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# ECONOMICS OF RESILIENCE TO DROUGHT KENYA 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
CSG	County Steering Group
CSI	Coping Strategies Index
CT-OVC	Cash Transfer for Orphans and Vulnerable Children
DFID	Department for International Development (UK)
EDE	Ending Drought Emergencies
FAO	Food and Agriculture Organization
FCI	Fodder Condition Index
FEWSNET	Famine Early Warning Systems Network
GAM	Global Acute Malnutrition
GD	GiveDirectly
GDP	Gross Domestic Product
GoK	Government of Kenya
HEA	Household Economy Approach
HSNP	Hunger Safety Net Program
IBLI	Index Based Livestock Insurance
KES	Kenyan Shillings
KFSM	Kenya Food Security Meeting
KG	Kilogram
LPT	Livelihood Protection Threshold
MT	Metric Tons
MUAC	Mid/Upper Arm Circumference

NDMA	National Drought Management Authority
PREG	Partnership for Resilience and Economic Growth
RCT	Randomized Control Trial
REAP	Rural Entrepreneur Access Project
StC	Save the Children
ToT	Terms of Trade
USG	United States Government
VfM	Value for Money
VSLA	Village Savings and Loans
WASH	Water, sanitation and hygiene

## 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 Turkana and Northeast Kenya, 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 potential impacts using the Household Economy Approach (HEA).

### EMPIRICAL EVIDENCE

The National Drought Management Authority (NDMA) collects monthly data from sentinel sites across the Arid and Semi-Arid Lands (ASALs) of Kenya (equivalent to 23 counties). The data shows changing trends in malnutrition data (specifically measured using Mid/Upper Arm Circumference, or MUAC) as compared with fodder condition. **Whereas MUAC is historically strongly correlated with fodder, that pattern seems to break in 2013, with MUAC holding even though fodder declined significantly.** These findings seem to also be echoed in the nutrition data from the SMART surveys, which offer a more robust sample of weight for height measures. While it is not possible to attribute these findings to any particular set of interventions, and indeed further analysis is required to deepen an understanding of this data, it is interesting that the evidence began to shift in 2013, coinciding with significant investment into the ASALs.

### MODELED EVIDENCE

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 million across 11 livelihood zones in Turkana and North East counties. 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\$381 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\$782 million, or an average of US\$52 million per year.**
- Safety net programming at a transfer level of US\$300 per household reduces the net cost of humanitarian response, saving an estimated US\$181 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\$433m over the cost of a late response. When avoided losses are incorporated, **a safety net transfer could save US\$962 million, or an average of US\$64 million per year.**
- A resilience building scenario that results in an increase in income of US\$450 per household reduces the net cost of humanitarian response by an estimated US\$273 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\$693 million over the cost of a late response. When avoided losses are incorporated, **resilience building could save US\$1.3 billion, or an average of US\$84 million per year.**
- **Investing in early response and resilience measures yields 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 Kenya, the USG could have saved US\$259 million over 15 years in direct cost savings, or 26% of the total cost of emergency aid. Incorporating the avoided losses to households, the model estimates net savings of US\$1.2 billion.**

Figure EI: Total Net Cost of Response, Kenya, US\$ Million

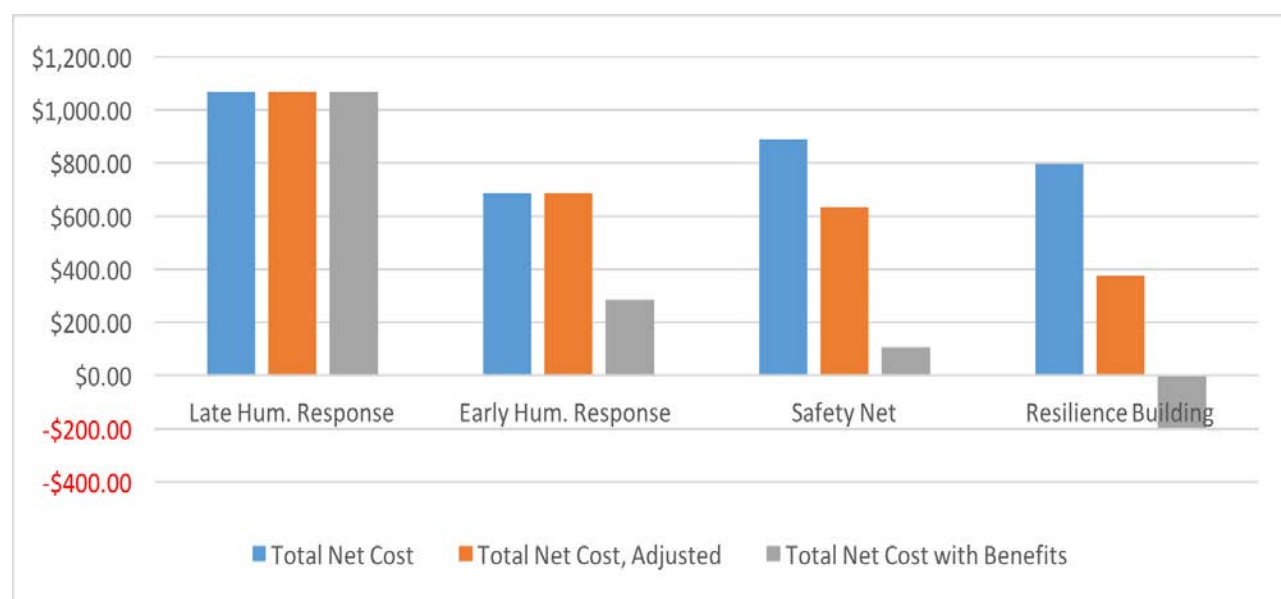


TABLE EI: SUMMARY OF COSTS, TURKANA AND NORTHEAST LIVELIHOOD ZONES, USD MILLION				
INTERVENTIONS	LATE HUM. RESPONSE	EARLY HUM. RESPONSE	SAFETY NET	RESILIENCE BUILDING
Total Net Cost, 15 years	\$1,068.3	\$687.1	\$887.5	\$795.8
<i>Savings</i>		\$381.2	\$180.8	\$272.5
Total Net Cost, adjusted, 15 years	\$1,068.3	\$687.1	\$635.2	\$375.2
<i>Savings</i>		\$381.2	\$433.1	\$693.1
Total Net Cost with Benefits, 15 years	\$1,068.3	\$286.8	\$106.4	-\$196.7
<i>Savings</i>		\$781.5	\$961.9	\$1,265.0
Average Net Cost with Benefits per year	\$71.2	\$19.1	\$7.1	-\$13.1
<i>Savings</i>		\$52.1	\$64.3	\$84.3

## 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.

**Reducing humanitarian impacts through greater resilience requires investment in complementary and layered approaches to build sustained change. Further, strengthening household resilience will require a mix of support for both consumption and production.**

**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. The NDMA monthly monitoring could potentially be used to monitor and map changes over time and track changes in ability to cope.

**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.



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# I INTRODUCTION

## I.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 under the HSNP, 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 Kenya. It is complemented by reports for Ethiopia and Somalia, as well as a summary report for all three countries. The full set of reports can be found [here](#).

## I.2 DROUGHT IN KENYA

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. In Kenya, over 80% of the land mass is defined as arid and semi-arid. North and eastern Kenya are particularly vulnerable to drought, with greater than a 40% annual probability of moderate to severe drought during the rainy season.<sup>1</sup>

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<sup>1</sup> HORN OF AFRICA NATURAL PROBABILITY AND RISK ANALYSIS, BARTEL AND MULLER, JUNE 2007.

TABLE 1: HISTORICAL COMPARISON OF DROUGHT EVENTS IN KENYA				
MAJOR DROUGHT EVENTS	GOK <sup>2</sup> AND INTERNATIONAL HUMANITARIAN AID RECEIVED (US\$)	NUMBER PEOPLE AFFECTED <sup>3</sup>	TOTAL POPULATION	% OF POPULATION AFFECTED
2011	427.4m	3.75m	41.4m	9.1%
2009	432.5m	3.79m	39.3m	9.6%
2006	197m	2.97m	36.3m	8.2%
2003/2004	219.1m	2.23m	34.4m	6.5%
1998-2001	287.5m	3.2m	31.9m	10.0%

In Kenya, the 1998-2000 drought was estimated to have had economic costs of US\$2.8 billion.<sup>4</sup> More drastically, the Post Disaster Needs Assessment for the extended 2008-2011 drought estimated the total damage and losses to the Kenyan economy at a staggering US\$12.1 billion.<sup>5</sup> By comparison, Kenya's Gross Domestic Product (GDP) was US\$71 billion in 2011.

In drought affected areas like the Horn of Africa, aid organizations have come to play a significant role in providing humanitarian response. While humanitarian aid can save lives, it has historically arrived late, well into the peak of a crisis. During the 2006 drought, despite warnings that came as early as July 2005, substantial interventions did not start until February 2006. Additionally, during the 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 1 shows, humanitarian funding did not increase significantly until the UN declared a famine in Somalia in July 2011.

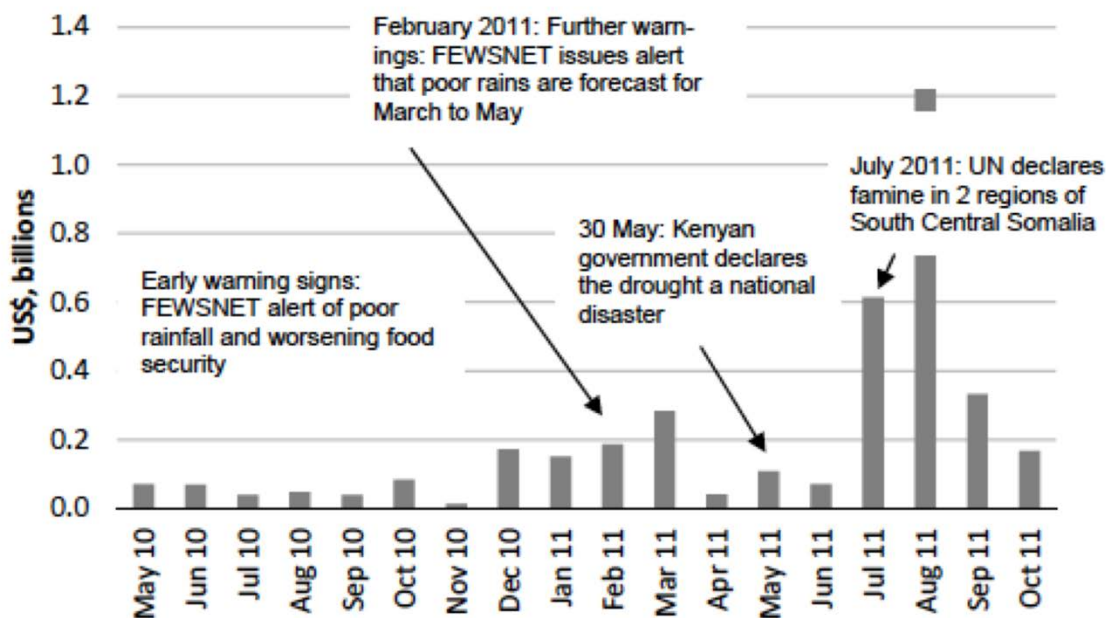
<sup>2</sup> GOVERNMENT OF KENYA

<sup>3</sup> BASED ON MAXIMUM NUMBERS ASSESSED FOR FOOD AID ASSISTANCE BY GOVERNMENT-LED KENYA FOOD SECURITY STEERING GROUP (KFSSG). DATA FROM MINISTRY OF NORTHERN KENYA.

<sup>4</sup> STOCKHOLM ENVIRONMENT INSTITUTE (2009), "ECONOMICS OF CLIMATE CHANGE: KENYA".

<sup>5</sup> REPUBLIC OF KENYA (2012) "KENYA POST DISASTER NEEDS ASSESSMENT (PDNA): 2008-2011 DROUGHT". WITH TECHNICAL SUPPORT FROM THE EUROPEAN UNION, UNITED NATIONS AND WORLD BANK.

Figure I: Humanitarian Funding for Ethiopia, Somalia and Kenya, 2010/2011<sup>6</sup>



In response, the Government of Kenya launched a Medium Term Plan for Drought Risk Management and Ending Drought Emergencies (EDE) for 2013-2017. The EDE strategy commits the government to end the worst of the suffering caused by drought by 2022, by strengthening the foundations for growth and development, and by strengthening the institutional and financing framework for drought risk management. The EDE is one part of a wider portfolio of reforms in the 2010 constitutional settlement that seeks to reverse the long-standing processes of marginalization in the drylands, which underpin current levels of vulnerability and risk. These reforms include, for example, the devolution of both funds and function to county level governments (started in 2013) and mechanisms such as the Equalization Fund, which has a primary objective to transfer funds solely for provision of basic services to marginalized areas.

Since droughts evolve slowly, their impacts can be monitored and reduced. The Government of Kenya (GoK) intends to eliminate the worst of these impacts by pursuing two simultaneous strategies. First, on an ongoing basis, and regardless of prevailing drought conditions, the GoK will take measures to strengthen people’s resilience to drought. These measures will be the responsibility of all sectors, since drought vulnerability is aggravated by deeper inequalities in access to public goods and services. Second, it will improve the monitoring of, and response to, emerging drought conditions in ways that harness the efforts of all actors – communities, the government and its development partners – in an effective and efficient manner.

<sup>6</sup> 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)

## Box 1: The Four Components of the Kenya Drought Management System

- A **drought early warning system** based on aggregated information from different sources ranging from field interviews to satellite imagery. Investment decisions must be guided by a serious and trusted drought information system, linked to the contingency financing mechanism, which all actors draw on to guide their response. This information system provides accurate warning as droughts evolve and uses evidence-based triggers to prompt appropriate and timely response at different stages of the drought cycle.
- A set of **county level contingency ('shelf') plans** for rapid reaction to early warning and changes in the warning stages. These cover the necessary interventions at each phase of a drought (normal, alert, alarm, emergency and recovery) together with a detailed budget for each activity.
- A **National Drought Emergency Fund** enabling rapid implementation of the contingency plans. The most critical issue in emergency response is timing and appropriateness. NDEF provides flexible resources that can be drawn on quickly and used to improve the timeliness and appropriateness of interventions.
- **Drought coordination and response structures:** The drought management structure at the national level includes the National Drought Management Authority (NDMA) and the Kenya Food Security Meeting (KFSM), whereas at the county level the coordinating role is discharged by the County Steering Group (CSG). The KFSM is an advisory group on all issues pertaining to drought and food security, while the CSGs are key components of the coordination of drought and early warning information at the county level. The NDMA is tasked with providing leadership on drought management, coordinating the work of all stakeholders implementing drought risk management activities, and ensuring delivery of the Ending Drought Emergency (EDE) strategy.

## Box 2: Early Warning Phases

- **Normal:** All *drought indicators show no unusual fluctuations* and remain within the expected ranges for the time of the year in a given livelihood zone, sub-county or county.
- **Alert:** *Environmental indicators show unusual fluctuations outside expected seasonal ranges* within the whole county/sub-county or livelihood zones. Proposed environmental indicators include remote sensed indicators measuring meteorological and agricultural drought, while hydrological drought is assessed using local informants.
- **Alarm:** Both *environmental and production indicators fluctuate outside expected seasonal ranges* affecting the local economy. This condition affects most parts of the county/sub-counties or specific livelihood zones and directly or indirectly threatens food security of vulnerable households. Production indicators include: milk production; livestock body condition; livestock mortality rate; pattern of livestock migration; actual planting date; area planted; estimated/actual harvest. If *access indicators* (impact on market, access to food and water) move outside the normal range, the status remains at “alarm” but with a worsening trend. Proposed access indicators include Terms of Trade (ToT), price of cereals, availability of cereals and legumes, and milk consumption. The trend will be further worsening when also welfare indicators (MUAC and Coping Strategies Index (CSI)) start moving outside the normal ranges.
- **Emergency:** *All indicators are outside of normal ranges*, local production systems have collapsed within the dominant economy. The emergency phase affects asset status and purchasing power to extent that seriously threatens food security. As a result, coping strategy index, malnutrition (MUAC) and livestock mortality rates move above emergency thresholds.
- **Recovery:** *Environmental indicators returning to seasonal norms*. In this phase local economies start recovering.

### 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 empirical evidence from longitudinal data collection in Kenya.
- Section 4 presents the findings from the HEA modeling for the northern counties, across a population of approximately 3 million people.
- Section 5 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 Kenya.
- Annex B contains full details of the HEA modeling and underlying assumptions.

## 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.

#### Modeling the Economics of Resilience

The second part of the analysis then uses the available empirical evidence, combined with the Household Economy Approach (HEA), to model the potential change in outcomes due to 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 HEA model is then combined with existing empirical evidence to create an economic model to estimate the total net cost of each scenario considered.

The methodology can be summarized as follows – each of these steps are 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 then 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

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)<sup>7</sup>.

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<sup>7</sup> HEA ANALYSIS ONLY INCLUDES LOW AND MEDIUM RISK COPING STRATEGIES, WITH AN OPTION TO EXCLUDE CERTAIN TYPES OR LEVELS OF COPING IF THEY ARE DEEMED NOT ACCESSIBLE FOR THAT PARTICULAR YEAR OR SCENARIO, OR IF POLICY MAKERS OR ANALYSTS DECIDE TO DEFINE THE INTERVENTION POINT BEFORE A HOUSEHOLD MUST RESORT TO THOSE TYPES OF STRATEGIES. EXAMPLES OF LOW RISK COPING STRATEGIES INCLUDE INCREASING ACCESS TO GIFTS AND REMITTANCES; CHANGING CROP SALES STRATEGIES (I.E. SELLING MORE OF A HIGH VALUE CROP AND SELLING LESS OF IT, IN ORDER TO USE THE CASH TO PURCHASE CHEAPER STAPLE), SWITCHING EXPENDITURE ON LUXURY ITEMS TO CHEAPER STAPLE PURCHASE, AND SELLING MORE LIVESTOCK (WITHIN THE LIMITS OF AN ACCEPTABLE OFFTAKE RATE THAT PROTECTS THE VIABILITY OF THE HERD IN THE MEDIUM TO LONG TERM). EXAMPLES OF MEDIUM RISK COPING STRATEGIES TYPICALLY INCLUDE INCREASING ACCESS TO LABOUR SALES, LABOUR MIGRATION, SELF-EMPLOYMENT OR PETTY TRADE; AS WELL AS SALES OF FIREWOOD AND CHARCOAL. HIGH



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.

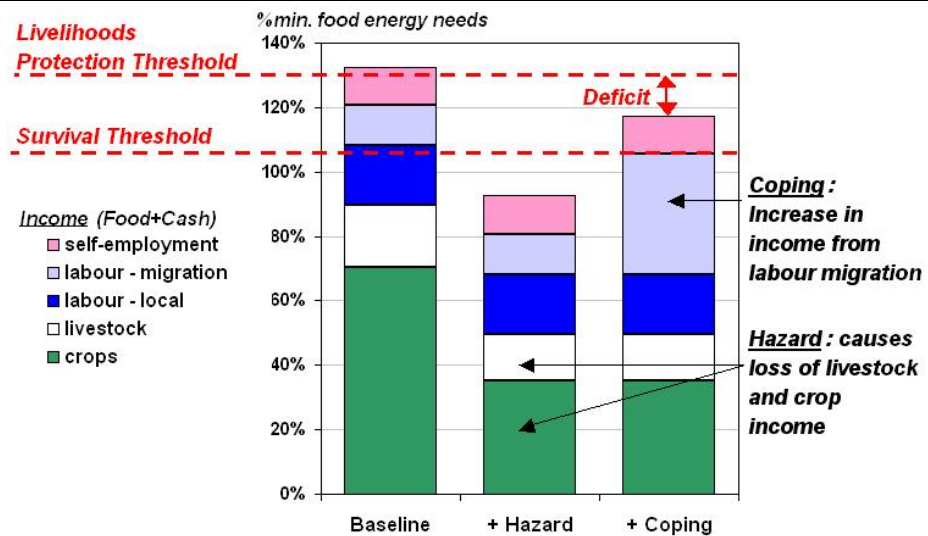
In HEA outcome analysis, projected 'total income' – or the sum of all food and cash income households secure, converted into a common unit or currency (either %kcal or cash) – is compared against two thresholds. These thresholds are defined on the basis of local patterns of expenditure, and in the case 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 2 shows the steps in an outcome analysis.

**Figure 2: 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.

RISK COPING STRATEGIES ARE NEVER INCLUDED IN AN HEA ANALYSIS, AS INTERVENTION THRESHOLDS ARE DESIGNED TO REPRESENT THE NEED FOR INTERVENTION BEFORE HOUSEHOLDS MUST RESORT TO THESE TYPES OF STRATEGY. HIGH RISK COPING INCLUDES UNSUSTAINABLE SALES OF LIVESTOCK, PROSTITUTION, SENDING CHILDREN AWAY TO LIVE WITH RELATIVES, AND FOREGOING MEALS.

## 2.2.1 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<sup>8</sup> across a population of 3 million, covering pastoral and agro-pastoral zones in Turkana (four livelihood zones with a total population of 796,565), and the North East (seven livelihood zones with a total population of 2,150,894, across Wajir, Mandera, and Garissa).

LIVELIHOOD ZONE	BASELINE YEAR
Turkana Central Pastoral	2015/2016
Turkana Border Pastoral	2015/2016
Kerio Riverine Agropastoral	2015/2016
Turkwel Riverine Agropastoral	2015/2016
NorthEast Agropastoral Mandera	2011/2012
NorthEast Agropastoral Wajir	2011/2012
NorthEast Pastoral Mandera	2011/2012
NorthEast Pastoral Wajir	2011/2012
Wajir Southern Grasslands Pastoral	2006/2007
Garissa Riverine	2006/2007
Garissa Former Pastoralists	2006/2007

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.

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<sup>8</sup> SOURCES OF BASELINE DATA ARE AS FOLLOWS: TURKANA & NE KENYA, SAVE THE CHILDREN, KENYA ([WWW.SAVETHECHILDREN.NET](http://WWW.SAVETHECHILDREN.NET)); MARSABIT, GSP AND LMP LZS: FSD (FINANCIAL SECTOR DEEPENING PROJECT), KENYA ([WWW.FSDKENYA.ORG](http://WWW.FSDKENYA.ORG)); MARSABIT, SPR LZ: CONCERN, KENYA ([WWW.CONCERNWORLDWIDE.ORG](http://WWW.CONCERNWORLDWIDE.ORG)).

**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<sup>9</sup>.

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<sup>10</sup>)
- 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.
- 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.

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<sup>9</sup> 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.

<sup>10</sup> SELF-EMPLOYMENT INCLUDES ACTIVITIES SUCH AS FIREWOOD AND CHARCOAL COLLECTION, BRICK-MAKING, SMALL-SCALE PETTY TRADE AND CARPENTRY.

## 2.3 ECONOMIC MODEL: DATA COMPONENTS

The following section describes each of the data components that underpin the model. Table 6, 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 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 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 3). For example, in Turkana, the deficit decreases from an average of 53 Kilograms (KG) to 39 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 0.75 (the ratio of 39.3 to 52.8).

TABLE 3: FOOD DEFICIT, AVERAGE KG REQUIRED, PER PERSON PER YEAR		
	TURKANA	NORTHEAST
Late	52.77	72.21
Early	39.32	68.41
Safety Net	21.91	51.15
Resilience Building	14.46	43.85

**Unit Cost of Humanitarian Response:** A typical food basket is made up of cereals, pulses and oil. The full cost is estimated using WFP data on the cost of commodity procurement, transport and storage, as well as all administrative and overhead costs. In Kenya, a monthly food ration typically

consists of 7.5 Kilograms (KG) of cereals per person per month, but this is raised to a full ration of 15 KG per person per month. The following assumptions are made:

- For a **late response**, cereals and pulses are purchased internationally at peak prices. The WFP estimates a cost of US\$793 per MT of food aid, or US\$81 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\$764 per MT, or US\$78 per person, equivalent to a 4 percent reduction in costs over a late response.
- It is also possible that more local purchase could be made at lower prices and lower transport and handling costs. Local procurement could significantly reduce this cost even further, to US\$592 per MT, or US\$69 per person. This figure is not used in the subsequent analysis, but would result in further reducing the cost of response.
- 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 that a greater use of cash and local procurement could significantly reduce this cost further.

TABLE 4: UNIT COST OF RESPONSE		
	COST PER MT	COST PP
Intl Purchase, peak	\$793	\$81
Intl Purchase, optimized	\$764	\$78

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, water, sanitation and hygiene (WASH), shelter and other items. Food aid represents on average 62% of the total cost of humanitarian response<sup>11</sup>, and hence the figures presented here are inflated to represent the full cost of response.

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<sup>11</sup> THE KENYA POST DISASTER NEEDS ASSESSMENT (PDNA) ASSESSED THE KENYA DROUGHT FROM 2008-2011 AND FOUND THAT FOOD AID OVER THE FOUR YEARS ACCOUNTED FOR 60-80% OF THE TOTAL COST OF RESPONSE, AND THE KENYA MARCH 2017 OCHA HUMANITARIAN DASHBOARD ESTIMATES FOOD AT \$99 MILLION, OUT OF A TOTAL REQUIREMENT OF \$213 MILLION (47%). THE AVERAGE OF THESE THREE DATA POINTS SUGGESTS THAT FOOD AID REPRESENTS 62% OF THE TOTAL.

### 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**

The model assumes that a transfer of US\$300 is made every year to all very poor and poor households, across all 15 years modelled. The cost of this transfer is estimated at US\$348 per household (administrative, monitoring and evaluation, and all associated costs are 16 percent of the total cost of providing a transfer; the remainder is the transfer itself). These costs and transfer amounts are based on actual HSNP cost and transfer amounts.

#### **Impact of Resilience Building**

A wide variety of measures can be used to build resilience to shocks and stresses. As discussed above, the Government of Kenya has been investing in a comprehensive framework via the EDE to build complementary packages of programming in the ASALs. This programming can include household specific interventions, such as livestock strengthening, agriculture, and income generation, and can also include investments in public goods such as security, roads, energy, education and health care. The USAID Partnership for Resilience and Economic Growth (PREG) and Resilience and Economic Growth in Arid Lands (REGAL) programs in Kenya have been similarly working alongside the NDMA and county governments to invest in a package of complementary measures to support households in the ASALs to become more resilient to the effects of drought.

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.

**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 investigating 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\$150 income per household.<sup>12</sup> A 2016 study by Landell Mills<sup>13</sup> attempted to gather

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<sup>12</sup> 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.

quantitative data on the variety of activities being implemented in the arid lands. Data on the impact of Save the Children (StC) activities for fodder production and Village Savings and Loans (VLSAs), Oxfam activities for fodder production, and BOMA women’s groups, are included here.

TABLE 5: COMPARISON OF COSTS AND BENEFITS OF IGA PROGRAMMES				
	StC Fodder	StC VSLA	Oxfam Fodder	BOMA
Benefit to Cost Ratio	3.9	3.1	9.1	4.2

The data available suggests that benefits ranging between US\$3.1 and US\$9.1 are realized for every US\$1 invested in programming.

This analysis purely compares the income benefit of each US\$1 of investment. These activities will have other direct and indirect benefits that are not quantified here, and the sustainability of activities may also be different across different types of programs.

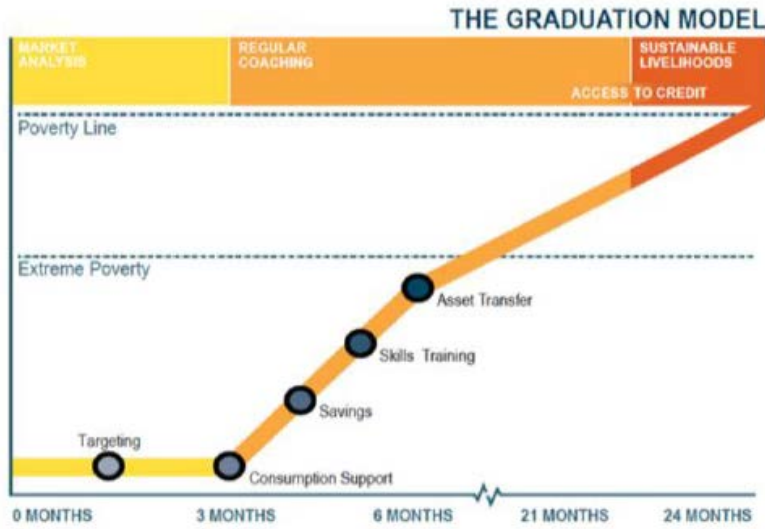
The model assumes an increase in income of US\$450 per household - US\$300 assumed to come from a safety net transfer and an additional US\$150 per household as a result of any investment that improves household incomes. Based on the evidence presented above, it is likely that household incomes could be increased by quite a bit more (ranging from US\$364 to US\$739 per household in the data presented). The model assumes a conservative return of US\$3 for every US\$1 spent based on the VSLA data. For fodder interventions it is possible that this figure could be greater. It follows that an increase of US\$150 would require an investment of US\$50 per household. It is assumed that this investment is made every three years, though evidence suggests 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 3), in which it is assumed that households will need to fulfill their deficit first, 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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<sup>13</sup> SIEDENBURG, J. (2016). "COMMUNITY BASED COST BENEFIT ANALYSIS: FINDINGS FROM DFID KENYA'S ARID LANDS SUPPORT PROGRAMME." LANDELL MILLS LTD.

Figure 3: 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 household 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 VfM assessment of the HSNP described in Annex A describes a range of additional benefits that have accrued from the program. In particular, it documents that the HSNP transfers have multiplier effects in the local economy, estimated at 1.23. Therefore, the model assumes that for each of the US\$300 transferred under the HSNP, an additional US\$0.23 is generated as a benefit in the local economy.



## 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. In reality, many of the areas modelled have seen high levels of population growth, hence the total amount of 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 of US\$450 per household in each year of the model and does not account for any growth in that income.

**TABLE 6: 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.	<p><u>Number of people with a deficit:</u> Modelled by HEA</p> <p><u>Unit cost of aid:</u> \$793 per Metric Ton (MT); \$81 per person</p>
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.	<p><u>Number of people with a deficit:</u> Modelled by HEA</p> <p><u>Unit cost of aid:</u> \$764 per Metric Ton (MT); \$78 per person</p> <p><u>Deficit Weighting:</u> Cost of humanitarian aid revised downwards based on decrease in food deficit modelled by HEA: North East – 0.95; Turkana- 0.75</p> <p><u>Avoided Losses:</u> Increase in income and livestock value as modelled in HEA</p>
A safety net 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.	<p><u>Number of people with a deficit:</u> Modelled by HEA</p> <p><u>Unit cost of aid:</u> \$764 per Metric Ton (MT); \$78 per person</p> <p><u>Deficit Weighting:</u> Cost of humanitarian aid revised downwards based on decrease in food deficit modelled by HEA: North East – 0.71; Turkana- 0.42</p> <p><u>Cost of Transfer Program:</u> \$338 per household (\$300 transfer plus 16% admin and overhead costs).</p> <p><u>Avoided Losses:</u> Increase in income and livestock value as modelled in HEA</p> <p><u>Multiplier effects in the local economy:</u> \$0.23 for every \$1 of cash delivered.</p>
Resilience Building	This scenario assumes that investments in resilience building increase household income by an additional \$150, in addition to the safety net transfer of \$300 per household.	<p><u>Number of people with a deficit:</u> Modelled by HEA</p> <p><u>Unit cost of aid:</u> \$764 per Metric Ton (MT); \$78 per person</p> <p><u>Deficit Weighting:</u> Cost of humanitarian aid revised downwards based on decrease in food deficit modelled by HEA: North East – 0.61; Turkana- 0.27</p> <p><u>Cost of Transfer Program:</u> \$338 per household (\$300 transfer plus 16% admin and overhead costs).</p> <p><u>Cost of resilience program:</u> \$50 per person (based on income return of 3:1)</p> <p><u>Avoided Losses:</u> Increase in income and livestock value as modelled in HEA</p> <p><u>Multiplier effects in the local economy:</u> \$0.23 for every \$1 of cash delivered.</p>

## 3 LONGITUDINAL DATA ANALYSIS

### 3.1 INTRODUCTION

The first part of the analysis looked at ongoing data collection exercises, to see if any existing data could be used to further understand and measure the impact of a more proactive response to disaster risk.

While numerous data sets were reviewed, most are not designed to measure the avoided losses as a result of a more proactive response.

However, the NDMA collects household level data every month at sentinel sites across the ASALs (23 counties). The UN Food and Agriculture Organization (FAO) has been working with the NDMA to clean and analyze this data, and has combined it with data on fodder, using a Fodder Condition Index (FCI).

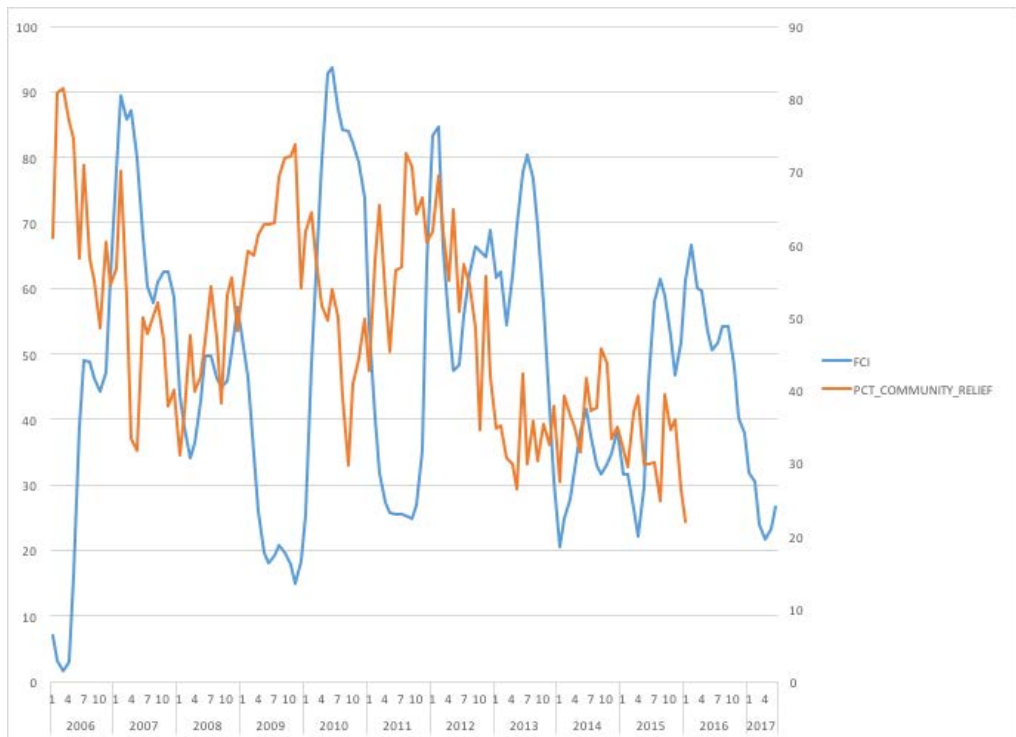
The surveys collect data on a range of variables, at a community and at a household level, including water sources, forage condition, prices of food commodities, migration, provision of relief, as well livestock holdings, income sources, coping strategies and nutritional status.

### 3.2 RELIEF

The NDMA longitudinal dataset was used to analyze the percentage of communities receiving some form of relief each month, since 2006. Figure 4 maps FCI against relief, and shows that, as one would expect, relief is inversely correlated to FCI. It also shows that relief typically only spikes just as fodder reaches its lowest point – relief is not arriving ‘early’.

Even more so, the figures for 2013 onwards are very worrying, as they show that fodder reached a low equivalent to 2009/2011, at three points (2013, 2015, 2017) but there has been no trigger in relief – it has stayed on par with the levels of relief that are provided in ‘normal’ years. Of course, fodder is not the only factor that drives humanitarian need, and other factors such as more stable prices and diversified income sources may have helped to mitigate against a crisis during this period.

Figure 4: FCI and Relief, All Counties, 2006-2017, NDMA data



### 3.3 NUTRITIONAL STATUS

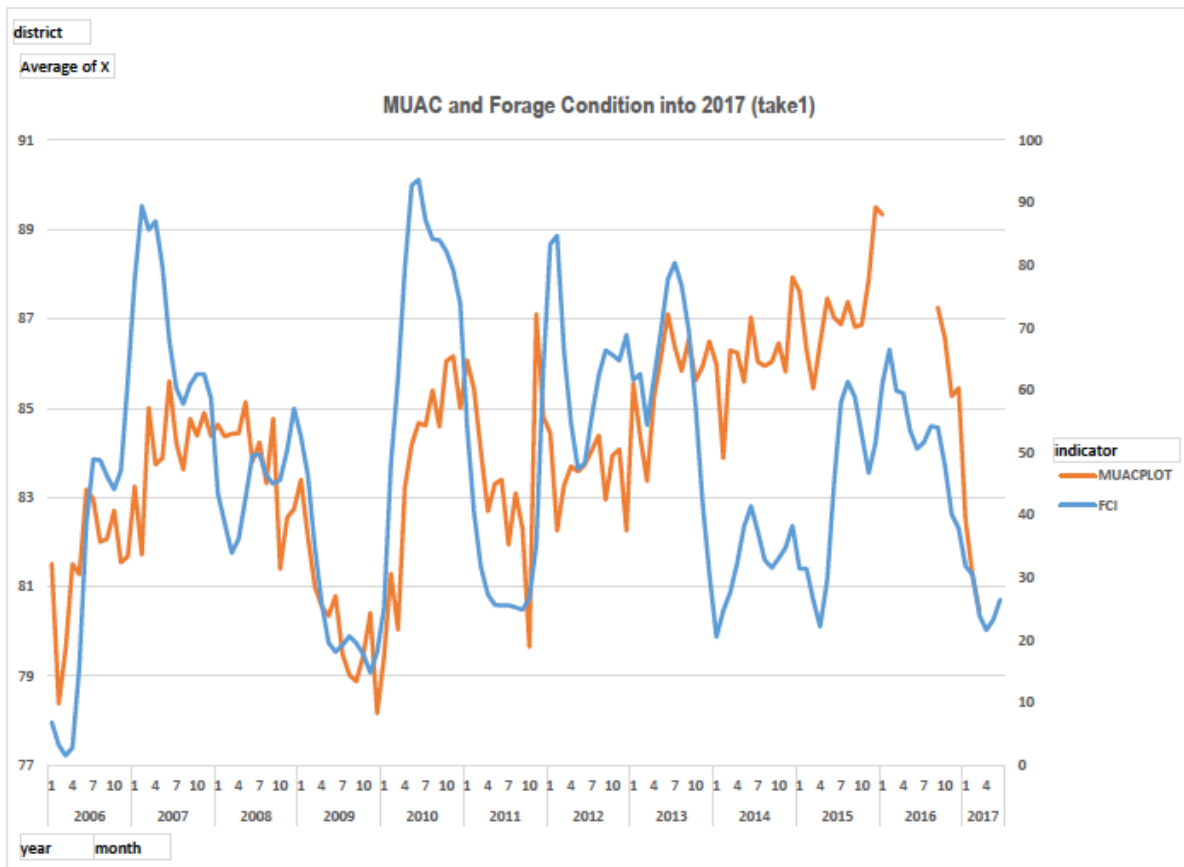
We also evaluated FCI against MUAC as a measure of nutritional status. Note that in these graphs, MUAC is inverted such that an increase in the line indicates an improvement in nutritional status. The line indicates children who have a MUAC reading greater than or equal to 135mm – in other words they are deemed not at risk.

It is important to note that MUAC typically underestimates the total number of children at risk. MUAC is also a lagging indicator; while it can be used to indicate the consequences of drought, it cannot be used for predictive purposes.<sup>14</sup> However, it nonetheless does provide an accurate assessment of the overall trend.

Figure 5 maps FCI against MUAC. The data suggests that, while MUAC has traditionally been correlated quite closely with FCI, that pattern seems to break in 2013, with MUAC holding even though fodder declined significantly. It is in 2016 that MUAC drops off significantly, suggesting that the magnitude of the drought overwhelmed the system.

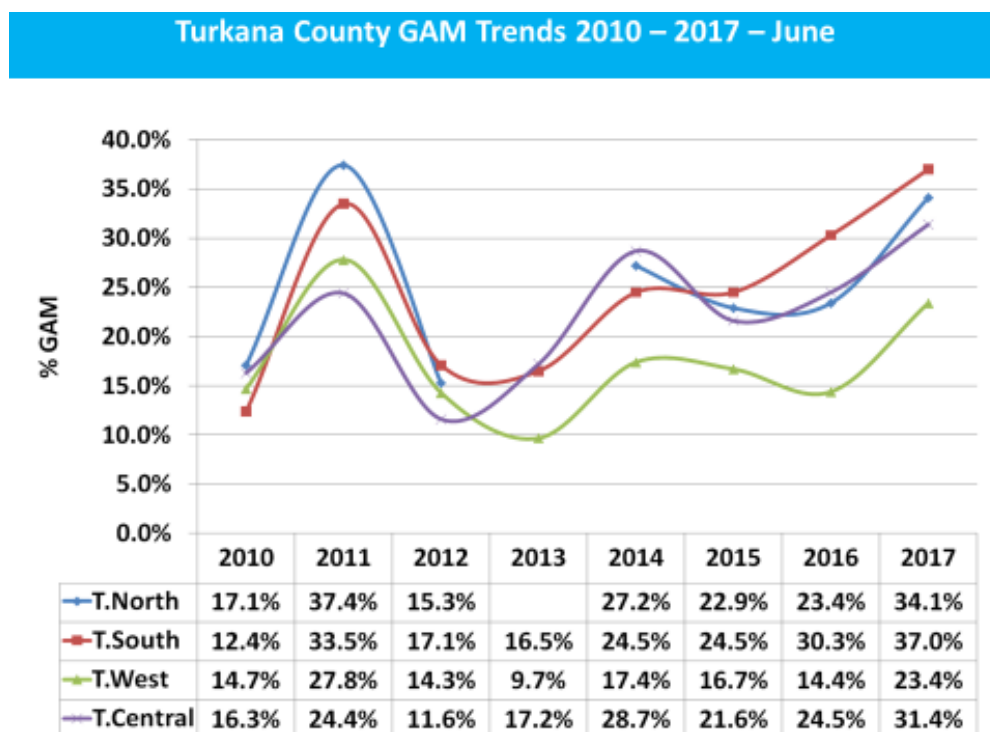
<sup>14</sup> KIMETRICA (2014). "METHODOLOGY REPORT: DESIGN OF A MODEL FOR SCALABLE NUTRITION INTERVENTIONS IN KENYA."

Figure 5: FCI and MUAC, all counties, 2006-2017



These findings seem to also be echoed in the nutrition data from the SMART surveys, which offer a more robust sample of weight for height measures. Figure 6 maps SMART data since 2010 for Global Acute Malnutrition (GAM) in Turkana and shows that GAM rates more or less held steady between 2012 and 2016, with an uptick in need in 2014 (also seen in Figure 5).

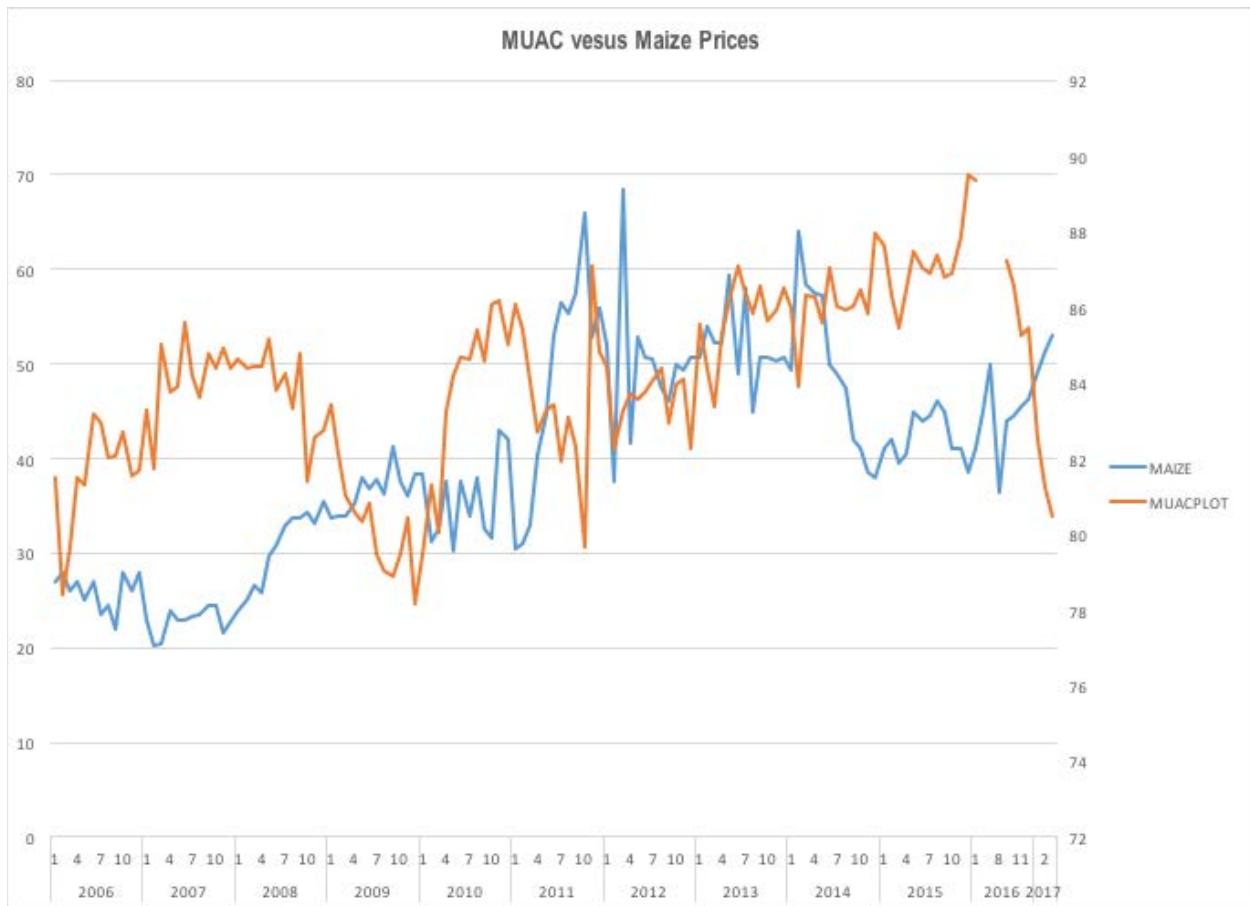
Figure 6: SMART Nutrition data for Turkana



Whereas MUAC is historically strongly correlated with fodder, that pattern seems to break in 2013, with MUAC holding even though fodder declined significantly until late 2016 when acute malnutrition levels spike. It is not possible to attribute this change to any particular program or set of programs. For example, this could be related to an increasing shift away from pastoralism to a more diversified income base in some counties, or it could be related to a number of initiatives that took place in 2012/2013, such as devolution, the HSNP, and high investment in preventative nutrition programming as well as substantial integrated investment in wider resilience building in the ASALs.

It is also interesting to note that maize prices remained stable and low during this same period (see Figure 7), and may be part of the explanation for the shifting trend in MUAC, as families would have been able to access staple foods for low prices to substitute for the lack of fodder. Again, attribution at this stage is speculative, but the data does suggest that it's worth further investigation.

Figure 7: MUAC versus Maize Prices, all counties, 2006-2017



## 4 COST COMPARISON OF DROUGHT RESPONSE

The following sections summarize the findings from the modeling for Turkana and for the North East livelihood zones. The first section summarizes the aggregate impact of early response and resilience building across a modelled population of approximately 3 million people. This is followed by results broken down for Turkana and for the NorthEast.

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.

#### 4.1 SUMMATIVE FINDINGS

Key Findings - Early Humanitarian Response:

- An early humanitarian response would save an estimated US\$381 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\$782 million, or an average of US\$52 million per year.

Key Findings – Safety Net:

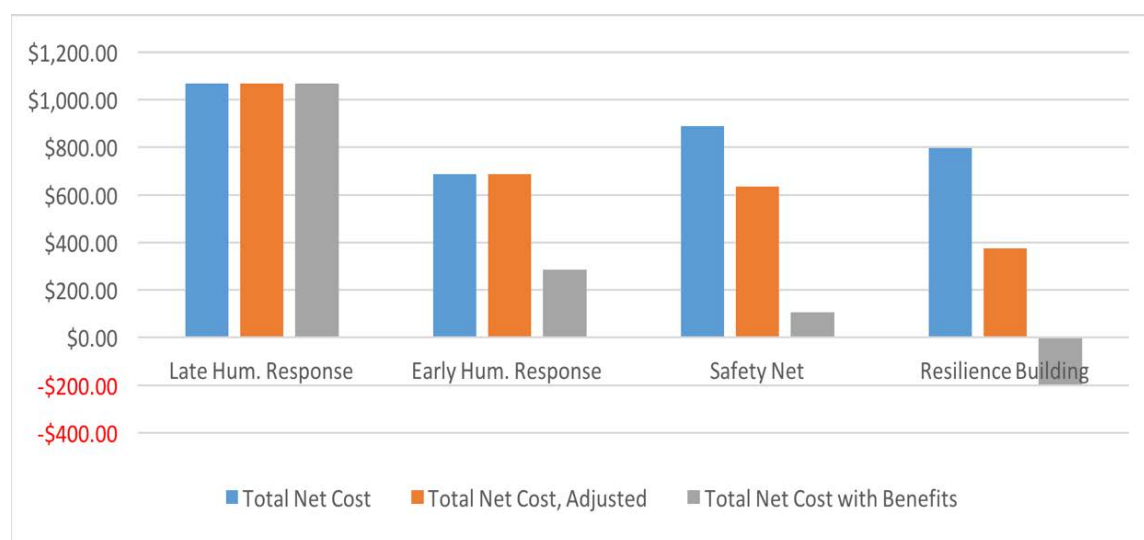
- Safety net programming at a transfer level of US\$300 per household reduces the net cost of humanitarian response, saving an estimated US\$181 million over 15 years over the cost of a late response. When this figure is adjusted to account for the benefits of the transfer beyond filling the food deficit, a safety net scenario saves US\$433m over the cost of a late response.
- When avoided losses are incorporated, a safety net transfer could save US\$962 million, or an average of US\$64 million per year.



### Key Findings – Resilience Building:

- Safety net programming at a transfer level of US\$300 per household plus an increase in income of an additional US\$150 per household, reduces the net cost of humanitarian response by an estimated US\$273 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\$693 million over the cost of a late response.
- When avoided losses are incorporated, a resilience building scenario could save US\$1.3 billion, or an average of US\$84 million per year.

Figure 8: Total Net Cost of Response, Kenya, 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 \$2.8 for every \$1 spent.

Total U.S. Government (USG) expenditures on emergency food aid in Kenya for the years 2001 to 2016 equated to US\$1.0 billion. **Applying the same ratios as estimated in this analysis of savings to total USG spend, the USG could have saved US\$259 million over 15 years, a savings of 26 percent of total emergency spend.** These are estimated direct cost savings to the USG 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\$1.2 billion.**

TABLE 7: SUMMARY OF COSTS, TURKANA AND NE LZS, USD MILLION				
INTERVENTIONS	LATE HUM. RESPONSE	EARLY HUM. RESPONSE	SAFETY NET	RESILIENCE BUILDING
Total Net Cost, 15 years	\$1,068.3	\$687.1	\$887.5	\$795.8
<i>Savings</i>		\$381.2	\$180.8	\$272.5
Total Net Cost, adjusted, 15 years	\$1,068.3	\$687.1	\$635.2	\$375.2
<i>Savings</i>		\$381.2	\$433.1	\$693.1
Total Net Cost with Benefits, 15 years	\$1,068.3	\$286.8	\$106.4	-\$196.7
<i>Savings</i>		\$781.5	\$961.9	\$1,265.0
Average Net Cost with Benefits per year	\$71.2	\$19.1	\$7.1	-\$13.1
<i>Savings</i>		\$52.1	\$64.3	\$84.3

These findings are modelled for a total population of 3 million, based on the availability of baseline datasets for HEA. We know the ASALs of Kenya are regularly impacted by drought, represented by a population of approximately 10 million. Clearly, counties are impacted differently depending on their specific characteristics, and some counties 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 three times those represented here when calculated for the whole of the ASALs of Kenya.**

Further, these estimates are likely a significant underestimate of the full costs of drought, and hence the potential for avoided losses. As stated previously, the 2008-2011 drought cost Kenya an estimated US\$12.1 billion in damages and losses combined and slowed GDP by an average of 2.8 per cent per annum<sup>15</sup>.

<sup>15</sup>DROUGHT POST DISASTER ASSESSMENT REPORT 2012

#### 4.1.1 TURKANA

Table 8 summarizes the findings from the economic model for Turkana.

<b>TABLE 8: SUMMARY OF COSTS, TURKANA, USD MILLION</b>				
INTERVENTIONS	LATE HUM. RESPONSE	EARLY HUM. RESPONSE	SAFETY NET	RESILIENCE BUILDING
Cost of Humanitarian Response	\$729.0	\$493.7	\$193.2	\$99.4
Cost of Transfer Program	-	-	\$256.2	\$256.2
Cost of Resilience Program	-	-	-	\$12.3
Avoided Losses - Income	-	-\$17.4	-\$45.4	-\$93.6
Avoided Losses - Livestock	-	-\$64.2	-\$64.2	-\$64.2
Multiplier benefits	-	-	-\$50.8	-\$50.8
<b>Total Net Cost, 15 years</b>	<b>\$401.5</b>	<b>\$273.6</b>	<b>\$249.3</b>	<b>\$202.3</b>
<b>Total Net Cost, Adjusted, 15 years</b>	<b>\$401.5</b>	<b>\$273.5</b>	<b>\$226.8</b>	<b>\$148.9</b>
<b>Total Net Cost with Benefits, 15 years</b>	<b>\$401.5</b>	<b>\$238.0</b>	<b>\$172.7</b>	<b>\$100.3</b>
<b>Average Net Cost with Benefits per year</b>	<b>\$26.8</b>	<b>\$15.9</b>	<b>\$11.5</b>	<b>\$6.7</b>

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 (HSNP, 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.

<b>TABLE 9: BENEFIT TO COST RATIOS (BCRS), TURKANA</b>			
	BCR: AVOIDED COST OF AID (1)	BCR: AVOIDED COST OF AID, ADJUSTED (2)	BCR: AVOIDED COST OF AID + AVOIDED LOSSES (3)
Safety Net	2.06	2.22	2.60
Resilience Building	2.33	2.69	3.01

#### 4.1.2 NORTH EAST

Table 10 summarizes the findings from the economic model for North East counties, and Table 11 summarizes the BCRs, as described above.

TABLE 10: SUMMARY OF COSTS, NORTH EAST, USD MILLION				
INTERVENTIONS	LATE HUM. RESPONSE	EARLY HUM. RESPONSE	SAFETY NET	RESILIENCE BUILDING
Cost of Humanitarian Response	\$1,340.7	\$836.4	\$449.8	\$298.8
Cost of Transfer Program	-	-	\$744.9	\$744.9
Cost of Resilience Program	-	-	-	\$35.7
Avoided Losses - Income	-	-\$573.8	-\$975.5	-\$1,331.4
Avoided Losses - Livestock	-	-\$145.7	-\$145.7	-\$145.7
Multiplier benefits	-	-	-\$147.7	-\$147.7
<b>Total Net Cost, 15 years</b>	<b>\$666.8</b>	<b>\$413.5</b>	<b>\$638.1</b>	<b>\$593.5</b>
<b>Total Net Cost, Adjusted, 15 years</b>	<b>\$666.8</b>	<b>\$413.5</b>	<b>\$408.5</b>	<b>\$226.3</b>
<b>Total Net Cost with Benefits, 15 years</b>	<b>\$666.8</b>	<b>\$48.8</b>	<b>-\$66.3</b>	<b>-\$297.0</b>
<b>Average Net Cost with Benefits per year</b>	<b>\$44.5</b>	<b>\$3.3</b>	<b>-\$4.4</b>	<b>-\$19.8</b>

TABLE 11: BENEFIT TO COST RATIO (BCR), NORTH EAST			
	BCR: AVOIDED COST OF AID (1)	BCR: AVOIDED COST OF AID, ADJUSTED (2)	BCR: AVOIDED COST OF AID + AVOIDED LOSSES (3)
Safety Net	1.07	1.62	2.76
Resilience Building	1.17	2.01	3.21

## 5 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\$450 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. The amount of increase in income required will vary depending on the context and over time – for example in some of the poorest areas of Turkana, the increase of US\$450 was only just sufficient in the model, whereas in other areas this amount may be more than is required.

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 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 in the ASALs of Kenya.

**This finding 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, 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. 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.<sup>16</sup>

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<sup>16</sup> WORLD BANK. 2015. THE STATE OF SOCIAL SAFETY NETS 2015. WASHINGTON, DC: WORLD BANK.

- 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.<sup>17</sup>
- 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.<sup>18</sup>
- A study by the World Bank and UNICEF found that scaling up of 11 key nutrition-specific interventions in Kenya would cost US\$76 million in public and donor investments annually. The resulting benefits through avoided loss of life and disability could increase economic productivity by US\$458 million per year, and every dollar invested has the potential to bring economic returns of US\$22.<sup>19</sup>
- 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.

**Reducing humanitarian impacts through greater resilience requires investment in complementary and layered approaches to build sustained change.** Individual actions rarely build resilience in a sustained manner. For example, improved awareness on health practices needs to be complemented by adequate health facilities and services at those facilities; investment in productive activities requires access to markets and investment in roads; cash transfers are not effective unless they take place within the context of highly integrated markets and access to goods and supplies. The model presented here assumes an increase in household income of US\$300 through a direct cash transfer and US\$150 through an improvement in income (at a cost of US\$50). Different types of interventions, and packages of interventions, will be more or less cost effective at not only achieving, but also sustaining, these outcomes.

Another point for discussion is the level of investment that is required to achieve these outcomes. The model assumes an increase in income of US\$450, and in some cases this may not be enough to allow households to absorb the impact of a shock, whereas in others it may be more than enough. A cost of diet analysis by Save the Children in Turkana found that the average household requires US\$1,033 per year to sustain the most basic, energy-only diet. An increase in income of US\$450 on top of existing household sources of income could therefore go a long way towards meeting this need. However, the cost of a fully nutritional and culturally appropriate package would cost close to US\$4,000 per year.<sup>20</sup>

**Building resilient households requires a mix of support for both consumption and production.** Figure 9 and 10 show examples of how deficits change over time, the first set of graphs compare a late humanitarian response and a resilience scenario for the Turkana Border Pastoral

<sup>17</sup> 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

<sup>18</sup> ORAZEM, P, P GLEWWE, H PATRINOS (2009). "LOWERING THE PRICE OF SCHOOLING". COPENHAGEN CONSENSUS BEST PRACTICE PAPER

<sup>19</sup> EBERWEIN, J, ET AL (2016). "AN INVESTMENT FRAMEWORK FOR NUTRITION IN KENYA." WORLD BANK GROUP, UNICEF

<sup>20</sup> SAVE THE CHILDREN (N.D.). "A COST OF THE DIET ANALYSIS IN TURKANA COUNTY, KENYA." PRESENTATION

livelihood zone, and the second compare the same set of graphs but for an Agro-Pastoral livelihood zone.

In the pastoral context, households consistently face a significant deficit, with the majority of their income made up of livestock sales, milk, and other sources of income (typically self-employment or wage labor). Under the resilience scenario, where households benefit from an increase in income, the population not only moves to above the livelihood protection threshold (LPT) in every year, but there is enough income in several of the years to also allow families to save (marked in red in the graphs below) – a key shift that allows households to begin to use their household income for productive activities and get on a path of graduation. However, this saving is pretty minimal, suggesting that even further inputs may be required with this particular population.

By contrast, the agro-pastoral population has more sources of income, with crops added to livestock, milk and other sources. Further, without any intervention, households are closer to their LPT. When the resilience scenario is added in, households are consistently above the LPT, and able to save in almost every year. Increases in income can result in greater investment, which increases income even further. The models presented below assume a constant income each year (from sources other than milk, livestock sales or crops), but if this amount was increasing it is possible to see how it could result in graduation.

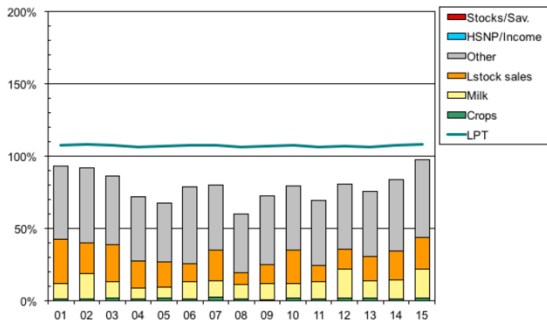
These differences are certainly influenced by the difference in production system. However, this is not to suggest that pastoral production systems are inherently less productive, but rather that efforts to strengthen that system may be required, for example in terms of closer access to markets selling cheaper food, or closer access to health and education services, or less risk of conflict. The issue is not just about how the income is constituted, but how connected these groups are to the institutions that support them.

The HEA data clearly indicates that many of the areas modelled require consumption support – and this is precisely what the HSNP is designed to do and provides the basis for a strong graduation model. It is also clear from the HEA data that income beyond the HSNP is required as part of a package of support to productive activities to allow households to have enough to save and build up a reserve to withstand future shocks.

The cost of an HSNP transfer is clearly much higher than the cost of investing in people's ability to generate their own income. However, both are needed as people will struggle to successfully engage in productive activities if they are not able to meet their basic household needs. Getting this mix right is important, but will also be difficult given that this balance will be different for each household.

Figure 9: Turkana Border Pastoral Livelihood Zone, Very Poor Households

Late Humanitarian Response



Resilience

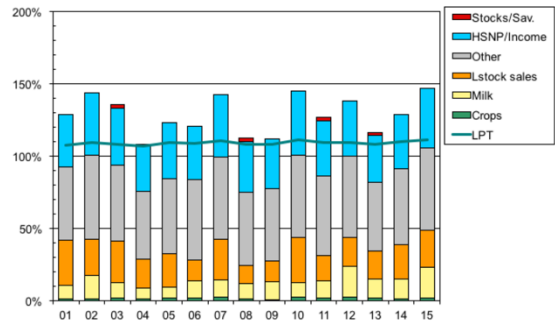
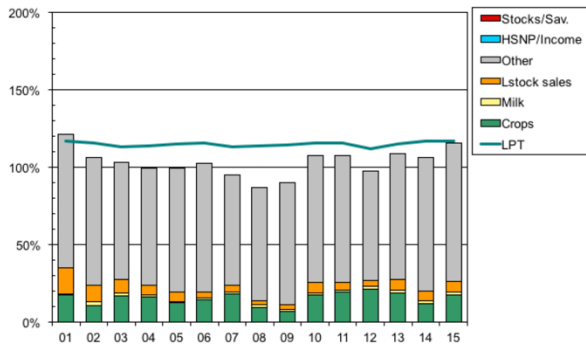
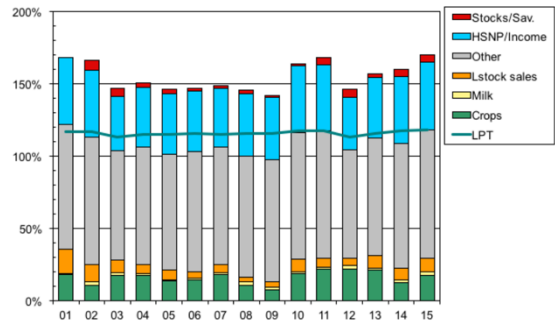


Figure 10: Turkana Agro-Pastoral Livelihood Zone, Very Poor Households

Late Humanitarian Response



Resilience





**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.

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.

The NDMA undertakes monthly monitoring at sentinel sites across the 23 ASAL counties. This longitudinal dataset is already a significant asset, and could be enhanced to allow ongoing monitoring and inform the best choice of packages of interventions depending on specific contexts. It is already possible to monitor long term trends using this dataset (as demonstrated in Section 3). The dataset also already gathers data on prices and coping strategies – two key indicators of stress. Further data collection, around when people receive different types of transfers (formal, informal, HSNP, emergency, etc.) as well as data on interventions (for example, in order to classify high, medium and low intervention areas, and/or different packages of interventions) could allow for mapping of key trends against response patterns.

**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\$381 million over the 15 years, or approximately US\$25 million per year. These funds could go a long way towards fulfilling the US\$76 million per year cost of investing in a full package of nutrition interventions for the whole of Kenya, as estimated in the World Bank/UNICEF study cited above.

In addition to cost savings, avoided losses are generated in the model as a result of intervention taking place before negative coping strategies are employed. A wider mix of activities can be used as part of an early response, corresponding to the alert and alarm phases in the Kenya Early Warning System (see Box 2). Contingency planning designed around the principles of ‘low regrets’ should facilitate a system where any early action is cost effective regardless of the scale of the crisis that materializes, because these activities will contribute to overall household resilience in either case.

There is not a clear or definitive measure for when an early response needs to be triggered. In the model, it is assumed to take place before negative coping strategies are employed and assumes some

reduction in the escalation of food prices. However, it also clearly shows that different populations are dependent on different factors. For example, very poor and poor pastoralists in the North East livelihood zones have so few animals that their food security status is almost entirely dependent on food prices. There is not a clear trend in the HEA as to which factors most affect food deficits, and it is clearly a mixture of food prices, animal prices, as well as rainfall. The policy implication is that triggers for early action need to be based on a comprehensive seasonal assessment that takes into account both production and marketing conditions.

Even in the context of a later response, systems that ensure that food and other commodities can be procured and pre-positioned well ahead of a crisis can result in significant cost savings. This is particularly true in the context of Kenya, where crises are regular and protracted and hence pre-positioned goods can be put to good use. Mechanisms such as multi-year humanitarian funding can contribute substantially to cost savings by ensuring that agencies have the funds in place to procure at the time of the year that optimizes prices, rather than delaying until emergency funds are released. Optimized procurement to stock pipelines can allow for significant cost savings.

These savings are amplified even further through local production. Supporting programs that seek to maximize the ability of local producers to grow food that can be pre-stocked for emergency needs can deliver even greater value for money, while also contributing to the income and longer term resilience of local farmers.

