

The priorities for food-security research under extreme events

September 21 2022



Asking questions, looking for answers. Credit: CIAT / Neil Palmer

Fixing hunger is as challenging as ever. Many food producers, including farmers, hunters and fishers are food-insecure; meaning they're not always sure where their next meal will come from. More than 50% of

the roughly 600 million who are food insecure live in conflict zones. The risk that multiple misfortunes can cascade, such as a war in one region and crop failures in others, increase the stakes for the most vulnerable, who are generally hard-pressed to withstand a single hit to their food supplies, let alone several.

How can researchers help? To determine what questions to ask and how to prioritize, 69 food security experts, including scientists, governments, international institutions and NGOs have published a comprehensive set of research questions across different food-related domains that have the potential to bolster food security. Their work was recently published in the journal *One Earth*.

"While similar exercises have been undertaken across a range of fields and topics, this work presents, as far as we know, the first attempt to compile and build consensus on the major threats and priorities for research on food security in the face of extreme events from experts working with diverse backgrounds and expertise and geographic foci," wrote the authors.

The experts identified 32 threats to watch for over the next two decades, and 50 research questions to help understand and mitigate the threats. The threats were divided into three categories: 1) compounding events and cascading risks, 2) vulnerability and adaptive capacity and 3) cooperation and conflict.

"Cascading risks can include things that were previously unthinkable, such as multiple breadbasket failures in a single year, migration due to climate change and disruptions like those caused by war and pandemics," said Liangzhi You, a researcher at the CGIAR's International Food Policy Research Institute and a member of ClimBeR, the main CGIAR Initiative on climate resilience and food security. "But today with climate change, anything is possible."

Vulnerability and adaptive capacity refer to the food-risk levels of farmers or communities and how well they can respond to shocks. The cooperation and conflict category covers war, cross-border policies and collaboration between government and international organizations.

Additional top threats include pest and disease outbreaks and marine heatwaves, which have the potential to affect cropland and fisheries simultaneously and severely.

A question of questions

With limited resources and countless lines of research that could be pursued to increase food security, prioritization is critical. The authors categorized questions in three areas and assessed them for feasibility in terms of time and investment, and the impact unlocking the answer could have.

Better maps and predictions, farm-level interventions and food system transformation are the three categories of research questions.

Better maps and predictions before, during and after extreme events will be crucial to facilitating better responses. The "standard basis for identifying risk, forecasting and responding to the impact of extreme events on food security is high-quality data," wrote the authors. Unfortunately, validated on-the-ground data on food security have not kept pace with the available technology.

Questions in this area include: "What are the likely impacts of specific critical infrastructure failures on food security?"; "To what extent can early warning systems identify and inform people most exposed, vulnerable, and unable to adapt to food insecurity challenges in the face of extreme events?"; and "Are there tipping points in the intensity of extreme events that will cause global food insufficiency?" Consult the

full list [here](#).

Farm-level interventions are critical because they have the potential to both stabilize food supply through resilience to extreme events and improve livelihoods. But issues related to poor access to finance and markets can hinder resilience. Examples include the slow adoption of crop varieties that are resistant to droughts and floods, and slow uptake of irrigation in developing countries.

Research questions at the farm level include: "Which on-farm practices increase resilience to drought, are cost-effective and easily adopted?"; "How much can increasing crop diversity improve smallholders' adaptive capacity?"; and "How does the loss of [biodiversity](#) make cropping systems more susceptible to extreme events?" Consult the full list [here](#).

Food system transformation refers to global and local actions that reduce food's negative impact on the environment, increase equitable access to complete and nutritious diets, and imply broad changes in the way most people eat in much of the developed world. The authors find the related questions among the most difficult to answer, but increased understanding of governance, food producers and consumers are critical parts of the research agenda.

Food system transformation questions include: "How does crop diversification at the household, community, and regional scales mediate food insecurity during extreme climate events?"; "In what ways does insurance enhance or undermine food security in the face of extreme events?"; and "What policies are required to ensure that efficiency gains in food distribution systems enable widespread food security without harming local and regional producers?" Consult the full list [here](#).

CGIAR's climate research agenda

"Many of these questions will be addressed in CGIAR's new research portfolio, particularly the CGIAR initiative on climate resilience," said You, who leads the Initiative's work on reducing risk in agriculture for smallholder farmers. The Initiative, called ClimBeR: Building Systemic Resilience Against Climate Variability and Extremes, aims to help 30 million smallholders across six countries to improve resilience to climate extremes by 2030.

The authors recognize that effective implementation of an ambitious research agenda and ensuring food security will be greatly helped by reducing armed conflict. In conclusion, they write, "Our findings support the notion that the pathway to peace globally remains essential for ensuring global food security in the face of extreme events. Conflict and lack of cooperation—in a variety of manifestations, and at different political scales—continues to present a major impediment to global [food security](#) and is a key factor that predisposes communities and nations to disasters following shocks."

"But in spite of these challenges, we see a major opportunity in tackling these issues through a focused, long-term research agenda and promoting peaceful societies," You said.

More information: Zia Mehrabi et al, Research priorities for global food security under extreme events, *One Earth* (2022). [DOI: 10.1016/j.oneear.2022.06.008](#)

Provided by The Alliance of Bioversity International and the International Center for Tropical Agriculture

Citation: The priorities for food-security research under extreme events (2022, September 21) retrieved 18 June 2024 from <https://phys.org/news/2022-09-priorities-food-security-extreme->

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