HiCN Households in Conflict Network
hicn.org

A Targeted Review of the Impacts of Anticipatory Action: Evidence and Research Priorities

Audrey Pereira[1*], Dorothee Weiffen[1], Hanna Paulose[2], Marlon Krippendorf[1,3], Tilman Brück[1,4,5], Ghassan Baliki[1,4]

HiCN Working Paper 460

November 2026

Abstract
Anticipatory Action (AA), the delivery of humanitarian assistance before a predictable shock, aims to mitigate the human and economic costs of climate-related crises before hazards reach their peaks. As governments and humanitarian actors expand the use of forecast-based triggers, pre-arranged financing, and context- and state-specific intervention packages, there is growing demand for evidence on the impacts of AA. This review synthesizes findings from 14 experimental and quasi-experimental impact evaluations conducted between 2010 and 2025, covering nine contexts, and across cold waves, cyclones, droughts, and floods. We find that AA generally performs better than post-shock response or no assistance. AA improves food security, reduces negative coping strategies, and increases household pre-emptive actions, although impacts vary across measures, hazards, and interventions. Positive impacts found are concentrated during and immediately after the shock, consistent with the intention of AA. The evidence base is young but growing rapidly: nine of the 14 included studies were published since 2023, five are randomized trials, and coverage is strongest for cash transfers and floods. Intrahousehold and community-level effects, long-term resilience, and cost-effectiveness are priority questions for the next phase. Advancing the field will require harmonizing outcome measures, expanding sectoral coverage, standardizing costing approaches, and testing the integration of AA with social protection and other systems. Addressing these priorities will enable AA to scale across diverse hazards and contexts with greater impact.

Keywords
anticipatory action, impact evaluation, forecast-based financing, humanitarian response, disaster risk management, early warning systems, climate hazards

[1] ISDC – International Security and Development Center, Berlin, Germany
[2] United Nations Office for the Coordination of Humanitarian Affairs, New York, USA
[3] Freie Universität Berlin, Berlin, Germany
[4] Humboldt-Universität zu Berlin, Berlin, Germany
[5] Leibniz Institute for Horticultural Sciences (IGZ), Großbeeren, Germany
[*]Corresponding author: pereira@isdc.org

Acknowledgments
This work is supported by the European Research Council under ERC grant ANTICIPATE - project number 101055176, by the Deutsche Forschungsgemeinschaft (DFG, German Research Foundation) – project number BR 3614/4-1 (TB), and by the United Nations Office for the Coordination of Humanitarian Affairs. Marlon Krippendorf gratefully acknowledges financial support from the Hans-Böckler-Foundation. The authors thank participants at Fragile Lives 2025 and 2026, and the Leveraging Evidence for Effective Anticipatory Action Workshop in 2026 for their feedback on the preliminary findings of this work.

Declaration of Competing Interests
The authors are affiliated with institutions that design, fund, deliver, and evaluate anticipatory action programs. This review includes primary studies co-authored by members of the research team. The findings, interpretations and conclusions expressed in this paper are those of the authors and do not necessarily reflect the policies or views of affiliated institutions.

Citation
Pereira, A., Weiffen, D., Paulose, H., Krippendorf, M., Brück, T. & Baliki, G. (2026) 'A targeted review of the impacts of anticipatory action: Evidence and research priorities', *HiCN Working Paper Series, no. 460*. Berlin, Germany: ISDC – International Security and Development Center.

INTRODUCTION

The humanitarian system increasingly faces the dual pressures of intensifying climate-related shocks and declining resources. Simultaneously, the economic impacts of climate change disproportionately affect the most vulnerable people and systems across and within countries (IPCC 2023). Approximately 3.3 to 3.6 billion people lived in settings that were highly vulnerable to climate change in 2024 (ibid). Yet, traditional post-shock response models to reach such populations often mobilize too slowly to prevent loss of life, livelihoods, and well-being. In response, anticipatory action (AA) – or acting ahead of predicted hazards to prevent and reduce impacts on lives and livelihoods (Chaves-Gonzalez et al. 2022) – has emerged as a promising shift toward proactive risk management. Over the past decade, AA has expanded significantly across national governments, agencies, and countries, illustrating rapid institutional uptake (Chaves-Gonzalez et al. 2022; Tozier De La Poterie et al. 2023; OCHA 2026; Humphrey and Kurz 2026b). By acting early on credible warnings through predefined triggers, pre-arranged financing mechanisms, and context-specific intervention packages, AA aims to enable people to act before the peak of predictable crises, thereby reducing adverse impacts, protecting lives and dignity, and preserving development gains.

An emergent body of empirical case studies analyzing climate-related AA has begun to quantify its impacts across different hazards and settings on a diverse range of outcomes, including food security, consumption smoothing, coping behaviors, mental health, and asset protection. Earlier work noted the shortage of studies with credible counterfactuals (Weingärtner and Wilkinson 2019; Weingärtner et al. 2020). Since

then, a number of experimental and quasi-experimental studies have been conducted, but their findings have not yet been synthesized across countries, hazards, outcomes, and methodological approaches, and questions about the timing and modalities of effective anticipatory action remain open. This review fills that gap by synthesizing the current empirical evidence on the impacts of AA across different hazard types and contexts. In doing so, we map where the evidence base can grow and set forth research priorities to strengthen the AA learning agenda and inform the design of scalable, predictable humanitarian systems.

Our review identified 187 records, of which 14 studies met the inclusion criteria, covering nine contexts and five outcome domains: economic; food security, nutrition, and resilience; health and wellbeing; pre-emptive actions; and social cohesion. Most AA were in the form of cash, although some studies include the provision of food and non-food items. In terms of economic outcomes, we find that cash transfers ahead of climate shocks perform better than no response. Comparing pre- versus post-shock response with cash transfers, there were no clear differences in non-livestock asset-related outcomes for floods: while cash successfully prevented severe damage to farms and crops in the field in one context, there were no statistically significant impacts on income or durable assets in two studies. However, the only drought study found that AA cash ahead of drought reduced household's need to borrow money. Impacts on livestock vary by livestock type, context, hazard, and intervention. AA in the form of cash transfers showed some improvements to food consumption and food security compared to post-shock assistance or no-assistance in some contexts. These improvements occurred during the peak and immediate aftermath of the shock, when AA is designed to act. Among the studies measuring health and life satisfaction, there

were some positive impacts on physical health and mental health, with the latter being measure-specific. Gains in life satisfaction were concentrated during the peak crisis period. AA also supports households' pre-emptive actions, especially in reinforcing houses and shelters and exercising agency over whether or not to evacuate. Two studies measure the impacts of AA on social cohesion. Findings on timing of AA support earlier assistance to improve outcomes. Our review of nine value-for-money studies covering 14 contexts finds mostly positive benefit-cost ratios though there is substantial variation in approaches, limiting comparability across studies.

Based on these findings, recommended research directions include generating evidence on more sectors, establishing the optimal timing and lead time of assistance, harmonizing outcomes, paying attention to intrahousehold and community dynamics, identifying longer-term impacts, and learning about AA integration into social protection and cross-sectoral systems. Together, addressing these priorities will help build the AA evidence base needed to understand what works, for whom, for how long, under what conditions, and at what cost, as AA scales.

METHODS

We identified relevant studies through searches of Google Scholar and the Anticipation Hub and ReliefWeb platforms' publication databases, capturing both the peer-reviewed literature as well as relevant reports, briefs and gray literature. The Anticipation Hub platform is a global platform which facilitates knowledge exchange, learning, guidance, and advocacy around AA and hosts a repository of reports, briefs, and other documents on AA. The ReliefWeb platform curates essential content on humanitarian information, including reports, maps, and infographics, connecting the

humanitarian community with NGOs, governments, research centers, and others. Search terms used were ("anticipatory action" OR “early action” OR “anticipatory cash” OR “early cash” OR “anticipatory” OR “pre-shock” OR “forecast-based”) AND ("experimental" OR "impact evaluation" OR "quasi-experimental" OR “RCT” OR “randomized controlled trial”) AND ("flood*" OR "drought*" OR "hurricane*" OR "cyclone*" OR "typhoon*"). The first ten pages (100 records) of Google Scholar and all records returned from the Anticipation Hub and ReliefWeb platforms were reviewed. Studies in reports, peer-reviewed articles, and working papers that test at least one anticipatory intervention, clearly identified a comparison group (that is, experimental or quasi-experimental designs), were published between 2010 and 2025, and focused on at least one LMIC, were extracted. Anticipatory interventions were defined as being delivered before a climate-related shock based on early warning information or forecast-based triggers.

Data extracted included hazard type (cold waves, cyclones, droughts, floods), intervention modality, timing, evaluation design with study arms considering delayed treatment or a pure control group, outcome measures, and main findings across five domains: (i) **economic** (including crop and livestock farming): Household economic resources and productive capacity such as household assets, borrowing, and damage or loss to physical property, as well as household ownership, productivity and preservation of livestock assets.; (ii) **food security, nutrition and resilience**: Household’s access to sufficient and nutritious food, food consumption, and behavioral strategies to manage food shortages and consumption constraints; (iii) **health and wellbeing**: Physical health, mental health, subjective wellbeing and life satisfaction; (iv) **pre-emptive actions**: actions undertaken by households or communities to prepare for

and mitigate the negative impacts of hazards.; and (v) **social cohesion**: Social conditions affecting household safety and community functioning. Example indicators falling under each domain are provided in Appendix Table 1.

AI use disclosure: The authors used AI to improve the language, clarity, and flow of the manuscript. All AI-generated suggestions were reviewed and edited by the authors, who take full responsibility for the content of the manuscript.

RESULTS

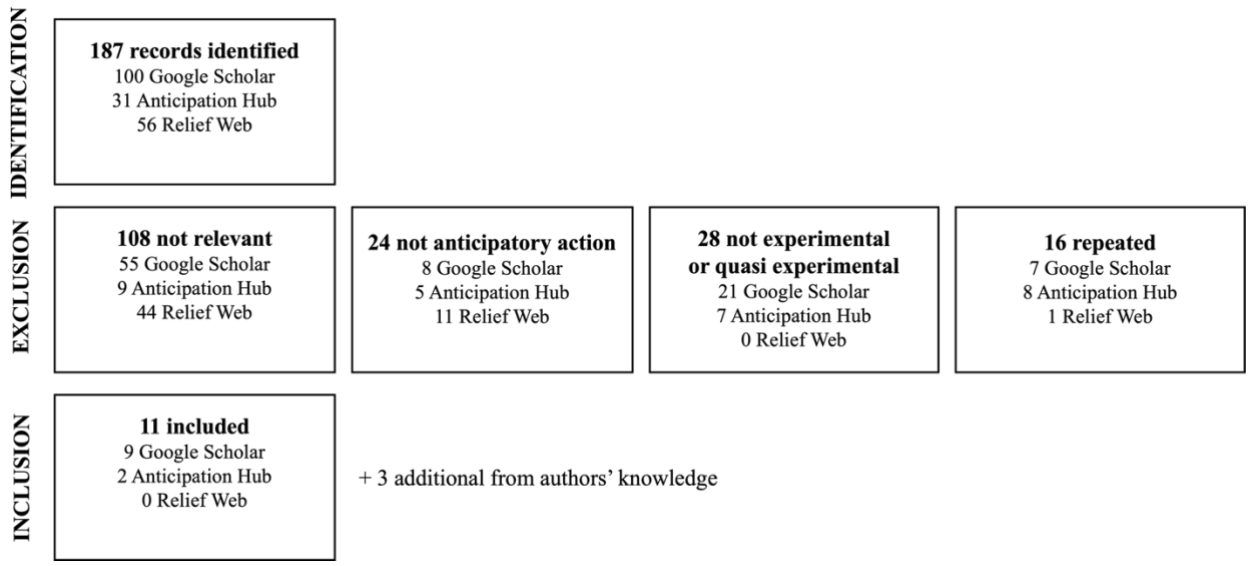
Search results

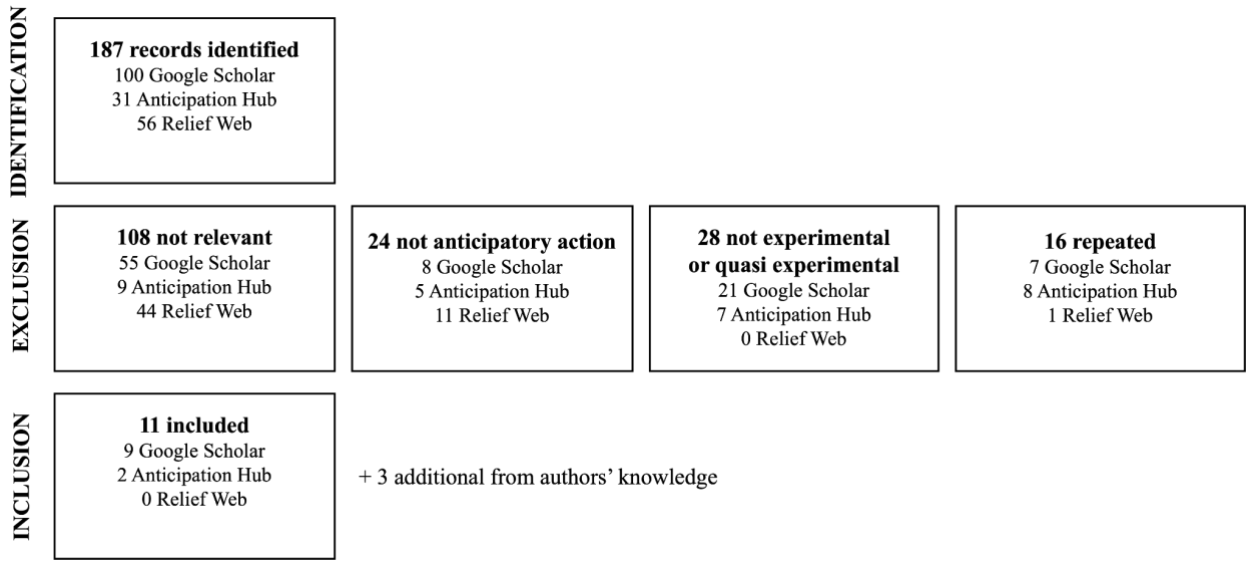
The search of the three publication databases in July 2025 yielded 187 records. From this total, 108 items were not relevant, 24 did not include AA activities, 28 were not experimental or quasi-experimental, and 16 were repeated across databases (Figure 1). Given how fast this literature is growing — nine of the 14 included studies appeared since 2023 — impact evaluations published after that date are not captured here, and the evidence base has likely expanded since then. The search resulted in 11 studies for inclusion, supplemented by three additional items missing from the databases but known to the authors, for a total of 14 included studies, summarized in Table 1. These 14 studies were conducted in nine contexts (Bangladesh, Mongolia, Mozambique, Nepal, Niger, Nigeria, Peru, Somaliland, South Sudan). Eight studies assessed AA for floods, three for cold waves, one for cyclones, one for cyclones and floods, and one on droughts. Cash transfers were the primary intervention type, which were included in some form in 10 studies. Cash transfer amounts ranged from USD 50 to USD 400. The other four studies included the provision of food and non-food items. Five studies were RCTs and the other nine included quasi-experimental methods, six of which used

Propensity Score Matching (PSM). Ten studies used control or comparison groups that did not receive any intervention (early action to no intervention), while four studies used a post-shock response comparison group. The economic domain was the most commonly examined (12 studies), followed by health and well-being (10 studies), food security, nutrition, and resilience (9 studies), pre-emptive actions (8 studies), and social cohesion (2 studies). The effects of intervention timing were assessed in six studies. The studies were published as six journal articles, four working papers, and four reports.

To supplement this review, we also include additional nine studies on value for money, covering 14 contexts (Afghanistan, Bangladesh, Colombia, Kenya, Ethiopia, Lesotho, Madagascar, Mongolia, Mozambique, Nepal, Philippines, Sudan, Viet Nam, and Zambia) based on our knowledge. These studies used comparative cost-benefit-analyses (CBAs), scenario-based CBAs, and back-of-the-envelope calculations on returns on investment. This value-for-money review was supplementary, non-systematic, and not intended to be comprehensive.

Figure 1. Search results





Notes: Titles that were not even closely related to anticipatory action were deemed "not relevant." Abstracts of all other titles were screened. Studies were classified as "not anticipatory action" if they did not include pre-specified trigger warnings or interventions.

Table 1: Studies included in this review

Country (Authors)	Hazard type	Main intervention	Targeting	Intervention details	Study design	Study arms	Timeline	Assessed timing of AA
Bangladesh (Gros et al. 2019)	Floods	Cash	Vulnerability criteria and scoring based on housing structure; flood exposure; income; household has at least one person with a disability (PWD), at least one child, and at least one elder; female headed household, primary livelihood source	One-off unconditional cash transfer of BDT 5000 (USD 60 equivalent as of 1 July 2017)	Quasi-experimental: Propensity Score Matching	T: Pre-shock cash transfer C: No intervention	Baseline: May 2016 Trigger: July 2017 Follow-up: October 2017, approximately one month after flood waters had receded	No
Bangladesh (Gros et al. 2023)	Floods	Cash	Vulnerability score based on the quality of the housing structure; the level of inun-dation during previous floods; the number of household members who are children, elderly, or disabled; family structure (being female-headed, widowed, or divorced); and the primary livelihood strategy.	One-off unconditional cash transfer of 4,500 BDT (USD 53)	Quasi-experimental: Propensity Score Matching	T: Pre-shock cash transfer C: No intervention	Early protocol activation: June 25, 2020 Treatment dates: 48 to 24 hours before peak flooding 1 Peak flooding 1: June 20 - July 3, 2020 Peak flooding 2: July 14, 2020 Data collection: January 29 - February 6, 2021	No
Bangladesh (Pople et al. 2024)	Floods	Cash	Red Cross Red Crescent Climate Centre supported implementation partner, WFP, to identify target geographic regions – unions – based on a joint assessment of their flood risk and overall socio-economic vulnerability. Next, WFP was required to	One-off unconditional cash transfer of BDT 4,500 (USD 137 at 2020 PPP rates). Sent via bKash digital wallets	Random sampling from treatment and control group lists	T: Pre-shock cash transfer C: No intervention	1st trigger: July 4, 2020 2nd trigger: July 11, 2020 Treatment dates: July 14, 15, 16 and 20, 2020 Peak flooding: July 22, 2020	Yes

Country (Authors)	Hazard type	Main intervention	Targeting	Intervention details	Study design	Study arms	Timeline	Assessed timing of AA
			use pre-existing lists to identify potential households within the chosen unions owing to restrictions on movement arising from the COVID-19 pandemic.				Data collection 1: September 21 - October 8, 2020 Data collection 2: December 22-28, 2020	
Bangladesh (Pronti et al. 2021)	Cyclone	Evacuation, In-kind	Not detailed, but beneficiaries and non-beneficiaries from four most vulnerable districts were included.	Evacuation to cyclone shelters and distribution of food (flattened rice, sugar, high-energy biscuits) and drinking water, provision of basic first aid, installation of artificial light facilities at night, and evacuation transportation with local tractors of people with their movable assets and livestock to the cyclone shelters	Quasi-experimental: Propensity Score Matching	T: Food and non-food items kits; evacuation to local shelters C: No intervention	Trigger: May 18, 2020 Data collection: January 27, 2021 - February 6, 2021	No
Mongolia (Gros et al. 2019)	Cold wave	Cash In-kind	The Mongolia Red Cross Society targeted the 40 most-at-risk soums (districts) in 12 provinces. Herders with 50–200 livestock who fulfilled one of the following criteria were considered to be eligible for the intervention: families with multiple children (more than five under the age of 16); families with a disabled member; elderly families aged 60 or more with no guardian; single-headed households with three or	Unrestricted cash grants of MNT 240,000 (USD ~100) in December 2017, sent to bank accounts, and animal care kits in January 2018	Quasi-experimental: Propensity Score Matching	T: Cash transfer and animal care kits C: No intervention	Dzud risk map published on November 26, 2017 Treatment: Cash in December 2017, animal care kits in January 2018 Data collection: May 2018	Yes

Country (Authors)	Hazard type	Main intervention	Targeting	Intervention details	Study design	Study arms	Timeline	Assessed timing of AA
			more children under the age of 16; or herders with up to 400 livestock who live in high dzud risk areas identified by Local Emergency Management Agencies (LEMAs).					
Mongolia (Mogge et al. 2024)	Cold wave	Cash	Households participating in the Coping with Shocks Survey, living in an area projected to be at very high, high, or medium risk of experiencing extreme winter conditions, according to the risk map published on January 10, 2021. Households also had to own livestock.	Unconditional one-off cash transfer of approximately USD 236	RCT	T: Pre-shock cash transfer (unconditional) C: No intervention	Dzud risk map published on January 10, 2021 Baseline: June 2020 - May 2021 (part of a larger panel survey) Treatment: Second week of March 2021 Post-intervention phone survey: Beginning mid-April to end of September 2021	No
Mozambique (Popat et al. 2024)	Cyclone (Floods)[1]	Provision	The National Institute for Disasters' Management (INGD), community leaders, and the Red Cross volunteers mapped out a list of eligible beneficiaries (based on the perceived relative vulnerability). Beneficiaries' selection criteria included the following: female-headed households, households with the presence of elderly people and/or people with disabilities and chronic	Provision of non-food items kits (including buckets, cups, mosquito nets, soaps, and COVID-19 masks)	Quasi-experimental: Propensity Score Matching	T: Non-food item kits C: No intervention	Cyclone: January 24, 2022 Flood activation: January 25, 2022 Treatment: started January 28, 2022 Data collection: July 2022	No

Country (Authors)	Hazard type	Main intervention	Targeting	Intervention details	Study design	Study arms	Timeline	Assessed timing of AA
			diseases, and of young children (5 years old or younger).					
Peru (Aguirre et al. 2019)	Floods	Provision	The Peruvian Red Cross selected beneficiaries based mainly on the infrastructure conditions of the house.	House material kits including corrugated roof, plywood plates, wooden sticks and wood slats	Quasi-experimental: Propensity Score Matching	T: Housing supplies kit C: No intervention	Trigger: November 2015 Baseline: December 2015 Treatment: February - May 2016 Endline: November 2017	No
Peru (Bazo et al. 2021)	Cold wave	Provision	The Peruvian Red Cross household eligibility criteria were based on a vulnerability score for each household using some pre-established criteria such as the number of household members who are children under 5 years old, adults over 65 years old, with disabilities, pregnant women, and people with chronic diseases, poverty index.	Veterinary kits for 50 heads of cattle per family, tarpaulins, tool kits to install a temporary awning for alpacas to protect them from the cold wind and snow, protection kits for alpaca herders and warm clothing for children under five, pregnant women, the elderly, and people with chronic and infectious diseases	Quasi-experimental: Simple matching	T: Livestock care kits C: No intervention	Treatment prior to first snowfall: May 2, 2018 Official level 4 warning for snowfall: May 31, 2018 FbF activation: June 2018 Data collection: June 22-24, 2018 (~one month after event ended)	No
South Sudan (Weiffen et al. 2025)	Floods	Cash	Beneficiaries of the cash distribution were selected by IOM in coordination with the community leaders in these settlements, who targeted the most vulnerable households, including female-headed	One-off unconditional cash transfer of ~43,950 SSP (USD ~65)	Quasi-experimental: Simple matching	T: Pre-shock cash transfer C: No intervention	Baseline: Before cash distribution (August 2022) Wave 1: After cash distribution (October 2022) Wave 2: Six months after cash distribution	No

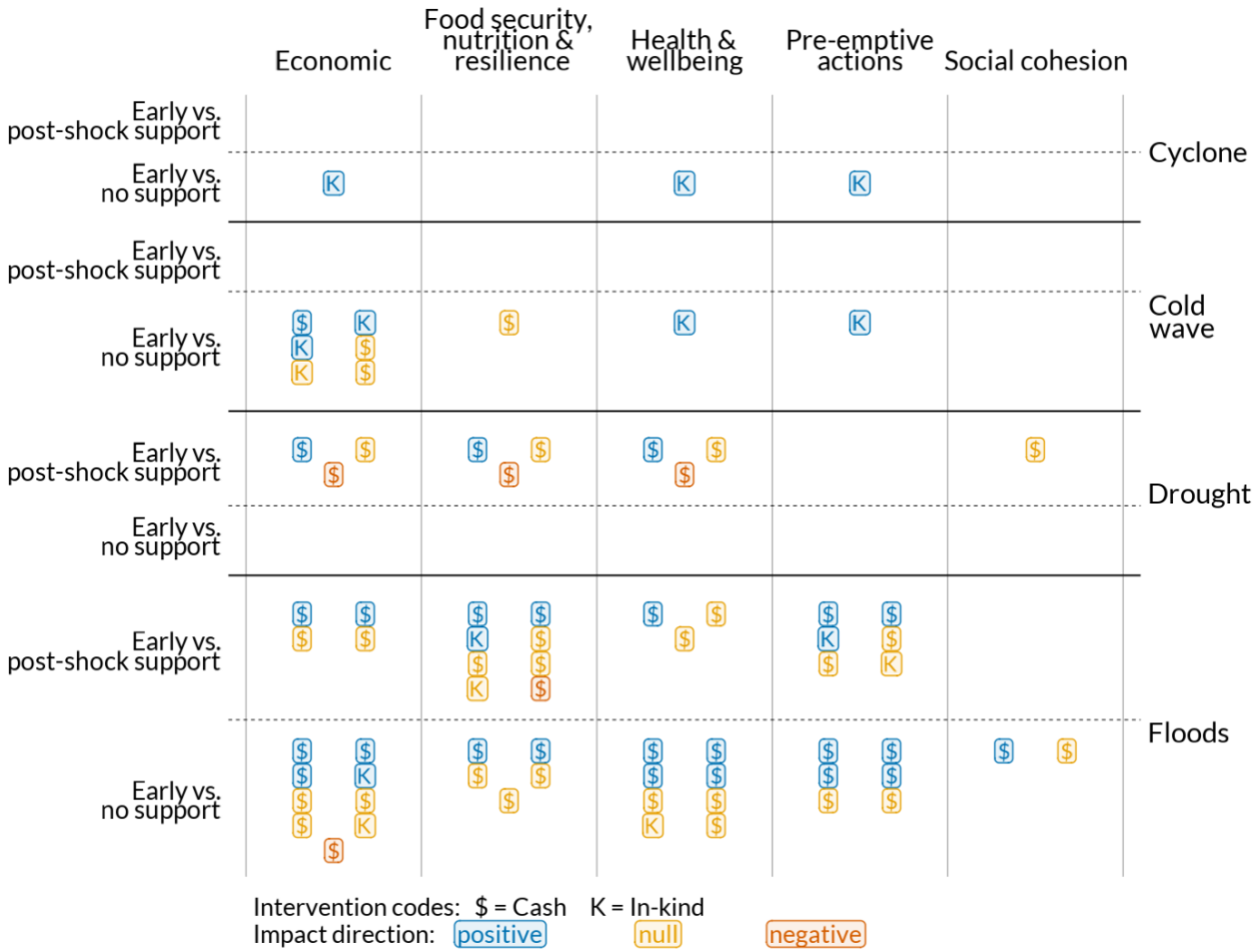
Country (Authors)	Hazard type	Main intervention	Targeting	Intervention details	Study design	Study arms	Timeline	Assessed timing of AA
			households with elderly or people with mobility impairments.				and after flood season (March 2023)	
Compared to traditional post-shock response								
Nepal (Dunsch et al. 2025)	Floods	Cash Early warnings	Not provided but the report indicates that different partners used different targeting criteria, which did not necessarily guarantee that the most vulnerable people were reached with assistance.	One-off unconditional cash transfer of NPR 15,000 (USD 117) Early warning message distribution	RCT	T: Pre-shock cash transfer (during or just a few days after flood peak) C: Post-shock cash transfer (within ~1-2 months after peak flood)	Trigger: October 7-8, 2022 Treatment : October-November, 2022 Wave 1: November 2022 Control: November-December 2022 Wave 2: January 2023 Endline: May 2023	Yes
Niger (Pople et al. 2025)	Drought	Cash	The Niger safety nets unit (Cellule Filets Sociaux) collected proxy means test (PMT) scores for all households in target villages between December 2021 and January 2022. Households were deemed eligible if they fell in the bottom 44% of the PMT distribution in each commune.	T1 Traditional response: Four payments of 45,000 CFA (USD PPP $220) during lean season and before next harvest season T2 Early short intervention: Four payments of 45,000 CFA (USD PPP $220) before lean season T3 Early long intervention: 12 smaller payments of 15,000 CFA or (USD PPP $74) before and during lean season Household targeting and total transfer amounts are held constant across arms	RCT	T1 (C): 4 "traditional response" cash transfers (during lean season and before next harvest) T2: 4 "early short" cash transfers (before lean season) T3: 12 "early long" cash transfers (before and during lean season and during harvest)	Trigger: late 2021 Baseline: February 2022 Pre-lean surveys: March - June 2022 Lean surveys: July - September 2022 Post-lean surveys: October 2022 - January 2023 Endline: May - June 2023 Treatment windows: T1: July - September 2022 T2: March - June 2022 T3: March 2022 - January 2023	Yes

Country (Authors)	Hazard type	Main intervention	Targeting	Intervention details	Study design	Study arms	Timeline	Assessed timing of AA
Nigeria (De Brauw et al. 2025)	Floods	Cash Early warnings	All households in the six communities identified as the most historically affected by floods and climatic shocks. 1450 participants were selected using stratified random sampling with proportional allocation by community and gender.	Early warning messaging for all households One-off unconditional cash transfer of N195,000 (USD ~400 last week of July 2022)	RCT	T: Pre-shock cash transfer C: Post-shock cash transfer after flooding receded (~3 months after treatment group)	Baseline: April 25 - May 31, 2022 Trigger: July 17 - 21, 2022 Treatment: July 27, 2022 Control: 7 November, 2022 Endline: December 2022	Yes
Somaliland (Swift et al. 2024)	Floods[2]	Cash Livestock support and early warnings	Villages were selected based on three considerations: their economic vulnerability, their vulnerability to flooding, and access and operational considerations. Households were selected using a community-driven, participatory approach, in which community committees identified the most vulnerable households based on community-defined wealth categories in line with the baseline Household Economy Analysis wealth grouping.	One-off unconditional cash transfer of USD 270 Both groups received livestock treatment to protect animals from flood-borne disease and early warning information. Both groups also received USD 90 after baseline to address immediate food and non-food needs.	RCT	T: Pre-shock cash transfer C: Post-shock cash transfer (~2.5 months after treatment group)	Trigger: August 2023 Baseline: September 2023. Initial transfer ($90): 7 October 2023 AA Treatment ($270): 14 October 2023 Midline: November 2023 Control ($270): 28 December 2023 Endline: March 2024	Yes

Notes: [1] Popat et al. (2024) list both hazard types. Cyclone Ana hit Mozambique on January 24, 2022 and the early warning system provided less than one week's notice. The cyclone protocol was not activated because wind speed thresholds were not met. However, the cyclone brought excessive rainfall, which exceeded flood trigger levels. Anticipatory assistance was then shifted toward flood-affected households within a very short timeframe.

[2] Anticipatory assistance was provided following a flood trigger. However, no excessive floods followed.

Figure 2: Summary of impacts



Notes: Each rectangle-bubble represents a single study. Studies are shown for every positive, negative, or null finding they report, so a single study can appear more than once within a domain. Impacts should be interpreted relative to the comparison/control group used. Positive findings indicate improvements in outcomes for the intervention group, while negative findings indicate that the control/comparison group performed better. However, for comparisons of anticipatory action and post-shock response, a negative finding generally indicates that the outcome was lower among households receiving anticipatory action, potentially reflecting differences in the timing of assistance. Null findings reflect no statistically significant difference ($p<0.05$) among the outcomes measured. Null findings indicate that there were no statistically significant differences between anticipatory action and no intervention in the Early vs. No support rows, and no statistically significant differences between anticipatory action and the post-shock assistance in the Early vs. post-shock rows. Outcomes a study did not examine are absent from the figure, not counted as null. For the drought study, direction of effect depends on the season during which the outcome was measured.

Targeting

Studies targeted households in geographic areas identified as the most vulnerable to the relevant hazard in each context (Table 1). Most studies also assessed household vulnerability, such as through proxy-means test scores based on poverty, household composition and dependency, and livelihoods. One study also used housing infrastructure for a housing intervention (Aguirre et al. 2019), while two others used community-based or participatory approaches to identify vulnerable households (Swift et al. 2024; Weiffen et al. 2025). Households had to own livestock for livestock-specific AA interventions (Mogge et al. 2024).

Impacts

An overview of the impacts by outcome domain, hazard type, and type of intervention is provided in Figure 2 and Appendix Table 2. Studies are shown for every positive, negative, or null finding they report, so a single study can appear more than once within a domain. Twelve of the 14 studies report at least one positive impact and 11 report at least one null findings. Negative findings are rare. A statistically significant negative finding indicates a lower outcome for AA beneficiaries than for the comparison group (either non-recipients or later-assisted households), but does not necessarily imply a reduction in welfare. In the four studies comparing AA to post-shock response, a negative finding shows that the latter group performed better than the former rather than a reduction in welfare for the AA group. In the other studies comparing AA to no intervention, a negative finding reflects an actual reduction in welfare, subject to the measure. Only three of the 14 studies report

negative impacts, and in two of these, outcomes likely reflect the timing of assistance for the post-shock group.

We examine each domain in detail below, first beginning with studies using a comparison group of no intervention, and then summarizing findings from studies comparing pre- versus post-shock assistance.

Economic outcomes

Twelve studies assessed the impacts of anticipatory activities on economic outcomes, with ten finding at least one positive effect and nine finding at least one null effect.

Across various studies comparing early action to no intervention in Bangladesh, cash transfers ahead of floods reduced the need for households to borrow money (Gros et al. 2019, 2023; Pople et al. 2024), prevented the destitution sales of household items (Gros et al. 2023), and protected assets from loss, but increased work for wage (Pople et al. 2024). At the same time, these studies did not find effects on a range of outcomes such as agricultural and non-agricultural income, destitution sales of livestock, or adult household members' ability to work. The provision of food and non-food items along with evacuation assistance ahead of a cyclone in Bangladesh, and the provision of housing supply kits in anticipation of floods in Peru, helped mitigate asset loss and household damage relative to households that received no interventions (Aguirre et al. 2019; Pronti et al. 2021). However, cash transfers following a cold wave trigger in Mongolia did not significantly affect household income and non-food consumption expenditures (Mogge et

al. 2024), while the provision of non-food item kits for floods in Mozambique did not have a significant effect on the loss of household assets (Popat et al. 2024).

Anticipatory action also helped protect some types of livestock in a few studies. In Bangladesh, cash transfers ahead of floods prevented the loss of calves, cows, chickens, and pigeons, but not goats, sheep, and ducks in one study (Gros et al. 2023). In another Bangladesh floods AA study, cash safeguarded small livestock and poultry, but not large livestock (Pople et al. 2024). Effects of AA on livestock, therefore, varied by type of animal, as well as by differences in the intervention cash amount and study design. The provision of food and non-food items and evacuation assistance before a cyclone also prevented the death of animals and ducks in Bangladesh, but not goat, sheep, or cattle mortality, or offspring survival among cattle and horses (Pronti et al. 2021). In the face of cold waves, cash and animal care kits reduced horse mortality and increased goat and sheep offspring survival, but not goat, sheep or cattle mortality or the share of animals with deteriorated body conditions, for example, in Mongolia (Gros et al. 2022). Veterinary care kits and temporary weather protection reduced high alpaca loss in the Peruvian Andes (Bazo et al. 2021), however, cash ahead of a cold wave in Mongolia had no significant effect on herd size or herding expenditures (Mogge et al. 2024).

Moving to pre- versus post-shock assistance, in Nigeria, pre-flood cash transfers did not significantly impact agricultural or non-agricultural income or household durable assets compared to post-flood cash transfer households (De Brauw et al. 2025). In Nepal, while households receiving pre-flood assistance did not experience significantly different flood damages to the house, wage income and business profits, and likelihood of having

to borrow money, compared to post-shock households, the cash transfers successfully prevented severe damage to farms and crops in the field (Dunsch et al. 2025). In the case of drought in Niger, households receiving early cash support were less likely to borrow money and borrowed smaller amounts compared to those receiving traditional response in the pre-lean season (Pople et al. 2025). In the lean season, however, these early support households were more likely to borrow money and borrow larger amounts than the traditional response group (ibid).

Cash and early warnings before floods had protective effects on tropical livestock units in Nigeria (De Brauw et al. 2025), but no significant effects on damage to fish farms, livestock, or poultry in Nepal (Dunsch et al. 2025). In Niger, cash transfers before the drought also did not have significant impacts on a livestock index (Pople et al. 2025).

In summary, anticipatory cash transfers ahead of climate shocks performed better than no response in terms of economic outcomes. While there were no clear differences in assets between households receiving anticipatory cash transfers and those receiving a traditional flood response, cash transfers ahead of drought prevented households from borrowing and from borrowing large amounts compared to the traditional response. The evidence also suggests no clear patterns for livestock: AA protected at least some livestock types in six of the nine studies that measured livestock outcomes; which animals benefited varied by hazard and intervention, and no study identified negative impacts.

Food security, nutrition, and resilience outcomes

Nine studies assessed the impacts of AA interventions on food security and nutrition. Five studies found at least one positive result, eight found at least one null effect, and no studies found negative effects reflecting reductions in welfare. Among studies comparing AA activities to no intervention, in Bangladesh, cash transfers reduced the likelihood of any household member having to eat only rice for a whole day or for ten days or more (Gros et al. 2019). Another study in Bangladesh found that cash given ahead of floods reduced food insecurity, particularly the likelihood of going a full day without eating (Pople et al. 2024). The transfers also protected child, but not adult, food consumption three months post-intervention, and adult, but not child, food consumption five months post-intervention (Pople et al. 2024). In contrast, other studies providing cash transfers before floods in Bangladesh and South Sudan found no significant effects on food security or food-based coping strategies (Gros et al. 2023; Weiffen et al. 2025), and no statistically significant effect on home livestock consumption ahead of a cold wave in Mongolia (Mogge et al. 2024).

Among studies comparing anticipatory interventions to post-shock responses, early cash transfers improved the Food Consumption Score (FCS), animal protein consumption, and the reduced Coping Strategy Index (rCSI) in Nepal immediately following floods (Dunsch et al. 2025); FCS and monthly food consumption in Niger during drought (Pople et al. 2025); and the rCSI in Somaliland although floods did not materialize (Swift et al. 2024). In Niger, transfer size also mattered: larger transfers resulted in greater net benefits before and during the lean season and more stability in the proportion of households

above the poor food security threshold (Pople et al. 2025). Finally, in Nigeria, de Brauw et al. (2025) did not find any significant effects on FCS, but observed a counterintuitive increase in the rCSI and Livelihood Coping Strategy Index (LCSI), which measure coping in the seven days prior to the survey. These counterintuitive findings are likely an artefact of the item's short reference period and the timing of measurement: coping strategies were measured at endline, only shortly after the control group had received their (late) cash payment. Looking beyond the intended AA time horizon, in both Nepal (floods) and Niger (drought), the welfare effects of cash transfers on household food consumption and food security dissipated by the last survey wave (Dunsch et al. 2025; Pople et al. 2025).

There are several lessons from the findings. First, AA in the form of cash transfers can improve food security and nutrition during crises, when AA is designed to act, although this evidence is not consistent across measures. The few studies with longer-term follow-up surveys did not detect sustained effects, which may reflect the intention of AA, the interventions themselves, or the short reference periods of the measures. Second, transfer size matters for food security outcomes amid drought, but this and other design features should be tested in more contexts and with other hazards. Third, FCS and rCSI were the most commonly used measures across studies, revealing the need for more harmonized measures to be included in surveys.

Health and Wellbeing

Ten studies also included measures of physical and/or mental health and well-being, among which eight found positive impacts, seven found null impacts, and none found

reductions in health and wellbeing. For physical health, cash transfer households reported fewer health issues such as coughing and skin rashes, but similarly on physical injuries, diarrhea, and dysentery after floods in Bangladesh (Gros et al. 2023), and better outcomes on adverse health pre-shock but not post-shock in South Sudan, relative to non-intervention households (Weiffen et al. 2025). In addition, evacuation and the provision of food and non-food items reduced injuries and health problems following a cyclone in Bangladesh (Pronti et al. 2021), but there were no differences in injuries and water-borne diseases with the provision of non-food item kits following a cyclone in Mozambique (Popat et al. 2024). And in Peru, the provision of veterinary kits, which included wind and snow protection and warm clothing for households, decreased the number of adults per household reporting respiratory ailments and did not change spending on medical care following a cold wave (Bazo et al. 2021).

For mental health, cash transfers reduced the frequency of having always felt miserable or unhappy since the flood in Bangladesh, but there were no significant effects on feelings of depression, anxiety or being able to think properly or concentrate relative to no intervention households (Gros et al. 2019). In Niger, compared to a traditional response, cash transfers before, and before and during, the lean season improved depressive symptoms as measured by the Center for Epidemiologic Studies Depression Scale Revised (CESD-R-10) (Pople et al. 2025). These effects dissipated by the lean season. Dunsch et al. (2025) and Weiffen et al. (2025) found no effects of pre-flood cash transfers on the Patient Health Questionnaire-4 (PHQ-4) in Nepal and the Generalized Anxiety Disorder-7 (GAD-7) in South Sudan, respectively.

Results on subjective well-being also varied by study and were mostly measured with a Life Satisfaction Cantril ladder. In Bangladesh, Gros et al. (2019) found that cash transfers in anticipation of floods improved subjective well-being scores, while Pople et al. (2024) found improvements in life satisfaction scores three months after the intervention. These impacts on life satisfaction scores dissipated among a subset of those surveyed at five months post-intervention compared to a no-intervention group (Pople et al. 2024). Similarly, compared to post-shock responses, pre-shock cash transfers improved life satisfaction shortly after floods in Nepal (Dunsch et al. 2025) and in the pre-lean season for droughts in Niger (Pople et al. 2025), but these effects were not sustained in either study. Finally, cash transfers ahead of floods showed no improvement in life satisfaction in Nigeria (De Brauw et al. 2025).

Overall, this review finds some positive health or wellbeing impacts of AA. Improvements in physical and mental health were found on some measures but not others, and gains in life satisfaction were concentrated during the peak crisis period when AA is intended to act.

Pre-emptive actions

Eight studies measured household pre-emptive actions, with seven finding at least one positive impact and four finding at least one null impact. Ahead of floods in Bangladesh, Nigeria, Somaliland, and South Sudan, households that received cash transfers were more likely to evacuate household members or livestock from flood-prone areas (Gros et al. 2019, 2023; Pople et al. 2024; Pronti et al. 2021), improve or reinforce shelters (Gros et

al. 2019; Swift et al. 2024; Weiffen et al. 2025), buy food (Gros et al. 2019), save money (Swift et al. 2024), or reallocate labor (De Brauw et al. 2025) compared to households that did not receive interventions. However, there were also no changes to protecting valuable assets, evacuating others, warning others, and temporarily relocating in some of these studies (Gros et al. 2019, 2023; Pronti et al. 2021). In Peru, Bazo et al. (2021) found that households that received livestock care kits in anticipation of a cold wave were less likely to migrate to lower altitudes, likely reflecting the time and resource-heavy nature of migration and increased confidence among herders to remain in their locations and protect their herds. Studies varied in the measures used, and almost all also found no statistically significant impacts on a number of pre-emptive action measures.

In summary, and as intended, AA enables households to act before a shock arrives. The specific actions taken depend on the hazard, context, and measure.

Social cohesion outcomes

Two studies assessed social cohesion outcomes, an emerging domain for AA. In South Sudan, Weiffen et al. (2025) observed spillovers from shelter investments to community cohesion. The authors anecdotally explain the decrease in theft and conflict through investment in lockable doors, which prevented unauthorized access into dwellings, thereby reducing community conflict. For droughts in Niger, there were no differences in social cohesion or the perception of violence between early support and traditional response groups (Pople et al. 2025).

Timing

In addition to the impacts reported on anticipatory versus traditional response interventions discussed above, two studies discussed the timing of AA. In Bangladesh, Pople et al. (2024) exploited variation in the delivery date of cash transfers ahead of floods and found that households receiving the cash transfer one day earlier relative to the local peak flood had slightly better adult food consumption three months later. In Mongolia, participant-reported receipt of cash and animal care kits earlier rather than later in anticipation of a cold wave resulted in decreased animal mortality, except for cattle (Gros et al. 2022).

Value for Money

AA value for money studies reveal a wide range of approaches across contexts, hazards, interventions, and outcomes, limiting our ability to reliably compare findings (Appendix Table 3). Across the 14 contexts, value for money was assessed in relation to anticipation of below average rainfall, cold waves, droughts, and floods. Interventions ranged from the set up and maintenance of earning warning systems, to cash assistance, livestock feed distribution, food and non-food items provision, and the operationalization or adoption of irrigation-based agriculture. Estimated time horizons ranged from six months to 20 years, with varying discount rates, both of which were sometimes unspecified. Key outcomes included asset protection, food security, income and revenues, livestock mortality, loss of life, and school attendance, among others. Given these heterogeneities, benefit-cost ratios are not directly comparable across studies. However, most estimates were positive, ranging from 1.23 to 34.39 (Atkinson 2018; Jones and Lombardi 2018; FAO 2023; Mogge

et al. 2024; De Brauw 2025; Dunsch et al. 2025; Matchaya et al. 2025), with only two estimates below one (FAO 2023).

DISCUSSION

The collected evidence demonstrates the potential of anticipatory action to reduce the negative impacts of predictable shocks. Before the onset of crises, early assistance can help households act proactively rather than reactively, supporting them in reinforcing houses and shelters and in exercising agency over whether or not to evacuate. AA targeting also generally prioritizes economically vulnerable households in geographically vulnerable settings. During hazards, such support helps households smooth consumption, protect assets, and preserve livelihoods, thereby mitigating shock severity, reducing downstream needs, and increasing their capacity to recover sooner. How households benefit from AA depends in part on the severity of the shock and threat of asset loss (Humphrey and Kurz 2026b). When expected shock severity and threat of loss are low, households are likely to use AA on basic needs. However, when the shock is expected to be severe, with a high threat of asset loss, households use AA support to protect assets and livelihoods (Humphrey and Kurz 2026b). In the former case, benefits are concentrated in the crisis window, which is the period AA targets, for which we find some evidence with livestock outcomes and pre-emptive actions, for example. In the latter case, it is unclear whether asset and livelihood protection leads to downstream benefits, as these outcomes have not been assessed in the longer term. Positive cost-benefit ratios further reinforce AA's potential to deliver efficient humanitarian outcomes although we caution that cost studies vary widely in their approaches. The findings of this review point to several

priorities for strengthening the evidence base on AA. Addressing these priorities will further strengthen AA as it moves from a rapidly growing portfolio of programs to an integrated, multi-sectoral component of the humanitarian system.

- *Generate evidence on multi-sectoral anticipatory action*

Evidence to date concentrates on economic, food security, coping, and pre-emptive outcomes. Evidence on WASH (access to water, access to latrines, water purification methods), education (school attendance and enrolment), and protection (harassment, gender-based violence (GBV), and violence against children) is the next step toward multi-sectoral anticipatory assistance.

- *Compare different modalities and design features*

Only one study has tested cash transfer design features: by varying the number and size of payments against a traditional-response arm, it isolated the effect of transfer schedule within a single evaluation (Pople et al. 2025). The next step is to apply this approach to other interventions and hazards (e.g., floods vs. droughts), to replicate the schedule (e.g., regular vs. one-off) and amount comparisons in more contexts, and to test design features that have not yet been compared, including modality (e.g., cash-only vs. cash-plus) and gender of the recipient, as previously recommended (Humphrey and Kurz 2026) .

- *Identify the optimal timing and lead time of anticipatory action*

The evidence consistently favors acting earlier, but how much earlier is optimal remains largely untested. Only two studies isolated delivery timing directly (Pople et al. 2024; Gros et al. 2022); the pre- versus post-shock studies establish that early beats late but treat

timing as binary. Future work should test lead time as a continuous design parameter across hazards, alongside the schedule and amount comparisons piloted in Niger (Pople et al. 2025).

- *Harmonize inclusion and measurement of outcomes across studies*

Studies include and measure outcomes in different ways. Even when studies cover the same domain, outcomes are operationalized differently (see Appendix Table 1), thereby limiting comparison across studies and contexts. Future research can help close these gaps by examining the effectiveness of AA interventions using clearly defined and comparable measures.

- *Pay greater attention to intrahousehold dynamics, including by gender and age*

Most studies assess outcomes at the household level, overlooking intrahousehold power relations that shape how the costs of hazards and benefits of AA are distributed among household members, especially women, children, and the elderly. There is a crucial lack of sex-disaggregated data and analysis of gendered vulnerabilities (Schindler et al. 2024; Kosec et al. 2026) and expanding this evidence would sharpen the identification and prioritization of the most marginalized groups for anticipatory assistance. To design more equitable and effective programs, it will be essential to move beyond the household and consider intrahousehold dynamics that influence wellbeing outcomes, including health and nutrition, agency, and education, and tailor programs to reach individuals with intersecting vulnerabilities.

- *Explore the role of social, institutional, and governance dynamics*

Few studies examine the broader social impacts of AA, including its effects on social cohesion, community-level power dynamics, and perceptions of fairness. Expanding our understanding of these dimensions through quantitative and qualitative methods can enhance the effectiveness of AA implementation and strengthen community capacity and resilience in the face of recurring or protracted shocks. Furthermore, the design and governance of early warning systems and their integration with local institutions are underexplored, yet they play a central role in ensuring timely and effective response. For example, understanding trust in trigger mechanisms can influence AA activity planning and implementation, as well as individual behavioral responses to early information (Morinere et al. 2024).

- *Examine long-term resilience to shocks*

Follow-up periods in the included studies mostly fall within six months of the shock, with the longest around 18 months. This duration is long enough to observe asset and livelihood protection during a crisis but not to test whether that protection improves recovery or leaves households better placed for the next shock. Longer research horizons, especially across recurrent or overlapping climatic shocks, could help identify interventions and strategies that not only address short-term needs but also contribute to medium- and long-term resilience, especially in contexts experiencing multiple, consecutive shocks. In addition, these longer time frames would highlight the value of examining whether and how AA contributes to wider or longer-term benefits alongside its primary objective of mitigating the peak negative impacts of predictable crises.

- *Identify costs, benefits, and effectiveness*

Further work is needed to understand the cost-benefit and cost-effectiveness of AA, including for framework development and activity coordination. Additionally, basic metrics such as cost per beneficiary obscure important differences in the quality, timing, and nature of support. Cost-effectiveness estimates could also consider outcomes beyond food security, for instance, pre-emptive actions, coping strategies, and asset protection. A common costing framework, specifying cost boundary, time horizon, discount rate, and comparator, would make these estimates comparable across contexts and against post-shock response.

- *Test the integration of AA into existing social protection systems and strengthen cross-sectoral coordination*

Short-term effects underscore the importance of viewing AA as one component of a broader resilience ecosystem. Similar to recommendations in Humphrey and Kurz (2026a), testing how best to integrate AA into complementary social protection systems, livelihood support, market access, and institutional strengthening, and the impacts of such integration will be important for understanding how AA can contribute to sustained improvements in wellbeing.

CONCLUSION

AA offers a compelling model to provide support before a shock peaks and consequently mitigate the impacts of predictable crises on lives, livelihoods, and well-being. The evidence from this targeted review identifies AA's positive, albeit context- and

outcome-specific impacts, such as improving household capacity to evacuate and reinforce shelters before crisis onset, and helping stabilize food security during crises, as intended.

We acknowledge several limitations. First, the search was restricted to English-language publications on climate-related hazards across three search platforms, so some relevant non-English language studies and AA for non-climate hazards may have been excluded. Second, a substantial share of included studies are agency and NGO reports; while grey literature is essential to this field, it raises the possibility of publication bias toward favorable results. Third, we did not conduct a formal risk-of-bias appraisal, and studies of differing designs are synthesized together without weighting by methodological strength. Fourth, our synthesis counts findings by statistical significance ($p<0.05$), which can treat underpowered null results as evidence of no effect. We also report only the direction and not the magnitude of effect sizes. Studies were not standardized in their reporting of results, particularly in the number of specifications reported, the inclusion, construction, and decomposition of indicators, and adjustments for multiple hypothesis testing. These findings should therefore be read as a map of the current evidence landscape rather than a pooled estimate of effect. Finally, our review of value-for-money studies known to us was supplementary to our main review given that value-for-money studies remain few and methodologically diverse. Future efforts should aim to comprehensively and systematically review AA's value-for-money and returns on investment.

Our review also maps where the evidence can grow next: sectoral coverage, long-term analysis, intrahousehold and community dynamics, and standardized cost

frameworks. Strengthening the cross-sectoral integration of AA into social protection and other relevant sectors may further boost household resilience to repeated and overlapping crises. Harmonized, rigorous, and multidisciplinary research remains vital for building robust anticipatory systems that can enhance humanitarian efficiency, reduce suffering, and protect development gains in an era of escalating climate risks.

REFERENCES

Aguirre, Julio, Daniel De La Torre Ugarte, Juan Bazo, Paulo Quequezana, and Mauricio Collado. 2019. 'Evaluation of Early Action Mechanisms in Peru Regarding Preparedness for El Niño'. *International Journal of Disaster Risk Science* 10 (4): 493–510.

Atkinson, Emily. 2018. *Social Cost Benefit Analysis of the Early Action Fund*. Technical Report. Save the Children.

Bazo, Juan, Coughlan De Perez, Gerardo Jacome, Kemper Mantilla, Mathieu Destrooper, and Maarten Van Aalst. 2021. 'Anticipation Mechanism for Cold Wave: Forecast Based Financing a Case Study in the Peruvian Andes'. *Frontiers in Climate* 3 (November): 747906. https://doi.org/10.3389/fclim.2021.747906.

Chaves-Gonzalez, Juan, Leonardo Milano, Dirk-Jan Omtzigt, et al. 2022. 'Anticipatory Action: Lessons for the Future'. *Frontiers in Climate* 4 (December): 932336. https://doi.org/10.3389/fclim.2022.932336.

De Brauw, Alan. 2025. *Cost Effectiveness of Anticipatory Action: Lesotho, Madagascar, and Mozambique*. Technical Report. Fragility, Conflict, and Migration. CGIAR.

De Brauw, Alan, Bedru Balana, Kwaw Andam, et al. 2025. 'Anticipatory Cash Transfers for Climate Resilience—Evidence from an Experimental Study in Northern Nigeria'. Preprint, SSRN. https://doi.org/10.2139/ssrn.5163930.

Dunsch, Felipe Alexander, Nidhila Adusumalli, Tanay Balantrapu, et al. 2025. *Impact Evaluation of Anticipatory Action in Nepal*. Impact Evaluation Report, OEV/2022/034. World Food Programme Office of Evaluation.

FAO. 2023. *The Impact of Disasters on Agriculture and Food Security: Avoiding and Reducing Losses through Investment in Resilience-2023*.

Gros, Clemens, Meghan Bailey, Saroja Schwager, et al. 2019. 'Household-Level Effects of Providing Forecast-Based Cash in Anticipation of Extreme Weather Events: Quasi-Experimental Evidence from Humanitarian Interventions in the 2017 Floods in Bangladesh'. *International Journal of Disaster Risk Reduction* 41 (December): 101275. https://doi.org/10.1016/j.ijdrr.2019.101275.

Gros, Clemens, Evan Easton-Calabria, Meghan Bailey, et al. 2022. 'The Effectiveness of Forecast-based Humanitarian Assistance in Anticipation of Extreme Winters: A Case Study of Vulnerable Herders in Mongolia'. *Disasters* 46 (1): 95–118. https://doi.org/10.1111/disa.12467.

Gros, Clemens, Andrea Pronti, Khairul Sheikh, Ahmadul Hassan, and Mohammad Shahjahan. 2023. 'Effects of Anticipatory Humanitarian Cash Assistance to Households Forecasted to Experience Extreme Flooding: Evidence from Bangladesh'. *Hydrology Research* 54 (11): 1315–28. https://doi.org/10.2166/nh.2023.111.

Humphrey, Alex, and Jon Kurz. 2026a. *Beyond 'Does It Work?': Three Evidence Priorities for Scaling up Anticipatory Action*. May 7. https://www.anticipation-hub.org/news/beyond-does-it-work-three-evidence-priorities-for-scaling-up-anticipatory-action.

Humphrey, Alex, and Jon Kurz. 2026b. 'Early Aid, Livelihood Protection, or Both? What Impact Evaluations Reveal About Anticipatory Action'. Mercy Corps, February.

IPCC. 2023. *Sections. In: Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, H. Lee and J. Romero (Eds.)]*. IPCC.

Jones, Catherine, and Niccolò Lombardi. 2018. *Early Warning Early Action: Early Action against Dzud Safeguards Herders' Livelihoods in Mongolia*. FAO Agricultural Development Economics Policy Brief. FAO.

Kosec, Katrina, Jordan Kyle, Emily Myers, et al. 2026. 'How Can Anticipatory Action Programming Support Women? Application of the Reach-Benefit-Empower-Transform Framework in Nepal and Nigeria'. *Journal of Rural Studies* 121: 103920.

Matchaya, Greenwell C., Winnie Kasoma-Pele, and Munyaradzi Mutenje. 2025. *Cost-Benefit Analysis of Drought Risk Reduction Anticipatory Action in the Western Province of Zambia*. CGIAR Food Frontiers and Security Program. International Water Management Institute.

Mogge, Lukas, Julian Röckert, and Kati Krähnert. 2024. *Impacts of Anticipatory Cash Transfers in the Context of Weather Disasters*. Ruhr Economic Papers. RWI. https://doi.org/10.4419/96973236.

Morinere, Lezlie C., Arielle Tozier de la Poterie, Laura Swift, and Lilly Schofield. 2024. *Looking Ahead in the Midst of a Crisis: The Role of Anticipatory Action in a Protracted Drought*. Save the Children.

OCHA. 2026. *From Pilot to Policy: How Governments Are Leading Anticipatory Action*. OCHA.

Popat, Meizal, Komal Rathod, Luis Artur, et al. 2024. 'Anticipatory Actions: Lessons from the Storm Ana in Mocuba District, Mozambique'. *Journal of International Humanitarian Action* 9 (1): 18. https://doi.org/10.1186/s41018-024-00162-9.

Pople, Ashley Charlotte, Ruth Hill, Stefan Dercon, and Ben Brunckhorst. 2024. *The Importance of Being Early: Anticipatory Cash Transfers for Flood-Affected Households*.

Pople, Ashley Charlotte, Patrick Premand, Stefan Dercon, Margaux Vinez, and Stephanie Brunelin. 2025. *The Earlier the Better? Cash Transfers for Drought Response in Niger*. Policy Research Working Paper 11138. The World Bank.

Pronti, Andreas, Clemens Gros, and BDRCS. 2021. *Evaluation of the Cyclone Early Action Protocol (EAP) Quantitative Impact Assessment of the 2020 EAP Activation for Cyclone "AMPHAN"*. EAP2018BD01. BDRCS.

Schindler, Alexandra, Everisto D. Mapedza, and Sandra Ruckstuhl. 2024. *Challenges and Opportunities for Mainstreaming Gender in Anticipatory Action Approaches within Refugee and Internally Displaced People Hosting Communities*. International Water Management Institute. CGIAR Initiative on Fragility, Conflict, and Migration.

Swift, Laura, Lilly Schofield, Michael Green, Prabhmeet Matta, and Rocco Zizzamia. 2024. *No Regrets: Acting in Anticipation of Flooding in Somaliland*. Save the Children.

Tozier De La Poterie, Arielle, Eduardo Castro, Hafizur Rahaman, Dorothy Heinrich, Yolanda Clatworthy, and Luis Mundorega. 2023. 'Anticipatory Action to Manage Climate Risks: Lessons from the Red Cross Red Crescent in Southern Africa, Bangladesh, and Beyond'. *Climate Risk Management* 39: 100476. https://doi.org/10.1016/j.crm.2023.100476.

Weiffen, Dorothee, Ghassan Baliki, Tilman Brück, and Jan Elfes. 2025. *Cash and Cohesion in Crisis: On the Impacts of Anticipatory Cash Transfers in IDP Camps in South Sudan during Floods*. Households in Conflict Network Working Paper Series 433. Berlin, Germany.

Weingärtner, Lena, Tobias Pforr, and Emily Wilkinson. 2020. *The Evidence Base on Anticipatory Action*. WFP.

Weingärtner, Lena, and Emily Wilkinson. 2019. 'Anticipatory Crisis Financing and Action: Concepts, Initiatives and Evidence'. *Report. Centre for Disaster Protection*.

APPENDIX

Appendix Table 1: Indicators compiled from studies across each domain

Domain	Definition	Example indicators
Economic	Household economic resources and productive capacity such as household assets, borrowing, and damage or loss to physical property. Household ownership, productivity and preservation of livestock assets.	Borrowed money Agricultural income Amount of money borrowed Any adult household member unable to work in the aftermath of the flood Any adult unable to work Destitution sale of land property Destitution sale of livestock Destitution sale of working equipment Destitution sales of valuable assets (House items, e.g., bed, furniture) Household durable assets Interest rates of borrowing Mean number of days unable to work Median number of days unable to work Non-agricultural income Personal items damaged Vehicle damaged Working equipment damaged Animal mortality reduced: Chickens and pigeons Animal mortality reduced: Cows and calves Animal mortality reduced: Ducks Animal mortality reduced: Goats and sheep Number of livestock in tropical livestock units (TLU) (#) Percent of transfers spent on climate resilient investments (investments in improved or flood tolerant seeds, irrigation equipment, and the link) Percent of transfers spent on productive assets

Domain	Definition	Example indicators
Food security and nutrition	Household's access to sufficient and nutritious food, food consumption, and behavioral strategies to manage food shortages and consumption constraints.	Any household member having had only rice to eat for a whole day Any household member having had only rice to eat for ten days or more Livelihood Coping Strategy Index Reduced Coping Strategy Index Reduced frequency of meals Reduced number of meals Reduced nutritional content of meals
Health and wellbeing	Physical health, mental health, subjective wellbeing and life satisfaction.	Frequency of feeling depressed or anxious in past 7 days Frequency of having sometimes been unable to think properly or concentrate because of feelings of stress 'Other' category, e.g., cough, skin rash Diarrhea/Dysentery Life Satisfaction Cantril ladder Mental health index (CESD-R-10) Physical and injuries Subjective wellbeing [(well-being from 1 (very bad) to 5 (very well)]

Domain	Definition	Example indicators
Pre-emptive actions	Actions undertaken by households or communities to prepare for and mitigate the negative impacts of hazards.	Build storage room for storing crops/seed Built new house away from the water course Buy plastic for protection Collective action - Build flood protection Collective action - Cleaned water passageways Collective action - Raised river embankments Diversify income Invest in agricultural/weather insurance Engage in crop rotation Evacuate flood prone area Evacuate household members Evacuate livestock Evacuated adult Evacuated animals Evacuated children Family labor re-allocation (e.g., migrated to work elsewhere) (yes/no Improved current house No action taken Number of post-shock actions Number of preemptive actions Other actions Protect roof or walls of house Protect valuable assets Protected roof Protection assets Purchase food Reduce agricultural production/move to other income Reduce investments in agricultural machinery Save more money Temporarily relocate Use improved livestock breeds Warn others

Domain	Definition	Example indicators
Social	Social conditions affecting household safety and community functioning.	Any conflict Any theft Displacement in camp Perception of violence index Severe theft Social cohesion

Notes: Indicators are taken from the 14 different studies and do not constitute a comprehensive list of all indicators used.

Appendix Table 2: Summary of AA impacts by domain

Country (Authors)	Economic			Food security, nutrition and resilience			Health & wellbeing			Pre-emptive actions			Social cohesion		
	Positive	Null[1]	Negative	Positive	Null	Negative	Positive	Null	Negative	Positive	Null	Negative	Positive	Null	Negative
Compared to no response															
Bangladesh (Gros et al. 2019)	Yes	Yes		Yes			Yes			Yes	Yes				
Bangladesh (Gros et al. 2023)	Yes	Yes			Yes		Yes	Yes		Yes	Yes				
Bangladesh (Pople et al. 2024)	Yes	Yes	Yes[2]	Yes	Yes		Yes	Yes		Yes					
Bangladesh (Pronti et al. 2021)	Yes						Yes			Yes					
Mongolia (Gros et al. 2022)	Yes	Yes													
Mongolia (Mogge et al. 2024)		Yes			Yes										
Mozambique (Poppat et al. 2024)		Yes						Yes							
Peru (Aguirre et al. 2019)	Yes														
Peru (Bazo et al. 2021)	Yes						Yes			Yes					
South Sudan (Weiffen et al. 2025)					Yes		Yes	Yes		Yes			Yes	Yes	

Country (Authors)	Economic			Food security, nutrition and resilience			Health & wellbeing			Pre-emptive actions			Social cohesion		
	Positive	Null[1]	Negative	Positive	Null	Negative	Positive	Null	Negative	Positive	Null	Negative	Positive	Null	Negative
Compared to traditional post-shock response[1]															
Nepal (WFP 2025)	Yes	Yes		Yes	Yes		Yes	Yes							
Niger (Pople et al. 2025)[3]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes					Yes	
Nigeria (De Brauw et al. 2025)	Yes	Yes			Yes	Yes		Yes		Yes	Yes				
Somaliland (Swift et al. 2024)				Yes	Yes					Yes	Yes				

Notes: Impacts should be interpreted relative to the comparison/control group used. Positive findings indicate that outcomes improve welfare for the intervention group, while negative findings indicate that the control/comparison group performed better. However, for comparisons of anticipatory action and post-shock response, a negative finding generally indicates that the outcome was lower among households receiving anticipatory action, potentially reflecting differences in the timing of assistance.

[1] Null reflects no statistically significant difference ($p<0.05$) in an outcome that was measured between the intervention and comparison group; outcomes a study did not examine are absent from the table and not counted as null.

[2] Specifically, work for wage increased and its interpretation is ambiguous.

[3] Direction of effect depends on the season during which the outcome was measured.

Appendix Table 3: Value-for-money studies

Context (Authors)	Hazard	Intervention(s)	Evaluation design and methods	Time Horizon	Discount Rate	Costs covered	Key Outcomes / Metrics	CBA / CEA Estimate
Ethiopia (Atkinson 2018)	Below normal rainfalls	Food assistance through cash for work, livestock feed distribution, support to government animal health campaigns, rehabilitation of water sources, distribution of water purification tablets	Scenario-based CBA; anticipatory vs. post-shock; no-regrets anticipatory vs. no shock triggered	6 months	Discounting rate applied but not specified	Direct intervention and indirect program costs	Income, access to clean drinking water, livestock stock, livestock health, FCS, school attendance among children, individual dietary diversity score	Benefit-cost ratio: 2.58 [anticipatory vs. post shock response] Benefit-cost ratio: 1.61 [no-regrets scenario]
Lesotho (De Brauw et al. 2025)	Drought	Early warning messages, cash transfers and agricultural inputs, access to safe water	Comparative CBA, anticipatory vs. post-shock response	5 years	Not specified	Mistargeting	Food security gains (FCS), protected assets and income (livestock)	Benefit-cost ratio: 1.28
Madagascar (De Brauw et al. 2025)	Drought	Early warning messages, cash transfers and agricultural inputs, water point rehabilitation	Comparative CBA, anticipatory vs. post-shock response	5 years	Not specified	Mistargeting using a proxy	Food security gains (FCS)	Benefit-cost ratio: 1.23

Context (Authors)	Hazard	Intervention(s)	Evaluation design and methods	Time Horizon	Discount Rate	Costs covered	Key Outcomes / Metrics	CBA / CEA Estimate
Mongolia (Jones and Lombardi 2018)	Dzud (cold wave)	Destocking for cash and animal feed distribution	Comparative CBA; anticipatory vs. no intervention	Not specified	Not specified	Livestock interventions	Adult and newborn livestock saved (mortality prevented) and value loss avoided due to poor body conditions, avoided loss of cashmere production value, extra milk	Benefit-cost ratio: 7.10 Sensitivity analysis range: 5.10 - 12.10
Mongolia (Mogge et al. 2024)	Dzud (cold wave)	Cash	Back-of-the-envelope calculation on ROI	--	--	Cash transfer only	Value of herd size increased	Benefit-cost ratio: 3.50
Mozambique (De Brauw et al. 2025)	Drought	Early warning messages, cash transfers and agricultural inputs	Comparative CBA, anticipatory vs. post-shock response	5 years	Not specified	Mistargeting	Food security gains (FCS), protected assets and income (livestock)	Benefit-cost ratio: 1.23
Multi-country (FAO 2023)	Drought, dzud, Covid-19 pandemic, plant pests and animal diseases, and others	Varies by country	Comparative CBA	11 years	10%, 5% and 5% sensitivity checks	Upfront capital costs (e.g. costs of machinery and materials, costs of installing equipment/structures), operations and maintenance, input costs (e.g. labor, energy, water, fertilizers, pesticides, seeds, feed)	Several outcomes including those related to livestock health and mortality, crop production, and animal products such as dairy production. Covers revenues from agricultural production and value of agricultural assets, i.e. livestock	Benefit-cost ratios: Afghanistan: 1.42 Bangladesh: 0.83 Colombia: 2.60 Kenya: 3.50 Ethiopia: 7.0 Madagascar: 2.5 Mongolia: 7.1 Philippines: 4.4 Sudan: 6.7 Viet Nam: 0.46

Context (Authors)	Hazard	Intervention(s)	Evaluation design and methods	Time Horizon	Discount Rate	Costs covered	Key Outcomes / Metrics	CBA / CEA Estimate
Nepal (Dunsch et al. 2019)	Floods	Multiple interventions including early warnings, non-food items and kits, evacuation. See Table Notes for full details.	Scenario-based; anticipatory vs. traditional shock response	20 years	10%	The average cost for one emergency of an average size (175,000 affected people) is approximately US$10.1 million in the WITH scenario and US$31.5 million in the WITHOUT scenario. Thus, the cost savings per response are US$21.4 million.	Costs saved	Benefit-cost ratio: 34.39
Zambia (Matchaya et al. 2025)	Drought	Operationalization and /or adoption of irrigation-based agriculture, promotion of adoption of drought-tolerant crops/crop varieties, or both	Comparative CBA	15 years (range 5 to 15 years)	10%, 15%, 20%	Irrigation costs (purchases of irrigation equipment (a motorized pump and accessories), maintenance, labor, seeds, fertilizer and pesticide costs per hectare); costs of seeds and seed distribution; land costs and others; labor costs	Value of production, using market prices for output; value of damage avoided per hectare; relief saved	Average benefit-cost ratios at 20% discount rate: Drought tolerance: 2.01 Irrigation: 2.30 Irrigation and drought tolerance: 4.93

Notes: Nepal (Dunsch et al. 2025) interventions include: Inform farmers to delay planting or harvest crops depending on seasonal calendar; prepare Non-food Items (NFIs) and inform farmers to protect fish and poultry farms; formation of Emergency Team, Information and Communication Team, Medical Team, Relief Distribution Team; emergency stockpiling of shelter materials, NFIs, food, water and medicines in a strategic location for distribution in minimal time; prepare and distribute Go-Bags, water-proof document pouches and medical and hygiene kit; evacuate the infirm and disabled, and ensure shelter protection arrangements for women and children.