The Economics of Early Response and Resilience: Summary of Findings

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Key Messages

- **Early humanitarian response should become the dominant paradigm for responding to crises.** Early humanitarian response is far more cost effective than late humanitarian response, and a shift to early response does not incur any additional cost, and therefore benefit to cost ratios are infinite.
- **Economic concerns over false early response are unwarranted.** Country studies found that, for every early response to a correctly forecast crisis, early responses could be made 2-6 times to crises that do not materialise, before the cost of a single late response is met.
- **Investing in longer-term interventions that support resilience should be prioritized, alongside ongoing early response to humanitarian need.** While the cost of achieving resilience is uncertain, the analysis uses very conservative figures that demonstrate that investment in resilience will bring substantial returns in terms of need averted and broader developmental outcomes. Benefit to cost ratios varied between 2.3:1 and 13.2:1, depending on the country. Ongoing support for humanitarian crises should run alongside a greater focus on investment in resilience.

1 Introduction

1.1 Introduction

The impacts of natural disasters and complex emergencies have been increasing over recent decades, putting the humanitarian system under considerable pressure. The costs of humanitarian crises are also growing – not only do disasters and complex emergencies result in significant economic losses, but they also require mobilization of large amounts of humanitarian aid from the international community. According to a recent study on funding streams for emergency response, aid from governments reached US$12.4 billion in 2010, the highest figure on record. And yet, despite a rhetoric that has called for reform for the past decade, only 4.2% of official humanitarian aid and 0.7% of non-humanitarian development assistance was invested in disaster risk reduction between 2006 and 2010.[1]

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[1] Kellet J. and H. Sweeney (2011). "Synthesis Report: Analysis of financing mechanisms and funding streams to enhance emergency preparedness." Development Initiatives, UK

It is widely held that, broadly speaking, investment in early response and/or building the resilience of communities to cope with risk in disaster prone regions is more cost-effective than the ever-mounting humanitarian response. Yet little solid data exists to support this claim, and there is a clear need for a greater evidence base to support reform.

1.2 Scope of the Analysis

The UK Government commissioned an independent study to contribute to filling these evidence gaps. The study was phased as follows:

- Phase I (2012) investigated case studies in Kenya and Ethiopia;
- Phase II (2013) added case studies in three more countries – Bangladesh, Mozambique, and Niger. Phase II was expanded to include a greater focus on the potential benefits that could come from multi-year humanitarian financing, and also to include a greater focus on nutrition. The modelling under Phase II was also refined. Specifically, in Phase I, modelling was done for a high magnitude drought occurring every five years, while in Phase II modelling was done for a combination of low, medium and high magnitude droughts over a 20-year period. Further, the Phase II modelling used empirical evidence from soil and water conservation practices to model the impact on household economies.

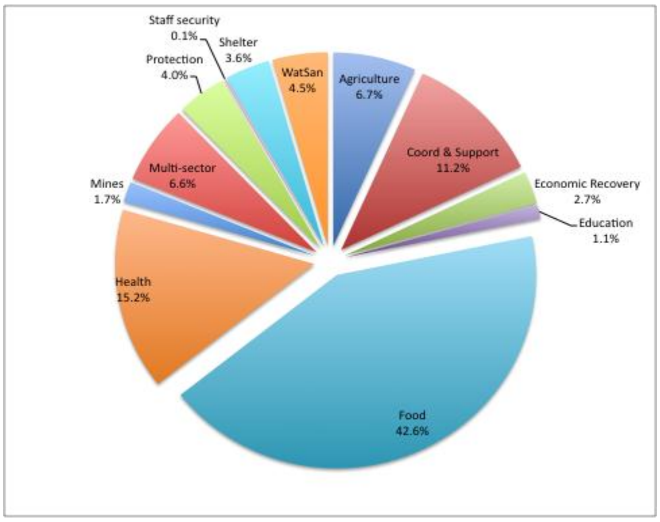
The study seeks to compare the cost of three scenarios:

- Storyline A: Late response results in humanitarian intervention.
- Storyline B: Early response is taken to ensure survival at the time of early warning of a crisis.
- Storyline C: Investment is made in building the resilience of communities to cope with drought on their own.

The data was analysed from two perspectives:

- *Bottom-up Analysis:* The Household Economy Approach (HEA) was used to model the impacts of drought events on household economies. It is the more detailed component of the analysis, because the study team was able to gather much more detailed data at this level to build up the storylines. This analysis was done for all countries, except Bangladesh where HEA data is minimal.
- *Top-down Analysis:* Evidence at a national level was aggregated for the country as a whole to model the cost of response.

Box 1: Food Aid and Humanitarian Response



Food aid makes up the majority of humanitarian response, and as a result is a key component of this study. Cost efficiencies in the procurement and transport of food aid can bring about significant gains in early response.

All estimates presented below are modelled over 20 years (10 years where noted), and discounted using a rate of 10%. The bottom-up and top-down analysis use very different sets of data and should not be compared. Similarly, caution should be used when comparing across countries, as the data available in each country was different.

A cost per capita was estimated for each of the country studies, using evidence from the bottom-up assessment. These are summarized in Table 1. These costs are based on the 20-year model for each study. Like-for-like comparisons cannot be made across studies, as the analysis used to arrive at these figures relied on differing data sources.

Table 1: Costs per Capita

	Scenario	Cost per Capita – aid only	Cost per Capita - aid + losses	Early as a % of late – aid only	Early as a % of late – aid + losses
Kenya	Late		$1,651		
	Early (B1)		$965		58%
	Early (B2)		$583		35%
Ethiopia	Late		$1,334		
	Early (B1)		$786		59%
	Early (B2)		$258		19%
Mozambique	Late	$174	$812		
	Early	$47	$58	27%	7%
Niger	Late	$230	$932		
	Early	$119	$269	52%	29%
Bangladesh	Late		$1,529		
	Early		$1,092		71%

Note that the estimates for Mozambique and Niger use the scenario that includes estimated losses

In all cases, responding early reduces the cost of aid and the losses suffered. The mean reduction in cost as a result of early response is 40%, though the estimates are wide ranging, between 7% and 71% of the total cost of late response.

Table 2: Reports in the Economics of Early Response and Resilience (TEERR) Series

Report Title	Report Content
TEERR Synthesis of Findings:	Summarizes the key findings
TEERR Approach and Methodology:	This report includes the introduction to the study objectives, and the detailed methodology as well as limitations to the analysis.
TEERR Country Reports: • Ethiopia • Kenya • Bangladesh • Mozambique • Niger	The country reports contain a very brief introduction, description of the country/study context, the detailed findings from the analysis, and conclusions/recommendations. These draw together the data presented in the country supporting documents (see below) as well as the HEA report, to model outcomes.
TEERR HEA report:	Contains details of the HEA modelling, assumptions and parameters, as well as modelling output.
Country Supporting Documents	Each country is supported by a report that contains country level detail and data.

2 Kenya

2.1 Bottom-Up Assessment

The bottom up assessment uses HEA modelling results on food deficits and livestock losses under a high magnitude drought (equivalent to the characteristics of the 2011 event) to estimate the cost of response for the Wajir Grasslands livelihood zone (beneficiary population 367k). This area is typically highly vulnerable to drought, with relatively poor households. The findings presented here could be far more significant if modelled over the entire pastoral population.

The analysis first looks at the size of the household deficit that would occur as a result of a high magnitude drought, using this as the proxy for the cost of late response (Storyline A). This is compared with two early response scenarios (Storylines B1 and B2). In the first, excess livestock deaths in a drought are reduced by 50% through commercial destocking[2] – there is a high degree of confidence in these figures, as they correlate with average destocking figures in actual events (per household), and can be fed directly through the HEA model to interpret how these changes affect household deficits. The second combines commercial destocking with an improvement in rainfall to simulate what might happen if animal condition is improved to increase conception and production of animals, for example through measures such as supplementary animal feed and veterinary services. Further, it is estimated that early procurement and transportation of food and other aid can significantly reduce their unit cost. These estimates are compared against an estimated cost of a package of resilience building measures for pastoralists in Kenya, at $137 per capita per year (Storyline C).[3] Clearly, the cost of resilience can vary significantly, depending on local context, and there is a great deal of uncertainty over how much it actually will cost to build resilience. The findings are summarized in Table 3 below.

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[2] Commercial destocking is considered an early intervention, in which traders are facilitated to buy animals off of households before the animals reach a weakened state, ensuring that households get a good price and have money to spend on other needs, such as feeding and caring for remaining animals. This is very different from slaughter destocking which is a late response intervention, in which animals are slaughtered in a very weakened condition, at which point their value is significantly diminished.

[3] For comparison, an alternative estimate of the costs of building resilience is the UN estimate of the cost of achieving the MDGs for Africa, at $110 per person per year over 10 years. Communities that have achieved the MDGs would likely be able to cope with drought.

Table 3: Summary of "Bottom Up" Cost Estimates over 20 years (discounted) - Wajir

	Late Humanitarian	Early Response (B1)	Early Response (B2)	Resilience	Resilience net of benefits
USD million	$606m	$354m	$214m	$464m	($54m)
Benefit to Cost Ratio: Building resilience compared with late response					**$2.9:1**

Note: cost estimates are the sum of aid requirements, losses from animal deaths, and response and resilience programme costs.

The modelling suggests that early response through early procurement and transportation of aid supplies and commercial destocking in Wajir alone would save over $250m in humanitarian aid and losses discounted over a 20-year period (for a population of approximately 367k)**.** Under a scenario where additional interventions are applied to improve animal condition, **the difference could be as much as $392m.**

When these figures are considered in a single high magnitude drought, the cost of introducing a destocking programme is $275k. Assuming an early response scenario that also results in lower food aid costs as described previously, the total benefit (reduced aid and avoided losses) is $107m for a population of 367k. The benefit to cost ratio is 390 : 1. **In other words, for every $1 spent on commercial destocking and early response, $390 of benefits are gained.**

The costs of resilience are higher than early response in the above analysis. However, the benefits of resilience can be significant, by delivering development gains. In order to estimate how these benefits might offset some of the costs, sector-specific cost benefit analysis was conducted for specific measures in three sectors – livestock, water and education. The findings offer evidence that the benefits are consistently higher than the costs, ranging from just below break even, to $26 of benefits for every $1 spent. The benefits quantified are very tangible – savings that contribute to a household's economy. **If we assume that we only generate $1.1 of benefit, for every $1 spent on resilience measures, a very conservative assumption, the net cost over 20 years is converted to a net benefit of $54m,** as compared with the $606m potential spend on late humanitarian aid over the same time period**.**

When the costs of building resilience are offset against the benefits over 20 years, the benefit to cost ratio is 2.9 : 1. In other words, for every $1 spent on resilience, $2.9 of benefits (avoided aid and animal losses, development benefits) are gained. When this is modelled over just a 10-year time frame – in other words, within the context of two high magnitude droughts - every $1 spent on resilience generates $2 in benefits.

2.2 Top-Down Assessment

While the bottom-up approach only applied to Wajir, the top-down perspective examines how national level costs compare across the three storylines. The figures are therefore not directly comparable. This assessment uses national level data on short and long term rain assessments, the cost of delivering aid per the World Food Programme, and the Kenya Post Disaster Needs Assessment (PDNA) to estimate the costs of late humanitarian response.

Early response is estimated by using the percentage reduction in aid and losses that can be achieved using commercial destocking as well as improved animal condition as a response measure, for both Storylines B1 and B2 as modelled under the HEA, as well as the estimated cost of such a programme. The cost of building resilience uses several national level plans for eradicating drought as proxies, as well as the cost of residual risk, i.e. ongoing aid and losses (given that building resilience takes time, and not all aid and losses will be eliminated). Clearly, there is a lot of uncertainty about what resilience might look like, and therefore how much it will cost. In order to make a best guess, a number of different plans and estimates at a national level were compared, to come up with a proxy using the approximate midpoint. The findings are summarized in Table 4 below.

Table 4: Summary of National Level Cost Estimates over 20 years (discounted) - Kenya

	Humanitarian	Early Response (B1)	Early Response (B2)	Resilience	Resilience with benefits
USD million	$29,771m	$22,330m	$7,168m	$9,168m	$4,018m
Benefit to Cost Ratio: Building resilience compared with late response					**$6.5:1**

These findings suggest that late humanitarian response costs nearly $21 billion more than resilience building activities over 20 years. Using a very conservative estimate, assuming a return of $1.1 for every dollar spent on resilience, which is assumed to persist for the full 20 years of the model, **the resilience scenario reduces costs even further, adding an additional $5b in savings. When the costs of building resilience are offset against the benefits, the benefit to cost ratio is 6.5 : 1. In other words, for every $1 spent on resilience, $6.5 of benefits are gained.**

3 Ethiopia

3.1 Bottom-Up Assessment

The bottom-up assessment uses the same parameters described above for Kenya. However, in the case of Ethiopia, there is significantly more HEA baseline data, and therefore the modeling was undertaken for southern Ethiopia, which is a largely pastoral population, with a much larger beneficiary population of 2.8m. In this case, because of the larger sample size, the HEA modeling was able to simulate household economies for a broader range of pastoral households, including more wealthy households with larger herd sizes. The findings are summarized in Table 5 below.

Table 5: Summary of "Bottom-up" Cost Estimates over 20 years (discounted) – Southern Ethiopia

	Late Humanitarian	Early Response (B1)	Early Response (B2)	Resilience	Resilience net of benefits
USD million	\$3,800m	\$2,240m	\$734m	\$2,945m	(\$1,075m)
Benefit to Cost Ratio: Building resilience compared with late response					**\$2.8:1**

The modelling suggests that early response through commercial destocking in southern Ethiopia would save \$1.6 billion in humanitarian aid and losses over a 20-year period, (this is for a population of approximately 2.8m)**.** Under a scenario where interventions are applied to improve animal condition, such as vet services, or supplementary feeding, **the difference could be as much as \$3.1 billion.**

When these figures are considered in a single high magnitude drought, the cost of introducing a destocking programme is \$2.1m. Assuming an early response scenario that also results in lower food aid costs as described previously, the total benefit (reduced aid and avoided losses) is \$665m, for a population of 2.8m. The benefit to cost ratio is 311 : 1. **In other words, for every \$1 spent on commercial destocking and early response, \$311 of benefit (avoided aid and animal losses) are gained.**

Sector specific cost benefit analysis is used to show how the benefits, when quantified and incorporated into the analysis, significantly offset the costs of resilience. **If we assume that we only generate \$1.1 of benefit, for every \$1 spent on resilience measures, a very conservative assumption, the net cost over 20 years is converted to a net benefit of over \$1 billion,** presenting a very strong case for investing in resilience.

When the costs of building resilience are offset against the benefits, the benefit to cost ratio is 2.8 : 1. In other words, for every \$1 spent on resilience, \$2.8 of benefits (avoided

aid and animal losses, development benefits) are gained. When this is modelled over just a 10-year time frame – in other words, within the context of two high magnitude droughts - every $1 spent on resilience generates $2 in benefits.

3.2 Top-Down Assessment

The Ethiopia assessment uses data from the Financial Tracking Service (FTS) of UNOCHA, as well as HEA modelling for livestock losses in southern Ethiopia, to estimate the cost and losses associated with late humanitarian response. Early response is estimated by using the percentage reduction in aid and losses that can be achieved using commercial destocking and improved animal condition as a response measure, as modelled under Storylines B1 and B2 in the HEA, as well as the estimated cost of such a programme. The cost of building resilience uses several national level plans for disaster management as proxies. The estimates presented below are significantly lower than Kenya figures – in Kenya, very comprehensive figures on losses from the 2009/2011 drought were used; in Ethiopia, this level of analysis was not available, and hence a much more limited assessment using HEA figures for animal losses in southern Ethiopia alone was used. The findings are summarized in Table 6 below.

Table 6: Summary of National Level Cost Estimates over 20 years - Ethiopia

	Humanitarian	Early Response (B1)	Early Response (B2)	Resilience	Resilience with Benefits
USD billion	$7,254m	$3,331m	$1,426m	$3,956m	$350m
Benefit to Cost Ratio: Building resilience compared with late response					**$3.1:1**

These findings suggest that late humanitarian response costs $3.3 billion more than resilience building activities over 20 years. Using a very conservative estimate, assuming a return of $1.1 for every dollar spent on resilience, which is assumed to persist for the full 20 years of the model, **the resilience scenario reduces costs even further, adding an additional $3.6b in savings. When the costs of building resilience are offset against the benefits, the benefit to cost ratio is 3.1 : 1.**

4 Mozambique

4.1 Bottom-Up Assessment

The bottom-up assessment uses HEA modeling to estimate the food deficit for drought in the Zambezi Valley and the Limpopo Basin, covering 16 livelihood zones, and a modelled population of 2.6m people (out of an approximate total population of 24m people). The modelling uses historic data to define high, medium and low magnitude droughts, their return period, and models these over a 20-year period. Detailed cost data was supplied from WFP on the cost of late and early humanitarian response, and this was combined with the caseloads estimated under the HEA. Further, spikes in acute malnutrition and their costs were also estimated. The resilience scenario used empirical data on the costs and increased yields as a result of soil and water conversation (SWC) practices in agriculture, and these were fed through the HEA model to estimate the change in food deficit within the household economy that would occur. The resilience scenario is also modelled assuming a very conservative return on investment of $1.1 for every $1 spent.

The model was run twice, once for costs only, and the second time incorporating potential losses as estimated in a cost benefit analysis conducted for the Africa Risk Capacity (ARC) Facility. This estimate includes reduced income potential of children under age 2 who receive reduced nutrition, reduced household growth (measured as income) due to reduced consumption and increased distress sales, plus direct losses from livestock deaths, and inflates the figures presented below quite significantly.

Table 7: Cost Comparison of Response for Storylines (USD million) – Mozambique, Zambezi Valley and Limpopo Basin Drought

	Storyline A	Storyline B	Storyline C	Storyline C – with benefits
	Late Hum. Response	Early Response	Resilience	Resilience with benefits
Aid Alone	$452m	$122m	$77m	$19m
Aid + Losses	$2,111m	$152m	$77m	$19m
Benefit to Cost Ratio: Building resilience compared with late response				$12.4-$55.9:1

Early response is significantly less expensive than late response, saving between $330m and $1,959m over 20 years, depending on the model. Resilience saves even more money still. On a pure cost comparison, SWC practices could save between $375m and $2,034m over 20 years, and if benefits are incorporated, between $433m and $2,092m are saved.

When the costs of building resilience are offset against the benefits, the benefit to cost ratio is 12.4 : 1. If the avoided losses are incorporated to this analysis, the benefit to cost ratio rises to 55.9:1.

4.2 Top-Down Assessment

The top-down assessment uses a variety of national level assessments on the costs of humanitarian aid, as well as estimated losses, to estimate total costs. There was a fair bit of variation in estimates, and as a result three scenarios were modelled, representing lower, middle and upper bound estimates, defined by differences in estimated aid costs, and incorporating potential climate change losses. Losses were estimated using World Bank figures on average annualized economic losses. Early response was estimated by adjusting the cost of late humanitarian aid to reflect reductions in caseloads as estimated in the HEA analysis and by WFP. The cost of resilience is compiled from a variety of national level estimates, including several comprehensive climate change strategies.

The modelling suggests that, at a minimum, early response could reduce humanitarian spend and losses by $837m over a 20 year period. The upper estimate, which includes potential additional losses under climate change, suggests a saving of $2,432m.

Table 8: Summary of National Level Cost Estimates over 20 years (discounted) - Mozambique

	Humanitarian	Early Response	Resilience – low/high estimates	Resilience – With benefits
Scenario 1	$1,575m	$738m	$609m/ $1,434m	($174m) / ($606m)
Scenario 2	$2,389m	$1,080m	$658m/ $1,483m	($124m) / ($557m)
Scenario 3	$4,578m	$2,146m	$791m/ $1,616m	$8m / ($424m)
Benefit to Cost Ratio: Building resilience compared with late response				**$2.6-$4.7:1**

All six resilience estimates result in figures that are less than the cost of humanitarian aid. Using a very conservative estimate, assuming a return of $1.1 for every dollar spent on resilience, which is assumed to persist for the full 20 years of the model, **the resilience scenario results in a *benefit* in five out of six scenarios, between $124 and $606m.**

When the costs of building resilience are offset against the benefits, the benefit to cost ratio ranges between 2.6 and 4.7:1.

5 Niger

5.1 Bottom-Up Assessment

The bottom-up assessment uses HEA modeling to estimate the food deficit for drought in agricultural and agro-pastoral areas of Niger, in 28 livelihood zones with a population of approximately 5.2m people (out of a total population of 17m).

The modelling uses historic data to define high, medium and low magnitude droughts, their return period, and models these over a 20-year period. Detailed cost data was supplied from WFP on the cost of late and early humanitarian response, and this was combined with the caseloads estimated under the HEA. The HEA model assumes that late humanitarian response occurs after the onset of medium- to high-risk coping strategies have been undertaken, whereas early response takes place before these coping strategies are employed. The resilience scenario used empirical data on the costs and increased yields as a result of soil and water conversation practices and agriculture, and these were fed through the HEA model to estimate the change in food deficit within the household economy that would occur. Further to this, spikes in acute malnutrition were estimated and costed.

Table 9: Cost Comparison of Response for Storylines (USD million) – Niger

	Storyline A	Storyline B	Storyline C	Storyline C – with benefits
	Late Hum. Response	Early Response	Resilience	Resilience
Aid Alone	$1,198m	$621m	$354m	($1,246m)
Aid + Losses	$4,844m	$699m	$354m	($1,246m)
Benefit to Cost Ratio: Building resilience compared with late response				$13.2-$31.5:1

Early response is significantly less expensive than late response, saving between $577m and $4,145m over 20 years, depending on the model. Resilience saves even more money still. On a pure cost comparison, SWC practices could save between $844m and $4,490m over 20 years as compared with late response.

When the costs of building resilience are offset against the benefits, the benefit to cost ratio is 13.2 : 1. If the avoided losses are incorporated to this analysis, the benefit to cost ratio rises to 31.5:1.

5.2 Top-Down Assessment

The top-down assessment uses a variety of national level assessments on the costs of humanitarian aid, as well as estimated losses, to estimate total costs. Humanitarian aid has increased significantly in recent years, as aid has been increased and improved to more adequately meet needs, and also as a result of successive events. Loss data was estimated from a World Bank report, though these estimates, while comprehensive, were only for crop losses, and therefore are likely to significantly understate the total impact. The cost of early humanitarian response was estimated by applying the same percentage reduction that was estimated in the HEA modelling. The cost of resilience was based on the Government's plans for addressing food security.

The modelling suggests that, at a minimum, early response could reduce humanitarian spend and losses by $1.5b over a 20 year period, or an average of $75m per year.

Table 10: Summary of National Level Cost Estimates over 20 years (discounted) - Niger

	Humanitarian	Early Response	Resilience	Resilience – With benefits
	$2.7 billion	$1.2 billion	$3.4 billion	($1.7 billion)
Benefit to Cost Ratio: Building resilience compared with late response				**$2.3:1**

The modelling indicates that resilience costs more, although the costs of late humanitarian response are likely to be a significant underestimate due to the lack of data on damages. Further, investment in resilience will yield benefits above and beyond reduced aid costs. For example, the improved seeds are shown in the bottom up assessment to have a return of $8 for every $1 spent. Assuming a return of $1.1 for every dollar spent on resilience, **the resilience scenario results in a *benefit* of $1.7 billion over 20 years.**

When the costs of building resilience are offset against the benefits, the benefit to cost ratio is 2.3 : 1.

6 Bangladesh

In the case of Bangladesh, HEA data is very limited and hence only a top-down analysis could be performed.

6.1 Top-Down Assessment

Late humanitarian response: National level statistics were used to estimate costs for each scenario. Humanitarian aid flows are estimated to be approximately $82m per year. However, unit humanitarian aid costs were also available, and these were combined with the estimated number of people affected each year by disaster, as an alternative measure. Specifically, aid is estimated to cost $72 per person (food aid, non-food aid, WASH and shelter), and it is estimated that an average of 10m people are affected by disasters each year, leading to a total estimated need of $720m per year, well above the estimated annual disbursements. The cost of spikes in acute malnutrition adds another $56m to the total cost. Further to this, losses are high in Bangladesh, estimated to average between $594 and $1,187m each year, and human loss adds another $1,921m in severe events.

Early humanitarian response: is estimated using data on reduced unit costs as a result of early procurement; reduced caseloads due to early treatment of malnutrition; reduced losses; and saved lives due to evacuation.

The cost of building resilience is estimated using the cost of the Bangladesh Climate Change Strategy and Action Plan (BCCSAP) 2009. In return, it is assumed that the total losses estimated under early response can be reduced by 10% each year, stabilizing at 10% of the original amount in year 10 to reflect the fact that some risk and loss will always be present. It should be noted that the analysis that models resilience under climate change, finds that detailed estimates of the cost of adaptation are similar to the costs presented here, and yet are predicted to offset losses in full – suggesting that these assumptions are very conservative, and that the cost of building resilience may be lower still.

The cost of building resilience under climate change is also estimated. Detailed analysis on the costs of climate change, as well as potential adaptation measures, was available for floods and cyclones and incorporated into the analysis.

Table 11: Baseline Scenario: Summary of National Level Cost Estimates over 20 years (discounted)

	Humanitarian	Early Response	Resilience	Resilience – With benefits
Model 1: Historic Aid Costs	$8,479m	$5,074m	$7,761m	$316m
Model 2: Unit costs of Aid	$15,292m	$10,920m	$10,485m	$3,041m
Benefit to Cost Ratio: Building resilience compared with late response				**$5.0-6.4:1**

The modelling suggests that early response could reduce humanitarian spend and losses by $3.4 to $4.4 billion over a 20 year period, or an average of $219m per year.

The modelling indicates that resilience costs less than late humanitarian response under both models. This is purely a cost comparison. When the potential additional benefits of resilience are included, the costs are significantly lower than even early response. **Under model 2, investing in resilience could save a minimum of $12 billion over 20 years.**

When the costs of building resilience are offset against the benefits, the benefit to cost ratio is between 5.0 and 6.4 : 1

Further to this, Bangladesh has very good information on the potential impacts of climate change on increased frequency and intensity of cyclones and floods. As a result, losses associated with natural disasters under climate change are expected to increase substantially, and as a result, the avoided loss associated with early response and preparedness is even greater. These impacts are modelled below.

Table 12: Climate Change Scenario: Summary of National Level Cost Estimates over 20 years (discounted)

	Humanitarian	Early Response	Resilience	Resilience – With benefits
Model 1: Historic Aid Costs	$26,213m	$15,474m	$10,577m	$598m
Model 2: Unit costs of Aid	$46,651m	$33,010m	$12,331m	$2,352m
Benefit to Cost Ratio: Building resilience compared with late response				**$8.4-11.9:1**

When the costs are considered in a future climate change scenario in 2050, the findings are even more staggering. Under climate change, early response could save between $10.7 billion and $13.5 billion, and resilience could save between $15.6 billion and $34.3

billion over a 20-year period, based only on a cost comparison. When the costs of building resilience are offset against the benefits, the benefit to cost ratio is between 8.4 and 11.9:1.

7 Conclusions and Recommendations

7.1 Conclusions

Early response and resilience building measures should be the overwhelming priority response. These two categories of response are not mutually exclusive – indeed commercial destocking, if taken to its fullest extent, would represent a functioning livestock marketing system, which would be considered a resilience building measure. The findings in this study fully support an economic imperative for a shift to greater early response and resilience building.

Early response is far more cost effective than late humanitarian response. The assumptions used in this analysis are conservative, and the findings nonetheless indicate that early response can decrease costs and losses substantially. This is consistent across all five country studies, with early response saving billions of dollars over the 20 year period. In Kenya, where comprehensive loss data was available, the model estimates that early response would save $21b over 20 years, or an average of $1bn per year. **Economic concerns over false early response are unwarranted.** Early responses could be made 2-6 times to forecast crises that do not materialise before total cost would be equivalent to that of a single late response.

Investment in resilience interventions is also more cost effective than late humanitarian response. In Niger and Mozambique, the HEA modeling was able to incorporate the cost and impact of specific SWC initiatives as a resilience building measure, to model the change in food deficit in household economies. The impact was a reduction in costs of $375m in Mozambique (for a modeled population of 2.6m) and $844m in Niger (for a modeled population of 5.2m). In Ethiopia, commercial destocking was used to model a specific early response. However, commercial destocking taken to scale would represent a functioning livestock market, a key resilience intervention. This intervention saves $1.6 billion for a population of 2.8m under the HEA modeling. The savings are higher because loss data was also available for Ethiopian households and incorporated into the model. If such data was available for Niger and Mozambique, the argument for investing in resilience would be strengthened. **The benefits of investing in resilience consistently outweigh the costs, yielding gains ranging from $2.3 to $13.2 for every dollar invested.**

Further to this, resilience investment yields benefits above and beyond the immediate reduction in humanitarian costs. This strengthens the imperative for greater investment in resilience. These interventions are proven in the literature to yield returns multiple times over the investment cost, delivering long term development gains well beyond the humanitarian agenda.

Investment in resilience requires flexible and long-term thinking. The selection of SWC and destocking is not meant to imply that these interventions should be prioritized for broader resilience investment. Rather, both of these measures have been used fairly extensively and data existed on their impact, and hence they provided a good proxy for the magnitude of change that could occur. Clearly, building resilience will require a combination of initiatives that vary depending on the local context. As a result, flexibility to respond to local contexts will be necessary to ensure that resilience investments deliver on their potential gains.

Climate change strengthens the imperative for investment in resilience. In Bangladesh, detailed analysis on the damages and losses associated with climate change, as well as the estimated adaptation costs, was available for both floods and cyclones. Over 20 years, the model suggests that, under climate change, early response could save between $10.7 billion and $13.5 billion, and resilience could save between $15.6 billion and $34.3 billion over a 20-year period, based only on a cost comparison.

7.2 Recommendations

Funding models must be changed to integrate relief and development in a coherent cycle. The findings of this analysis fully support the HERR recommendation to change funding models by **increasing predictable multi-year funding** to help facilitate early response. Along similar lines, funding should be allocated under an umbrella mechanism that covers all stages of disaster management.

In the short term, a more cost effective approach would be to prioritize early response measures. Even if there is some level of uncertainty over whether a high magnitude event will occur, the cost difference is such that it will still be much more cost effective to invest in measures that promote early response. Further, many of these measures can also help to build resilience in the longer term. Ways to take these types of interventions to scale should be investigated.

Spending on resilience needs to increase significantly, both in the short and the long term. Current efforts to build resilience have remained largely at a pilot/demonstration level. Donors and governments need to shift far greater portions of funding into resilience, and in the short term this will also require continued funding to humanitarian aid as asset depletion is reversed.