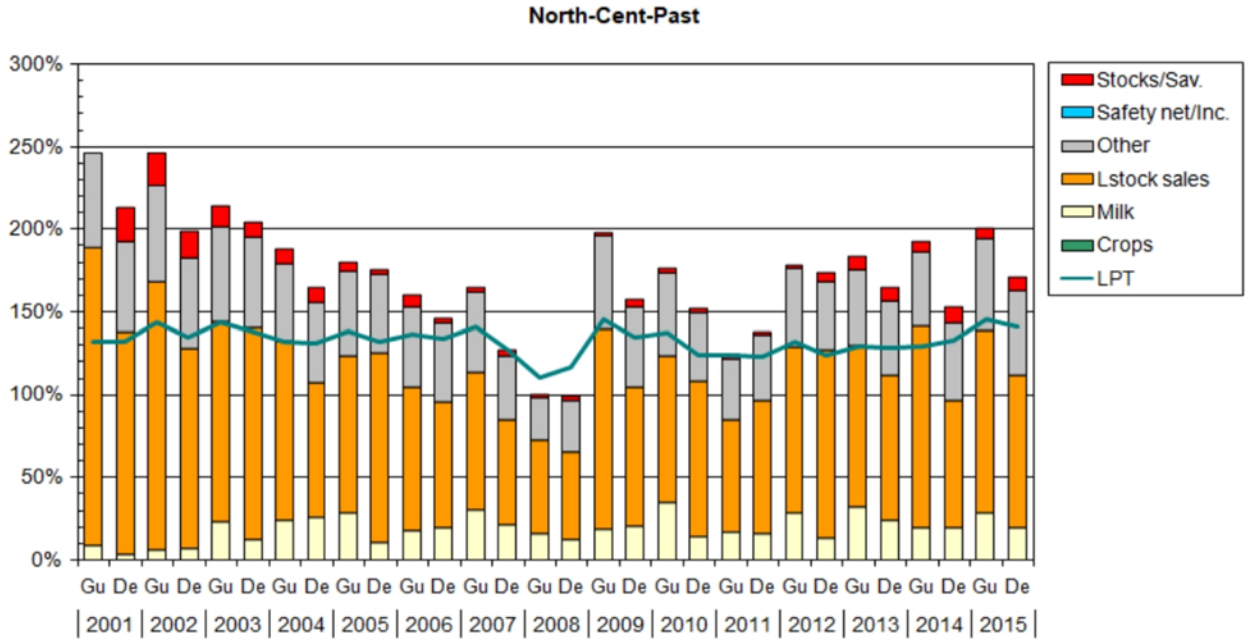


Figure 7: Household Economy Modelling for South Pastoral Livelihood Zones

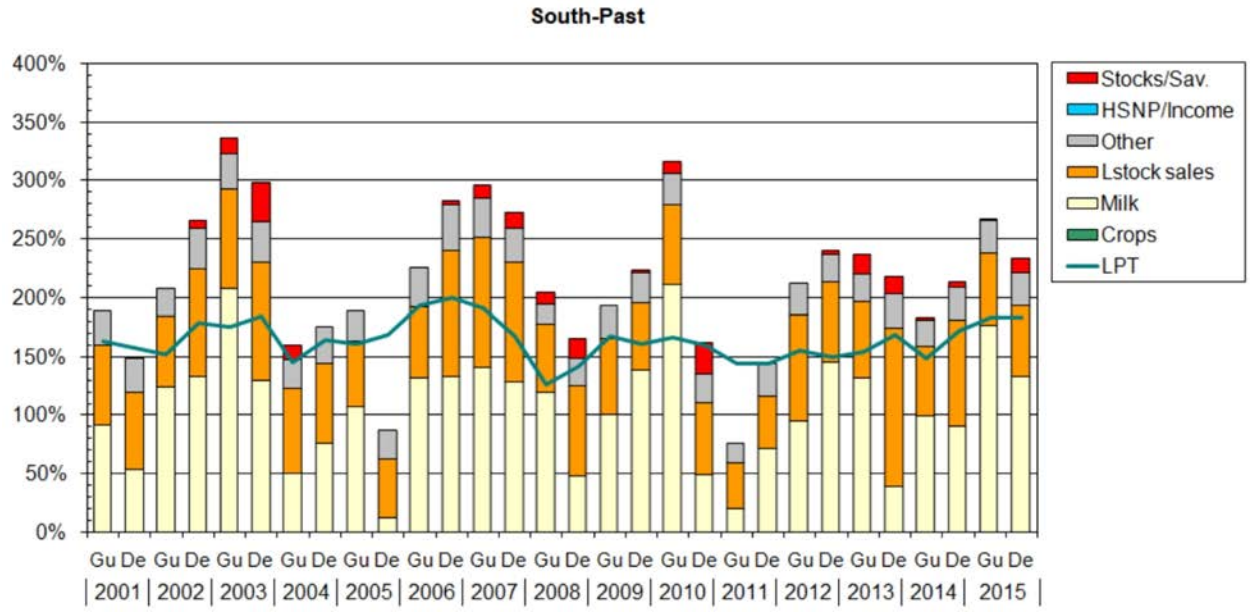
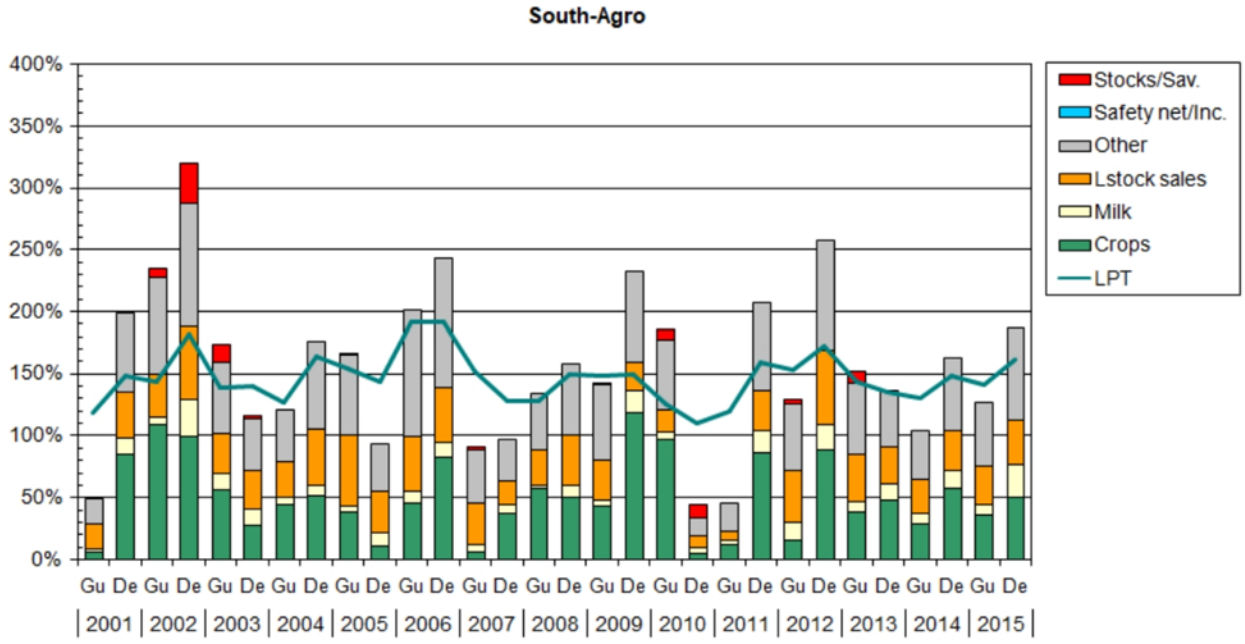


Figure 8: Household Economy Modelling for South Agro-Pastoral Livelihood Zones



4 DISCUSSION OF FINDINGS AND POLICY IMPLICATIONS

The findings presented above clearly indicate that a scenario that seeks to build people's resilience to drought through a mixture of activities that build income and assets is significantly more cost effective than continuing to provide an emergency response.

Interventions that build people's resilience, as modelled here through an increase in household income of US$405 per household per year, is far more cost effective than meeting household needs in a crisis. This increase in income can be achieved in numerous ways, and will require a package of complementary interventions that can sustain this income over the longer term.

Importantly, these investments are proactive and do not require triggering by a specific threshold. Resilience building can include a whole range of interventions that should complement each other and work together to maximize effectiveness. Further analysis on the cost effectiveness, and strong monitoring of the impact of different packages, should be a priority moving forward.

This does not suggest that an emergency response is not, or will never be, needed. In fact, the model includes the cost of responding with humanitarian aid to spikes in need that push people beyond their ability to cope on their own. However, it does clearly indicate that investing in drought resilience saves money and should be the priority

The finding that resilience building is most cost effective is amplified by evidence on the impact of a more proactive approach to drought risk management.

The analysis presented was able to account for the cost of meeting people's immediate needs, as well as the impact on household income and livestock (measured as 'avoided losses'). However, the estimated savings are likely to be very conservative. Firstly, the analysis has not accounted for all avoided losses – most notably loss of life. The 2011 famine in Somalia killed nearly 260,000 people[13], and the economic and social costs of lost life cannot be underestimated. Further, global evidence is clear that investing in the types of activities that can allow people to cope in crisis times can also bring much wider gains in 'normal' times, and these gains would substantially increase the economic case for a proactive investment. For example:

- A World Bank review of social safety nets globally finds that the benefits of regular cash transfers extend well beyond the immediate positive impacts. Studies confirm the positive and significant impacts of cash transfers on school enrollment and attendance; increased live births in safer facilities; improved prenatal and postnatal care; and regular growth monitoring of children during critically important early ages. All of these impacts would help to reduce household expenditure and/or improve lifetime earnings.[14]

- The World Health Organization (WHO) has quantified the return on investment for WASH investments globally, and found that for every US$1 invested, benefits of US$4.3 are generated. These benefits arise as a result of a reduction in adverse health effects and time saving.15

- A study for the Copenhagen Consensus evaluated the impact of schooling, and found that the median increase in earnings averages 8-10 percent per added year of schooling.16

- Further to this, the social impacts of minimizing the effects of a crisis are substantial. Avoided distress, childhood marriage, migration, and conflict can also have very significant effects on those affected.

Investment in shock responsive and adaptive management approaches that can respond to the particular context and changing circumstances of households should help to realize outcomes most effectively.

The analysis presented here makes the case for greater investment in resilience building, by demonstrating that initiatives to increase household income in advance of a crisis or shock are more cost effective than waiting and responding to a humanitarian need. However, this increase in income can be achieved by a variety of combinations of interventions. Further work is required to monitor the impact, and cost effectiveness, of packages of resilience building interventions.

Even more so, a much broader perspective on adaptive investment that can respond to the multiple and changing needs of households and communities may be required to truly address resilience in an effective and sustained manner.

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13 HTTP://WWW.UN.ORG/APPS/NEWS/STORY.ASP?NEWSID=44811#.WED60IZRY1G

14 WORLD BANK. 2015. THE STATE OF SOCIAL SAFETY NETS 2015. WASHINGTON, DC: WORLD BANK.

15 HUTTON, G (2012). "GLOBAL COSTS AND BENEFITS OF DRINKING-WATER SUPPLY AND SANITATION INTERVENTIONS TO REACH THE MDG TARGET AND UNIVERSAL COVERAGE." WORLD HEALTH ORGANIZATION

16 ORAZEM, P, P GLEWWE, H PATRINOS (2009). "LOWERING THE PRICE OF SCHOOLING". COPENHAGEN CONSENSUS BEST PRACTICE PAPER

The findings also raise some tough questions around what 'building resilience' might look like for different populations. Providing significant investment in a chronically poor context still may not lift households to a point where they can cope on their own without compromising their welfare. Building systems to allow for people to maximize their productive potential won't work in all contexts, for example where household land holdings are so small that self-sufficiency is simply not possible, no matter how productive that piece of land.

Intervening early to respond to spikes in need – i.e. before negative coping strategies are employed - can deliver significant gains and should be prioritized.

While building resilience is the most cost effective option, there will always be spikes in humanitarian need, and having the systems in place to respond early when crises do arise will be critical. The model estimates that cost savings alone could result in total savings of US$220 million over the 15 years, or approximately US$15 million per year.

While cost savings due to early procurement make up a substantial part of the savings, the avoided losses – both income and livestock – account for the majority of savings. These avoided losses are generated in the model as a result of intervention taking place before negative coping strategies are employed, and would result in an estimated savings of US$460 million.