















Demystifying Compounding and Cascading Hazards in Anticipatory Action:

New Approaches to Mitigating Food Insecurity

INTRODUCTION

We live in a complex and interconnected world, where humanitarian crises mirror this complexity. Anticipatory action (AA), or acting ahead of predicted hazards to reduce or prevent acute humanitarian impacts before they unfold, is a key approach for mitigating the impacts of forecastable hazards. Anticipatory action plans require use of pre-agreed triggers (thresholds and decision-making guidelines), pre-agreed activities and pre-arranged financing. These plans are often based on single natural hazard forecasts coupled with vulnerability and exposure data. However, the reality is that the majority of contexts have multiple connected, cascading or compounding hazards with limited access to timely data and scope for expert judgement that could better facilitate consideration of complexity for AA.

At the Global Dialogue Platform (GDP) on Anticipatory Humanitarian Action in Berlin in October 2024, AA practitioners and academics came together to explore new approaches that better consider compounding and cascading hazards, with a focus on mitigating adverse impacts on acute food insecurity and malnutrition. This paper summarizes the discussions and practical steps identified from the session, alongside ongoing challenges in taking a more multi-hazard approach in AA.

THE CHALLENGE OF DEFINITIONS

Multi-hazard approaches are an inherent component of ensuring people are food secure because of the plethora of ways different hazards interact. In addition, a multi-risk lens enables consideration of how exposure, hazards, vulnerability and response interact within a population (Gill et al., 2022). This interaction helps identify the probability of a negative impact on people and assets (REAP, 2022). To reduce food insecurity risks, people must have physical, social and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life (FAO, 1996). Whether slow or rapid onset, shocks to food systems impede access to nutritious and sufficient food.

Multi-risks arise when people are faced with multiple hazard events that occur in a cascading or compounding manner and cause interactions with underlying vulnerabilities. In exploring the complex dynamics between the risk of food security in conflict settings, recent research highlighted different elements: (1) interconnections between different nodes of the food system (**connected**); (2) successive and repeated (**cumulative**) exposure to disruptions in the food system that intensify impacts; (3) the **compounding** nature of co-occurring effects of the food system that act together to multiply impacts (Patel et al., 2023).

In practice, current models of single hazard protocols are unable to address these complex interconnections and risk cascades – which can at times be transboundary impacts – and the resulting exposure. Food security, alongside disease outbreaks and conflict, was a focus of discussions on scaling up AA at the European Humanitarian Forum in 2023 (Anticipation Hub, 2023) and several Anticipation Hub Working Groups tackle issues such as multi-risk and AA in conflict. It was noted that to scale-up, practitioners need to better preempt multi-hazard risk cascades that can have a compounded impact on local food security.

HOW COMPOUNDING & CASCADING HAZARDS MANIFEST

KEY TAKEAWAYS

- Food security is a global system and shocks caused by climate or conflict can cascade and negatively affect other geographical areas, particularly those already affected by food insecurity.
- Examples from Bangladesh and Nigeria show a need for multi-hazard monitoring and early warning systems for man-made and natural hazards.

In humanitarian contexts, compounding and cascading hazards create unique challenges that disrupt food security and amplify vulnerability. These challenges manifest from global to sub-national scales, with the Ukraine conflict offering one example of how conflicts can cascade to impact already vulnerable and food insecure contexts. Examples from Bangladesh and Nigeria show how the convergence of natural, socio-political, and economic factors exacerbate adverse food security outcomes in contextually distinctive ways. All examples highlight the complex interplay of multiple risks that hinder AA efforts and undermine resilience.

UKRAINE Conflict escalation and global food price shocks

The escalation of the Ukraine conflict in February 2022 created shocks to global food systems. An estimated third of world wheat trade and three-quarters of sunflower oil trade was sourced from the Black Sea region, including over half of the World Food Programme's (WFP) wheat grain. In particular, local markets in East Africa and the Middle East had high dependencies on Black Sea exports. Prices on international markets spiked as Black Sea ports were blockaded and the harvest disrupted, amid historically high global food prices (Glauber, 2023).

Cascading impacts on food security in complex crises such as Lebanon, Sudan and Somalia were foreseen (e.g. Breisinger et al., 2022). These contexts were already facing high levels of acute food insecurity due to intersecting factors, including conflict, natural hazards, displacement and economic challenges. Impacts were anticipated to extend beyond the immediate region, to countries such as Bangladesh and Nigeria, also facing multiple other food security challenges, as detailed below.

To help identify impacts, the Integrated Food Security Phase Classification (IPC) initiative adjusted their assessment approaches to account for additional cascading conflict impacts on acute food security outcomes (IPC, 2022). Whilst anticipatory actions were not documented, policymakers recognized the risk to global food security, and brokered the Black Sea Grain Initiative (UN, 2022), which saw Black Sea grain exports resume from July 2022 to July 2023.

BANGLADESH Climate Extremes, Saline Intrusion and Compounding Food Insecurity

Bangladesh's southwestern coastal district of Satkhira exemplifies the devastating effects of multiple, overlapping hazards. The 2023-24 El Niño event contributed to prolonged heatwaves and insufficient

rainfall (Bangladesh Meteorological Department, 2024), followed by Cyclone Remal in May 2024, which saw heavy rains and severe coastal flooding (UNICEF, 2024). These climate extremes, combined with long-term, slow-onset saline intrusion (e.g. Khan & Shoumik, 2022), have degraded agricultural land, reduced potable water availability and affected aquaculture systems, threatening food security. Seasonal migration and labor shortages further compound these issues (Luetz, 2018), impacting agricultural productivity.

As Tamanna Rahman from Practical Action elaborated during the Global Dialogue Platform (session video link), despite community coping strategies, such as reducing food intake, significant gaps remain in monitoring and conducting anticipatory actions. Bangladesh lacks an integrated multi-hazard plan that brings together existing frameworks, even though efforts are under way to support multi-risk approaches (e.g. Start Fund Bangladesh et al., 2021). Currently, critical indicators such as water temperature — essential for aquaculture — are not effectively monitored. Contributions from the GDP session emphasized the importance of integrated rapid and slow onset multi-hazard monitoring and early warning systems that consider changing vulnerability to address these cascading hazards, with specific mention of gaps in hydrometeorological warnings and delays in communication. These insights underscore the need for a coordinated, multi-hazard approach to AA in Bangladesh, particularly in vulnerable coastal zones.



Aleya Begum is working in her floating vegetable garden. After receiving training from Friends In Village Development Bangladesh (FIVDB), Aleya is now providing training at Climate Field School.

NIGERIA Climate Change, Conflict and Displacement-Induced Food Insecurity

Tobi Salawu from the Christian Rural and Urban Development Association of Nigeria (CRUDAN). highlighted that in Nigeria, climate change intensifies compounding hazards, which has resulted in shifting rainfall patterns, increased drought intensity and recurrent flooding (session video link). Northern Nigeria faces severe droughts that reduce crop and livestock production. In addition to climate stress, competition over and management of dwindling land and water resources fuels conflict between farmers and herders with conflict leading to widespread displacement, disrupting agricultural activities and increasing food prices, more adversely impacting households with already high vulnerabilities.

Seasonal flooding poses significant challenges, especially in central and northern states where inconsistent rainfall patterns result in destructive floods that damage infrastructure and displace thousands of people. Floods contaminate water sources, leading to outbreaks of waterborne diseases like cholera, placing strain on local health services and reducing labor availability for farming. As a result, communities face compounded risks to both health and food security, with cascading impacts on agricultural productivity and market access. Contributions from the GDP audience highlighted the need for AA systems that incorporate conflict-sensitive frameworks and multi-hazard risk assessments, especially for areas like Northern Nigeria, where climate change, conflict, and health crises intersect. Solutions such as multi-stage triggers that account for both environmental and social indicators were suggested as essential for effectively addressing the cascading effects of these hazards.

SOLUTIONS FOR APPROACHING COMPLEXITY IN AA

KEY TAKEAWAYS

- Working on multi-hazard risks requires the application of a systems thinking approach, this can be used to understand how food insecurity can cascade along different nodes of the food system and can be used to identify points of intervention.
- Underlying all approaches is a focus on understanding and defining impact; impact-based forecasting provides avenues into accounting for multi-risks.
- Statistical modelling and context-monitoring are two examples of explorations into what can constitute a multi-risk analysis.
- Key to operationalizing multi-risk analysis is a strong connection to organizational process that can facilitate anticipatory action.

Effectively addressing the intricate challenges posed by compounding and cascading hazards at differing scales requires innovative and adaptive approaches. Multi-risk approaches can help identify the main drivers, seasonal patterns, relative weight of drivers and their impacts. This can benefit communities and organizations through providing longer timeframes for action, potentially enabling a broader range of early actions. The subsequent section explores solutions developed by the GDP session convening organizations for navigating this complexity, highlighting practical strategies and frameworks that can enhance resilience and better prepare communities for the cascading impacts of multiple hazards. It is by no means an exhaustive list but seeks to engage a broader range of actors in thinking about and sharing solutions.

CHATHAM HOUSE Using systems thinking to manage cascading risks

To understand complex cascading risks, under the EU's <u>CASCADES 2023</u>, Chatham House researchers developed risk and response archetypes to understand how risks cascade. These risks were mapped across to sectoral expertise areas, i.e., food systems, for example, chokepoints in global food trade (King, <u>2022</u>), sustainable agriculture and food systems (Benton and Harwatt, <u>2022</u>), the Ukraine conflict and threats to food/energy security (Benton et al., <u>2022</u>) and near-term climate impacts (Quiggin et al., <u>2021</u>).

In partnership with Practical Action, Chatham House is assessing the integration of cascading risks in early warning systems (EWS) to mitigate food insecurity. Understanding how communities experience cascading risks can help us know how communities see the value add of various EWS. Through a multi-level study, recommendations will be aimed at at-risk communities and decision-makers to strengthen integration of cascading risks in EWS to improve early warning and early actions to mitigate impacts on food systems and food security.

Risks often cascade across multiple geographies - the combined *risk* from hazard, exposure, vulnerability; and its impact across communities can look very different. Being cognizant of these variations is essential to mitigate impact. Often, opportunities to anticipate and intervene at stages of upstream risk of any lower order impacts on the communities can help build greater system resilience.

Understanding how and which risks are cascading to communities can support anticipatory efforts. Where these risks are understood and their local systems' resilience is strengthened accordingly, there could be greater trust and buy-in within communities for anticipatory approaches as a result. Communities vulnerable to hazard events need to be given actionable information. To enable this, there must be a greater chain of responsibilities on different components of the risk ownership for cascading impacts.

By anticipating upstream risks and interrupting risk cascades by strengthening local systems and resilience, vulnerability and exposure of communities can be reduced. Early warning systems are complex and often depend on trigger thresholds to estimate impacts. In slow onset and multi-hazard settings, identifying these trigger thresholds can be even more challenging as they require more time to access information, mobilise and disburse timely resources because no 'single' trigger can be identified. Upstream risk analysis can help build in flexibility, moving beyond hard triggers and thresholds that are successful in many sudden or single hazard protocols, to soft triggers with greater dependency on expert interpretation.

ACTION AGAINST HUNGER (ACF) Accounting for complexity in malnutrition forecasts

As a food and nutrition security-focused organization, multi-risk contexts form part and parcel of ACF's operating contexts, with nutrition outcomes often resulting from an interplay of multiple hazards that compound and cascade, increasing vulnerabilities and risk of being adversely affected. Impact-based forecasting, where ACF considers not only the impact of an individual hazard, but how a series of hazards can accumulate and shape particular outcomes, is a promising approach they consider to better account for multi-risk realities in our AA approaches.

Widening the lens and considering impact-based forecasts that relate to more than an individual hazard and its immediate outcome(s) is particularly pertinent in the nutrition security field, not least because malnutrition emerges over longer timeframes and can fall off the radar of traditional AA approaches. Yet, adopting an anticipatory mindset and assessing early on where situations threaten to deteriorate to critical levels as a result of multiple, cascading and compounding hazards can open valuable opportunities to undertake anticipatory and early actions that prevent or at least mitigate the undesired impacts.

To enable just this, ACF is working on a statistical modelling approach to forecast acute malnutrition prevalence rates whilst accounting for a rich interplay of factors. The <u>Modelling Early Risk Indicators to Anticipate Malnutrition</u> (MERIAM) initiative is utilizing conflict factors, alongside climate factors, as lead indicators in the development of predictive models to forecast acute child malnutrition prevalence and caseloads currently in four countries: Ethiopia, Kenya, Somalia and South Sudan. The work builds upon extensive prior research that demonstrated how such forecasts can provide foresight up to 12 months into the future (Backer & Billing, 2024).

Current efforts are underway to engage in different pilot implementations that test the operational utility and added value of such information to provide insights into at-risk areas, underlying drivers and associated response needs to shape more proactive nutrition interventions, including anticipatory actions. Acute malnutrition early warning information could be included in AA protocols by setting specific, context-appropriate thresholds which if crossed warrant the allocation of additional resources to carry out anticipatory actions. At the same time, the information can also be used to inform better evidencebased programming more generally, with the central tenet of anticipatory action in mind: protecting the dignity of the at-risk population, acting as early as possible to proactively prevent, or at least mitigate, impending nutrition crises.

INSECURITY INSIGHT Unpicking complexities of food-related violence, Mali

Insecurity Insight is an H2H (Humanitarian to Humanitarian) organization, supporting the work of aid agencies and other civil society organizations by providing publicly available information and analysis for evidence-based policies. Their work focuses on data about violence against civilians and damage and destruction of vital civilian infrastructure, aiming to strengthen protection and the delivery of aid in armed conflict. Recently, the organization developed a series of briefings mapping the

impact of food-related violence in Mali (Figure 1) to limit the cascading impact of conflict and advance approaches to AA.

The briefings map a multitude of violent incidents including the deliberate burning of granaries by conflict parties, the looting of livestock and incidents of violence at marketplaces and directly affecting people whilst travelling to or from markets. Insecurity Insight make these data publicly available via the Humanitarian Exchange. Additionally, the briefings consider compounding and cascading effects of conflict on food insecurity and propose relevant anticipatory actions for humanitarian organizations and communities to mitigate their worst impacts (Insecurity Insight, n.d.). They apply an innovative approach to AA focusing on the humanitarian impacts of conflict rather than predicting the occurrence of conflict, in line with recent priorities from the Anticipation Hub's Anticipatory Action in Conflict Practitioners' Group.

Insecurity Insight's approach to complexity centers around flexibility, systems thinking, and proactivity. This is also reflected in Insecurity Insight's concept of the 'anticipatory mindset' (Insecurity Insight, 2024). This mindset is based on the underlying rationale of AA to avoid crises from foreseeable events. It focuses on the ongoing monitoring of incidents of food related violence, considering their likely impacts and proactively taking conflict sensitive measures to mitigate these.

Ultimately, their work aims to support operational organizations and affected communities through regularly updated contextual information and analyses assessing likely impacts of conflict on food security. Such contextual analysis is critical for actors to identify potential cascades and identify leverage points for early action. These can contribute to soft triggers for humanitarian organizations and local communities to take early actions to mitigate the worst effects of violence on food security.

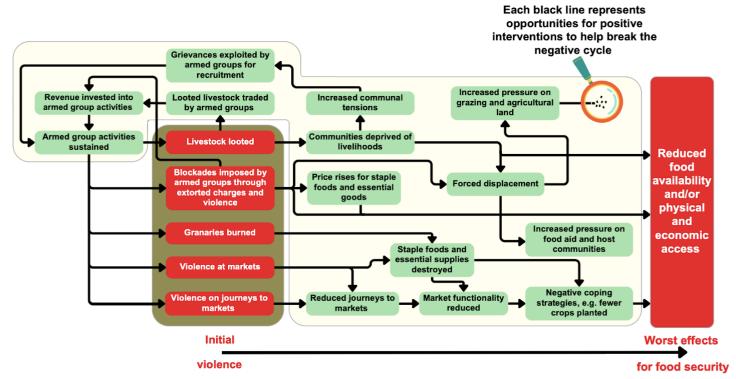


Figure 1. Flowchart showing compounding and cascading hazards stemming from conflict for food insecurity in Mali and opportunities for anticipatory actions to mitigate the negative foreseeable impacts. From Insecurity Insight (2024).

A WAY AHEAD

A focus on compounding and cascading hazards supports understanding the complexities of humanitarian crises and improve anticipation of impacts. Man-made and climate hazards continuously interact, increasing exposure and vulnerability and thereby the risk of a hazard becoming a crisis. For anticipatory action to capture this complexity requires developing methods tailored to multi-risk settings. Zooming in on the global food system, this paper presented several innovative approaches to strengthening analysis, early warning and anticipatory action around multi-risks.

The methods ranged from deepening understanding of how cascading risks can be included in early warning systems for food insecurity, to developing a statistical modelling approach to forecast acute malnutrition and mapping impacts of food-related violence on food insecurity. The approaches showed a few commonalities: a systems approach to understand and map impact, a need for flexibility and the application of an anticipatory mindset. This can include allowing space for expert judgement and soft trigger approaches that consider multiple shocks alongside formalized hard-trigger anticipatory action protocols. Although a complex change, multi-risk anticipatory action requires adjusting existing approaches and developing new ones centralizing these factors.

During the Global Dialogue Platform, attendees showed significant interest in exploring anticipatory action approaches that tackle multiple, compounding or cascading hazards¹. When asked for their perspectives, attendees indicated several challenges. Some critiques were common to all anticipatory action approaches, funding, insufficient localization including limited strategies, lack of cross-sectoral coordination and lack of commitment to and interest in AA from government actors. Specific to the multi-risk hazards was the technical complexity of designing AA systems. This included an inability to combine different indicators, a lack of impactbased information, granular data and limited analytical capacity. Proposed solutions interlinked with this, stressing a need for increased collaboration with partners, across sectors and with local communities organizations to establish evidence-based methods.

Climatic hazards and conflict factors will continue to 'work together' and create compounding and cascading risks. Shying away from the resulting complexity is not an option; instead, anticipatory action stakeholders need to continue exploring novel ways to account for this complexity and build new approaches, which adopt an anticipatory mindset to protect affected populations.

One place to continue this discussion and learn more about ongoing work in this space is the Anticipation Hub's <u>Multi-Risk Working Group</u>. If you are interested to join, please contact the group's convenors.

¹ Out of 58 votes on the question 'Do you have an interest in exploring anticipatory action approaches that tackle multiple, compounding or cascading hazards?', 57 voted yes, 1 person voted maybe.



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