



World Food Programme

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WFP's evidence base on Anticipatory Action 2015-2024

Synthesis of 16 studies on the
effectiveness of Anticipatory Action

April 2025

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Introduction

This document synthesizes the evidence gathered by the World Food Programme's (WFP) anticipatory action (AA) programmes worldwide to date. It examines the effect of providing assistance to populations prior to shocks, and what this means in quantitative terms for people's food security. While not providing an exhaustive literature review of all the evidence generated by partners working on AA, this synthesis is intended to inform practitioners beyond WFP, academics, and decision makers – pointing to how this type of programming can be better monitored, evaluated, and, ultimately, conducted in future anticipatory interventions worldwide.

This document explores the findings, lessons learned and recommendations from this body of evidence. It highlights both the insights gained into how WFP generates evidence and what WFP should do to further improve evidence generation, and asks questions about AA, in order to maximize the impact of anticipatory interventions.

Context

WFP has been a leader in Anticipatory Action since its inception in 2015 (Figure 1). As part of WFP's strategy to prevent predictable extreme weather events from turning into humanitarian disasters, WFP has been committed to generating evidence on the effects of AA interventions over the last decade.

Over five formative years (2015-2020), WFP invested in five pilot countries (Bangladesh, Nepal, the Philippines, Haiti and the Dominican Republic) to clarify the differences and complementarities between preparing humanitarian response systems for impending disasters (that is, emergency preparedness), and launching preventive and life-saving interventions at community level to reduce the scale of losses and damages from potentially hazardous events (that is, anticipatory action).

WFP produced a report on [the State of AA Evidence in 2020](#), highlighting the need to generate more evidence in a harmonized way.

This initial work helped to establish a baseline for AA programmes in WFP and was an instrumental guidepost for other agencies' emerging programmes. Since then, WFP has also issued [guidance on monitoring and evaluation of AA for fast and slow-onset hazards](#) and on [planning and monitoring country capacity strengthening for AA](#).

The year 2020 was pivotal for AA, as it marked the first activation against flood risk at scale in Bangladesh. The first independent evaluation related to this provided critical insights that demonstrated the potential of AA. The success of this activation (and the study that demonstrated it) attracted financial support from additional donors beyond the United Nations Central Emergency Response Fund (CERF); this grew the portfolio, and eventually resulted in expanding reach and effectiveness of AA initiatives globally.

Between 2015 and 2024 WFP carried out 28 anticipatory activations. These have resulted

in 24 pieces of evidence¹ across 12 countries², reflecting the strong commitment of the organization to evidence-based AA programmes despite the complexities of varied humanitarian contexts. As part of WFP's review of the existing AA evidence, 16 of these studies were analysed based on quantitative focus, availability at the time of writing, and quality standards.

Today, WFP's AA programme is present in over 44 countries, and covers over 6.2 million people ahead of forecast droughts, floods, and

cyclones. The breadth and depth of this portfolio has provided fertile ground for a robust, wide-reaching and growing body of evidence.

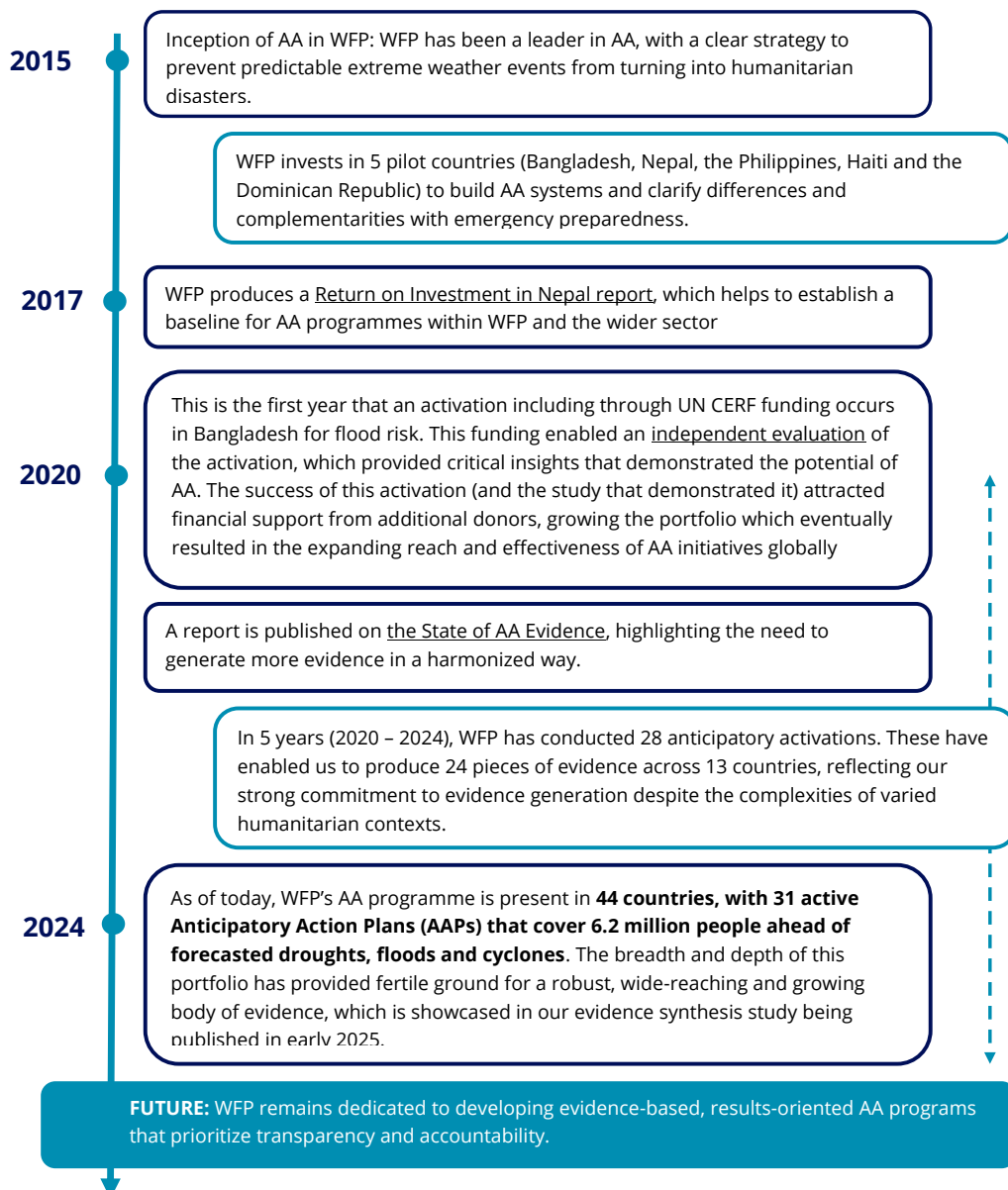
This document explores the findings, challenges, and lessons learned from this body of evidence. It highlights both the insights gained and the remaining gaps to inform how WFP generates evidence, asks questions about AA, and ultimately maximizes the impact of anticipatory interventions.

¹ Evaluations expected to be finished in the last quarter of 2024 are not included in this piece.

² Bangladesh, Nepal, Ethiopia, Somalia, the Niger, Lesotho, Madagascar, Mozambique, Zimbabwe, the Dominican Republic, Guatemala and Haiti.

Figure 1

A decade of AA evidence at WFP



What evidence do we have?

KEY MESSAGES

This section discusses how the overall effectiveness of AA is evaluated from the pool of evidence and illustrates the breadth of evidence currently available (by geography, weather hazard and cash volume). It also discusses the different levels of robustness of studies, and how this may affect the interpretation of overall results.

- The 16 studies surveyed in this synthesis report cover 12 countries.
- The document draws on 8 studies from slow-onset hazard AA activations and 8 sudden-onset hazard interventions.
- Robustness varied significantly across studies. To illustrate shades of robustness, studies are grouped into four levels (1-4), where 1 is the most robust.
- The cash transfer volumes ranged from USD 50 to USD 268 per household.

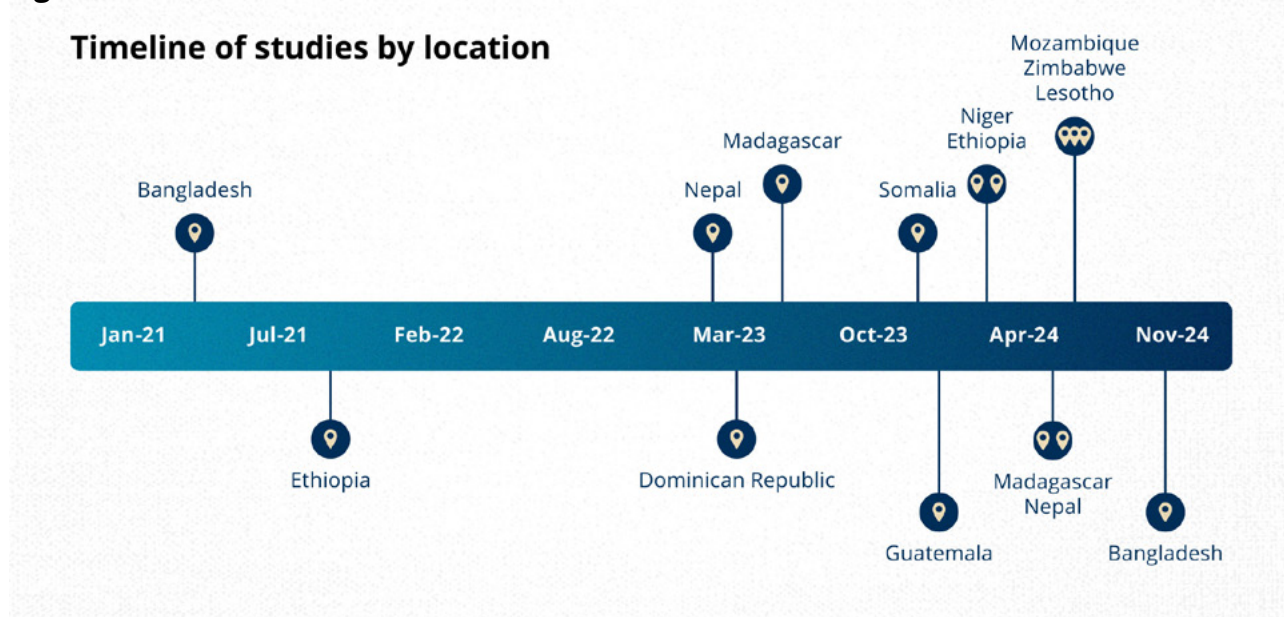
This meta analysis takes advantage of the breadth of evidence available to portray common trends in the effects of AA interventions across geographies, hazard types and interventions³. That is, the meta analysis attempts to uncover patterns in the documented effects of AA on food consumption across studies with substantial contextual differences. The studies also vary substantially in the robustness of their results – even though potential confounding factors are a key challenge for any

empirical study. It is not possible to perfectly identify treatment effects in every documented instance of AA due to the trade off between addressing these concerns with the availability of resources and humanitarian considerations. By surveying common trends across studies, this meta-analysis documents which treatment effects found in more robust studies are also supported by the more numerous results from less robust studies.

³ While the meta analysis takes averages of the results across groups of studies as an indicator of the direction of these common trends (that is, whether AA has a positive or negative effect), the exact point estimate of these averages does not provide an interpretation for the broad treatment effect of AA, as this would require all individual studies to be drawn from the same contexts and demographics using the same empirical methodologies.



Figure 2



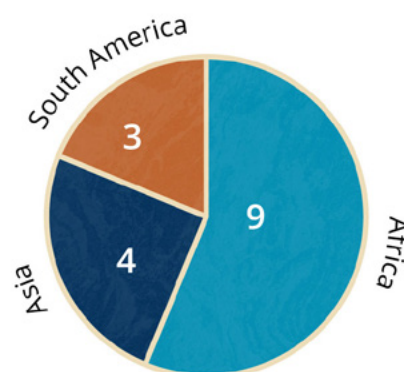
EVIDENCE BY GEOGRAPHY

In total, this analysis synthesis surveyed 16 studies covering 12 countries.

Of these 16 studies⁴, 3 were based on evidence from Latin America and the Caribbean (Guatemala, the Dominican Republic and Haiti), 9 were on evidence from Africa (Madagascar, Somalia, Lesotho, the Niger, Ethiopia, Mozambique and Zimbabwe) and 4 were based on evidence from Asia (Nepal and Bangladesh). This provided the synthesis with evidence from most countries where at-risk communities have received anticipatory support from WFP, with the exceptions of Sudan, Malawi and Burundi, where it was only possible to conduct Post-Distribution Monitoring.

Figure 3

Number of studies by continent



Number of studies by country



1

Dominican Republic	Mozambique
Guatemala	Niger
Haiti	Somalia
Lesotho	Zimbabwe



2

Bangladesh
Ethiopia
Madagascar
Nepal

⁴ For the full list of studies with author and publication details, see bibliography.

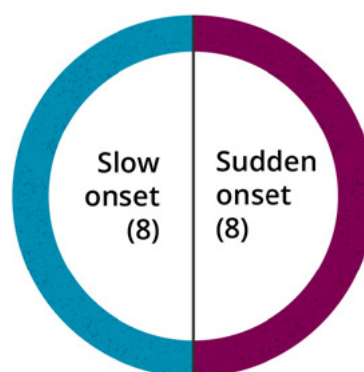
EVIDENCE BY HAZARD TYPE

The wide geographical coverage of the studies surveyed gives the synthesis coverage over three types of natural hazards: floods, droughts and cyclones. These can be divided into the two broad categories of slow-onset (droughts) and sudden-onset natural hazards (floods and cyclones), as seen in Figure 4.

The balance of evidence coverage across countries globally is reflected in the equal coverage of sudden- versus slow-onset hazards. Within the 16 studies surveyed, 8 pieces used evidence from AA implementation in anticipation of sudden-onset hazards and 8 used evidence from slow-onset hazards.

Figure 4

Studies surveyed by type of climate hazard



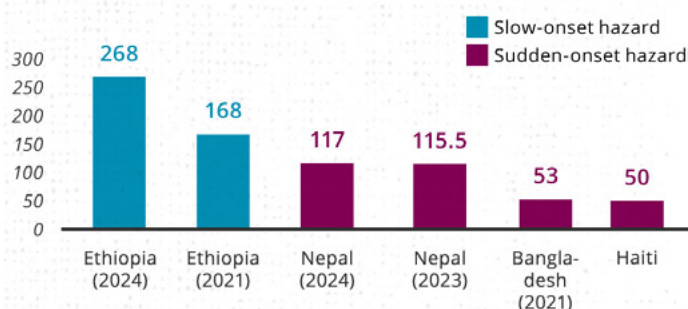
EVIDENCE BY CASH VOLUMES

Of the 16 evidence pieces quantifying the effects of AA, 6 specified the cash amounts distributed per household. This averaged USD 128.6 and ranged from USD 50 to USD 268.

Figure 5 illustrates that cash transfers as part of AA to address drought risks (coloured in grey) were noticeably higher than those for sudden-onset hazards (coloured in blue). This is in line with the longer period covered by slow-onset hazards to address needs prior to the peak of drought impact, and also consistent with the different contexts in which WFP operates.

Figure 5

Cash transfer per household (USD)



EVIDENCE BY LEVELS OF ROBUSTNESS

The degree of robustness in the empirical analyses varied greatly across studies. The key challenge in all empirical analysis is the presence of confounding factors – that is, whether the observed outcome may also unintentionally capture the effects of non-treatment factors. The level of robustness across studies is therefore the degree to which a study is able to identify and account for potential confounding factors⁵. While empirical methodologies varied, the widespread positive trend of AA's effect across studies of different robustness levels reinforces the hypothesis that AA has a general positive effect.

At the baseline level of robustness, most studies included information on a control group to indicate the counterfactual outcomes without AA treatment. Beyond this, the robustness of studies differed in three key dimensions.

- The studies differed in how the treatment group was selected versus the control group, which in turn may affect the presence of selection bias.

- The studies also differed in the information available on the characteristics of the treatment and control groups along the timeline of AA implementation. Information on how characteristics differ can inform the extent to which the control group serves as an appropriate counterfactual to AA intervention.
- The studies differed in how potential confounding factors were addressed, with some studies using econometric techniques (such as inverse probability weighted [IPW], regression analysis and difference-in-difference specifications) to account for differences between the control and treatment groups.

To illustrate the range of levels of robustness, these studies can be grouped into four broad categories of robustness from 1 to 4, where 1 is the most robust and is therefore most able to address endogeneity concerns. Table 1 summarizes the four categories of robustness.

⁵ See the section on “methodological challenges” (below) for an in-depth discussion of the robustness issues involved in empirical evaluations of AA.

ROBUSTNESS LEVEL	DESCRIPTION
1	The study uses evidence from a randomized control trial (RCT). In an RCT, the control group and treatment group are selected randomly from the same population, such that the two groups only differ in whether AA intervention was received or not. This means any difference in outcomes can be attributed to the AA intervention.
2	The study uses regression analysis controlling for characteristic differences between treatment and control group based on quasi-experimental sample design. This includes regressions with controls for household characteristics and inverse probability weighting (IPW) regressions.
3	The study uses (or contains the information to use) a difference-in-difference (DID) estimator of the treatment effect. DiD is able to control for level differences in baseline characteristics between the control and treatment groups but also rests on assumption that the two groups evolve in the same way over time (the “parallel trend” assumption).
4	The study compares endline outcomes between a treatment and a control group, without accounting for potential differences between the two groups.

Table 2 summarizes the studies surveyed across levels of robustness, geographies and hazards.

LOCATION	ANALYSIS TYPE	SAMPLE SIZE	LEVEL OF ROBUSTNESS	HAZARD	COMPLETION DATE
Nepal	RCT	2983	1	Flood	June - 2024
Bangladesh	RCT	4761	1	Flood	Nov - 2024
Bangladesh	Regression	6566	2	Flood	April - 2021
Lesotho	IPW	370	2	Drought	July - 2024
Niger	IPW	203	2	Drought	March - 2024
Somalia	IPW	454	2	Flood	Dec - 2023
Madagascar	IPW	1555	2	Drought	June - 2023
Zimbabwe	IPW	975	2	Drought	July - 2024
Guatemala	DiD	800	3	Cyclone	Jan - 2024
Mozambique	DiD	839	3	Drought	July - 2024
Ethiopia	DiD	n/A	3	Drought	Mach - 2024
Ethiopia	DiD, Comparison	329	3	Drought	Oct - 2021
Haiti	Comparison	355	4	Cyclone	Nov - 2023
Dominican Republic	Comparison	96	4	Cyclone	April - 2023
Nepal	Comparison	379	4	Flood	mach - 2023
Madagascar	Comparison	1279	4	Drought	June - 2024

The first category of robustness includes the RCT conducted in Nepal and Bangladesh.

This had the most robust findings due to the availability of midline and endline data across a treatment, and a (pseudo) control group⁶ that was randomly selected across villages equally vulnerable to hazards and exposure to early warning messaging. In addition to the random assignment of AA treatment within the same population, the full empirical specification also controls for household characteristics. As a result, the consumption outcomes of the treatment and control groups were observed across the AA implementation timeline for the treatment group, and this could be compared to a control group that provided an accurate counterfactual. This suggests that the estimated treatment effect of AA accurately captures the “true” treatment effect (that is, it has a high level of internal validity).

The second category of robustness includes the studies that made use of descriptive statistics to introduce inverse probability weighted regressions. It also includes the Bangladesh study that used a regression with controls for characteristic differences between treatment groups to assess the effects of AA. This second category of robustness attempts to use baseline descriptive statistics to address the endogeneity issue arising from selection bias between the treatment and the control group, as these did not have the same characteristics. However, these studies suffer from the disadvantage that they do not observe the outcome consumption indicators for the two treatment groups prior to the intervention, which would be an important informant for the comparability of the two groups. These studies are considered less robust than category 1 as they attempt to correct for selection bias using econometric techniques

⁶ Given the humanitarian context, there was no “pure” control group, and both treatment and controls groups ultimately received cash transfers, albeit at different times. The study can be thought of as measuring the effect of AA relative to traditional humanitarian intervention (rather than no intervention at all).

to account for differences in household characteristics, but do so imperfectly, due to a lack of baseline data on consumption outcomes.⁷

The third category of robustness includes the studies surveyed that have both baseline and endline data, and so are able to introduce a DiD methodology to analyse the effects of AA. This methodology allows these studies to address the endogeneity issue arising from level differences in baseline characteristics between the treatment and control group. A DiD estimator adjusts the observed treatment effect by the counterfactual outcome, as measured by the control group. This rests on a “parallel trends” assumption, which assumes that characteristic differences affect the level of indicator variables observed across the two groups but not their evolution over time or their response to natural hazards. These studies are considered less robust than category 2 as they do not contain information on or control for household characteristics, which may affect the validity of the parallel trend assumption.

The second and third categories of robustness represent two ways to address the endogeneity

concerns facing empirical analysis of AA. Ideally, studies would combine the features of these two categories and have both baseline and endline data on indicator variables, as well as descriptive statistics on household characteristics across the treatment and control group. This would allow for a DiD methodology to be used, with controls for household characteristics that might affect the response of indicator variables to AA interventions.

The fourth category of robustness compares the endline results across treatment and control groups without accounting for selection bias or characteristic differences. These studies either relied on bivariate t-tests across treatment and control group to test for significant differences in outcomes, or did not comment on statistical significance. Note that while these studies share a similar level of robustness in their empirical strategy, they vary greatly in the level of detail provided for information on characteristic differences between the control and treatment group. As they do not account for any confounding factors, these studies are considered less robust than categories 1-3.

⁷ It is important to note that baseline data collection is not mandatory per WFP guidelines, given the practical challenges with AA timelines (for example, the timeline of a sudden-onset hazard may occur over a few days).



What does the evidence say?

KEY MESSAGES

1. The effect of AA interventions on food consumption scores (FCSs) was largely positive.

- The most commonly reported indicator was the share of “acceptable” FCS category. Eight out of ten studies that reported this indicator⁸ suggested AA cash transfers had a positive effect⁹.
- Nine out of ten studies that reported the average value of FCS found that AA had a positive effect¹⁰.
- Evidence from studies that also reported the share of “poor” and “borderline” FCSs suggests that AA intervention is associated with an upwards shift from “poor” and “borderline” FCSs into “borderline” and “acceptable” FCSs, relative to control groups.

2. The effect of AA interventions on coping strategies (as measured by the reduced coping strategies index, rCSI) was also positive.

- Nine out of twelve studies reported that AA improved (that is, lowered) the rCSI in treated households. The remaining three found that, despite AA, this index increased in the treatment group.

3. Evidence on the effect of AA on other indicators was both sparser and more mixed.

- There was no clear trend across the seven studies that reported on the use of livelihood coping strategies (LCSs).
- There was very sparse coverage (< 4 studies) on the effect of AA on food expenditure shares (FES), resilience capacity scores (RCS), climate capacity scores (CCS), total livestock units (TLU) and financial outcomes, such as likelihood of borrowing.

⁸ Note that the meta-analysis surveyed 16 evidence studies, but 1 (the Dominican Republic) was excluded from the analysis due to validity concerns.

⁹ Note that only one result was statistically significant. Other studies either did not test for significance or were insignificant. However, the widespread positive trend for the effect of AA across studies of different levels of robustness reinforces that AA has a general positive effect.

¹⁰ Note that not all studies measured both the proportion of respondents in the acceptable FCS category and the average FCS value.

4. Qualitative evidence suggests that early warning messages are useful. In conjunction with cash transfers, they can help advise people on the best use of their resources to prepare for weather hazards.

- However, quantitative evidence on the effect of early warning messages and cash transfers was limited.



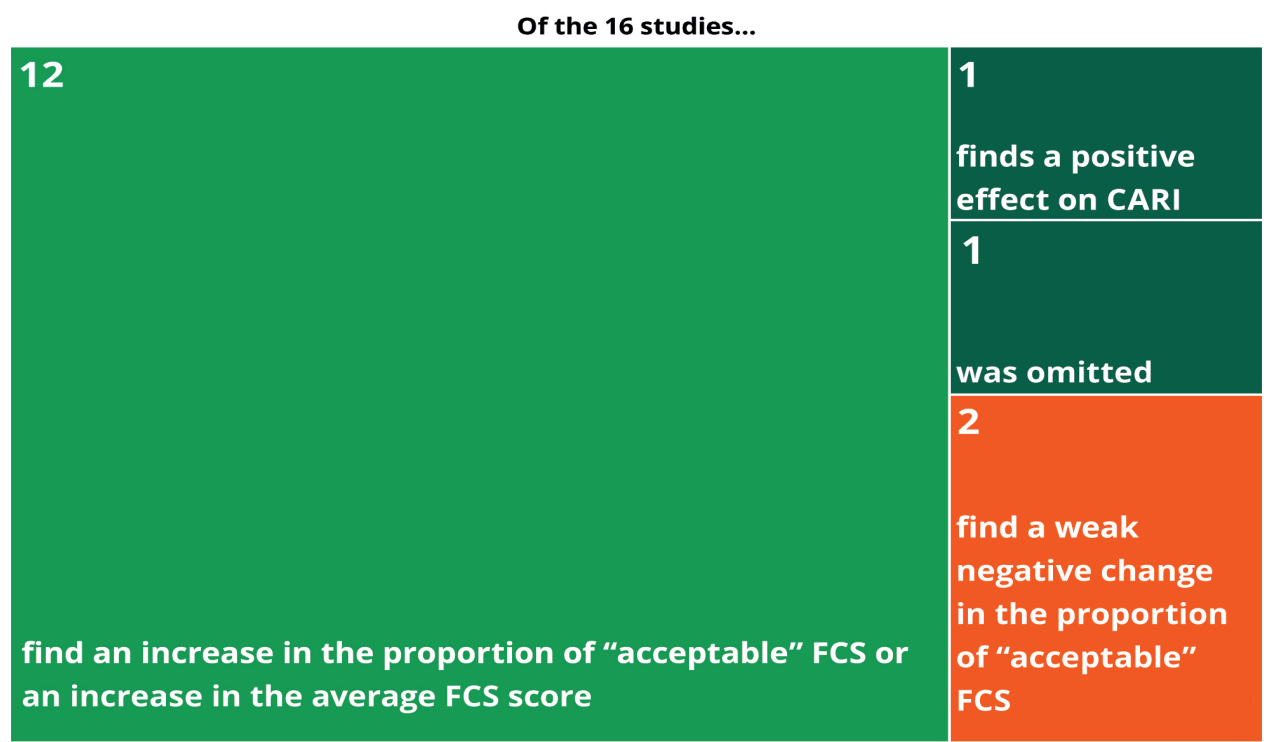
This section provides a meta-analysis of the results of the quantitative studies surveyed, with a particular focus on documenting common trends across studies and across different contexts, hazards and levels of robustness. It covers the results relating to FCS indicators, as these were the common indicators available across nearly all the studies. It also discusses in-depth the results relating to rCSI

scores, which was the second most common indicator available.

In the following graphs, **significant results are displayed with a red border**. Note that not all studies tested for significance, particularly in the case of studies where regression analysis was not carried out.

AA HAS A POSITIVE EFFECT ON FOOD CONSUMPTION SCORES

Evidence from food consumption scores (FCSs) generally showed a positive treatment effect of AA on consumption, although this effect was not always significant.



Overall, 13 out of 16 studies suggested a positive point estimate for the effect of AA on an FCS-based indicator (Figure 6)¹¹. Eight studies showed positive change in the proportion of “acceptable” FCS relative to a control group. This was in line with the trend found in nine studies that associated AA interventions with a shift in the distribution of FCSs from the “poor” and “borderline” categories to the “borderline” and “acceptable” categories. Three studies that did not include information on the FCS categories instead included information on the average FCS, all of which had positive point estimates for the AA treatment effect on average FCS. One study (Ethiopia, 2024) used the Consolidated Approach for Reporting Indicators of Food Security (CARI) method (which includes FCS) to show that AA treatment led to a positive increase in the

distribution of individuals across food security categories.

AA assistance led to an average increase of 7 percent in the proportion of households with an “acceptable” FCS across slow- and sudden-onset hazards (Figure 7). Estimates ranged relatively widely, from an 18 percent increase in “acceptable” FCS relative to a control group in Tete, Mozambique (2024) to a -1.7 percent fall in Zimbabwe (2024).

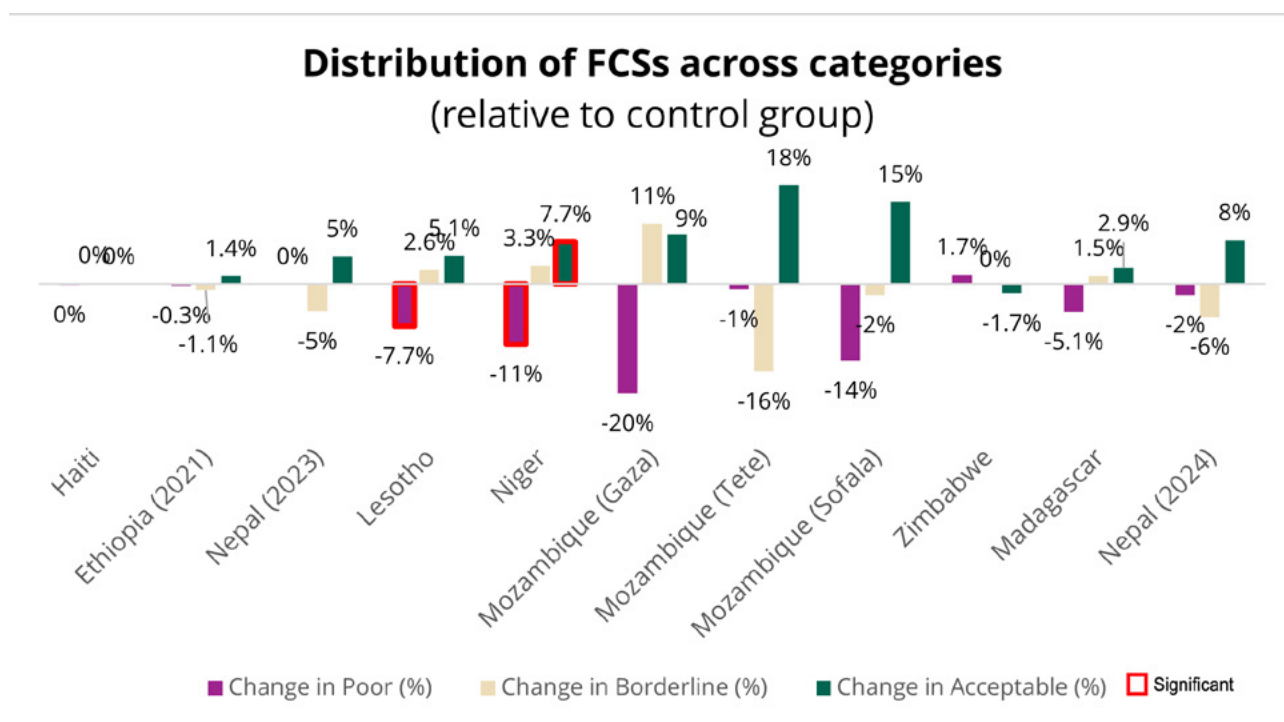
The positive effect of AA on the proportion of “acceptable” FCSs was observed across studies with a relatively higher level of robustness (Figure 7), underscoring the significance of this result.

11 The 16 studies include one study in the Dominican Republic that was surveyed but excluded from this meta-analysis due to the lack of a control group.
WFP’s evidence base on Anticipatory Action

There were two outliers to the generally positive trend: the Haiti (2023) study, which showed no significant effect of AA on the treatment group's FCS-related indicators relative to the control group, and the Zimbabwe (2024) study, which found a negative effect of AA on FCS scores (Figure 7). These studies were not of the highest level of robustness. While

negative results should be used as a basis for lessons learned for future AA implementation, more contextual information may be needed to discern whether these results have programmatic or methodological implications.

Figure 7



COUNTRY CASES IN DETAIL

In Nepal, AA assistance in the form of unconditional cash transfers of USD 117 received in the days following the flood peak led to an 8 percentage point increase in the proportion of households with an “acceptable” FCS four weeks after the transfer. This RCT experiment was the most robust evidence piece (alongside the RCT in Bangladesh), as it surveyed and tested the effectiveness of AA relative to a control group who received the same amount of cash six weeks after the flood peak. This finding was based on an increase of 2.64 points in the average FCS of the treatment group versus the control, which was significant at the 5 percent level.

Of the **four studies with IPW regressions** studying the likelihood of households having an “acceptable” FCS, Somalia (2023) saw a significant increase of 13.4 percent with AA after flooding, and the **Niger** saw a significant increase of 7.7 percent during the lean season after AA for drought. Two studies using IPW regression analysis found that AA had positive but insignificant effects. In **Lesotho**, the estimated effect was a 5 percent increase in the likelihood of having an “acceptable” FCS. In **Madagascar**, this was slightly lower at 2.9 percent. The similarities in finding a positive effect of AA across studies with different levels of robustness supports the external validity of the finding that AA improves food consumption.

One study in the **Dominican Republic** commented on the effect of AA on the proportion of “acceptable” FCSs, but did not include a control group and so was omitted from the meta-analysis due to concerns of robustness. The study found that the proportion of “acceptable” FCS fell by 9 percentage points to 74 percent from April 2022 to November 2022, after AA was implemented. However, the lack of a control group to indicate what the counterfactual FCSs may have been without AA treatment make these numbers difficult to interpret, as this change in proportion of “acceptable” FCSs reflects the effect of all events that happened in the seven-month period, and not just AA.

Evidence from the **Ethiopia (2024)** study using the **Consolidated Approach for Reporting Indicators of Food Security (CARI)** methodology was consistent with the general positive effect of AA intervention on FCS-related indicators. This methodology used FCSs alongside three other measures (rCSI, the Livelihood-based Coping Strategy Index (LCSI) and FES) to assess the proportion of households across treatment groups in three categories measuring food security: marginally food secure, moderately food insecure, and severely food insecure. The availability of baseline and endline data on households’ positions across these three categories allows for a DiD methodology to be used when interpreting the results. The treatment group saw a 4 percent increase in severely food insecure households, in comparison to a 53 percent increase for the control group. This indicated a 49 percent fall in the proportion of severely food insecure households relative to the control group. Using the same methodology, there was a 23 percent increase in the proportion of moderately food insecure households, and a 25 percent increase in the proportion of marginally food secure households. Although the study did not indicate the contribution of FCS to the overall results, the treatment effects of AA are consistent with the rightward shift in distribution for FCS categories and the higher proportion of “acceptable” FCSs seen across other studies.

In **Zimbabwe**, the poor consumption outcomes found in AA treatment groups contradict the simultaneous finding that crop yields were significantly higher after the hazard occurred for the AA treatment group (27.6kg/ha) compared to the control group (4.8 kg/ha). Qualitative evidence or more contextual information may be needed to understand why consumption for the treatment group was so much poorer than the control group even as crop yields were markedly better, and whether this might hold any programmatic or methodological implications for AA implementation.



THE POSITIVE IMPACT ON FOOD CONSUMPTION IS ROBUST AND CONSISTENT ACROSS METRICS

The data show a general trend of AA interventions being associated with an upwards shift in the distribution of households across FCS categories, moving from “poor” to “borderline” and on to “acceptable” (Figure 7). Of the studies that provided evidence on the proportion of “acceptable” FCSs, nine also provided evidence on the proportion of “borderline” and “poor” FCSs¹². This allows for a broad based examination of how the distribution of FCSs across the three categories changed across studies. Figure 8 illustrates this trend. This was consistent across slow-onset hazard studies (Ethiopia, Madagascar, Lesotho, the Niger, Mozambique, Zimbabwe) and sudden-onset

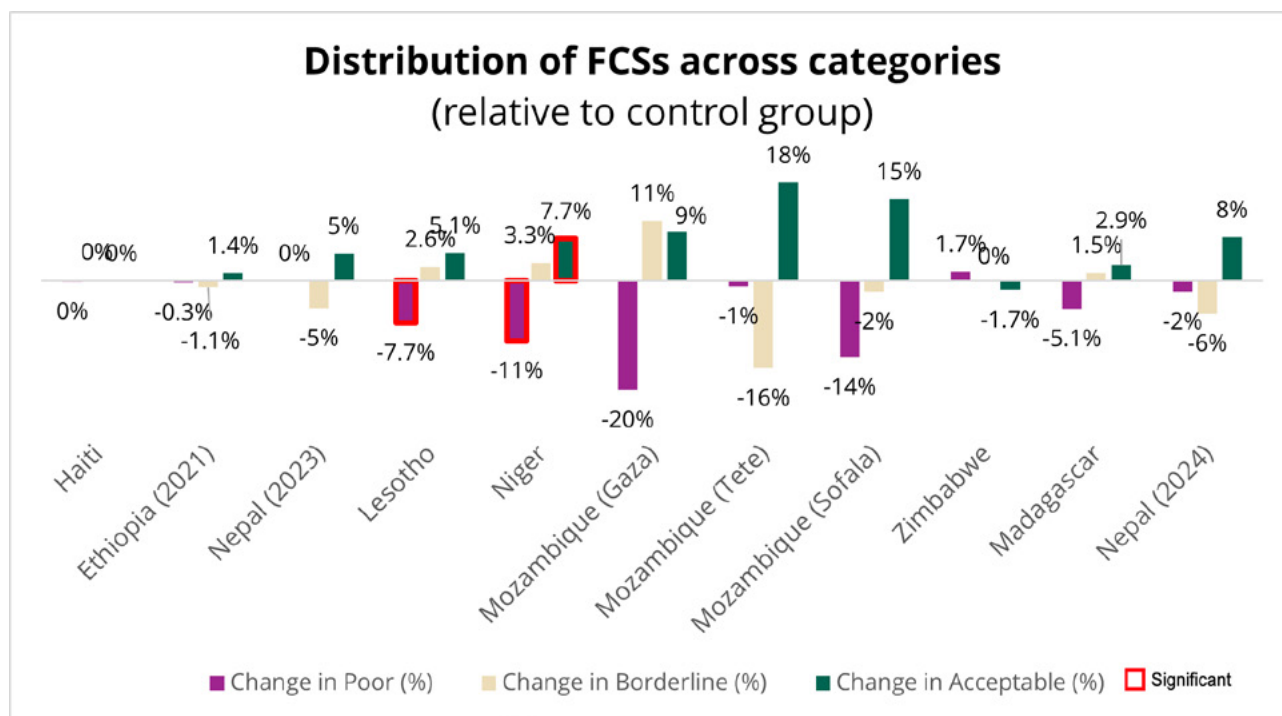
hazards (Nepal and Bangladesh). In addition to these results, one study (Madagascar, RC 2023) did not include information on the proportion of “acceptable” and “borderline” FCSs but did include information on the proportion of “poor” FCSs. This study used IPW regression analysis and found that the treatment group was 6 percent less likely to exhibit a “poor” FCS, and that this result was significant at the 5 percent level.

As before, the outlier to this trend was the Zimbabwe (2024) study, which showed a rise in “poor” FCSs in the AA treatment group, and the Haiti (2023) study, which saw a negligible difference between the treatment and control group¹³.

12 The exception to this was Somalia (2023).

13 The exact point estimates show a slightly higher proportion of “poor” and “borderline” FCS for men in the treatment group, and a slightly lower proportion of “poor” and “borderline” FCSs for women.

Figure 8



The improvement in FCSs found across studies is also seen in a widespread increase in average FCSs, relative to the control group (Figure 8).

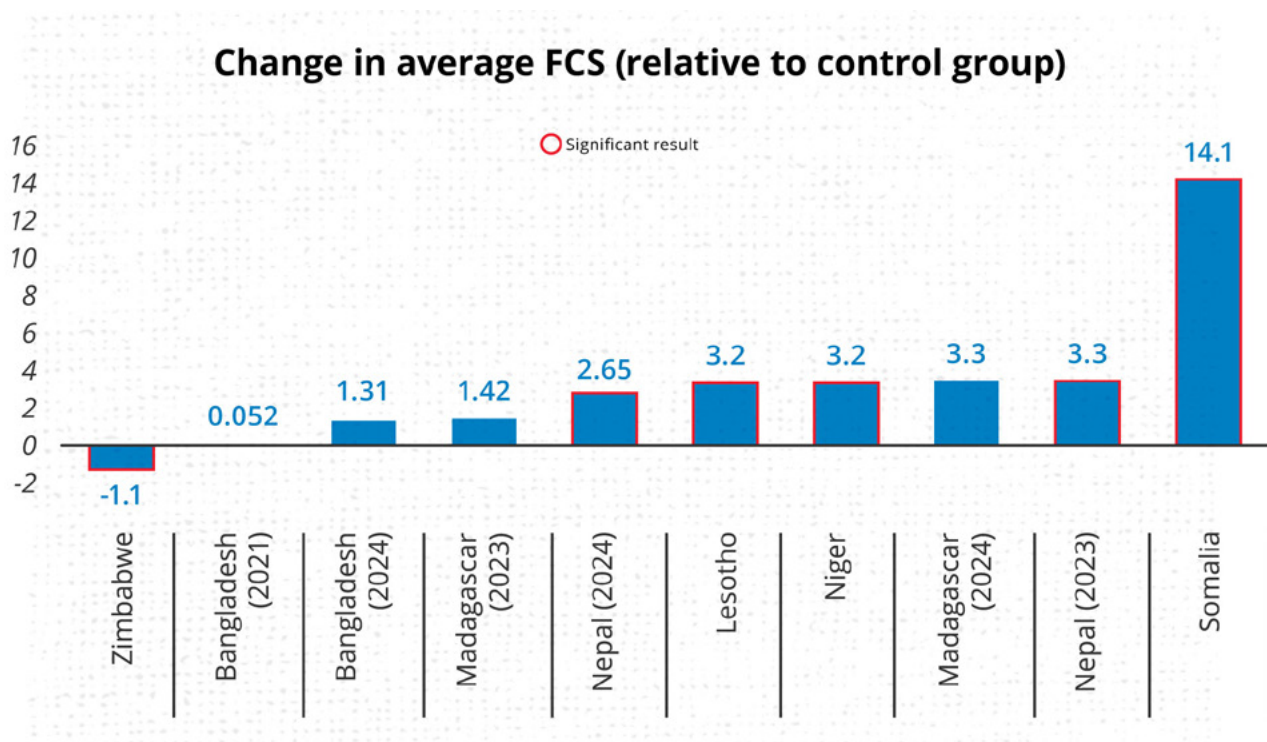
Eleven studies included information on the treatment effect of AA on the average FCS, including some that did not have information on the proportion of individuals with “acceptable” FCSs (Bangladesh, 2021, 2024; Madagascar, 2023; Guatemala, 2024). Figure 9 illustrates the increase in average FCS relative to the control group across these studies³.

These studies again had varying levels of robustness, ranging from an RCT (Nepal, 2024; Bangladesh 2024) to regressions with controls or IPW (Lesotho, 2024; Madagascar, 2023; Bangladesh, 2021), to simple comparisons

between the treatment and control group baseline data (Nepal, 2023). As above, the positive effect of AA on average FCSs across these different studies supports that the general effect of AA is positive. The similarity in point estimates between the Nepal (2023) and Nepal (2024) studies, despite differences in robustness, also supports the external validity of the estimated change in average FCS for Nepal. In Bangladesh, although small and insignificant effects are observed soon after the flood peak, the effects of AA on food security materialize 1.5 - 2 months after the flood. However, the first round of data collection already shows the positive effects of AA on mental health and coping strategies.

14 The Guatemala (2024) study is not included in the graph due to a difference in units: the study estimates the treatment effect as a 13.9 percent increase in the average FCS, which is significant at the 10 percent level. The average increase in FCS across the remaining studies was 3.99 FCS units, reflecting a range from 0.052 in Bangladesh to an increase of 14.1 in Somalia. This covered four studies on sudden-onset hazards (Somalia, Bangladesh and Nepal) and three studies on AA in slow-onset hazards (Madagascar, the Niger and Lesotho).

Figure 9



THE EVIDENCE POINTS TO A POSITIVE EFFECT OF AA ON CONSUMPTION-BASED COPING STRATEGIES

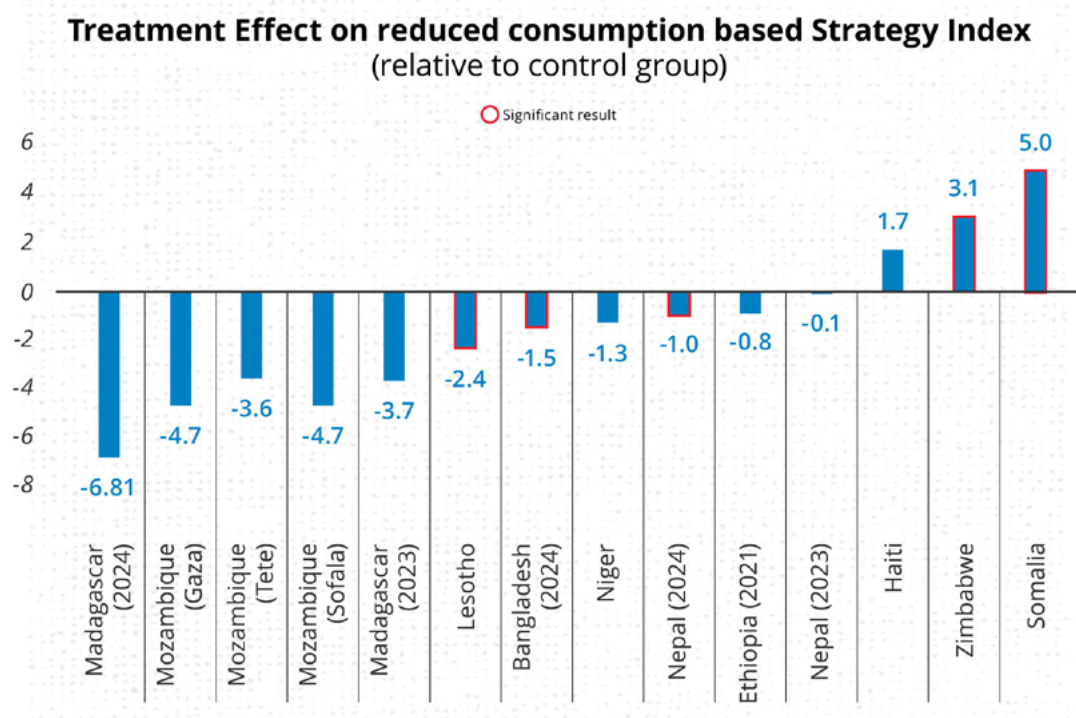
The Consumption-based Coping Strategy Index, widely referred to as reduced Coping Strategy Index (rCSI), is used to assess the level of stress faced by a household due to food shortages.

Out of 15 study locations that assessed the treatment effect of AA on rCSI scores, 12 studies showed that AA reduced the need for households to use consumption-based coping strategies; that is, rCSI scores fell (Figure 10). This positive effect of AA was seen in studies covering sudden-onset hazards (Bangladesh, Nepal, Haiti) as well as slow-onset hazards (Madagascar, Mozambique, Lesotho, the Niger, Ethiopia, Somalia). The treatment effect of AA on rCSI scores across studies averaged a fall of -1.48 rCSI units. This reflected a range of values, from a fall of -6.8 rCSI units in Madagascar (2024) to an increase of 5 units in Somalia (2023). These studies also had a wide range of levels of robustness. Of the studies showing a positive (decreasing) effect in Figure 10, three were

statistically significant (Bangladesh, Lesotho and Nepal) and the remainder either did not test for statistical significance or were insignificant. The improvement in rCSIs observed across studies in different geographies facing different hazards therefore suggests that AA had a widespread positive effect on coping strategies.

Notably, three studies in Figure 10 showed an increase in rCSI scores in the treatment group, indicating a negative association between AA intervention and the treatment group's coping ability. Two of the studies were Haiti (2023) and Zimbabwe (2024), where the increase in rCSI scores for the treatment group is consistent with the zero to negative impact of AA on the FCS indicators. The other study was Somalia (2023), which found a positive effect of AA intervention on rCSI scores which was significant to the 5 percent level. This is contradictory to the highly significant and positive change AA treatment was found to have on the likelihood of having an "acceptable" FCS, and more context may be needed to explain why coping strategies worsened while food consumption improved.

Figure 10



The counterintuitive findings from these three studies on a negative rCSI effect of AA highlights the usefulness of baseline and endline data on key indicators. The treatment groups here were shown to have a significantly higher proportion of unemployed households, a lower proportion of households that own their own home, and a higher proportion of households living in houses with brick or tin walls. As such, it is difficult to assess whether baseline differences in rCSI

scores across treatment groups (which are not recorded) may have contributed to the estimated effect of AA intervention. While IPW regression attempts to correct for these differences based on household baseline characteristics, it may not be able to do so fully. This reinforces the recommendation that, ideally, both baseline data on indicator variables and descriptive statistics on household statistics would be available.



NO CLEAR TREND ON THE EFFECT OF AA ON USE OF LIVELIHOOD COPING STRATEGIES

The Livelihood Coping Strategies for Food Security (LCS-FS) or for Essential Needs (LCS-EN) is an indicator used to measure the extent that households needed to use livelihood coping mechanisms as a response to a lack of food or money, to purchase food or to meet essential needs (shelter, education, health, food) during the 30-day period prior to the survey.

There was no clear trend across the evidence on the effect of AA on the use of livelihood coping strategies (LCSs). Seven studies indicated the effect of AA on the share of respondents reporting that they had adopted emergency, crisis, stress or no coping strategies (Figure 11).

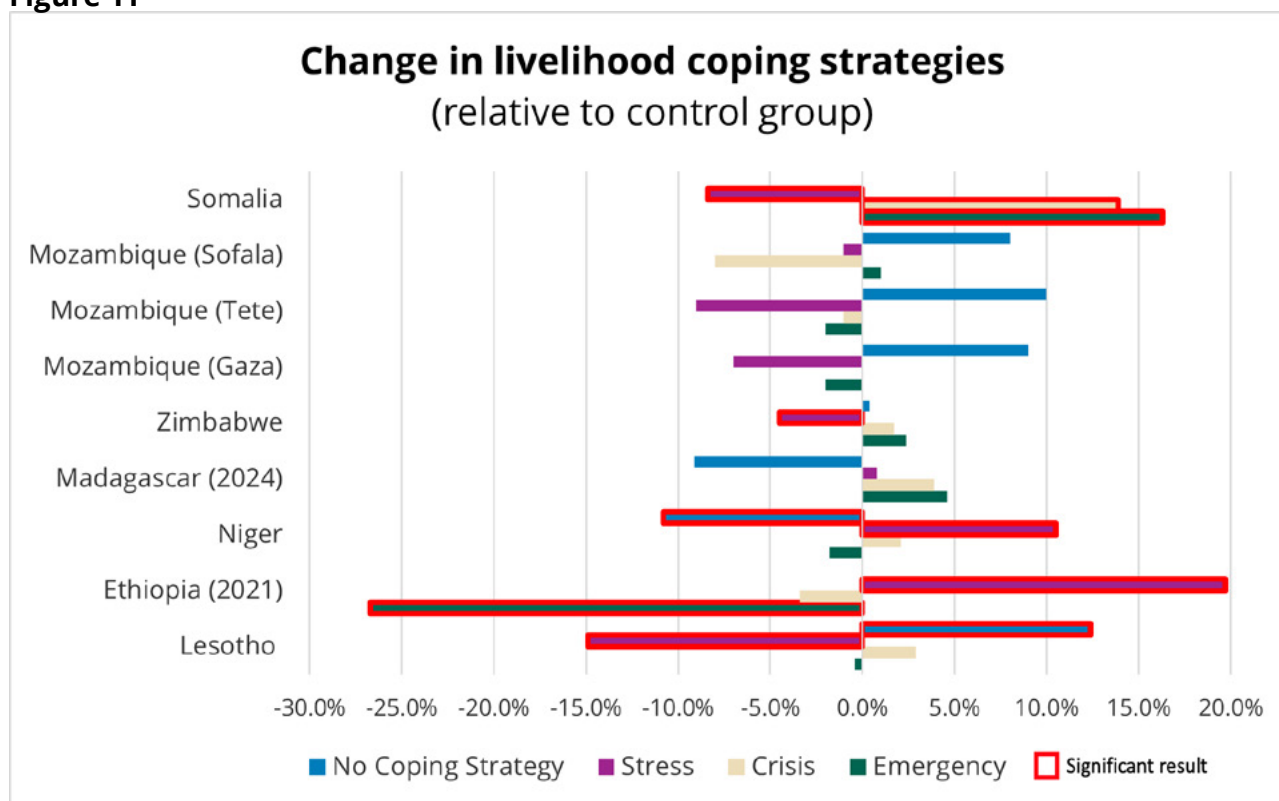
As seen in Figure 11, three studies showed that AA intervention reduced the severity of

livelihood coping strategies in the treatment group, with the distribution of coping strategies used moving from emergency and crisis coping strategies towards stress and no coping strategies. These were Ethiopia (2021), Lesotho (2024) and Mozambique (2024). Contrarily, four studies found a negative treatment effect of AA on the use of coping strategies (Somalia, 2023; the Niger, 2023; Madagascar, 2024; and Zimbabwe, 2024)¹⁵.

These mixed results hold when separating the studies by geography, type of hazard and robustness – no clear trend emerges for the effects of AA on LCS. This could be because there are fewer studies with evidence on LCS available, making general trends more difficult to separate from idiosyncratic outliers. Alternatively, it could be because the effects of AA are primarily seen in food consumption outcomes. More evidence would be needed to judge which explanation is likely to drive these mixed results.

¹⁵ Two studies (Haiti, 2023; Guatemala, 2024) are omitted from the graph due to measurement differences. Haiti (2023) found (qualitatively) that a larger proportion of the treatment group had reported using emergency and stress coping strategies. Conversely, Guatemala (2024) found that the use of food LCS after AA intervention fell by -40.2 percent relative to a control group.

Figure 11



What remains inconclusive

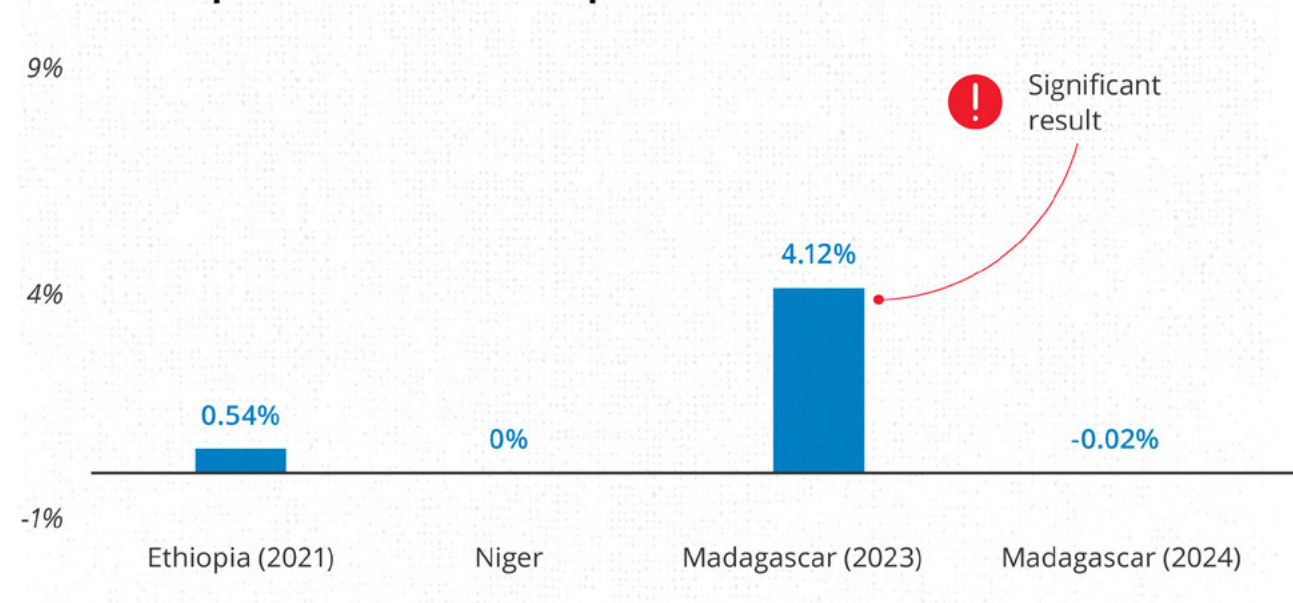
Across the studies surveyed, there was sparse coverage of other standardized indicators. This highlights the benefits of studies reporting the same standardized indicators. While individual studies may vary in the degree of robustness achieved, common trends and patterns across a breadth of studies provide support for broad conclusions on the effect of AA. It is much easier to see these common trends when studies provide evidence on the same standardized indicators. With only a few evidence pieces discussing a given indicator, it is difficult to assess whether results are in line with a general trend or due to idiosyncratic variation.

THE EFFECTS ON HOUSEHOLDS' FOOD EXPENDITURE SHARE

Four studies provided evidence on the effect of AA on FES. There was a weak trend across these studies that suggested AA increased the share of income spent on food (Figure 12). Guatemala (2024) found a significant decrease in "low" FES

of 5.6 percent in treated households compared to a control group. Ethiopia (2021) had a positive but insignificant point estimate of 0.54 percent for the effect of AA on FES, relative to a treatment group. Madagascar (2023a) found that AA had a positive and significant effect (4.12 percent) on FES, but Madagascar (2024) conversely found a small fall in FES (-0.02 percent). The Niger (2023) found no overall increase in FES in the AA treatment group. A decomposition of the overall FES showed this was composed of a small decrease in "medium" FES and a large increase in "high" FES, accompanied by a large increase in "very high" FES and a small increase in "low" FES. This suggests a shift towards more extreme FES, with a larger movement in the shift towards very high FES. However, it should be noted that none of these results were statistically significant.

Figure 12 Improvement in food expenditure share for AA households



SOME EVIDENCE ON RESILIENCE CAPACITY

Three studies reported the effects of AA on the resilience capacity score (RCS) of the treatment group (the Niger, 2023; Madagascar, 2023; Madagascar, 2024). Across the three studies, there was a common improvement in RCS. The Niger (2023) study found a significant -8.7 percent fall in the share of respondents with a “low” RCS and a -7.5 percent fall in the share with a “medium” RCS after receiving AA compared to a control group. Simultaneously, the share of individuals with a “high” RCS rose by 16.3 percent. Madagascar (2023) reported a significant -15 percent fall in the proportion of treated individuals with a “low” RCS, although this study did not provide detail on the distribution of RCS across “medium” and “high” categories. In line with this trend, Madagascar (2024) found that the average RCS rose 3.58 RCS units, suggesting that AA improved households’ resilience.

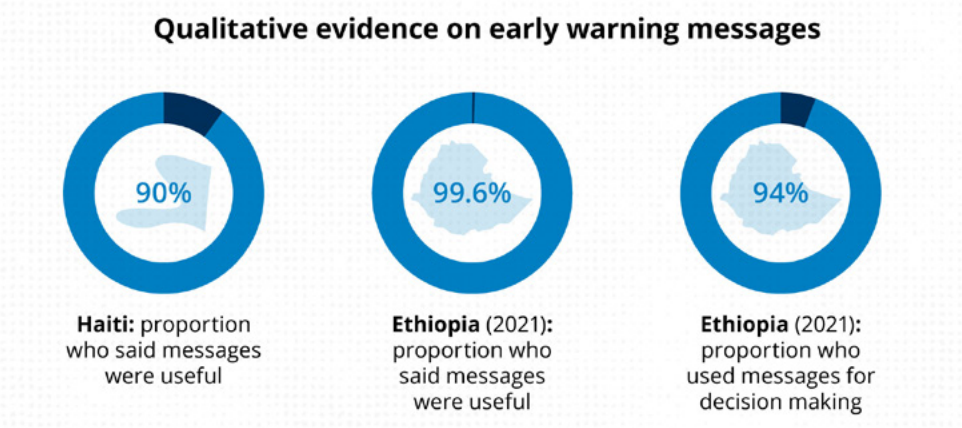
The inclusion of more studies providing evidence on the same indicators would help build a more complete picture of the effects of AA on the people that receive it, as well as allow for investigation into whether the effect of AA varies systematically by geography, hazard type or other factors. For example, only Ethiopia (2021) surveyed the impact of AA on the treatment group’s economic capacity to meet essential needs (ECMEN), finding a small but insignificant impact. This suggests a neutral to positive effect of AA on ECMEN, but this holds

little internal validity due to the insignificance of the point estimate, and little external validity due to study-specific confounding factors. Additionally, while some country offices have investigated the effects of AA on indicators such as herd sizes and likelihood of financial borrowing, these results are inconclusive and only sparsely available, and so are not presented in this meta-analysis.

HOW EFFECTIVE IS CASH ALONE COMPARED TO CASH WITH EARLY WARNING?

Qualitative evidence from Haiti, Ethiopia and Nepal suggest that early warning messages are an important component of AA intervention. In Nepal (2023), qualitative evidence described the contribution of early warning messages that forecasted flooding despite seemingly good weather. Ethiopia (2021) found that 99.6 percent of respondents who received early warnings found them to be useful, and 94 percent used information from these messages to make decisions. Similarly, in Haiti (2023), over 90 percent of respondents across men and women in both control and treatment groups said that the early warning message received was useful (Figure 13). These studies highlight the benefit of more qualitative evidence to portray a more complete picture of the impact of AA, as the quantitative evidence in the studies in Haiti and Ethiopia pointed to extremely mixed effects of cash AA on consumption-based outcome variables.

Figure 13



Qualitative evidence from Madagascar (2023b) also highlights an important role of early warning messaging in advising high marginal propensity to consume (MPC) households on the purpose of their cash transfers. As households that received anticipatory assistance are likely already to be vulnerable to food insecurity, “the concept of investing in future, hypothetical risks [due to weather hazards] may not be immediately apparent”. This is particularly important in slow-onset hazards such as droughts, where the timeline of AA and lead time for cash transfers is in terms of months. As cash transfers are unconditional, vulnerable households with a high MPC may be incentivized to spend their cash transfers immediately on

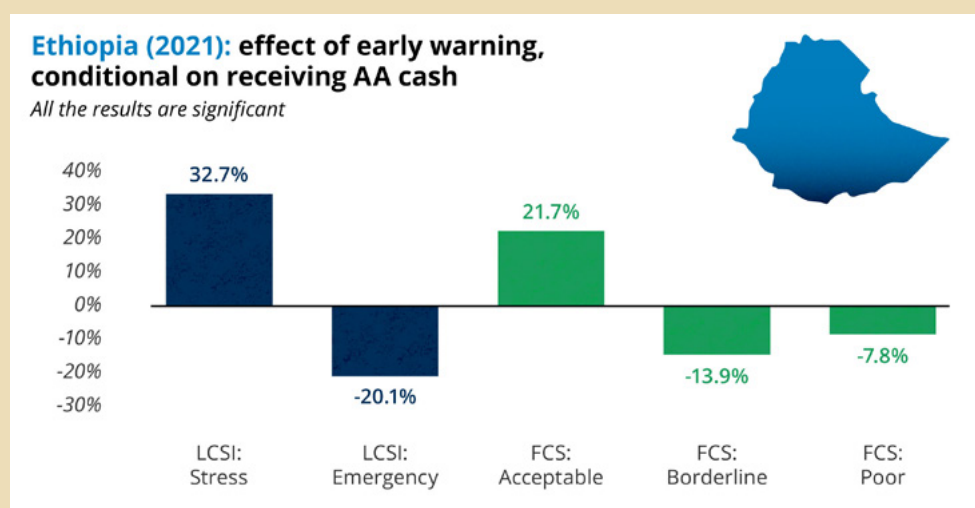
short-term needs unrelated to the future weather hazard. Early warning messages could help encourage households to use the cash transfers towards preparing for future weather hazards by recommending specific actions to take.

While the quantitative evidence suggests that unconditional cash transfers are most effective when combined with early warning messaging, only two studies provide evidence on this, and both have concerns regarding robustness when quantifying the role of early warning messaging. The quantitative evidence should therefore be viewed with caution and as a secondary support for the qualitative results.



ETHIOPIA: TRYING TO DISCERN THE EFFECT OF EARLY WARNINGS

In Ethiopia, the 2021 study finds a very positive effect of early warning messages combined with a cash transfer on LCSIs and FCSs among the AA intervention group, despite finding poor results for the effect of AA on consumption outcomes overall. The study found a shift from the proportion of “emergency” level LCSIs to “stress” level LCSIs among households that received early warning messaging in addition to a cash transfer. The proportion of households with an “emergency” LCSI was -20.1 percent lower than households that did not receive early warnings, and the proportion of households in the “stress” LCSI category was 32.70 percent higher. There was also a shift from the proportion of “borderline” and “poor” FCSs towards “acceptable” FCSs, with a lower proportion of “borderline” and “poor” FCSs (-13.90 percent and -7.8 percent, respectively) and a higher proportion of “acceptable” FCSs (+21.7 percent). This suggests a positive effect of early warning messaging in conjunction with cash transfers when implementing AA.



However, these results should be treated with caution for several reasons.

First, the study compared results from households in the endline data who reported not receiving any early warning messages to those that did receive them. As the distribution of early warning messages was not targeted to the AA treatment group, whether or not a household received early warning messages alongside unconditional cash transfers may be a result of selection bias. For example, if households do not receive early warning messages because they are less well equipped or fundamentally more vulnerable to weather hazards, then this negative effect on outcome variables may be wrongly attributed to the lack of early warning messages.

Second, the sample size for the cash-only, no-early warning group is much smaller (59 people) than the cash and early warning group (273 people). The highly asymmetric sample size makes the conclusions drawn from a comparison of these two groups less robust, and further highlights that whether or not a household received early warning messages may be endogenous.

Third, more information is needed on the Satellite Index Insurance for Pastoralists in Ethiopia (SIIPE) payout that was made in addition to the cash intervention to 24.4 percent of the treatment group.

Finally, the study does not compare these two treatment groups with the original control group. This makes the findings difficult to assess, particularly given the mixed results when comparing the AA treatment group (as a whole) to the control group.



Methodological challenges facing empirical studies of AA

KEY MESSAGES

This section outlines the key methodological challenges facing empirical studies of AA. Note that some of these challenges are not specific to AA and would be present in the assessment of any humanitarian intervention conducted in a real-world context. The purpose of this section is to provide practitioners and monitoring and evaluation experts with knowledge of common factors that may bias quantitative evaluation, so that these factors can be accounted for when assessing existing quantitative results or kept in mind when designing future studies.

Three key challenges facing empirical studies on AA are:

1. **Selection bias:** unless deliberately controlled for (as in an RCT), a control group is not always an unbiased counterfactual and there may be many confounding factors.
2. **Differences in early warning messages across treatment and control groups:** when early warning messages are widespread and received by both treatment and control groups in significantly different proportions and in a non-random way, this may introduce a confounding factor that makes it difficult to disentangle the effect of early warning messages from unconditional cash transfers.
3. **Timeliness of data collection:** if AA is a short-term relief measure, endline data collection may be too late to capture the effects of AA on key consumption outcomes.

FINDING SUITABLE CONTROL GROUPS

The key potential confounding factor is the lack of a suitable control group to compare against households receiving AA (selection bias). This is an important consideration in all empirical research as a control group is needed to provide a counterfactual outcome. But control groups (particularly in a humanitarian context) are unlikely to be exactly the same as treatment groups. In the context of AA, this could mean that the difference in outcomes between the treatment and control group due to fundamental differences may be wrongly attributed to the AA intervention. As discussed in section 2, the studies surveyed in this evidence synthesis differed in the degree to which they addressed this source of endogeneity, which affected the robustness of their empirical analysis¹⁶. As there are many trade-offs involved in ensuring a “perfect” counterfactual control group, the majority of studies surveyed here are likely to have some degree of selection bias.

The volume of studies in this meta-analysis was able to compensate for this to some degree, and still drew the conclusion that the effects of AA on consumption were positive. The finding that the effects of AA on consumption were largely positive was seen across studies where the control group was likely to be fundamentally better off than the treatment group as well as studies with the converse scenario, where the treatment group was fundamentally better off. As such, it is convincing that the positive effect of AA observed was not solely because of confounding factors. In addition, the availability of studies with relatively high levels of robustness (RCTs, deliberated selection of control groups and controls of household characteristics) meant that the well-identified positive effects of AA found in these studies corroborated the positive effects found in studies with a lower level of robustness.

Where feasible, baseline, midline and endline evidence would be collected to assess AA, as done by the Nepal (2024) study. Reflections on the best timing of data collection can be found below in the last sub-section of this chapter.

¹⁶ The most robust studies (Nepal, 2024 and Bangladesh, 2024) conducted RCTs that allocated households randomly across treatment and control groups and included controls for household characteristics and municipality-level fixed effects. In contrast, the least robust studies surveyed compared endline outcome variables across the treatment and control groups without accounting for possible confounding factors.

COUNTRY CASE STUDY: NEPAL

Nepal (2023) and Nepal (2024) are two evidence pieces that highlight how a variety of levels of robustness can still contribute to the understanding of the effectiveness of AA.

As discussed previously, the RCT studies in Nepal (2024) and Bangladesh (2024) were the most robust evidence surveyed. In contrast, while Nepal (2023) selected the treatment and control group randomly, demographic differences and differences in exposure to early warning messages between treatment and control groups were not accounted for in the empirical analysis, which simply compared endline data between the two groups. This suggests that the Nepal (2023) results are less robust. Nevertheless, their finding that the treatment group saw a 5 percent larger proportion of “acceptable” food scores is roughly in line with the RCT’s finding of an 8 percent larger proportion.

Despite being less robust, the consistency of the Nepal (2023) study with the Nepal (2024) study lends support to the external validity of a positive treatment effect within Nepal, especially given the similarity in volumes of the AA transfers.

DISENTANGLING THE EFFECTS OF AA CASH FROM THE EFFECT OF EARLY WARNING MESSAGES

A second challenge identified in the surveyed studies is the difficulty in isolating the impacts of different anticipatory actions – in particular, the roles of unconditional cash transfers and early warning messages. The majority of studies appeared to analyse the effect of cash transfers in scenarios where early warning messaging were also disseminated across both treatment and control groups, despite AA encompassing both early warning communications and unconditional cash transfers. A potential reason for this may have been because unconditional cash transfers are easily targeted but the effects of early warning messages are widespread within both treatment and control groups.

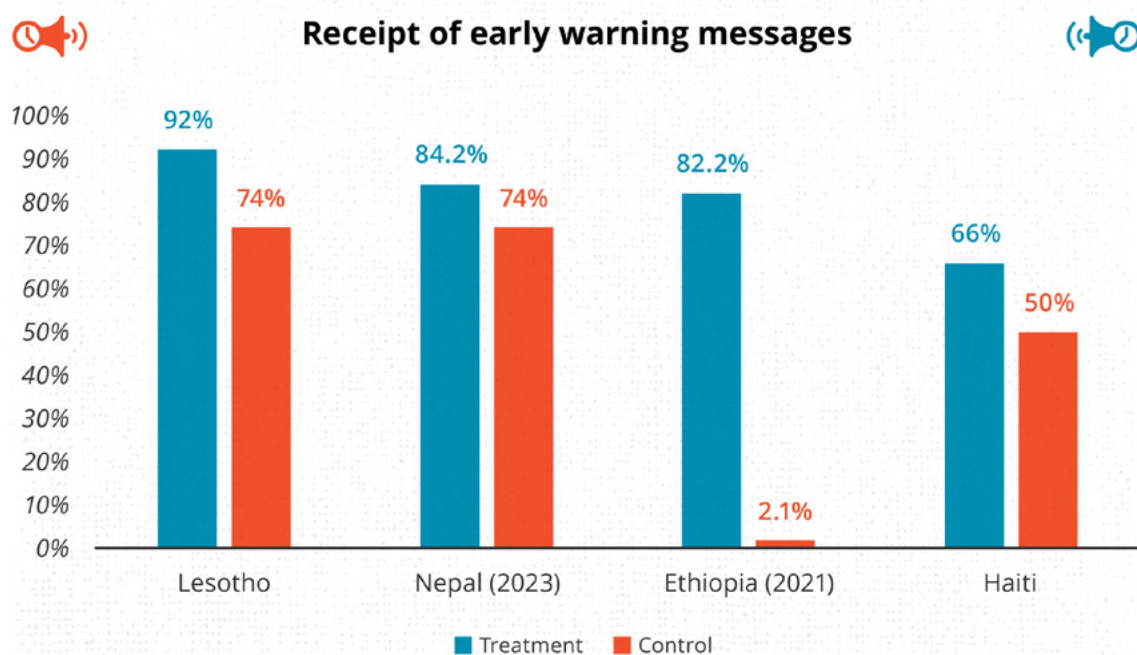
This concern could be more clearly addressed with more information on what and how AA was implemented. Many studies surveyed in this synthesis lacked context, which hindered interpretation of results and comparability across studies. Future studies would benefit from clearly

stating whether the AA intervention measured was the effect of cash transfers or cash transfers plus early warning messaging, in which case the control group would ideally not receive either cash or early warning messages.

Of the 16 quantitative studies surveyed, only one¹⁷ (the RCT in Nepal, 2024) explicitly discusses this potential confounding factor and is able to verify that the reach of early warning messages did not differ across control and treatment groups. Only a few studies mention the proportion of households who received early warning messages across treatment and control groups. However, the evidence available from these studies shows (i) a high prevalence of early warning messages received across both treatment and control groups; and (ii) different proportions of early warning messages received across treatment groups. This may be a significant confounding factor in the quantitative estimation of the effects of AA, including early warning messages, as differences in outcome variables between treatment and control groups may be driven by the unconditional cash transfers received by the treatment group (as

¹⁷ Bangladesh (2021) mentions that the proportion of early warning messages across treatment and control households are similar at “just under two thirds”. Three other studies mention the proportion of the treatment group who received early warning messages compared to the control group.

Figure 14



assumed in the studies surveyed), or because of differences in the proportion of households receiving early warning messages.

Figure 14 illustrates this. In Lesotho (2024), 92 percent of the treatment group received warning messages compared to 74 percent of the control group. Similarly, in Nepal (2023), 84.2 percent of the treatment group received warning messages compared to 74 percent of the control group. The Ethiopia (2021) study attempts to differentiate between the effects of unconditional cash transfers and early warning messages (early warning messages were received by 82.2 percent of the treatment group compared to 2.1 percent of the control group).

TIMING OF DATA COLLECTION

Finally, the timing of data collection poses a practical challenge for the empirical assessment of AA. The majority of studies surveyed appeared to use only endline data after the intervention, presumably within the standard three- to four-week post-intervention data collection period. If the nature of AA is to assist with short-term hazard relief, then midline data may be more

relevant than endline data for assessing the effect of AA on consumption outcomes. This is particularly relevant for sudden-onset hazards, where the comparatively short timeline means that the effects of AA may not be measurable anymore in data taken three to four weeks after the weather hazard. For instance, in the Philippines AA cash assistance is only intended to sustain people over 10 days. Future studies may wish to take these differences into account when collecting data, and specify in the empirical analysis when data was collected to inform whether this may affect the empirical results.

As suggested in the [WFP guidance on monitoring and evaluation of AA for fast and slow-onset hazards](#), the timing of outcome data collection should be decided based on when results can be expected to have fully materialized, and before they begin to erode. For example, if a cash transfer is meant to cover a period of 30 days for an average household, and the food consumption score is measured based on the household's experience over the last 7 days, collecting endline data six weeks after the transfer was made can already be too late to measure a discernible effect.



Lessons learned and recommendations from the AA evidence synthesis

AA IS EFFECTIVE, WITH ROOM FOR HARMONIZING HOW RESULTS ARE MEASURED

Overall, the consistency of positive trends in the estimated treatment effects of AA on FCS and rCSI indicators across geographies, types of natural hazards and studies with different degrees of robustness is consistent with a widespread positive effect of AA. The presence of these positive trends lends support to future AA programmes.

There is room to harmonize how AA results are measured. A standardized framework for data collection and reporting would be beneficial to ensure the consistency of information across studies. Ideally, studies would have the same basic information on context behind the AA intervention and use similar indicators to measure AA effectiveness, alongside additional information particular to the study. This would greatly improve comparability across studies and improve the ability to draw conclusions on general trends in results. This could also allow for creation of a centralized database of the effect of AA on key indicators that could be used to draw broad conclusions on the effects of AA across studies.

CONTEXTUAL INFORMATION IS CRUCIAL

The lack of balance between context and quantitative results hinders the comparability of studies and the interpretation of results for AA effectiveness. With the exception of a few, more in-depth pieces, studies that focused on quantitative analysis did not include much description of the AA intervention. In contrast,

evidence pieces that focused on implementing AA interventions and qualitative data did not include much quantitative or technical detail on the robustness of the results.

Three key pieces of information would be helpful for building context around AA implementation.

- 1. It would be useful to know the volume of cash transfers.** For example, when examining the broad conclusions from FCS-related indicators, nine studies indicated the proportion of “acceptable” FCSs relative to a control group. However, only five of these nine studies included the volume of the cash transfer given as part of the AA intervention. Furthermore, cash volumes were not always stated in the same currency, nor whether they were PPP-adjusted or per capita versus per household. More information on cash volumes would have been informative for whether the size of the treatment effect estimated was correlated to transfer sizes. In addition to the volume disbursed, the rationale determining cash volumes also matters for comparability and to understand whether the observed outcomes are in line with the intended effect.
- 2. It is important to know the timeline of the forecast, weather hazard and data collection as well as the severity of the hazard.** This, in conjunction with cash transfer volumes, would help inform on whether AA is more effective as a short- or medium-term measure, and whether this differs across slow- and sudden-onset hazards. If AA is intended to be a very short-term measure preventing short but severe changes in

consumption following a extreme weather event, then a lack of positive treatment outcomes could be explained if the data were collected four weeks after the intervention. Knowing the timeline of events and the severity of a extreme weather event could also help inform when the “ideal” time is to collect data, and to what extent the results of a study are able to capture the dynamic response to a weather hazard in consumption and coping outcomes.

3. **Some description of the AA implementation, as tailored to the country or weather hazard, is necessary on the robustness and plausibility of the quantitative results.** For example, while all studies surveyed cash transfers that had taken place, not all studies were clear on the role of early warning messaging, which constitutes an AA intervention that was often experienced by both control and treatment groups. As discussed previously, this may introduce a confounding factor. Knowledge on what the AA intervention constituted and which AA interventions differed across treatment and control groups is essential to determine the robustness of results obtained. It is also important for assessing whether results are plausible. For example, the Zimbabwe (2024) study which suggested AA worsened consumption outcomes despite simultaneously hugely benefitting crop yields would need to be contextualized in order to assess whether this is plausible.

ADDRESSING BIAS

One suggestion for future studies is that the common methodological challenges highlighted in the previous chapter and other potential confounding factors can be addressed when discussing results. When drawing broad based conclusions on the effects of AA, potential biases in estimated treatment effects within individual studies can be partially compensated for if there is a large volume of studies available with different sources of bias, but the same trend in observed outcomes. If studies are able

to explicitly highlight what potential biases are, this makes it easier to assess whether biases are common across studies and therefore hold programmatic or methodological implications for future AA evidence generation, or differ idiosyncratically, and so can be negated by observing a large volume of studies.

THE IMPORTANCE OF BASELINE DATA

A second key takeaway from the meta-analysis is that inclusion of baseline data on outcome variables would improve the ability to interpret the effectiveness of AA within individual studies. As the settings of these studies mean that there are many confounding variables, the ability to compare between baseline consumption outcomes across the treatment and control group would provide a measure of how different the two groups are. Post-intervention, the endline consumption outcomes could then be adjusted for fundamental differences between the two groups. Without baseline data, it is difficult to gauge whether differences in the outcome variable are due to the effects of AA or differences between the control and treatment group. This problem persists even if the treatment and control group are selected randomly, as random selection does not guarantee two comparable or identical groups. Information on baseline characteristics is also helpful for gauging the differences between the treatment and control group but is an imperfect substitute for measuring how these differences may have affected consumption outcomes.

List of AA evidence surveyed

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List of acronyms

AA	Anticipatory action
CARI	Consolidated Approach for Reporting Indicators of Food Security
CCS	Climate capacity scores
DiD	Difference-in-difference
ECMEN	Economic capacity to meet essential needs
FCS	Food consumption score
FES	Food expenditure share
IPW	Inverse probability weighting
LCS	Livelihood coping strategy
LCS-EN	Livelihood Coping Strategies for Essential Needs
LCS-FS	Livelihood Coping Strategies for Food Security
LCSI	Livelihood-based Coping Strategy Index
MPS	Marginal propensity to consume
RCS	Resilience capacity score
rCSI	Reduced coping strategies index
RCT	Randomized control trial
USD	United States dollar
WFP	World Food Programme

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