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The evidence base on **Anticipatory Action**

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Lena Weingärtner, Tobias Pforr, Emily Wilkinson

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Executive summary

Anticipatory action (A-A) is attracting global attention with the number of pilot initiatives delivering support to vulnerable communities before disasters strike growing in number and size. At the UN Secretary General's Climate Action Summit on 23 September 2019, the Risk-informed Early Action Partnership (REAP) was launched, with more than 30 partners committing to vastly increasing the coverage of A-A. The target is to cover one billion more people by financing and delivery mechanisms connected to effective early action plans by 2025.

As A-A expands so too does the importance of monitoring and evaluation to improve practice, strengthen accountability, and enhance reflection and learning. This paper takes stock of the evidence produced so far on the benefits of acting early prior to the onset –or deepening – of a crisis, to reduce the impacts. Overall, existing evidence indicates that the effects of A-A at household level are mainly positive, with beneficiaries for instance experiencing less psychosocial stress when floods hit, higher crop productivity and less food insecurity during prolonged periods of drought, and lower livestock mortality during severe cold spells. However, not all expected benefits are observed in all cases and findings should be considered in relation to context and the kind of action that was taken. The range of counterfactuals used is also limited, so although acting early can be better than doing nothing, it is less clear whether it is also better than doing other things at different points in time.

Initiatives that explicitly link forecasts to pre-predetermined actions and financing are relatively new in the humanitarian sector, so the evidence base is thin but growing. The focus to-date has been largely on producing evidence for advocacy, to generate agreement and buy-in from donors, set global targets and ultimately to encourage further investment in A-A. Early studies have therefore focused on the monetary benefits by using return on investment (ROI) and cost–benefit analysis (CBA). These studies help make the general case for A-A, but greater attention now needs to be paid to producing evidence in a way that can lead to improvement in the design and delivery of A-A programmes.

This report proposes an evidence agenda for A-A focusing on:

1. Greater investment in monitoring, evaluation and learning (MEL) systems

As more A-A initiatives come online the need to evaluate and compare these becomes more critical, but larger initiatives also mean more resources are available for MEL. Greater investment in MEL is needed to ensure evidence is produced to a high standard and can be used to make improvements to the design and delivery of A-A on the ground.

2. Development of a common analytical framework for A-A evaluations

Implementing agencies need to agree a common analytical framework by which to undertake and ultimately assess A-A, and a set of principles that encourage methodological rigour in testing the appropriateness of early actions. This will encourage coherence and quality in the evidence base. A starting point and critical step is for agencies to start sharing evaluation reports and the data and methods on which they are based.

3. A focus on improving the models

Special care must be taken not to over-estimate the value of avoided losses when calculating and presenting the monetary benefits of A-A using ROI and CBA methods. Transparency about models and assumptions is critical. Evaluation methodologies should also seek to capture and emphasise the collective benefits or public goods associated with A-A.

Efforts to improve evaluation methodologies for A-A are underway. Encouragingly, implementing agencies consulted for this study are already taking forward recommendations to share information and use more robust evaluation methods. **There are moves to develop manuals and guidelines on best practice in monitoring and evaluation, and a new monitoring, evaluation, accountability and learning (MEAL) group on forecast-based early action has been set up and is exploring the idea of creating a common analytical framework to assess A-A.**

With strong monitoring, evaluation and learning frameworks built into the design of A-A initiatives, and as these initiatives grow in an attempt to reach 1 billion people, more substantial evidence will soon be available for assessing the benefits of acting early before disasters.

Introduction

Anticipatory action (A-A) approaches are gaining increasing traction with international humanitarian agencies keen to act earlier to reduce the impact of natural hazards and enhance post-disaster response. Such initiatives, often referred to as forecast-based early action (FbA), Forecast-based Financing (FbF) and Early Warning Early Action (EWEA), can be distinguished from other humanitarian, disaster risk reduction and preparedness practices as they rely on weather and other forecasts to trigger funding for concrete, pre-determined actions prior to a shock or before acute impacts are felt. A-A needs to be conceptualised, discussed and agreed in advance so that decision-making and financing can happen quickly and efficiently (Wilkinson et al., 2018).

Most practitioners share a common vision of the importance of anticipation, but initiatives classified as 'anticipatory', 'early', or 'forecast-based' are diverse, with different approaches to the timing of decisions and actions, the use of forecasts and risk information and the financing instruments and delivery mechanisms deployed (Wilkinson et al., 2018). This diversity is also reflected in the terms used to refer to A-A (see de Wit, 2019 for an overview), as well as in the type of evidence that is being generated to understand impacts and build a case for further investment in these mechanisms. Although acting early might intuitively make sense – and there is a moral imperative to act if a crisis is predicted, in order to avoid human suffering – robust, scientific evidence regarding the efficiency and effectiveness of A-A is also needed to refine and improve these mechanisms, engage donors and justify further investment.

This paper reviews the evidence base on A-A emerging from FbA, FbF, EWEA and other initiatives implemented in recent years. The types of actions undertaken and evaluated range from small cash transfers for poor households at risk of flooding to livelihood and health interventions and actions that help humanitarian agencies and governments act early and better prepare for a more effective response (see Table 1). Studies have looked at outcomes related to objectives such as:

- Avoiding, reducing and mitigating expected impacts by acting early, before a disaster strikes.
- Acting early to reduce response time, so that aid gets to people faster, averting suffering and helping to prevent more severe impacts.
- A decrease in the cost of humanitarian response through greater prepositioning and early procurement.
- Better-quality programme design through pre-planning with more preventative measures, and potential co-benefits in non-crisis times (Wilkinson et al., 2018).

As forecasts improve, the use and geographical coverage of A-A is growing, with donors and international agencies attempting to scale up pilots and achieve greater impact. Hence, learning from their successes and failures is critical. This paper provides an overview and assessment of the evidence available to date.

The next section describes the methodology used for this review, including the criteria used to assess the evidence base. In section 3, the authors discuss the concept of 'evidence', and why it is needed for A-A. Section 4 describes some of the challenges of undertaking evaluations of A-A, some of which are common to evaluations of humanitarian action more broadly. In section 5, modelled and empirical evidence is presented and critically assessed in terms of its strengths and limitations. Finally, section 6 presents the main conclusions of the study and sets out recommendations for the development of an evidence agenda on anticipatory action.

Methodology

This report builds on and reviews primary and secondary literature on the outcomes of A-A. Published grey and academic literature was identified through keyword searches via Google and Google Scholar search engines. Relevant keywords used included A-A terms (e.g. 'forecast-based early action', 'anticipatory action' or 'Forecast-based Financing'), in combination with study-related terms (e.g. 'cost–benefit analysis' or 'impact evaluation'). Primary literature entails papers presenting original evidence on the impacts of anticipatory action, including studies on the return on investment (ROI), cost–benefit analysis (CBA) and value for money (VfM). Secondary literature comprises documents that review, synthesise or further discuss this primary evidence. Although the secondary literature provided less detail, it was useful as a starting point for reference tracing to identify further primary studies. In parallel to the online literature search, and to access additional unpublished information, the authors asked key institutions engaged in A-A to share additional internal studies.

Based on a review of abstracts, summaries and in some cases full text, literature that did not focus on outcomes and impacts of A-A or that provided insufficient detail on the study methodology were excluded from the review. The initial list of studies for review was thus reduced to 25 published and unpublished documents, including peer-reviewed journal articles, case studies and monitoring and evaluation reports.

An overview of the studies considered in this review is provided in Annex 1. Studies on preparedness and early response that came up through the search process were included in the review if they were sufficiently similar to A-A, used definitions that would include anticipatory actions or were timely enough to overlap with what is considered as A-A in this report. Selected studies were then compiled and analysed in a matrix capturing the methodologies and models used, types of impacts studied, results presented and methodological limitations.

The authors also conducted 15 key informant interviews with practitioners working in the field of A-A, as well as monitoring, evaluation, accountability and learning (MEAL) specialists. Interviewees spanned international UN organizations, donor governments and non-governmental organizations (NGOs). This generated information on how different stakeholders view and approach the generation and use of evidence on A-A.

Evidence and why it is needed

What is evidence in the context of anticipatory action?

Evidence helps with decision-making on how a given problem ought to be solved. The goal of creating an evidence base is therefore to answer whether, when, where, what and, ideally, how much resources should be devoted to A-A. While the evidence base is clearly important, views vary widely on the nature, strength and saturation of evidence. For some key informants, the evidence base is established and strong. Others, by contrast, found the evidence base to be limited and small. For example:

> ***I see the evidence base as anything that is ideally published or publicly accessible on anticipatory action that has been rigorously produced. It's a small evidence base, I think, but one that is luckily growing.***
> *Key informant 2*

> ***I think we have tried to document things as we go. Sometimes it's hard for me to accurately assess what other people know. Because we write down a lot of things and some of it goes public, some of it just dies in somebody's email inbox. I do think a lot of it is out there.***
> *Key informant 3*

There is no single view on what constitutes the evidence base on A-A, or even what counts as evidence for or against A-A. This partly reflects differences in opinion of what constitutes anticipatory action, as opposed to strengthening early warning systems or preparedness work more broadly. A thesaurus,[1] still in draft stage, defines anticipatory action as 'actions taken in anticipation of a future crisis'.[2] Relevant initiatives that come under the A-A banner include Forecast-based Financing, Early Warning Early Action, forecast-based action and forecast-based early action (de Wit 2019). There is also a much larger field of practice and associated literature on early warning systems (see Box 1) and plenty of experience of individuals acting in anticipation of all kinds of potentially adverse events. These last two fall outside the remit of this paper.

In this report, we focus on initiatives of humanitarian organizations that comprise a comprehensive system of linked, pre-defined and planned forecasts, triggers and decision-making protocols; early actions; financing mechanisms; and delivery channels (Wilkinson et al., 2018). These organizations are attempting to streamline A-A in the humanitarian sector so that assistance is provided earlier, and disaster impacts can be reduced. This represents a substantive shift in the traditional humanitarian sector, where anticipatory action was previously carried out either ad hoc or not considered part of the mandate of these organizations. **A core group of organizations has worked towards this shift and started to build the evidence base, including the Red Cross Red Crescent Movement, the Food and Agriculture Organization (FAO), World Food Programme (WFP) and the Start Network.** Other large international non-governmental organizations (INGOs) such as CARE, Save the Children, Welthungerhilfe and others have also contributed.

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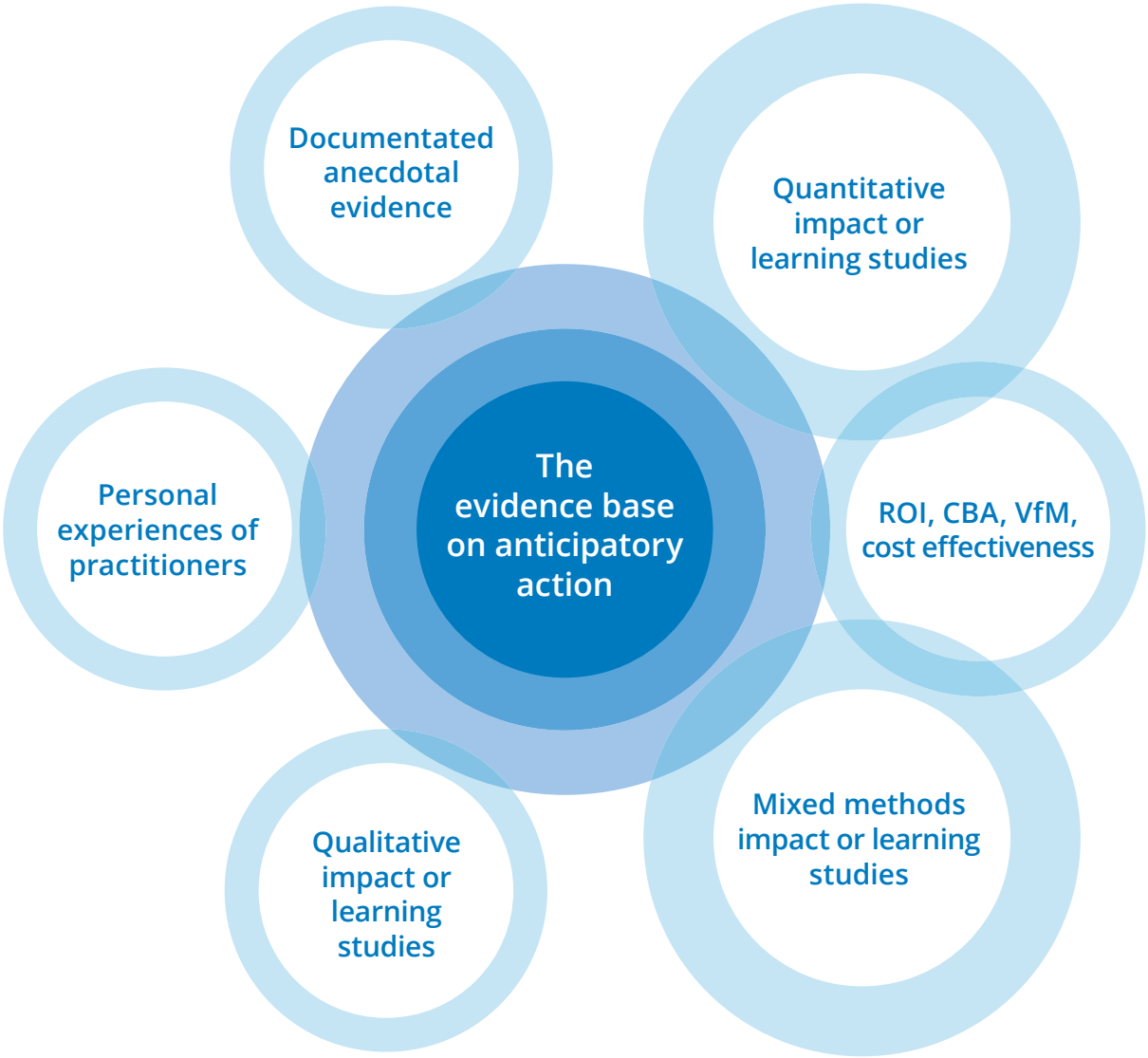
1 Recently commissioned by the Centre for Disaster Protection, the Red Cross Red Crescent Climate Centre and the UN Office for the Coordination of Humanitarian Affairs (OCHA).
2 At the time of writing the thesaurus was still being developed and a decision had not been taken on whether the term 'crisis' would be used as the state before which A-A should or could be taken.

Evaluations of these initiatives are diverse and include different types of knowledge (summarised in Figure 1). Some key informants felt that a combination of knowledge types is needed to make up the evidence base, while others favoured particular subsets of knowledge, such as published and peer-reviewed studies or personal experience and anecdotal evidence emerging from their own organizations' implementation of anticipatory actions. In this report, we use a wide definition, with 'evidence' meaning any information within this domain that systematically assesses or evaluates the impacts of A-A.

Figure 1: Different types of knowledge considered as evidence on anticipatory action by stakeholders [3]



3 Anecdotal knowledge is something gained second-hand, as opposed to personal experience.

Evidence for what purpose?

Evidence is not produced in a vacuum. It takes resources (human and financial) to compile data and further resources to analyse that data in ways that answer particular questions. The evidence produced so far on A-A reflects the different questions posed, as well as the knowledge and interests of the actors involved.

Humanitarian agencies are most concerned with existing, ongoing suffering, and the goal of humanitarian action is to address that suffering as quickly and fully as possible, wherever it occurs (Slim, 2015). Yet there is never enough funding to relieve all current suffering: according to OCHA the humanitarian funding gap is around 40 percent (OCHA 2019), so agencies need to justify using current resources for potential future disasters. Evidence is needed to answer questions about whether a humanitarian intervention improved the lives of the people affected (and did no harm). Some humanitarians are also convinced of the need to invest in risk reduction and preparedness so that local communities are more resilient in the future; others feel that this might not be a humanitarian responsibility and hence not the most appropriate use of humanitarian funds.

Disagreements over the state of the evidence base on A-A reflect these differences. Essentially, actors are looking for different kinds of evidence for different purposes: some want evidence on whether A-A is more cost-effective than regular humanitarian intervention, while others want to show whether it relieves human suffering or provides relief faster than normal humanitarian assistance. Others want to learn what has worked and what has not worked from past A-A interventions to inform the design of future ones. Whether practitioners consider existing evidence as 'sufficient' or 'lacking' for their purposes thus depends as much on the goal of an intervention – and whether they agree this was the right goal – as it does on the approach used to generate evidence on whether that goal was accomplished.

Early studies on A-A have placed most emphasis on producing evidence for advocacy and to drive donor investment in A-A, with less emphasis on scientific rigour and lesson-learning. This is particularly the case for studies aimed at monetising the benefits and costs of anticipatory action, to evaluate return on investment. More attention should now be paid to analysis that could drive improvements in programming and implementation, and care should be taken to also focus on those interventions whose results are less easy to measure. This will improve the credibility of these evaluations.

What constitutes 'success' in anticipatory action?

While views differ on expected outcomes of A-A, stakeholders did agree that success could be considered at different scales: from the individual and household level to institutional and humanitarian-system levels (see Table 1). Most stakeholders agreed that reducing humanitarian needs is critical, as is improving the longer-term wellbeing of vulnerable people. These objectives are linked, with anticipatory action leading to improvements in humanitarian interventions and, eventually, better outcomes for households and communities.

Key informants had different views on the time dimension in which outcomes needed to occur: essentially, some are more focused on short-term outputs and outcomes related to specific events – mostly rapid-onset ones such as floods or cyclones – and others more concerned about longer-term outcomes, such as strengthening resilience to recurrent shocks and stresses. All recognised, however, that these longer-term outcomes were not currently being studied.

Table 1: Expected outcomes of anticipatory action

HUMANITARIAN SYSTEMS / INSTITUTIONAL LEVEL	INDIVIDUAL AND HOUSEHOLD LEVEL
• Increased operational capacity to act on forecasts or early warnings	• Protected lives
• Reduced response costs and time	• Protected livelihoods • Avoided losses • Faster recovery
• Reduced or transformed the scale of later humanitarian needs	• Avoided or mitigated physical and psychological suffering • Protected food security and nutrition
• Shift in humanitarian / disaster management / development culture and policy	• Strengthened resilience

Source: Key informant interviews

An overview of the evidence base

Existing studies on A-A can broadly be divided into two types:

1. Modelled outcomes based on theory and constructed scenarios, which can help identify potential benefits of A-A, create an analytical framework, and build a theory of change for A-A, and

2. Empirical studies that provide evidence on the actual outcomes and impacts of A-A.

Of the 25 studies included in this review, 10 are purely based on theoretical modelling while 13 include at least some empirical assessment and a further two focus on institutional learning.

Studies can also be differentiated by the types of hazards for which action is taken, the action(s) themselves, the probability of the event, the likely impacts, the needs of the target population at different points in time and the windows of opportunity for different actions; the outcomes or impacts of A-A considered; the methodology used; alternative scenarios of how a situation could develop and other actions that could have been taken; and how an intervention contributes to resilience and longer-term development (Weingärtner and Wilkinson, 2019).

Of the 25 studies reviewed, 15 focus on or include a CBA, cost-effectiveness, VfM or ROI components. In assessing the outcomes of A-A, seven out of the 15 empirical studies compare anticipatory interventions against a control group that received no intervention. Others attempt to estimate a counterfactual of later humanitarian response or construct a scenario where action was taken but the anticipated hazard or impact did not materialise. More studies that compare A-A to standard humanitarian response and to regular, predictable preparedness actions in areas prone to frequent, repeated and cyclical disaster events would be useful (Tanner et al., 2019). Alternative scenarios where different types – or combinations – of anticipatory actions are considered are also lacking, as are considerations of the various opportunity costs of a particular intervention.

It should be noted that, given the short timeframes involved, most studies only estimate effects of an intervention on a time horizon of less than a year. There is a desire to better understand longer-term impacts and stakeholders recognise that longitudinal studies would be needed to generate this type of knowledge.

In terms of country focus, studies have been conducted in over 16 countries, but most countries have only been subject to one or two studies (Ethiopia, Kenya and Bangladesh seem to be the exceptions). A diverse range of actions has been evaluated in different contexts, further limiting the generalisability and comparability of results.

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Given the diversity described above, it is not possible to conduct a robust meta-analysis at this time. Rather, what emerges are insights about particular interventions (see section 5). There is some concern regarding the degree of fragmentation and the danger of 'comparing apples and oranges' in reviewing different studies, but some level of consolidation seems to be slowly growing around evaluations of anticipatory cash transfers – the single type of action which has seen the most assessments at this point.

It is perhaps not surprising, given the diversity of studies and issues outlined above, that assessing the evidence base is a complex task. Given the differences in context, in the design of A-A, the diversity of actors involved and the different data collection methodologies used, it is impossible to apply the same criteria of evaluation to different studies to aggregate findings. This prevents a more thorough meta-analysis of the evidence for now, particularly as there are still only a few examples of A-A being implemented and rigorously evaluated.

The evidence base around A-A is neither coherent nor comprehensive. Rather, it reflects the very different programmes and interventions that are captured under the umbrella term 'early action'. These different initiatives, in turn, reflect the diverse mandates of the organizations delivering them. Given this diversity, it is not surprising that there are diverging judgements about the best way to assess and evaluate A-A. This includes differences of opinion regarding the level of certainty that is required to consider something as established evidence.

Challenges of studying **anticipatory action**

Challenges of studying anticipatory action

One major difficulty in studying A-A relates to the broader problem of conceptualising and understanding human wellbeing between different individuals and over time. Evaluating A-A also suffers from difficulties faced more broadly in evaluations of humanitarian interventions. These have been well-studied and described in the academic and practitioner literature. Puri et al. (2017), for example, identify six key practical challenges: complex settings, the need for speed, a multiplicity of actors, attribution, high co-variability and ethical challenges related to the construction of relevant counterfactuals for the evaluation of preventive action.

TIMING OF ACTIONS

Measuring A-A outcomes faces many challenges, including how 'early' is defined, especially in the case of drought and pandemics. The windows for action to reduce impacts from floods, cyclones or other rapid-onset events based on forecasts and early warnings are relatively clear but defining the start of slower-onset events is more difficult. For instance, a drought evolves through various phases and interventions could begin based on a seasonal rainfall outlook; sub-seasonal or short-term rainfall forecasts; when satellite data shows that crops have failed; when food prices begin rising; when people start migrating; or when other humanitarian consequences manifest. Depending on which expected impacts A-A is trying to address and what type of information is available, different types of actions become relevant. What is understood as 'early' action therefore influences the intervention as well as how it is studied and evaluated.

COUNTERFACTUALS

A further challenge is the lack of consensus on alternative scenarios that A-A should be compared with. Should it be compared with what would have happened during a normal humanitarian response? Or against another anticipatory intervention? Or a situation where action had been implemented but the forecast event did not materialise? Should it be compared with activities that build resilience? Or a scenario where no intervention had taken place at all? If what matters most is satisfying unmet needs through a humanitarian intervention, the most basic alternative scenario is not having done anything. In reality, however, different options for alternative humanitarian action may exist and the potential of A-A approaches to enable earlier action poses additional questions. These include whether A-A reached those who were (or would have been) most affected by the crisis once it materialised; as well as whether needs could have been met equally well or better through a more cost-effective intervention, a timelier intervention or an intervention coordinated in a different way.

From a humanitarian perspective, these questions matter because they relate to directly reducing suffering as well as to opportunity costs (e.g. resources saved through earlier action that could be used to address additional needs). Development practice, on the other hand, is concerned not only with basic needs, but also with broader issues of longer-term wellbeing, resilience and sustainability. Unlike basic needs, which at some point can be considered to have been fully met, development is an open-ended process, and possible scenarios include longer-term or regular interventions to reduce risk, increase preparedness and strengthen resilience. Larger and longer-term interventions would require more resources.

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RAISING THE BAR

Some key informants felt that the bar of what counts as good evidence was significantly higher for A-A than for normal humanitarian response. Considering the much smaller levels of funding and scale of interventions, they were concerned that A-A was being held to unachievably high standards early in its development. Nonetheless, these high standards may be needed to overcome what is known as status quo bias, 'where change is resisted unless the benefits very clearly and categorically outweigh the risks' (Feeny, 2017). In the case of A-A, this means shifting from inaction or late action to early action, spending money on a crisis that has not yet happened.

Anticipatory humanitarian systems in their current form have only been operational for around five years and many of the pilot mechanisms have not yet been triggered, which partly explains the lack of robust evidence and why so much attention is placed on only a handful of evaluations. As one key informant explained: 'We introduce something a bit new. And we expect from the donors to accept a certain level of uncertainty [but] we feel we should show them that it's worth it. So I understand why we put so much weight on these [first evaluations]'. This common sentiment highlights the importance of using evidence in donor relationships, but also reveals a problematic premise among some practitioners testing anticipatory action; one where evidence is aimed at demonstrating that the approach works, rather than at better understanding whether it works at all or what action is needed in a specific context at a certain point in time.

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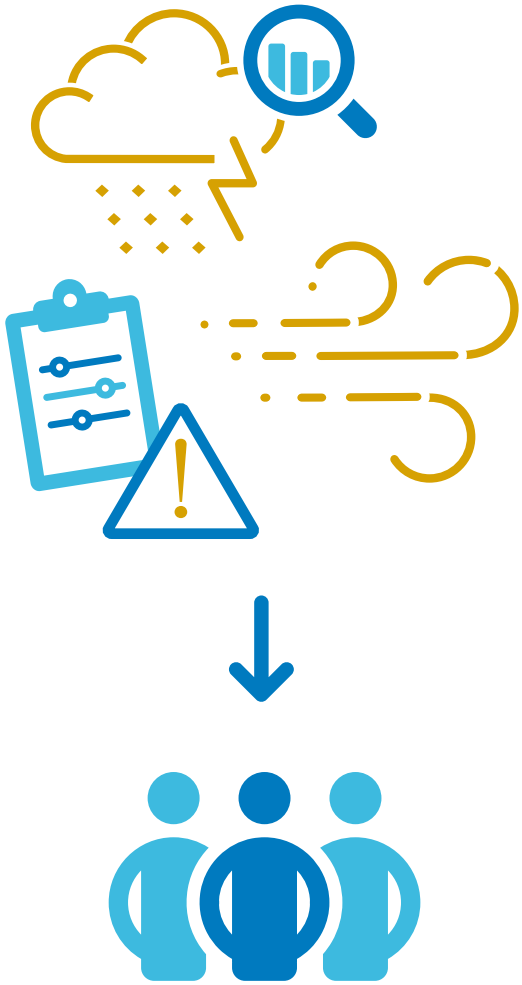

Understanding outcomes and impacts **of anticipatory action**

Understanding outcomes and impacts of anticipatory action

The assessment of outcomes from A-A considered in this review is based on other recent evidence reviews and studies.[4] A-A studies can broadly be divided into two types: modelled outcomes based on theory and constructed scenarios, and empirical studies.

Theoretical models rely on assumptions, for instance about the fluctuation of crop and livestock prices or what beneficiaries will buy with the cash they receive before a shock, which are not necessarily realistic. This means that studies based purely on theoretical modelling cannot tell us the actual outcomes of interventions. Nonetheless, they can be useful in identifying potential outcomes, creating an analytical framework and building a theory of change for A-A. An overview of these studies is presented in section 5.1. Studies based on empirical evidence are smaller in number but slowly growing. They rely on much fewer assumptions than theoretical models and are used to test theories in the real world. These are summarised in section 5.2.

Modelled outcomes of anticipatory action

This section presents the modelled evidence of outcomes from anticipatory action at different levels. Results highlight the potential to enhance outcomes for humanitarian systems and institutions, as well as for households, but they are not based on empirical testing.

Potential outcomes of anticipatory action on the effectiveness of humanitarian systems

Substantive savings in disaster response could be made through A-A based on forecasts and early warnings. Most studies look at A-A aimed at enhancing preparedness and readiness to respond, for instance through prepositioning relief items or emergency communication systems in areas likely to be affected by an imminent shock.

Studies commissioned by DFID and USAID modelled the effects of various types of actions on reducing and mitigating disaster impacts in several African and Asian countries, with an overall positive verdict on the potential gains from acting earlier, before acute impacts are felt (Cabot Venton, 2013; Cabot Venton, 2018).

In Bangladesh, Ethiopia, Kenya, Mozambique and Niger, an 'early response' to natural hazards is estimated to be more cost-effective than an alternative late humanitarian response (Cabot Venton, 2013).[5] In Kenya, the authors estimate a saving of US$20 billion over a 20-year period (i.e. an annual average of US$1 billion) from acting at the first signs of a possible drought. Activities such as commercial animal destocking, early procurement of food or other aid or animal health interventions would be carried out ahead of peak humanitarian needs, before significant livestock deaths occur and before people start resorting to high-risk coping strategies. The study also addresses fears of 'getting it wrong', i.e. taking actions early when an expected crisis does not materialise later on. It finds that actions based on 'false alarms' could be taken two to six times before the total costs would reach those of a single late response.

Some of the estimated savings come from procuring food before prices rise. However, as cash assistance becomes more popular with international agencies, delivering cash early rather than procuring food early might also shift the level of savings from A-A related to food prices. In this case, food would be purchased by cash transfer recipients in local markets rather than by humanitarian agencies in national or international markets. A further consideration is that people benefiting from livestock-related A-A are primarily those with more animals to sell, while people who would get relief tend to be those with no, or few, animals. This in no way invalidates the importance of early livestock interventions, but it does highlight the difficulty of comparing these interventions with the costs of relief.

4 In particular, this report draws on excerpts from a recent overview of evidence on anticipatory action in Weingärtner and Wilkinson (2019).

5 The Cabot-Venton study uses the term 'early response' to describe actions including early procurement, with the aim of reducing disaster-related losses and saving lives through evacuation. Despite the different terminology, there is significant overlap with what would be considered A-A in this review.

A more recent study in Ethiopia, Kenya and Somalia also suggests that action taken to reduce drought impacts before price rises and before people resort to negative coping strategies is cost-effective compared to a later response. However, the magnitude of savings modelled across the three countries was much smaller than for the earlier Kenya country study, amounting to US$1.6 billion over 15 years (Cabot Venton, 2018).

A recent study of WFP and UNICEF emergency preparedness interventions in Chad, Madagascar and Pakistan reveals a positive impact in terms of cost and time savings in humanitarian response (Meerkatt et al., 2015). The study includes a wide range of preparedness investments, much of which is beyond the scope of what anticipatory action systems could deliver (e.g. infrastructure projects). However, it also looks at the pre-positioning of emergency supplies for early response, which has been implemented as an early action triggered by forecasts in some existing A-A systems. Procuring international commodities (which may not be available in sufficient quantity in local markets, or are needed to bridge post-disaster gaps until local markets have recovered) has mostly had a positive return on investment, reducing the costs of transportation ahead of an emergency and providing a time saving of around 16 days on average across the three countries, facilitating a quicker response. Pre-positioning internationally sourced emergency supplies was one of the few actions with positive ROI and time savings across the three countries considered. This indicates how taking action early, based on forecasts, could help speed up response. However, whether international procurement is a suitable anticipatory action depends, among other factors, on the time window available between the forecast and the onset of disaster.

A recent study of action implemented by WFP and the government of Nepal to address floods in Nepal, looks at the potential humanitarian return on investment (H-ROI) from delivering information and advice to farmers, the formation of emergency teams, emergency stockpiling, preparing and distributing emergency kits, evacuations and preparing shelters (WFP, 2019). It draws on historical data, expert judgement and a risk scenario.

The WFP Nepal study assesses A-A against the OECD-DAC's eight evaluation criteria – appropriateness and relevance, effectiveness, efficiency, impact, connectedness, coverage, coherence and coordination – and considers two broad scenarios: one with FbF and one without.

In the case of FbF, potential benefits are considered where: the event happens and an alarm is (a) given or (b) not given; and a situation where an alarm is given but the event does not happen (i.e. a false alarm). The study concludes that FbF can provide substantial benefits over a scenario without FbF, including reduced harm to people and assets, an immediate cost saving for response of US$34 per dollar invested and lower long-term recovery needs. However, even though assumptions used in the cost savings calculation model are listed, the paper provides no explanation of the numbers behind the assumptions and the authors had no access to further information about how they were determined. As the study rightly points out, further ex-post analysis is needed to validate the potential benefits identified (WFP, 2019).

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Potential outcomes of anticipatory cash transfers at household level

One of the few peer-reviewed journal articles on the outcomes of A-A assesses the potential cost-effectiveness of drought-related anticipatory cash transfers that could be triggered by a forecast before the harvest, compared to later cash transfers after the harvest in five Kenyan districts (Nobre et al., 2019). It finds the early cash transfer to be more cost-effective than the post-harvest cash transfer in preventing undernourishment in years with low yields. This finding holds regardless of price variations (which are tested through a sensitivity analysis) and even when false alarms are considered. Forecasts with perfect accuracy (i.e. that correctly predict a drought 100 percent of the time) would be most cost-effective six months ahead of the harvest, but even transfers based on less accurate forecasts (with a higher probability of false alarms) are cost-effective for at least one of the lead times prior to the harvest.

> « Even taking the possibility of a false alarm into account, it is estimated that every US$1 invested in the FbF programme would lead to US$3 saved in beneficiary losses. »

These findings are, however, based on strong implicit assumptions about human behaviour and patterns of food insecurity – related to the use of money, food consumption and the timing of transfers – which are unlikely to hold up. This includes the assumption that if people receive a cash transfer six months before the harvest (i.e. in March), they would use this money to purchase food and eat it throughout the growing season and after the harvest (in September). In reality, six months before the harvest is the middle of the lean season, i.e. the period between harvests when food stocks are depleted (FAO, 2019). Whether people need support during this period will depend on the previous, rather than the future, harvest. At this time, cash transfer programmes may be in place to help people cope with the lean season based on results from the previous harvest, and it seems unlikely that people would save early transfers and store food for later consumption after the harvest rather than consume additional resources received during this time of need.

The authors of this study also assume that maize prices are solely influenced by supply, and that prices are stable during the growing season. In reality, as the study acknowledges, prices can fluctuate, particularly under the impacts of drought, and other factors beyond supply influence this. Another limitation of the study is that operational costs are not considered in the calculations, and that yields are assumed to depend only on climate variability and vegetation cover, while in practice other factors also influence yields. Results could be improved through a deeper understanding of the dynamics of maize supply, demand and prices, and require testing the study's approach and assumptions (Nobre et al., 2019).

A WFP simulation in Zimbabwe used a household baseline survey conducted in 2015 as the starting point to replicate households' economic behaviour in the event of a shock and to model potential benefits from anticipatory action (Giuffrida et al., 2017). This study is linked to the 'Small Grains' project of the Food Security Climate Resilience Facility (FoodSECuRE), which promotes the production of drought-tolerant crops (in addition to maize, the predominant staple) in communities likely to experience below-average rainfall. In the face of production and price shocks, the intervention is estimated to produce 11 percent higher production compared to no intervention (where people would continue to produce only maize in a season with below-average rainfall). In addition, the report estimates that food insecurity increased less for those benefiting from FoodSECuRE, than the national average: 32 percent in the province compared with a national increase of 86 percent between November 2015 and March 2016.

Interestingly, in wards with the largest share of high food insecurity 'beneficiaries seem not to profit significantly from the intervention' (Giuffrida et al., 2017). Women-headed households were also affected to a greater degree by shocks than male-headed households and experienced fewer advantages from the primary crop introduced by the intervention, potentially linked to them cultivating smaller plots with less irrigation and a smaller workforce. This finding highlights how a certain type of anticipatory action – in this case a shift in crop production – benefits different people to varying degrees, and where additional support for anticipation and response might be required.

In advance of implementing FbF in Bangladesh, the Red Cross Red Crescent Climate Centre undertook a forward-looking case study to assess the potential value of anticipatory cash transfers. This study compares a scenario where cash is transferred roughly three days before a potential flood (based on flood forecasts) with two alternative scenarios: one where floods occur with no humanitarian response and one where cash transfers are delivered after flooding occurs. Even taking the possibility of a false alarm into account, it is estimated that every US$1 invested in the FbF programme would lead to US$3 saved in beneficiary losses. This is supported by a sensitivity analysis based on 5,000 simulations showing US$2.50 to US$3.90 of avoided losses per dollar invested. However, details on how avoided losses were calculated are not available in the case study. Calculations are based on the following assumptions: that cash transfers would amount to roughly 10 percent of incurred losses; that people resort to negative coping strategies in cases of flooding in large part due to a lack of funding; that the cash intervention would not result in substantive inflation; and that people would spend the cash before or immediately after the event rather than save it (Red Cross Red Crescent Climate Centre, 2016).

Potential outcomes of anticipatory action on the economy

A recent World Bank study (Hill et al., 2019) estimates the value of drought-related early action on household welfare. It should be noted that, while the study uses the term 'early action', it mainly refers to an earlier response, or at least does not explicitly make early action contingent on any kind of forecast or early warning. As a result, uncertainty in the decision to act and potential related opportunity costs are not considered. The study finds that the most common coping mechanism for households during crises is reducing consumption, leading to stunting, with potential long-term implications on future income, for instance through diminished growth, lower levels of education and lower cognitive capacity. In the case of drought, the study estimates that failure to meet consumption needs results in 3.9 percent lower income per capita in the long run.[6] Consequently, a response that is one month quicker than usual would result in gains of 0.8 percent of income per capita. This is based on the understanding that drought impacts on nutrition in eastern and southern Africa start to escalate five months after the start of harvest (on average, in non-conflict settings), and increase until 11 months after the start of harvest (Hill et al., 2019).

BOX 1 RESEARCH ON THE IMPACTS OF EARLY WARNING SYSTEMS

Anticipatory action systems build on longer-standing experiences with early warnings, forecasting and early warning-early action work within the humanitarian, development and disaster management sectors. In general, early warning systems for floods, and other climate and weather services, have been shown to be cost-effective. A recent study on the monetary benefit of early flood warnings in Europe (Pappenberger et al., 2015), for instance, estimates a cost–benefit ratio of 1:400. The study assumes that all flood early warnings released through the European Flood Awareness System (EFAS) lead to some kind of flood preparedness action by national and regional authorities. It does not, however, consider the types of action taken or the theory of change that would lead from early warning to action to reduced impact in further detail. The authors take into account avoided flood damage as a benefit and compares this to the costs of installing and running early warning systems. Costs of taking early actions are not included.

Rogers and Tsirkunov (2010), by contrast, show a much wider and more moderate range of ratios. In their review of a number of studies around the world, they find cost–benefits ranging from 2.1 to 7.0. Similarly, Subbiah et al. (2008) find a large range of ratios, including an instance where costs outweigh benefits. Hallegatte (2012) estimates that the potential benefits from implementing better hydro-meteorological early warning systems in all developing countries would lead to savings of between US$300 million and US$2 billion a year in avoided asset losses, an average of 23,000 lives saved and between US$3 billion and US$30 billion per year in additional economic benefits.

It should be noted that in practice forecasting requirements and capacities are more nuanced than these figures indicate. For instance, even within the same country, certain kinds of floods can be predicted more reliably than others and the accuracy of specific forecasts can differ between seasons. A generic cost–benefit ratio for investments in early warning systems obscures these nuances for the sake of generalisation and simplification and, in the worst case, can lead to misguided investments.

The institutional and governance arrangements to act effectively and in a timely fashion, based on early warnings, is a major assumption in studies of the value of early warning systems and the costs of taking action are not accounted for. Yet, in many developing countries these arrangements are lacking. In addition, the level of computing power, required data, and expertise is frequently not available. This means, findings from studies on the impacts of early warning systems are not always transferable to other contexts.

Nonetheless, they provide a useful reference point for the field of anticipatory action and the scale of investments required. The establishment of early warning systems that operate and could potentially deliver benefits at scale is also a very different matter from the pilots implemented so far in the field of anticipatory humanitarian action. The kinds of early warning systems reviewed in the literature require very substantial up-front investments. No anticipatory action pilot to date has reached this level of investment. In fact, one study estimated that better hydro-meteorological early warning systems for all developing countries would require annual investment in excess of US$1 billion (Hallegatte, 2012).

In parallel, early warnings are becoming increasingly institutionalised in humanitarian and development sectors and the list of successful examples such as the Famine Early Warning System Network (FEWS NET) or the Global Framework for Climate Services (GFCS) is growing (Ross et al., 2009; Hewitt et al., 2012; Gros et al., 2019).

6 This is based on a development accounting approach and assumptions presented in Galasso and Wagstaff (2018). Their approach holds everything else except stunting and income constant, and therefore does not account for spill-over effects or externalities.

Empirical evidence on outcomes of anticipatory action

This section reviews empirical evidence on the outcomes of A-A at different levels: the humanitarian system and institutions, and households.

Empirical evidence on anticipatory action outcomes on the effectiveness of humanitarian systems

Only one study reviewed for this report looks empirically at the differences between A-A and post-disaster response in terms of cost and time savings for humanitarian interventions. The potential of A-A to reduce humanitarian need and the burden on response systems post-shock was demonstrated through a series of actions taken by the International Federation of the Red Cross (IFRC) in West and Central Africa in 2008, based on a seasonal forecast indicating flooding (IFRC, 2009; Braman et al., 2013). These actions included 'pre-positioning relief items, improving disaster response capacity through trainings, development of flood contingency plans, and launching of pre-emergency funding requests for preparedness activities and response' (IFRC, 2009). At the time, this represented a significant shift to more proactive disaster management by the Red Cross Red Crescent Movement. It resulted in a substantial time saving, where most countries had access to the required supplies in a matter of days, instead of the 40 days' delay in starting flood operations in 2007. Early action and flood response in 2008 together cost 33 percent less per beneficiary than the flood response alone in previous years.

Data also indicates that the number of lives lost relative to the number of people affected was lower in 2008 than in 2007. However, the authors caution that in the absence of better data about the severity of flooding, response times and delivery of interventions, increases in lives saved cannot be attributed directly to A-A (Braman et al., 2013). Such information would be needed to establish whether events of both years were of similar magnitude and would have resulted in similar levels of impact in the absence of any early action or late response.

Empirical evidence on anticipatory action outcomes on the effectiveness of humanitarian systems

At household level, the most commonly assumed outcomes of A-A are a reduction in economic losses and changes in consumption. Some studies consider additional aspects, such as debt reduction, psychosocial wellbeing, continuation of livelihood activities and school attendance, depending on the type of action. **Table 2 summarises the results from those ex-post empirical studies that provide sufficient detail on findings and methodologies used.** These studies generally use a control group of similar households that received no assistance as a counterfactual. While all studies presented in the table are based on empirical evidence and some level of statistical testing, there are still important differences in quality.

The table shows a range of outcomes from A-A. These studies should not be directly compared due to the limitations outlined previously, which prevent a more thorough, systematic review or meta-analysis of A-A. Two of the papers are based on a quasi-experimental design and more elaborate statistical testing, including controls, random sampling from beneficiary and control populations, and matching techniques which allow for more robust attribution of outcomes to the studied intervention (Gros et al., 2019; Red Cross Red Crescent Climate Centre, forthcoming). These are highlighted in dark blue in the table. Studies that use control groups, but do not statistically test differences in outcomes between beneficiary and control populations are highlighted in light blue. Their findings can give indications about the benefits of A-A but need further analysis and testing to establish statistical significance of differences between groups and attribution to the intervention. Outcomes from the remaining studies presented in Table 2 are based on qualitative data without control groups.

Overall, effects at the household level appear to be mainly positive, though not all expected outcomes are observed in all cases and the range of counterfactuals considered is limited. **The evidence suggests that A-A is better – for households and from a donor, humanitarian or development agency perspective – than no intervention. However, establishing whether A-A is also better than doing other things or taking action at a different point in time (before or after a shock) requires further testing.**

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Only one study (on cash transfers in Bangladesh) considers regular, seasonal action not linked to a specific forecast as an alternative scenario to calculate the VfM of A-A in Bangladesh (Tanner et al., 2019), one study looks at the assistance being provided earlier compared to later (Red Cross Red Crescent Climate Centre, forthcoming), and a few others include later action as a scenario in calculating cost–benefit ratios. These alternative scenarios are constructed rather than empirically tested and based on assumptions which draw on varying levels of data and expert judgements. None look at whether A-A and short-term outcomes for households result in long-term benefits.

Table 2: Summary of outcomes at household level, based on empirical analysis of interventions

EXPECTED OUTCOME	TYPE OF A-A TAKEN	COUNTRY AND HAZARD	FINDINGS	REFERENCE
Supported household-led early action	Cash transfer	Bangladesh, flood	Among recipients of anticipatory cash transfers through FbF, only 7 percent took no early action. Among similar non-recipients, almost 20 percent did not act early. FbF appears effective in helping households evacuate, though this was not analysed in relation to actual urgency and needs.	Gros et al. (2019)
	Cash transfer	Bangladesh, flood	Cash transfers enabled people to take action to prepare for and cope with floods. Recipients carried out similar types of activities to non-beneficiaries, but were able to do so on a larger scale.	Tanner et al. (2019)
	Cash transfer and animal care kits	Mongolia, dzud[7]	Assisted and non-assisted households used destocking of livestock as a strategy, but this was more common among FbF-assisted households. Inconclusive effect on ability to buy hay or fodder.	Red Cross Red Crescent Climate Centre (forthcoming)
Reduced destitution sale of assets	Cash transfer	Bangladesh, flood	No conclusive evidence.	Gros et al. (2019)
Reduced debt accrual	Cash transfer	Bangladesh, flood	Differences in borrowing behaviour between FbF-assisted and control households are large and statistically significant. Households that received an early transfer accumulated less debt during and straight after the flood.	Gros et al. (2019)
	Cash transfer and animal care kits	Mongolia, dzud	No apparent influence of FbF assistance on households' loan use or repayment.	Red Cross Red Crescent Climate Centre (forthcoming)

7 Dzud is 'extreme winter conditions preceded by a hot and dry summer, which reduces pasture availability' (Red Cross Red Crescent Climate Centre, forthcoming).

	Destock-ing-for-cash and livestock feed distribution	Mongolia, dzud	Beneficiary households took out larger loans to cope with the dzud and were able to repay them more quickly.	FAO (2018b)
Enhanced continua-tion and resumed productive activities	Cash transfer	Bangladesh, flood	No conclusive evidence on the continuation of work or speed at which productive activities resumed.	Gros et al. (2019)
	Destock-ing-for-cash and livestock feed distribution	Mongolia, dzud	Beneficiary households had fewer deteriorated goats than non-beneficiary households at the time of combing. Milk cows owned by beneficiary households produced more milk than non-beneficiary households.	FAO (2018b)
	Concentrate feed and mineral licks for livestock	Sudan, drought	Compared to non-beneficiaries, beneficiary households increased milk production.	FAO (2019b)
	Supplementary feed for livestock	Kenya, drought	Most beneficiaries (94 percent) reported high milk production. Resulting from improved condition of milking animals, beneficiary households produced almost two litres more of milk daily.	FAO (2018a)
	Distribution of crop seeds, tools and irrigation equipment	Madagascar, drought	Yields were overall stronger among beneficiary households compared to non-beneficiaries. Beneficiaries were able to grow vegetables over several cycles while the majority of non-beneficiary households planted once.	FAO (2019a)
Reduced livestock mortality	Cash transfer and animal care kits	Mongolia, dzud	Strong and significant positive impact on assisted households, helping to reduce the mortality of horses and improve survival rates of goat and sheep offspring. The odds of horse, sheep and goat survival increased significantly for households who reported receiving assistance earlier compared to those who reported receiving assistance later.	Red Cross Red Crescent Climate Centre (forthcoming)
	Destock-ing-for-cash and livestock feed distribution	Mongolia, dzud	Beneficiary households reported reduced average mortality for small livestock. Newborn mortality rate was lower in beneficiary versus non-beneficiary households.	FAO (2018b)
	Concentrate feed and mineral licks for livestock	Sudan, drought	The mortality rate of goats and sheep was higher in control than in beneficiary households	FAO (2019b)
	Supplementary feed for livestock	Kenya, drought	Beneficiary households reported reduced average mortality for small livestock.	FAO (2018a)
Maintained or improved animal body condition	Destock-ing-for-cash and livestock feed distribution	Mongolia, dzud	Beneficiary households reported maintaining body conditions of their herds at higher rate than non-beneficiaries (66 percent to 34 percent).	FAO (2018b)
	Concentrate feed and mineral licks for livestock	Sudan, drought	Body condition of the majority of livestock owned by beneficiary households increased, while it deteriorated for almost half of control households.	FAO (2019b)
	Supplementary feed for livestock	Kenya, drought	Improvements in body condition among beneficiary-owned animals.	FAO (2018a)

Ability to afford basic necessities during period of hardship	Cash transfer and animal care kits	Mongolia, dzud	No significant effects found	Red Cross Red Crescent Climate Centre (forthcoming
Enhanced quality and quantity of food	Cash transfer	Bangladesh, flood	FbF-assisted households were significantly less likely to skip meals or reduce meal sizes. FbF-assisted households were significantly less deprived of nutritious food than control households.	Gros et al. (2019)
	Cash transfer and animal care kits	Mongolia, dzud	No significant effects found on quantity of food	Red Cross Red Crescent Climate Centre (forthcoming
	Distribution of seeds, tools and irrigation equipment	Madagascar, drought	Beneficiaries showed higher food consumption scores than non-beneficiaries. Although all households engaged in similar coping strategies that negatively affected their food security, non-beneficiaries resorted to more of these strategies more frequently	FAO (2019a)
Reduced illness	Cash transfer	Bangladesh, flood	No conclusive evidence on the experience of illness among adults or children.	Gros et al. (2019)
Reduced prevalence of diarrhoea	Distribution of water purification tablets	Uganda, flood	More than four in five assisted households used tablets and only 5 percent drank unpurified water compared to over 50 percent in the control group, but prevalence of diarrhoea was high with minimal difference between both groups.	Jjemba (2018)
Reduced spread of cholera	Mass chlorination of water sources, water point analysis, training of health workers, awareness campaigns	Malawi, cholera	Water chlorination was judged by interviewees as the most effective among the actions taken. Evidence on the impact of the awareness campaign, aimed at behavioural change, was inconclusive.	Start Network (2018)
Reduced psychosocial distress	Cash transfer	Bangladesh, flood	Households receiving anticipatory cash transfers experienced less psychosocial stress after the flood than comparison households.	Gros et al. (2019)
	Cash transfer and animal care kits	Mongolia, dzud	No significant effects found.	Red Cross Red Crescent Climate Centre (forthcoming)

Note: Rows highlighted in dark blue refer to studies which use a quasi-experimental design and more elaborate statistical testing, including controls and matching techniques which allow for more robust attribution of outcomes to the studied intervention. Studies that use control groups, but do not statistically test differences in outcomes between beneficiary and control populations (though they statistically test compatibility of treatment and control groups pre-intervention as part of their sampling process in some cases) are highlighted in light blue. Their findings can give indications about the benefits of A-A but need further analysis and testing to establish statistical significance of differences between groups and attribution to the intervention. Remaining outcomes displayed in the table are based on qualitative data without control groups.

The following sub-sections expand on details and findings of the studies highlighted in Table 2 to illustrate the variety of interventions and evaluations in the field of A-A.

Mitigating the impact of floods and waterborne diseases through anticipatory action

Anticipatory cash transfers in advance of flooding in Bangladesh

Some of the most comprehensive and robust evidence available so far on A-A outcomes at household level is in relation to flood interventions in Bangladesh.

After the Red Cross Red Crescent FbF mechanism had been implemented for the first time in Bangladesh in 2017, a more thorough post-impact evaluation was conducted to 'assess the effectiveness of the forecast-based cash distribution in helping beneficiaries to take preparatory early actions and reduce the negative impacts of the flood on their health, wellbeing, assets and livelihoods' (Gros et al., 2019). The quasi-experimental mixed methods study design included a quantitative survey as well as qualitative focus group discussions and key informant interviews. Control households were selected through propensity score-matching to balance out differences between assisted and non-assisted groups. This resulted in a total of 174 and 216 households included in the assessment from the respective groups. Triggered by a flood forecast, the FbF system released cash grant equivalents of US$60 to 1,039 households in vulnerable communities in Bangladesh. The transfers reached beneficiaries between seven and three days ahead of the first flood peak.

Cash transfers appeared to strengthen the quality and quantity of food consumption among assisted households. They also reduced debt accumulation and lessened psychosocial stress after the flood. Other expected impacts, such as reduced destitution sale of assets, reduced prevalence of physical illness and maintained or resumed productive activities, could not be confirmed.

Complementing this, a theory-based impact assessment (TBIA) was conducted on the same intervention (Tanner et al., 2019). The TBIA approach aims to follow links in a chain of logic based on a project's Theory of Change, to assess whether and which actions are valuable for FbF. This small-scale qualitative study was carried out a year after the initial intervention. It involved key informant interviews and focus group discussions with 50 households, assessing a conventional humanitarian response against A-A.[8] Findings confirm that cash payments reached households three to four days before they needed to move, and that households could use these payments to prepare. Cash transfer recipients carried out similar types of activities to non-beneficiaries but on a larger scale, for instance stockpiling more food. They also needed to borrow less (usually, flood-related increases in commodity, transport and the cost of debt means that loans increase).

This study does not include an evaluation of the value of the cash grant itself, only that of delivering the cash before rather than after the flood. It relies on alternative scenarios constructed based on information collected through interviews. The study found an added value of 650 Bangladeshi Taka (BDT), or 13 percent of the transfer value, in delivering cash assistance based on a forecast before the flood, compared to delivering it afterwards and in an unpredictable way, i.e. where recipients do not know in advance that they will later receive assistance. Compared to a predictable post-disaster payment, i.e. where recipients know they will receive assistance afterwards, the value of anticipatory cash assistance is estimated at 350 BDT, or 7 percent of the transfer value. Finally, in a third scenario, payments could be delivered annually at the start of the season through a safety net programme, meaning households may have transfers at their disposal earlier than they would through a forecast-based system. In this case, additional household savings could reach BDT 150 to BDT 300, or 2–6 percent of the transfer value compared to forecast-based transfers (ibid.).

8 Comparison and beneficiary groups were all selected from the same recipient communities, so spill-over effects might be an issue.

Preventing further spread of cholera in Malawi

In 2018, the Start Fund Anticipation Window was activated to prevent the further spread of cholera after flooding in Malawi (Start Network, 2018). Actions taken included community sensitisation, mass chlorination of water sources at household level, water point analysis and training of district health facilities. A subsequent study assessed the costs and benefits of these measures with a major focus on the Start Fund, but also taking costs and benefits to Malawian health systems and communities into account. Outcomes were not analysed in comparison to a real-life control group. Instead, the intervention was assessed with respect to two possible scenarios: a response at a point in time when the situation had moderately deteriorated (i.e. the number of cases and cholera-related deaths had increased) and a later response when the situation had severely deteriorated (i.e. cases and deaths had increased even further). Primary data in the form of interviews was collected as part of a project visit in 2018, and secondary data from the Malawian government on previous cholera outbreaks was used to underpin the two scenarios.

The study concludes that actions led to resource and time savings compared to a later response, estimated at between £16,400 and £52,367.[9] The study also acknowledges that the intervention was not particularly early and at an earlier point in time different actions could have further brought down costs. It also assumes that the costs of inputs would remain the same over the duration of the cholera outbreak and that a larger quantity and wider variety of inputs would be needed should the caseload increase. The study did not attempt to monetise the value of social outcomes, but instead discussed these in a qualitative way. Data on impacts is also qualitative, and the assessment uses alternative scenarios rather than a baseline study, control group or other measurable counterfactuals, limiting the extent to which observed changes can be attributed to the anticipatory actions taken.

Analysis of the qualitative data indicates that, out of the actions taken, respondents judged chlorination to be the most effective. Evidence on awareness campaigns and their contribution to behavioural change was mixed. In part, the study hypothesises, this is because influencing behaviour requires more time than is available in the window of opportunity for early action. Behaviour is often embedded in existing livelihood practices, making it difficult to change. 'For example, in Phalombe and Salima, cholera is common among fishermen who spend days at a time out fishing on a nearby lake, using the same water for fishing, drinking and defecation. Without alternate livelihoods, it is hard to change this behaviour' (Start Network, 2018).

Mitigating impacts of drought and dzud on agricultural production and pastoralist livelihoods

Drought in Ethiopia

A Save the Children study assessed the socio-economic benefits of A-A against the costs of its Early Action Fund (EAF) release in Ethiopia (Atkinson, 2018). In February 2017, the Save the Children Ethiopia Country Office triggered the EAF based on meteorological forecasts, traditional community forecasts and additional household economy analysis projecting below-average rainfall with likely impacts on food needs and livelihoods. The most difficult months were expected to be June to September and the EAF was triggered for A-A between March and May. Actions included cash for work, distribution of livestock feed, animal health campaigns, rehabilitation of water sources and distribution of water purification tablets. The study highlights positive outcomes from a qualitative impact assessment of the intervention on maintained household income, access to clean drinking water, maintained number and health of livestock, food consumption, nutrition and school attendance.

To assess the cost-effectiveness of the intervention, the study relied on qualitative data from interviews and workshops. It compared early action in advance of a drought to two different scenarios: a humanitarian response and early action when the event did not actually materialise. Benefits considered include a range of socio-economic outcomes spanning income, consumption, nutrition, education, access to drinking water and livestock assets. Overall, the study found that every £1 invested in the early action fund results in an average of £2.58 in social value for targeted households. It also concluded that, even if no crisis occurs, £1 spent yields £1.61 in social value per household. However, these findings must be considered in light of the study's methodological limitations: not all stakeholders could be interviewed and quantitative data that could inform outcomes and scenarios was not available. 'Therefore, expert assumptions were used to estimate the magnitude of change that beneficiaries would experience. This method is highly subjective and open to wide error margins' (Atkinson, 2018). Furthermore, the study assumed that all beneficiaries received the same assistance, which was not the case in practice.

9 Cost caluclations are not included in detail in the report, but provided by the Start Network in an online annex to the study.

Dzud in Mongolia

Ahead of forecast dzud conditions in Mongolia in 2017, the Red Cross Red Crescent FbF mechanism delivered animal care kits and released unconditional cash transfers of US$100 in local currency to 2,000 herder households. 'Animal care kits included mineral blocks, hoof ointment and fish oil – supplies that do not require veterinary training to administer and are well-known and used by herders' (Red Cross Red Crescent Climate Centre, forthcoming). The majority of assisted households used the bulk of the cash they received on additional hay or livestock feed. Interestingly, an FAO EWEA intervention during the same instance of dzud chose to purchase feed in bulk for distribution to pastoralists (FAO, 2018b), but neither of the accompanying studies assessed which of these two options was most effective and efficient. This may be worth exploring further (Red Cross Red Crescent Climate Centre, forthcoming).

Similar to the FbF activation in Bangladesh, the FbF release in Mongolia was accompanied by a quasi-experimental study. In this case, 446 farmers (223 beneficiaries and 223 control households) with similar characteristics were randomly selected for participation in a survey. Although differences between these groups were largely balanced out through propensity score matching, assisted households on average remained more vulnerable than the control group due to the higher prevalence of disability among family members in this group. Overall, the FbF intervention in Mongolia was found to have a positive and significant effect on reducing mortality among horses and enhancing the survival of sheep and goat offspring. Animal care kits appear to have a particularly important role to play in supporting survival rates. The time when households reported having received the assistance had a strong positive effect on reducing mortality rates, meaning that later assistance was associated with higher mortality for all livestock except cattle. However, no significant effects were found on households' overall food intake, ability to meet basic needs, loan use and repayment, or psychosocial stress (Red Cross Red Crescent Climate Centre, forthcoming).

In the same dzud event, the FAO EWEA mechanism delivered animal health equipment, nutrient supplements, livestock feed and destocking-for-cash activities to 504 households. Meat from the destocking was distributed to poor urban households. As in the Red Cross Red Crescent intervention, most households benefiting from destocking-for-cash spent all or part of the cash on animal feed. FAO carried out a study incorporating quantitative and qualitative data from semi-structured interviews to assess the effects of the EWEA interventions on the livelihood assets and income sources of herders.[10] This included assessing the ROI of the destocking-for-cash and early feed and supplement distributions carried out before the peak of the dzud. The study built on interviews with 87 beneficiary and 54 non-beneficiary households and t-tests carried out using a variable describing sheep forage units relative to household size confirmed a balanced sample, randomly selected from a list of households fulfilling pre-selection criteria.[11] Although efforts were undertaken to select similar beneficiary and non-beneficiary households, the possibility of selection bias and spill-overs cannot be excluded, and the sample size remains small.

> « According to the Mongolia study, actions implemented through the EWEA system contributed to reduced losses and additional benefits of up to US$2,008 per household. This included helping households maintain animal health and, relatedly, the value of the herd, reducing mortality among livestock and new-borns, increasing production of cow milk and avoiding loss of value in cashmere production. »

10 The study also attempted to quantify avoided costs of humanitarian assistance post-dzud, but this was not successful in large part because of a lack of data from prior emergency interventions.

11 These entail households that were similarly affected by dzud conditions and had a similar socio-economic status. For beneficiaries, additional criteria were that they had received only the FAO EWEA cash assistance and livestock feed, and for non-beneficiaries that they had not received any kind of livestock feed assistance, irrespective of its source, for the duration of the intervention.

According to the Mongolia study, actions implemented through the EWEA system contributed to reduced losses and additional benefits of up to US$2,008 per household. This included helping households maintain animal health and, relatedly, the value of the herd, reducing mortality among livestock and new-borns, increasing production of cow milk and avoiding loss of value in cashmere production. While descriptive statistics and qualitative analysis are provided on these outcomes, the study does not statistically test differences between groups. With costs per household of US$285 (including costs of livestock feed, destocking costs and project support costs), this results in a benefit to cost ratio of 7.1. A sensitivity analysis using worst- and best-case scenarios showed positive benefit to cost ratios of 5.1 to 12.1 (FAO 2018).

Anticipatory action and early response in Madagascar, Kenya and Ethiopia and Sudan

Further FAO EWEA activations to address drought were implemented and assessed in Madagascar, Kenya and Ethiopia and Sudan, with a similar approach to demonstrating impact and returns on investment. The general methodology, sampling strategy and limitations follow that of the FAO Mongolia study discussed above. In 2016, the FAO EWEA plan was piloted in Kenya and Ethiopia, and in 2017 it was activated in Sudan to reduce drought impacts on food security and livelihoods. In Kenya, the system was triggered in early October 2016 based on rainfall forecasts and government-issued early warnings for the October–December short rains. Providing supplementary livestock feed (hay and range cubes) was one of the actions implemented, and there was a focus on post-implementation assessments. In Sudan, concentrate feed and mineral licks for livestock were distributed to around 200 beneficiary households before peak drought impacts had been reached. The intervention was triggered by a series of monitored drought impacts (including length of dry spell, livestock movement, agriculture and vegetation indices and crop price fluctuations), followed by a rapid assessment. This means that, rather than being based on forecasts ahead of the rainfall season, the system relies on observations as a potential drought develops, so actions overlap with early response activities.

Despite the different actions taken and analysed, the accompanying studies found similar benefits to that from the Mongolia EWEA intervention: beneficiary households reported reduced livestock mortality, improved body condition of animals and increases in milk production compared to non-beneficiary households. For Sudan, this led to average benefits of US$431 per beneficiary household against costs of US$64 and a benefit to cost ratio of 6.7. Results from a sensitivity analysis range from 4.7 to 6.5 depending on the assumptions made (FAO, 2019a). In the case of Kenya and Ethiopia, benefit to cost ratios were 3.5 and 7 respectively (FAO, 2018a). Ahead of the rainfall season in Madagascar in 2017/ 2018, FAO took action to support agricultural production and address food insecurity among vulnerable households. This was triggered by EWEA and Integrated Food Security Phase Classification (IPC) projections of a likely deterioration in the food security situation and a 'potential early lean season and likely dry conditions affecting the main agricultural season in the south of the country' (FAO 2019b). Actions were implemented in November 2017, before the onset of rains in December. These included distribution of crop seeds, irrigation equipment and small tools and the provision of training and supervision.[12] To assess impacts, FAO conducted a study based on quantitative and qualitative data gathered through semi-structured interviews with 99 beneficiaries and 94 non-beneficiaries, as well as 12 focus group discussions.

Findings imply that the drought situation led to low yields overall, but yields were considerably better for most crops among beneficiary households compared to non-beneficiary households. Beneficiaries were also able to grow vegetables over several cycles, while most non-beneficiary households only planted once. These differences are reflected in higher dietary diversity scores among beneficiaries. Although all households engaged in similar coping strategies that undermined their food security, non-beneficiaries resorted to more of them more often. Total benefits from the intervention amount to US$78. Overall, this represents a benefit–cost ratio of 2.5. Worst- and best-case scenarios from the sensitivity analysis remain positive, ranging from 1.8 to 3.6 (FAO, 2019b).

12 Note, however, that most of these actions are not commonly used as anticipatory actions, i.e. based on a forecast or early warning, but often as part of seasonal or longer term resilience and development interventions.

Strengths and limitations of existing studies

Evaluation methodologies vary hugely, from quantitative to qualitative, and from survey methods to estimation techniques. This section discusses the advantages and disadvantages of various methodologies used to assess A-A.

One methodological distinction that has attracted particular attention is the difference between studies that monetise the cost and benefits of A-A and those that do not.

FAO has so far undertaken most of the existing studies using ROI methods (in Mongolia, Madagascar, Kenya, Ethiopia and Sudan) (see also previous section). These studies attempt to provide a clear conceptualisation of the transmission mechanisms of their intervention and identify likely adverse consequences and then design counter-measures to prevent these. The studies also try to isolate the effects of the intervention from other changing circumstances. To evaluate outcomes of A-A, they collect primary data, often via survey methods or semi-structured interviews, from beneficiaries and control populations. These studies provide good insights into the economic contexts in which A-A takes place.

However, in order to provide more precise estimates, the studies need to make some ultimately problematic assumptions. For example, to estimate avoided losses of livestock, they use the economic replacement value of animals (meaning the price it would cost to buy the same animal at the local market); presumably though, the actual benefit of an animal should be far in excess of its current replacement value. The precision of estimates and exact size of the benefits of the intervention remain unknown. This problem is exacerbated by the fact that available empirical studies only estimate benefits for a short period of time following an intervention, in the range of a few months, though some of the non-empirical studies model cost-effectiveness over a longer period of several years or decades (e.g. Cabot Venton, 2013; Cabot Venton, 2018; WFP, 2019). To understand the true size of the benefits, these effects would need measuring over a period of years. Given the cumulative effects of asset growth/loss, it is possible that the effects would increase if measured over a longer period.

This is not to argue that monetising the benefits and avoided disaster impacts due to A-A is not important. Associating a monetary value to the avoided impact of disasters on agricultural production and assets is crucial to show the economic relevance of safeguarding rural livelihoods ahead of shocks. The value of protected assets, for instance, implicitly shows how expensive it would be to rebuild assets and livelihoods after shocks occur. Instead, the preceding discussion highlights some of the methodological challenges and limitations of monetising the costs and benefits of A-A and underscores the need for clarity and transparency in conducting such studies.

BOX 2 STUDYING COSTS, BENEFITS AND RETURNS ON INVESTMENT OF ANTICIPATORY ACTION

Evaluation methodologies such as ROI, VfM, cost-effectiveness and CBA calculations have come under some scrutiny. These studies generate tensions between practitioners because they touch on the very heart of what it means to be a humanitarian. Unmet human needs and suffering are a humanitarian priority and as such are deserving of relief. Although the costs of delivering this relief are a secondary concern, they are an essential consideration for humanitarians to avoid unnecessary waste of valuable resources and to assess how most lives can be saved with the resources at hand. VfM and similar studies are thus regarded as a tool to understand 'fairness and equity in the allocation of resources between people' (Slim, 2015). At the same time, prioritising needs according to cost seems morally questionable. If human needs and suffering are taken to be absolute, there can be no point in making the kind of relative comparisons which return on investment calculations invite.

Some key informants for this review were concerned that these kinds of calculations might grow in importance in the future and be used to guide and channel humanitarian funding flows. This concern is justified. Techniques of standardisation and measurement tend to develop a life of their own and to lead to a number of often adverse side-effects (Bowker and Leigh Star, 1999). Frequently, measurements are turned into guidelines, which can influence the way numbers are computed. The most famous example of this tendency is the so called Goodhart's law, named after LSE economist Charles Goodhart, who is credited with the idea that 'when a measure becomes a target, it ceases to be a good measure'.

Besides concerns around how these calculations and techniques might affect humanitarian imperatives and funding in the future, there are also widespread fears among stakeholders consulted for this paper about the ways in which the numbers are computed. Some practitioners correctly highlight that there are no agreed measurement techniques or guidelines about what can be considered a cost or benefit of early action. This leads to a concern that, if any cost or benefit can be used, the range that a particular estimate might take is only limited by the imagination of the person(s) involved in their calculations. There are also questions about the discount rates to be used and the way different cost–benefit items are computed and estimated.

Advocates of these types of calculations point out that they can in fact help to improve humanitarian funding. What matters is that, in order to compute ROI or CBA numbers, there needs to be an understanding of transmission and use mechanisms. In other words, using ROI or CBA numbers can be a tool to develop deeper understanding of what happens with humanitarian relief on the ground. This is a crucial point. Given local complexities, there can be too little understanding of the long-term effects of humanitarian relief efforts. If ROI and CBA analysis are used for that purpose, they can clearly help to fill an important gap in the humanitarian mission.

However, humanitarian practitioners will have to exercise constant vigilance that the means of calculation do not become the ends of calculation. A related concern is that the easily reproducible and catchy numbers that ROI and CBA studies produce can obscure the quality of and underlying assumptions behind these numbers. This is especially the case because doing ROI and CBA analysis well is extremely resource-intensive. It requires a very detailed understanding of the economic and social lives of beneficiaries and the socio-economic environments in which they move, a thoroughly conceptualised framework for tracing the various cost and benefit items, as well as on- the-ground primary data collection. Given these very high requirements, there is a justified concern that the time and resource constraints of humanitarian practice and the complexities of calculations might be used to obscure difficult choices. Bearing in mind these caveats, and even though we are aware of the tension between investment language and humanitarian principles, CBA and ROI analysis can help improve understanding of local conditions and the local effects of relief.

Those studies that do not monetise the benefits from A-A include a number from the Red Cross Movement. In particular, the study of A-A before the 2017 floods in Bangladesh considers a range of factors that cannot be easily measured or converted into monetary terms. These studies are important to understand the breadth of outcomes from A-A and to ensure that non-monetary benefits are adequately captured. They can also highlight nuanced difficulties of measurement that a more monetary-oriented approach would probably have to disregard. For example, the study finds that, although there is some evidence that A-A helped households evacuate in a timely manner, there is no reliable household data on the impact of the flood

itself. Thus, although A-A can be considered successful, there remains a fair amount of indeterminacy in that judgement. For example, the study found statistically significant effects in the number of meals beneficiaries were able to maintain, i.e. that beneficiaries were much less likely to have to skip meals as a result of the effects of the flood (Gros et al., 2019). Again, it would be difficult – and not necessarily meaningful or useful – to translate this finding into something that could be converted into a monetary estimate: what is the economic value of not having to go to bed hungry?

Yet studies that look beyond the monetisation of costs and benefits are not without their problems. As the authors of the Mongolia assessment acknowledge (Red Cross Red Crescent Climate Centre, forthcoming), the comparison group was not very comparable to the beneficiary group because households receiving assistance through the FbF mechanism were much more vulnerable than the control group (which was an aim of the intervention in the first place). This means that the true effects of the intervention were likely far in excess of what was measured.

These two studies on Mongolia and Bangladesh, along with some of the Start Network MEAL outputs around the Start Fund Anticipation Window, demonstrate a relatively high level of transparency in reporting not only findings on positive outcomes, but also showing which of their hypotheses were not confirmed. In other reports focused more on monetising benefits from A-A, such 'non-findings' tend to be overlooked. However, reporting on hypotheses that were not confirmed is important because it can point to limitations of A-A and help identify questions and assumptions that require further study.

Aside from the gaps in individual studies – i.e. things that it would be nice to know but which were not included due to scope, limited resources, lack of data, methodological challenges or other reasons – there are also larger structural knowledge gaps in the current evidence base. Too little attention is paid to understanding longer-term effects. In some ways, this may just mean that the positive effects are currently vastly under-estimated. But it could also be the case that A-A has long-term negative consequences that are not currently being captured, such as impeding local markets or inhibiting local capacity development. It might also be the case that A-A encourages people to stay in areas which will simply become uninhabitable in the future, delaying necessary population movements. So far, the time horizons under which A-A have been evaluated are quite short and there is little understanding or appreciation of what the longer-term consequences might be.

There is also limited understanding of the added value of using forecasts to trigger payments through social protection systems. In the case of cash transfers, for instance, relevant questions include:

- **What could people do with additional cash before a shock to avoid, reduce or mitigate impacts that they could not do if they received cash afterwards?**
- **Do people have sufficient time and information to allow them to use the cash to prepare based on when the A-A system can deliver support, or would they be better off receiving cash further in advance?**

Assessing this added value is particularly important where A-A is used to address repeated cyclical disasters, and regular seasonal support would allow more time for action. However, having less information on where a disaster might hit (because no forecast is used) would likely mean a larger population needs targeting, thus resulting in higher costs. Understanding these different options and trade-offs is critical to informing future programmes.

A more comprehensive meta-evaluation will be required in the future to estimate the benefits of A-A based on several interventions. Current evaluation methodologies are too disparate, and too few empirical studies have been carried out to date, to permit this at present. However, if the aim is to understand A-A as a field or category of action, rather than disparate individual interventions, such studies will be needed in the future. They would also enable different organizations to work more directly with one another in order to improve evaluation techniques and practices.

Next steps:
An evidence agenda for anticipatory action

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The goal of creating an evidence base is to answer questions related to the appropriateness, efficacy, efficiency and relative benefits of allocating resources to A-A. The questions posed and methods used to answer them vary widely, as is to be expected from the range of agencies engaging in these initiatives. What the evidence base consists of, and when it can be considered robust, is nonetheless important, although views vary widely on the strength and saturation of evidence on A-A. Only through repeated studies over time, in multiple contexts and with different hazards, can guidance be given about how to maximise the impact of A-A. Given the limited scope and number of studies available at this time, it would be premature to judge whether anticipatory humanitarian action had substantively reduced humanitarian needs, avoided losses, produced faster recovery, or strengthened resilience.

Evidence helps to ensure accountability in humanitarian action and, given the substantive gaps identified in this report, greater investment is needed in robust monitoring, evaluation and learning on anticipatory action. Without this, and a clear agenda for enhancing the evidence base to improve future policy and programming, the humanitarian system will continue to struggle to meet needs.

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To arrive at a coherent, unified evidence base, we recommend three critical steps:

1. Further implementation and evaluation

An obvious first step towards deepening the evidence base is to continue to implement and evaluate AA activities in a variety of contexts. Early studies on A-A have placed more emphasis on producing evidence for advocacy; the emphasis now needs to be on scientific rigour, lesson-learning, and driving improvements in the delivery of A-A on the ground. More resources should be made available from programme budgets for monitoring, evaluation and learning (MEL) activities.

Current AA initiatives are small scale and even when actions are similar, the outcomes being measured vary from case to case. Most studies are therefore not directly comparable: findings cannot be aggregated or generalised without closer scrutiny. Nor do studies consider the longer-term effects of A-A through multi-year or follow-up evaluations. Implementation of A-A at larger scales should mean more resources can be devoted to MEL and learning activities to improve the evidence base; something that is very much called for given the current dearth of primary data. Prioritising MEL will be critical to the success of anticipatory action.

2. A common analytical framework and principles

Different contexts will require diverse ways of planning, implementing and monitoring A-A. Current studies reflect some of these differences, but there is room to experiment with different evaluation methods. Rather than advocating for one methodology, a pluralistic approach is needed, but more importantly, a coordinated and common framework for analysis to guide and promote careful matching of methods to the questions being asked. Implementing agencies need to agree on a common analytical framework by which to undertake and ultimately assess A-A. This is not a technical exercise – plenty of methodological guidance already exists at institutional level.[13] Rather, what is required is a set of principles that encourage methodological rigour in testing the appropriateness of early actions and encourage coherence and quality in the evidence base.

> « A common analytical framework can help promote alignment in evaluation methodologies so that they accommodate differences but are similar enough for there to be cross-country, cross-hazard comparisons. »

Established criteria for the quality of evidence such as those developed by the Active Learning Network for Accountability and Performance in Humanitarian Action (ALNAP) could be a starting point (Knox-Clarke and Darcy, 2014; Christoplos et al., 2017), but criteria would need to be adapted to the specific requirements and challenges of A-A.

A common analytical framework can help promote alignment in evaluation methodologies so that they accommodate differences but are similar enough for there to be cross-country, cross-hazard comparisons. This will permit more thorough meta-analysis; so multi-country, multi-hazard, multi-year evaluations can be carried out. Principles should include transparency in assumptions on which models are based and the need to validate the counterfactuals that are used. Few current evaluations use control groups, while most rely on modelled hypothetical alternative scenarios as counterfactuals to generate CBAs and ROIs. However, there remains disagreement about what constitutes a 'plausible' alternative reality, as well as about which kinds of costs and benefits should be considered in these calculations. Existing platforms for exchange, such as the informal multi-stakeholder 'FbA MEAL group', are well-suited to inform and shape the creation of a common analytical framework and principles, and have already taken steps to assess MEAL guidance for A-A across implementing organisations.

One important step towards this is for different agencies to start sharing data and models with each other as well as external parties. Implementing agencies often know little about what other agencies have learned from their studies, and the data and models used to estimate impacts are not publicly available so they cannot replicate good practices. Given the complexity of calculations and current lack of comparability, evaluation reports and the data and methods on which they are based should be made publicly available (subject to data protection requirements). In other fields, replicability is considered paramount to ensuring scientific rigour. All studies on anticipatory action should therefore be published in formats that allow full replicability from external parties. The guidelines set out as part of the Mandatory Replication Policy in the Journal of Development Economics serve as a useful starting point in this regard.[14] Replicability should feature as a central principle within any common analytical framework for A-A.

13 See for example the FbF M&E Guide (Red Cross Red Crescent Climate Centre, 2018), a theory-based impact assessment methodology originally used for the Start Network's Drought Risk Financing Facility (Levine and Gray, 2017), a recent Start Network guide on designing forecast-based and disaster risk financing initiatives (Harris and Swift, 2019) and ROI methodology developed by BCG and refined by PwC for a range of UN agencies to assess preparedness interventions (Meerkatt et al., 2015; PwC, 2017).

14 For more details, see www.journals.elsevier.com/journal-of-development-economics/policies/mandatory-replication-policy-devec.

3. Improving the models

Distinguish between different types of benefits from anticipatory action

Greater care needs to be taken to outline how the benefits of ROI and CBA analysis are calculated, what they represent and to what extent monetary values can or should be derived from non-monetary benefits or costs. The ratios produced often mean that a beneficiary has avoided loss of assets – and in some cases also avoided a reduction of subsequent income if productive assets are included in the calculation – but has not actually increased his/her income or wealth in any way. Seemingly, a 7:1 return on investment in less than a year looks better than most commercial projects. However, these benefits are mostly non-monetary. Although ROI studies generally raise this issue, greater care should be taken in differentiating between monetary and non-monetary benefits.

Experiment with different evaluation techniques to capture collective benefits

None of the methodologies used in empirical studies on A-A so far can incorporate benefits that are not accrued individualistically. Methodologies should recognise and seek to capture the collective benefits of A-A – for example improvements in relationships and trust within and between communities. Some approaches, such as the Humanitarian Return on Investment used by WFP in Nepal, attempt to model results of A-A at a wider system level with respect to efficiency, appropriateness/ relevance, effectiveness, connectedness, coverage, coherence and coordination. Further empirical testing of these models and categories is now needed.

« One important step towards this is for different agencies to start sharing data and models with each other as well as external parties. »

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Annex 1:

Studies on the impacts of anticipatory action in developing country contexts

AUTHOR(S), YEAR AND TITLE	NAME OF THE INITIATIVE STUDIED	COUNTRY OF FOCUS	TYPE OF STUDY	HYPERLINK
Atkinson, E. (2018) Social CBA of the early action fund. London: Save the Children.	Save the Children Early Action Fund (EAF)	Ethiopia	Empirical, using constructed alternative scenarios to represent late action	Unpublished
Braman, L.M., van Aalst, M.K., Mason, S.J., Suarez, P., Ait-Chellouche, Y. and Tall, A. (2013) Climate forecasts in disaster management: Red Cross flood operations in West Africa, 2008. Disasters, 37(1), 144-164.	West and Central Africa zone (WCAZ) of IFRC	West and Central Africa zone (Togo, The Gambia, Senegal, Ghana)	Empirical with past events representing normal humanitarian response as counterfactual	https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1467-7717.2012.01297.x
Cabot Venton, C. (2016) The Economic Case for Early Humanitarian Response to the Ethiopia 2015/2016 Drought. London: UK Department for International Development (DFID)	DFID Contingency fund for Ethiopia	Ethiopia	Modelled	https://static1.squarespace.com/static/5567b109e4b0101076d7f0bd/t/581b75e0cd0f68b05009b283/1478194658325/Ethiopia+Contingency+Analysis.pdf
Cabot Venton, C. (2018) Economics of resilience to drought in Somalia, Kenya and Ethiopia. Washington, D.C.: USAID.	Unspecified; overall humanitarian / crisis funding	Somalia, Kenya and Ethiopia	Modelled	https://www.usaid.gov/sites/default/files/documents/1867/Summary_Economics_of_Resilience_ES_Final_Jan_4_2018_-_BRANDED.pdf
Cabot Venton, C. and Coulter, L. (2013) The Economics of Early Response and Resilience: Lessons from Niger. London: UK Department for International Development (DFID).	Unspecified; overall humanitarian / crisis funding	Niger	Modelled	https://assets.publishing.service.gov.uk/media/57a08a0ded915d3cfd000572/61114_Niger_Report.pdf
Cabot Venton, C., Fitzgibbon, C., Shitarek, T., Coulter, L. and Dooley, O. (2012) Economics of Early response and Disaster Resilience: Lessons from Kenya and Ethiopia. London: UK Department for International Development (DFID).	Unspecified; overall humanitarian / crisis funding	Ethiopia and Kenya	Modelled	https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/67330/Econ-Ear-Rec-Res-Full-Report_20.pdf
FAO (2018a) Horn of Africa. Impact of Early Warning Early Action. Protecting Pastoralist livelihoods Ahead of Drought. Rome: FAO.	FAO Early Warning Early Action	Kenya, Somalia and Ethiopia.	Empirical with control group, representing no action as counterfactual	http://www.fao.org/3/ca0227en/CA0227EN.pdf detailed report unpublished
FAO (2018b) Impact of Early Warning Early Action. Protecting the livelihoods of herders from a dzud winter in Mongolia. Rome: FAO	FAO Early Warning Early Action	Mongolia	Empirical with control group, representing no action as counterfactual	http://www.fao.org/emergencies/resources/documents/resources-detail/en/c/1161388/ detailed report unpublished
FAO (2019a) Impact of Early Warning Early Action Madagascar. Protecting farming livelihoods from drought and food insecurity. Rome: FAO.	FAO Early Warning Early Action	Madagascar	Empirical with control group, representing no action as counterfactual	http://www.fao.org/emergencies/resources/documents/resources-detail/en/c/1186991/ detailed report unpublished

FAO (2019b) The Sudan. Impact of Early Warning Early Action. Protecting Agropastoralist Livelihoods Ahead of Drought. Rome: FAO.	FAO Early Warning Early Action	Sudan	Empirical with control group, representing no action as counterfactual	http://www.fao.org/3/ca4653en/ca4653en.pdf detailed report unpublished
Giuffrida, V., Ogbachristos, S., Fläming, T. and Husain, A. (2017) Exploring projected outcome of the FoodSECuRE small grains project: Evidence from Zimbabwe. Rome: WFP.	FoodSECuRE	Zimbabwe	Modelled	https://www.wfp.org/publications/zimbabwe-exploring-projected-outcomes-food-secure-small-grains-april-2017
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Hill, R., Skoufias, E., and Maher, B. (2019) The chronology of a disaster. A review and assessment of the value of acting early on household welfare. Washington, D.C.: World Bank.	Unspecified; overall humanitarian / crisis funding	Global	Modelled	http://documents.worldbank.org/curated/en/796341557483493173/The-Chronology-of-a-Disaster-A-Review-and-Assessment-of-the-Value-of-Acting-Early-on-Household-Welfare
IFRC (2009) Early Warning, Early Action An Evaluation of IFRC West and Central Africa Zone Flood Preparedness and Response 2008. Dakar: IFRC.	West and Central Africa zone(WCAZ) of IFRC	West and Central Africa zone (Togo, The Gambia, Senegal, Ghana)	Empirical with past events representing normal humanitarian response as counterfactual	https://www.preventionweb.net/files/12247_EarlywarningEN.pdf
Jjemba, E.W., Mwebaze, B.K., Arrighi, J., Coughlan de Perez, E. and Bailey, M. (2018) Forecast-Based Financing and Climate Change Adaptation: Uganda Makes History Using Science to Prepare for Floods. In: Zommers, Z. and Alverson, K. (eds.) Resilience. The Science of Adaptation to Climate Change. Elsevier.	Red Cross Red Crescent FbF	Uganda	Empirical with control group, representing no action as counterfactual	https://www.sciencedirect.com/science/article/pii/B9780128118917000190?via%3Dihub
Meerkatt, H., Kolo, P. and Renson, Q. (2015) UNICEF/WFP Return on Investment for Emergency Preparedness Study. Munich: Boston Consulting Group.	UNICEF and WFP preparedness investments under DFID Humanitarian Programme funding for emergency preparedness	Chad, Pakistan, Madagascar	Modelled	https://www.unicef.org/publications/files/UNICEF_WFP_Return_on_Investment_for_Emergency_Preparedness_Study.pdf

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Red Cross Red Crescent Climate Centre (2016) Case Study Bangladesh. The Hague: Red Cross Red Crescent Climate Centre.	Red Cross Red Crescent FbF	Bangladesh	Modelled	http://fbf.drk.de/fileadmin/Content/Manual_FbF/07_Monitoring_Evaluation_Accountability_Learning/07_03_01_CBA_MEAL_Case_Study_Bangladesh_Cash.pdf
Red Cross Red Crescent Climate Centre (forthcoming) Effects of providing forecast-based cash and animal care kits to vulnerable herder households during the 2017-2018 Dzud season in Mongolia: Impact survey results. The Hague: Red Cross Red Crescent Climate Centre.	Red Cross Red Crescent FbF	Mongolia	Empirical with control group, representing no action and reported late action as counterfactual	Unpublished; submitted for publication (this review used the April 2019 version)
Save the Children, Oxfam, World Vision (2018) Post distribution monitoring. Anticipatory north east monsoon response.	Anticipatory Northeast Monsoon Response (NEMR) under the Start Fund Anticipation Window	Sri Lanka	Focused on institutional learning, no empirical assessment of A-A outcomes	Unpublished
Start Network (2017) Case Study: Start Fund Alert 173 Tajikistan. London: Start Netowork.	Start Fund Anticipation Window	Tajikistan	Focused on institutional learning, no empirical assessment of A-A outcomes	https://reliefweb.int/sites/reliefweb.int/files/resources/Case%20Study%20Alert%20173%20-%20Tajikistan%20-%20Anticipating%20Flooding%20%2B%20Landslides.pdf
Start Network (2018) Case Study: Start Fund Alert 220 Malawi anticipation of Cholera outbreak. London: Start Network	Start Fund Anticipation Window	Malawi	Empirical, using constructed alternative scenarios to represent late action	Unpublished
Tanner, T., Gray, B., Guigma, K., Iqbal, J., Levine, S., MacLeod, D., Nahar, K., Rejve, K. and Cabot Venton, C. (2019) Scaling up early action Lessons, challenges and future potential in Bangladesh. London: ODI.	Red Cross Red Crescent FbF	Bangladesh	Empirical, using interviews to construct alternative scenarios representing predictable late action, unpredictable late action and regular seasonal earlier action.	https://www.odi.org/sites/odi.org.uk/files/resource-documents/12641.pdf
WFP (2017) Evaluation Assessment of Guatemala FoodSECuRE Project: A Global Synthesis. Rome: WFP.	FoodSECuRE	Guatemala	Empirical descriptive	Unpublished
WFP (2019) Forecast-based Financing in Nepal. A Return on Investment Study. Rome: WFP.	WFP FbF	Nepal	Modelled	https://docs.wfp.org/api/documents/WFP-0000108408/download/

Acronyms

A-A	anticipatory action
ALNAP	Active Learning Network for Accountability and Performance in Humanitarian Action
BDT	Bangladeshi Taka
CBA	cost–benefit analysis
EAF	Early Action Fund
EFAS	European Flood Awareness System
EWEA	Early Warning Early Action
FAO	Food and Agriculture Organization
FbA	forecast-based (early) action
FbF	Forecast-based Financing
FEWS NET	Famine Early Warning System Network
GFCS	Global Framework for Climate Services
H-ROI	humanitarian return on investment
IFRC	International Federation of the Red Cross
INGO	international non-governmental organization
IPC	Integrated Food Security Phase Classification
MEAL	monitoring, evaluation, accountability and learning
MEL	monitoring, evaluation and learning
NGO	non-governmental organization
OCHA	UN Office for the Coordination of Humanitarian Affairs
REAP	Risk-informed Early Action Partnership
ROI	return on investment
TBIA	theory-based impact assessment
VfM	value for money
WFP	World Food Programme

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REAP Risk-informed Early Action Partnership