CASE STUDY

Promoting Food Security, Resilience and Equity during Climate-related Disasters

The U.S. is often viewed as a nation of abundance, yet paradoxically, one in ten households were "food insecure" in 2019, meaning that they struggle to get the proper nutrition to keep their family healthy.[77]

These challenges are not borne equally. Rates of food insecurity were nearly three times higher for low-income and single mother-headed households and nearly twice as high for Black and Latino households than for White households.

Early research has found a doubling of the average food insecurity rate across the U.S. linked to the COVID-19 pandemic, with even greater increases among vulnerable populations.[78–81] Disruptive events, whether climate-related disasters or the COVID-19 pandemic, can exacerbate existing barriers to securing healthy food for vulnerable populations and further widen food and health disparities.[82]

Food insecurity has clear health implications. Adults who are food-insecure may be at an increased risk of health problems, including obesity, heart disease, diabetes, depression, and increased susceptibility to COVID-19.[83–85] Food insecurity also puts children at a higher risk of asthma, anemia, and obesity, as well as behavioral, developmental, and emotional problems.[83,86]

Climate-intensified extreme events are compounding existing food insecurity

Climate change is anticipated to worsen existing food insecurity as climate-related disasters, such as drought and flooding, become more frequent and severe and as agricultural pests become more persistent.[72,87] In 2019, there were fourteen climate-related disasters within the U.S. that each caused over a billion dollars in damages.[52]

Historic floods in the Midwest destroyed millions of acres of agriculture and caused widespread infrastructure damage (**see Case Study**). In addition, an above-normal Atlantic hurricane season inundated coastlines with unprecedented rainfall, high winds, and storm surge; and wildfires in California and Alaska caused widespread energy disruptions, compromising the health and well-being of residents.[52]

The mechanisms of food system disruption

Disasters such as these threaten all aspects of food production, distribution, and accessibility, with subsequent impacts for affordability that can further exacerbate food insecurity for vulnerable populations. When food is not consumed where it is produced, it must be processed, stored, transported, and then sold or donated. These processes involve complex interdependent, and at times, international systems. Roads, bridges, warehouses, airports, energy grids, and other transportation or telecommunication infrastructure are at risk of direct damage from climate change, severely disrupting the food system as a whole.[88,89]

For example, following the 2019 floods in the Central states, the flood waters caused more than forty state and federal highways to close, hydroelectric dams to be breached, and threatened nuclear power stations (**see Case Study**).[90,91] These disturbances limited the movement and storage of goods throughout the region and prevented consumers from accessing food sources.[91,92] In the midst of an extreme fire season in California that same year, utility providers turned off power to millions of homes and businesses, plunging low-income households into hunger and financial crisis as their food spoiled.[93]

Recent climate disasters decreased food security

Climate disasters can lead to acute food insecurity in the short-term and exacerbate chronic food insecurity in the long-term (**see Table 3**). Populations already struggling from chronic insecurity, or those who are only marginally food secure, are particularly vulnerable to the socioeconomic impacts of disasters, such as loss of livelihood, rising food prices, forced migration, loss of social support, and health-related impacts. Data from the aftermath of 2019 disasters is still scarce, but the impacts from previous disasters that are similar in nature are well documented.

For example, nearly five years after Hurricane Katrina, many of the households heavily impacted by the hurricane in Louisiana and Mississippi remained food insecure. This was especially true for women, Black households, and those living with chronic illness, mental health issues, or low social

support.[94] Similar impacts were demonstrated in New York City following Hurricane Sandy, where one-third of surveyed households in the heavily impacted Rockaway Peninsula reported difficulty obtaining food due to economic hardship, disruption of public transportation, and long-term closure of grocery stores months after the storm.[95]

A path towards equitable food security

Learning from Baltimore

In the era of complex disasters, community-level resilience is essential, as federal relief is often too slow and under-equipped to meet the immediate needs of individuals and households. A growing number of U.S. cities are working to protect and improve food security in the aftermath of climate-related disasters and help build climate-resilient local and regional food systems.

For example, officials from Baltimore, Maryland worked with researchers at the Johns Hopkins University in 2017 to assess the resilience of the city's food supply to climate-related disruptions and to identify ways to support communities at risk of experiencing food insecurity both before and after disasters.[96] This is a wonderful example of the power of academic and public partnerships.

Baltimore also designated a food liaison to sit within the Office of Emergency Management during crises. This city received funding from FEMA to coordinate a collaborative regional food and water resilience plan with surrounding jurisdictions. When COVID-19 spread to Baltimore in early 2020 — closing schools and many businesses — the city quickly put its food resilience planning into action and convened a group of food assistance stakeholders to better coordinate responses supporting food access for residents.

TABLE 3.

Individual, household and community level risk factors to food insecurity following climate-related disasters.

	Risk Factors	Protective Factors
Individual and Household	» Financial instability[95] » Insufficient housing[101] » Limited transportation and/or mobility[95] » Chronic illness[102] » Specialized dietary needs » Single income or female-headed household » Households with children/infants » Pre-existing food insecurity » Loss of livelihood[103] » Residence within a food desert[104] » Minority race[77] » mmigrant status[105] » Minority ethnicity[77] » English as a second language » College students[106]	» Strong community cohesion and social support[107] » Good mental and emotional health[108] » Financial resources[95] » Back-up power at primary residence[93] » Emergency shelter access » Transportation options[93] » Sufficient, stable and safe housing[103] » Access to healthcare » Evacuation options
Community	» Existence of systemic, structural racism and discrimination[100] » Limited disaster resilience planning[109] » Aging, poorly constructed infrastructure[92] » Low social capital[108] » Food waste and lack of food recovery[92] » Lack of local food production[104] » Lack of investment in equitable food distribution mechanisms and local agriculture[110] » Existence of food deserts and lack of public access to food stores or farmers markets[104]	» Equitable and inclusive food and health policymaking[111] » Disaster-resilient infrastructure (e.g., buildings, roads, bridges, energy grids, public transportation)[112] » Resilient and nutritious local and regional food systems[110] » Cross-sectoral food security planning[111] » Pre-existing disaster planning with emphasis on food provision[111] » School food programs[113] » Allowance for SNAP benefits to be used at farmers markets and Community Supported Agriculture (CSA)[113] » Involvement of healthcare sector in healthy food provision and elimination of food waste

Adaptive actions for health and equity

Local and state governments across the country can take similar steps to incorporate food insecurity risk analysis and adaptive planning into emergency management and climate adaptation planning (**see Table 4**). Local governments and community partners can ensure food assistance programs provide well-balanced meals and are targeted to reach vulnerable individuals and communities.

It is critical to support federal and state assistance programs during non-disaster times, such as the Supplemental Nutritional Assistance Program (SNAP), Women, Infants and Children (WIC), and school lunches. As an example, SNAP and WIC services have been pathways to try to meet the rise in food insecurity during the pandemic, and many schools have attempted to continue to provide meals to children most in need.[97,98] Thus, ongoing support can ensure that these programs are even more adaptable, optimally funded, and able to be rapidly mobilized during a disaster of any kind, thus reducing vulnerability and supporting food security in the short- and long-term.

Simultaneously, addressing food insecurity in the wake of disasters goes hand in hand with combating the root causes of food insecurity and health disparities, such as poverty and food deserts.[99] Structural racism is also deeply interconnected through complex pathways, including through the creation of disadvantaged social and economic factors that contribute to food insecurity.[100] Yet, even when these factors are removed, some evidence suggests food insecurity remains for people of color, highlighting the need for further research.[100] Finally, applying a food systems approach to food security after disasters, such as production of and access to healthy foods, and supporting diverse, local, and regional agriculture, is an important long-term strategy with clear benefits for both health and climate change.

TABLE 4.

Suggested adaptive actions for communities and organizations.

ADAPTIVE ACTIONS FOR COMMUNITIES AND ORGANIZATIONS

- Identify and address the impact of systematic racism and discrimination in food insecurity and food distribution systems[100,114]
- Assess and consider public access to food for people with limited capacity to travel[94]
- Promote policies and practices to enhance access to affordability of nutritious foods, including food diversion programs that reduce food waste[115]
- Increase flexibility and access to emergency food for vulnerable populations (D-SNAP, WIC, food banks, and school meals)
- Screen for food insecurity in the healthcare setting
- Address food sovereignty for tribal and Indigenous people[116]
- Identify and address food deserts within communities[99]
- Foster partnerships with local food producers through community cooperatives in order to promote food access and local economic resilience
- Create community collaborations for resource sharing[117]
- Strengthen social support networks among vulnerable populations[117]
- Undertake risk assessments to understand climate change threats and the current state of preparedness, specifically with regard to food supply[118]
- Undertake food vulnerability mapping to understand risk profiles among neighborhoods[119]
- Promote resilient local and regional agricultural practices, including urban agriculture and community gardens[120]
- Utilize existing frameworks for addressing food insecurity following disasters:
  » Urban food chain supply resilience[121]
  » Local food system resilience and food insecurity[122]
  » A food systems approach to climate change preparedness[103]