COLUMBIA CLIMATE SCHOOL
Climate, Earth, and Society

Building Climate-Resilient Health Systems for Nutrition:
Development and Strengthening of Climate Services

Columbia Climate School's Food for Humanity Initiative

May 2025

Overview

The climate emergency is the biggest threat facing the planet and humanity. Since the turn of the millennium, climate hazards[1] have doubled compared to the previous twenty years and future projections suggest that with further warming, every region is projected to increasingly experience concurrent and multiple changes in climate, compounding overall risk across sectors and regions.

Climate change has multiple negative effects on nutrition outcomes through complex, multi-directional pathways including impacts on food, health, water, social protection, education and humanitarian systems. Importantly, climate change is undermining the ability to achieve the 2030 Agenda for Sustainable Development, including the Sustainable Development Goal 2 *Zero Hunger.*

Though recent global dialogues and fora such as the Conference of the Parties have begun to include health in Nationally Determined Contributions and National Adaptation Plans, in particular, nutrition is not mainstreamed into the larger climate change agenda or political moments, outside of food systems. There is little recognition among the climate change community that addressing nutrition is an important adaptive response to climate hazards including extreme climate and weather events such as heat waves, droughts and floods that impact the resilience[2] of populations.

---

1 The potential occurrence of a natural or human-induced physical event that may cause loss of life, injury, or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, and environmental resources. Source: Intergovernmental Panel on Climate Change. Glossary of terms. In: Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation [Field, C.B., V. Barros, T.F. Stocker, D. Qin, D.J. Dokken, K.L. Ebi, M.D. Mastrandrea, K.J. Mach, G.-K. Plattner, S.K. Allen, M. Tignor, and P.M. Midgley (eds.)]. A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change (IPCC). Cambridge University Press, Cambridge, UK, and New York, NY, USA. 2012. pp. 555-564.

2 The ability of a system and its component parts to anticipate, absorb, accommodate, or recover from the effects of a hazardous event in a timely and efficient manner, including through ensuring the preservation, restoration, or improvement of its essential basic structures and functions. Source: Intergovernmental Panel on Climate Change. Glossary of terms. In: Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation [Field, C.B., V. Barros, T.F. Stocker, D. Qin, D.J. Dokken, K.L. Ebi, M.D. Mastrandrea, K.J. Mach, G.-K. Plattner, S.K. Allen, M. Tignor, and P.M. Midgley (eds.)]. A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change (IPCC). Cambridge University Press, Cambridge, UK, and New York, NY, USA. 2012. pp. 555-564.

Key points

Climate change and nutrition are inextricably linked. However, there is little recognition among the climate change community that acknowledges nutrition as an adaptive response and the nutrition community is ill prepared for compounding extreme weather events and their impacts on malnutrition.

There is tremendous potential to converge sectors and systems for improved nutrition preparation and response through the use of weather and climate information for decision-making. Based on current evidence, three recommendations emerge:

Recommendation 1
New data ecosystems and diverse data are needed to fill in key knowledge gaps.

Recommendation 2
Sustainable financing mechanisms can help facilitate nutrition-resilience.

Recommendation 3
Global consensus on recommended packages of interventions can allow for better coordination and early action.

Because of this, a synthesis of the evidence was undertaken to identify examples of how and which types of climate information services[3] (i.e., development and deployment of early warning systems and climate-informed forecasting) have been used to prepare the nutrition community, in terms of implementation of effective nutrition interventions[4], in low- and middle- income countries in advance of and in response to extreme weather events. Ultimately, these findings can help inform national and regional climate and disaster risk reduction strategies to better improve nutrition and increase the resilience of populations.

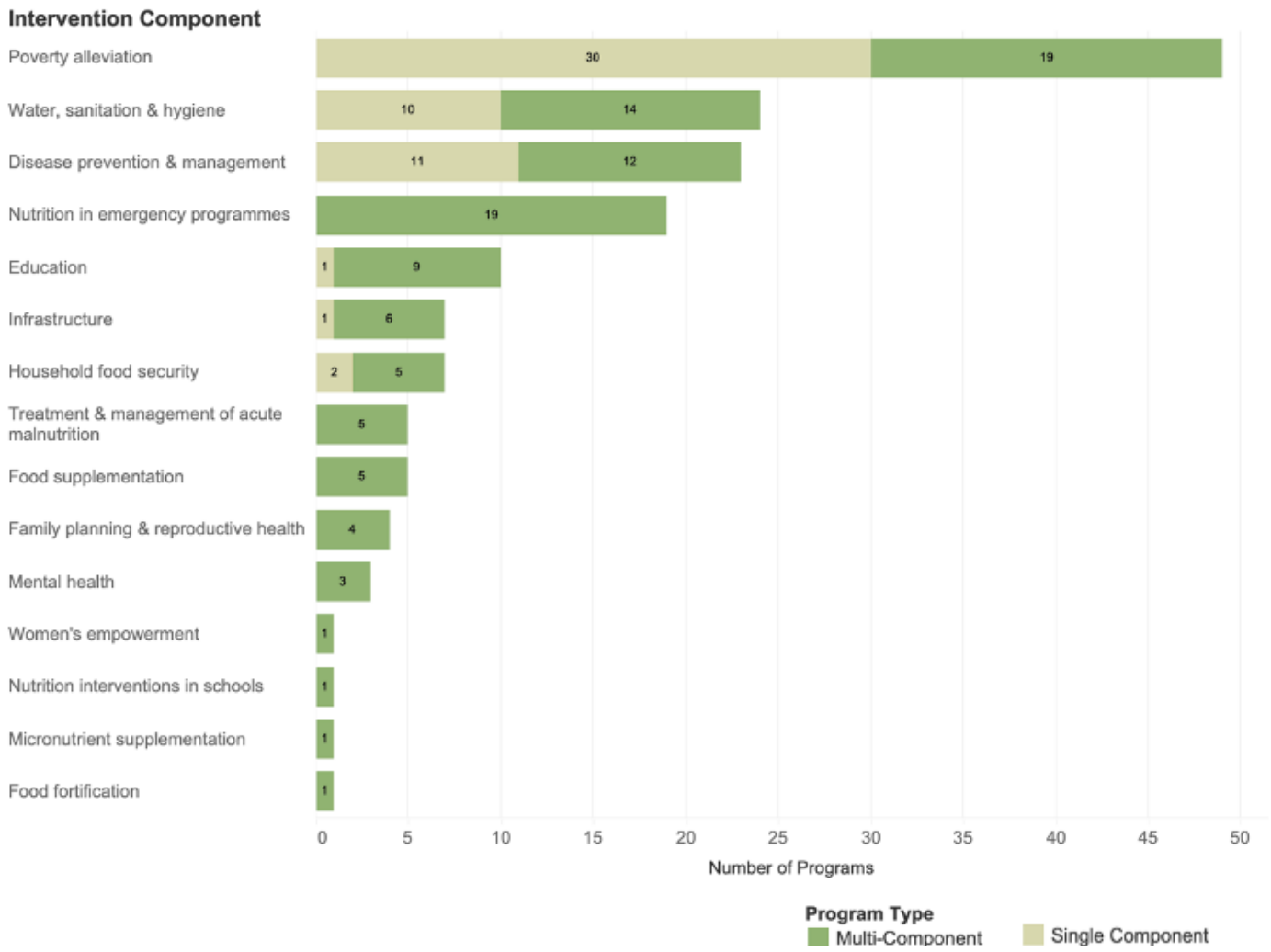
Findings suggest three critical knowledge gaps. First, climate information services across low- and middle- income countries for specific extreme climate and weather events have largely been used to anticipate changes in food security and infectious diseases such as malaria and dengue as opposed to changes in nutritional status outcomes such as stunting, wasting or micronutrient deficiencies. This resulted in most studies implementing indirect nutrition interventions such as social protection schemes or water, sanitation and hygiene activities, and few studies implementing treatment of acute malnutrition, micronutrient supplementation or nutrition counselling interventions (Figure 1). Second most interventions were implemented in preparation for and response to floods and droughts, with few studies providing climate information services on extreme heat or cold events. Third, it was unclear how the implementation of nutrition interventions improved nutrition outcomes, especially outcomes which may manifest in the long-term. Most evaluations were conducted in the short-term (i.e., within a year post-disaster), leaving valuable long-term impacts and effectiveness unknown.

---

3 The transformation of climate-related data (from the past, present or future) - together with other relevant information - into customized products such as projections, forecasts, information, trends, economic analysis, assessments (including technology assessment), counselling on best practices development and evaluation of solutions and any other services in relation to climate that may be use for the society at large.

4 Direct nutrition interventions include nutrition in emergencies, treatment and management of acute malnutrition, in-school meals, food fortification, food supplementation, micronutrient supplementation. Indirect nutrition interventions include poverty alleviation and social protection programs, water, sanitation, and hygiene initiatives, disease prevention and management, education, family planning and reproductive health initiatives, infrastructural improvement, and women's empowerment. Source: Keats, E. C., Das, J. K., Salam, R. A., Lassi, Z. S., Imdad, A., Black, R. E., & Bhutta, Z. A. (2021). Effective interventions to address maternal and child malnutrition: an update of the evidence. The Lancet Child & Adolescent Health, 5(5), 367-384.

Figure 1. Number of Country-Level Programs, by Intervention Type and Component



Recommendation 1:

A new climate-nutrition data ecosystem is needed to fill key knowledge gaps

There is urgency and opportunity for better integration of weather and climate information into health systems decision-making to improve both short- and long-term nutrition outcomes. To make this possible, we need a new architecture or a data ecosystem that facilitates continuous data sharing and surveillance, while bringing together multi-disciplinary expertise to better track climate hazards and nutrition vulnerabilities across sectors responsible for nutrition. This new architecture must go beyond utilizing a narrow set of climate indicators (i.e., precipitation) to monitor select extreme weather events, such as floods and droughts, and consider filling evidence gaps related to extreme heat and cold events.

Recommendation 2:

Sustainable financing mechanisms can help facilitate nutrition-resilience

To ensure health systems can deliver nutrition interventions, both timely and effectively in preparation of a climate hazard, there is a need for sustainable financing mechanisms. Current global financial flows from development assistance and domestic sources for nutrition are insufficient for, and constrain implementation of, adaptation options, especially in developing countries. For health systems to act on weather and climate information, there is a need for sustainable financing mechanisms to ensure the adaptation and scale-up of nutrition interventions are appropriately resourced. Given this scenario, it is imperative for the nutrition community to support countries' efforts to step up and renew financial commitments[5] and at the same time make the investment case for nutrition adaptation within the climate agenda, to leverage climate funds.

Recommendation 3:

Global consensus on recommended packages of interventions can allow for better coordination and early action

There is a need for the global nutrition community to develop recommended packages of interventions, across sectors, depending on extreme weather event. For example, health facilities and communities can stock essential nutrition supplements and treatments such as oral rehydration salts, micronutrient supplements and ready-to-use therapeutic foods ahead of floods and droughts, as well as ensure public health nutrition practitioners undertake climate training to be better equipped to act. In addition, climate information services, if designed well, can help to ensure good service delivery of effective, safe and quality nutrition interventions to targeted communities by incorporating spatial risk assessments and pre-arranged financing for nutrition actions that can be quickly dispersed once certain early warning thresholds are met.

---

5 Shekar, Meera; Shibata Okamura, Kyoko; Vilar-Compte, Mireya; Dell'Aira, Chiara; eds. 2024. Investment Framework for Nutrition 2024 . Human Development Perspectives Overview booklet. © Washington, DC: World Bank. http://hdl.handle.net/10986/42164 License: CC BY 3.0 IGO."

Box 1. Multi-Component Anticipatory Action in Somalia

Anticipatory Action (AA) Programmes, or "a set of actions taken to prevent or mitigate potential disaster impacts before a shock or before acute impacts are felt" is reshaping the humanitarian system by use climate information services to monitor and detect pre-agreed forecast thresholds set by respective governments and donors (i.e., United Nations Member States, international organizations, private sector, and philanthropists). Once thresholds are met, pre-agreed and pre-pooled financing is distributed via provisions and or cash transfers ahead of a forecasted climate-related hazard to vulnerable households with the intention of maintaining food security and building resilience to climate shocks. These proactive cash transfers have shown success at increasing food consumption and diversity, while also leading to higher resilience capacity scores and less psychosocial stress across 36 countries in in Africa, Asia, Latin America and the Caribbean.

While previous AA Programmes were developed for flood-prone countries, Somalia serves as a notable example for AA which specifically addresses the impacts of drought. Somalia's multi-component AA goes beyond traditional financing and integrates direct and indirect health sector, and indirect other sector activities to further support food security among affected populations.

Between 2020 and 2023, cash transfers were deployed ahead of forecasted droughts through Somalia's Baxnaano National Safety Net Program, which allowed for streamlined targeting and distribution through an existing and national-level social protection platform. Moreover, direct and indirect health sector activities included the implementation of integrated food assistance, prevention and treatment packages for acute malnutrition, and in-school meals in coordination with the World Food Programme and other local partners.

After drought AA activation in 2022, approximately USD 2.7 million in cash transfers were distributed to over 200,000 people while 25,000 children (<5 years old) and pregnant and breastfeeding women and girls received specialized nutritious foods to treat acute malnutrition. Additional impact evaluations also indicated that Somalia's AA recipients were less likely to resort to 'crisis' coping strategies, regardless of drought severity.

AUTHORS:

Bianca Carducci
Columbia Climate School, Columbia University, New York, New York, United States

Georgia Dominguez
Centre for Global Child Health, The Hospital for Sick Children, Toronto, Ontario, Canada

Jessica Fanzo
Columbia Climate School, Columbia University, New York, New York, United States

COLUMBIA CLIMATE SCHOOL
Climate, Earth, and Society

climate.columbia.edu