



FOOD SAFETY, NUTRITION, AND DISTRIBUTION

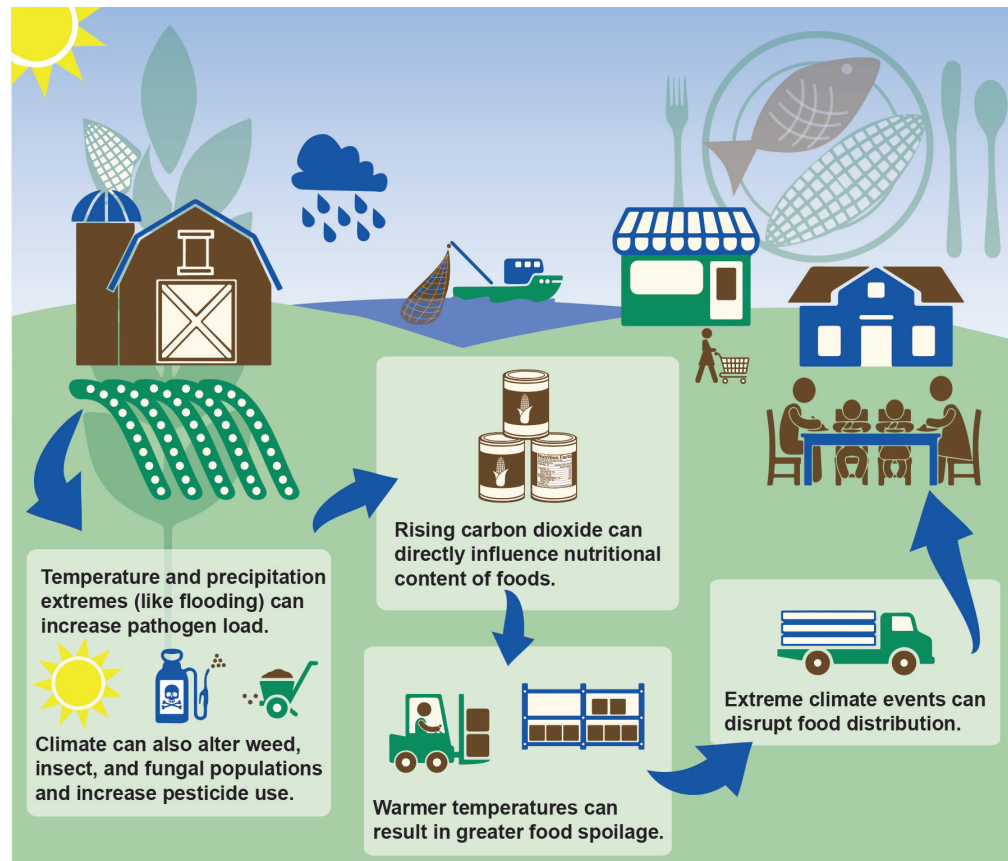
A safe and nutritious food supply is a vital component of food security. The impacts of climate change on food production, prices, and trade for the United States and globally have been widely examined, including in the recent report “Climate Change, Global Food Security, and the U.S. Food System.”⁷ An overall finding of that report was that “climate change is very likely to affect global, regional, and local food security by disrupting food availability, decreasing access to food, and making utilization more difficult.”

This chapter focuses on some of the less reported aspects of food security, specifically the impacts of climate change on food safety, nutrition, and distribution. There are two overarching means by which increasing carbon

dioxide (CO₂) and climate change alter safety, nutrition, and distribution of food. The first is associated with rising global temperatures and the subsequent changes in weather patterns and extreme climate events. Current and anticipated changes in climate and the physical environment have consequences for contamination, spoilage, and the disruption of food distribution. The second pathway is through the direct CO₂ “fertilization” effect on plant photosynthesis. Higher concentrations of CO₂ stimulate growth and carbohydrate production in some plants, but can lower the levels of protein and essential minerals in a number of widely consumed crops, including wheat, rice, and potatoes, with potentially negative implications for human nutrition.

Farm to Table

The Potential Interactions of Rising CO₂ and Climate Change on Food Safety



The food system involves a network of interactions with our physical and biological environments as food moves from production to consumption, or from “farm to table.” Rising CO₂ and climate change will affect the quality and distribution of food, with subsequent effects on food safety and nutrition (see Ch. 7: Food Safety).

Increased Risk of Foodborne Illness

Key Finding 1: Climate change, including rising temperatures and changes in weather extremes, is expected to increase the exposure of food to certain pathogens and toxins [*Likely, High Confidence*]. This will increase the risk of negative health impacts [*Likely, Medium Confidence*], but actual incidence of foodborne illness will depend on the efficacy of practices that safeguard food in the United States [*High Confidence*].

Chemical Contaminants in the Food Chain

Key Finding 2: Climate change will increase human exposure to chemical contaminants in food through several pathways [*Likely, Medium Confidence*]. Elevated sea surface temperatures will lead to greater accumulation of mercury in seafood [*Likely, Medium Confidence*], while increases in extreme weather events will introduce contaminants into the food chain [*Likely, Medium Confidence*]. Rising carbon dioxide concentrations and climate change will alter incidence and distribution of pests, parasites, and microbes [*Very Likely, High Confidence*], leading to increases in the use of pesticides and veterinary drugs [*Likely, Medium Confidence*].

Rising Carbon Dioxide Lowers Nutritional Value of Food

Key Finding 3: The nutritional value of agriculturally important food crops, such as wheat and rice, will decrease as rising levels of atmospheric carbon dioxide continue to reduce the concentrations of protein and essential minerals in most plant species [*Very Likely, High Confidence*].

Extreme Weather Limits Access to Safe Foods

Key Finding 4: Increases in the frequency or intensity of some extreme weather events associated with climate change will increase disruptions of food distribution by damaging existing infrastructure or slowing food shipments [*Likely, High Confidence*]. These impediments lead to increased risk for food damage, spoilage, or contamination, which will limit availability of and access to safe and nutritious food depending on the extent of disruption and the resilience of food distribution infrastructure [*Medium Confidence*].



(Left) The risk of foodborne illness is higher when food is prepared outdoors. (Right) Crop dusting of a corn field in Iowa.

