

Flooding significantly impacts food security, new study finds

October 17 2022



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New research finds that flooding can affect food security for more than 5.6 million people across several African nations. The work comes at a time when floods have also devastated Pakistan, India, and large parts of the European Union and the United States.

"Our findings show that floods can impact food security both

immediately and in the months after the flood event," says Connor Reed, a former New York University Center for Data Science graduate student and lead author on the study, "The impact of flooding on food security across Africa," which appears in the *Proceedings of the National Academy of Sciences*. "In many [flood events](#) we assessed, there were substantial damages to infrastructure, croplands, and livestock, which compromised food production and access, as well as water resources and sanitation also critical to food security."

In recent years, record rainfall and flooding have prompted increased attention to the ramifications for affected populations and pointed to the urgency for a greater understanding of the magnitude of their destruction, particularly on populations' food needs.

To gain detailed insights into the impact of flood disasters, Reed, along with Sonali Shukla McDermid, an associate professor in NYU's Department of Environmental Studies, and other colleagues examined more than a dozen countries across western, eastern, and southern Africa, including Nigeria, Niger, Kenya, Mozambique, and Malawi, among others.

Over the studied period (2009–2020), the researchers examined how key flood characteristics, including location, duration, and extent, influence an independent food insecurity metric used by the USAID-created Famine Early Warning System: the Integrated Food Security Phase Classification (IPC) scale. IPC measures the severity of food insecurity using a five-point scale: minimal food security (IPC 1), stressed (IPC 2), emergency (IPC 3), crisis (IPC 4), and famine (IPC 5). The team measured the impact of flooding over extended periods of time using panel analyses.

The results showed that approximately 12% of those who experienced food insecurity in the studied areas had their food security status

affected by flooding over the 2009–2020 period. These impacts included detrimental increases to food insecurity, as expected, but there were also some beneficial impacts that ameliorated [food insecurity](#), depending on the time period and regional scale.

"Our results suggest that floods can have opposing effects on food security at different spatial scales, particularly at time periods after they occur," says study co-author Weston Anderson, a research scientist at NASA Goddard Space Flight Center and the University of Maryland's Earth System Science Interdisciplinary Center. "In a given year, excess precipitation may immediately lead to floods that destroy crops in a localized area while also being associated with beneficial growing conditions that boost crop production on the country-scale."

The researchers, nevertheless, caution that any positive impacts from flooding are not guaranteed, and these findings instead speak to the importance of improved data collection on flood and food security for disaster response and climate adaptation planning.

"What we highlight in particular is that flooding has important but complicated impacts on food security at different times and spatial scales," McDermid says. "This is however largely understudied globally, and therefore not well understood. Improving knowledge of where, when, and to what extent floods affect food security is crucial, especially for decision-makers across flood-prone rural areas that contribute to regional and global food supplies."

Notably, the results also revealed that flooding significantly affects food security in highly localized and varied ways—as opposed to uniformly across entire countries. The researchers say this indicates that the relationship between flooding and food security is not due to country-wide dynamics (e.g., changes in food prices), but instead to context-specific impacts on food production (e.g., subsistence crop loss), food

access (e.g., destruction of infrastructure or direct loss of livelihoods), and/or food utilization (e.g., water-borne diseases and sanitation deficiencies).

"Understanding flood impacts on [food security](#) is of growing importance for the humanitarian community," says co-author Andrew Kruczkiewicz of the International Research Institute for Climate and Society at Columbia University. "With the outputs of this study, the humanitarian community is in a better position to decide what actions, including anticipatory, preparedness and response, to prioritize—or deprioritize—in the areas we studied."

"This research illustrates how cross-disciplinary teams can generate exponential improvements in our understanding of societal problems," says Jeffrey Mantz, a program director for the National Science Foundation, which supported the research. "We knew that flooding had downstream impacts, but this study clarifies and quantifies those impacts in ways that will have important benefits for people and communities that are facing increasingly frequent severe weather events."

More information: Reed, Connor et al, The impact of flooding on food security across Africa, *Proceedings of the National Academy of Sciences* (2022). [DOI: 10.1073/pnas.2119399119](https://doi.org/10.1073/pnas.2119399119).
doi.org/10.1073/pnas.2119399119

Provided by New York University

Citation: Flooding significantly impacts food security, new study finds (2022, October 17) retrieved 20 April 2024 from <https://phys.org/news/2022-10-significantly-impacts-food.html>

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