Presenter

Allison Crimmins, MS, MPP
Climate Change Division
Office of Atmospheric Programs
U.S. Environmental Protection Agency

AMERICAN PUBLIC HEALTH ASSOCIATION
For science. For action. For health.
Climate change impacts of food safety, nutrition, and distribution

Chapter 7 of
THE IMPACTS OF CLIMATE CHANGE ON HUMAN HEALTH IN THE UNITED STATES: A SCIENTIFIC ASSESSMENT

Allison Crimmins
U.S. Environmental Protection Agency
Food security, in a public health context, can be summarized as permanent access to a sufficient, safe, and nutritious food supply needed to maintain an active and healthy lifestyle.

Ziska et al., 2016

Brown et al., 2015
Impacts of ↑ CO$_2$ and climate change

Rising global temperatures and changes in weather patterns

- Temperature and precipitation extremes (like flooding) can increase pathogen load.
- Climate can also alter weed, insect, and fungal populations and increase pesticide use.

Rising carbon dioxide can directly influence nutritional content of foods.

- Warmer temperatures can result in greater food spoilage.

Extreme climate events can disrupt food distribution.

Rising CO$_2$ concentration or “fertilization”
Risks to Food Safety

Changes in air and water temperatures, weather-related changes, and extreme events can shift the seasonal and geographic occurrence of bacteria, viruses, pests, parasites, fungi, and other chemical contaminants.

• **Higher temperatures** can increase pathogens and bacteria on produce and seafood, before and during food storage
• **Precipitation** can contaminate irrigation water and produce
• **Rising sea surface temperatures** lead to seafood pathogens
• **Extreme weather events** like dust storms or flooding can introduce toxins and heavy metals in the food supply
Climate change will influence the fate, transport, transmission, viability, and multiplication rate of pathogens in the food chain.

This increases the risk of negative health impacts but actual incidence of foodborne illness will depend on efficacy of food safety practices.
KF2: Chemical Contaminants in the Food Chain

- Climate change will affect human exposure to
  - Metals
  - Pesticides
  - Pesticide residues

- However, resulting incidence of illness will depend on the genetic predisposition of the person exposed, type of contaminant, and extent of exposure over time.
\textbf{KF3: Rising Carbon Dioxide Lowers Nutritional Value of Food}

- **Protein**: When grown at the CO2 levels projected for 2100 (540–958 ppm), major food crops, such as barley, wheat, rice, and potato, exhibit 6% to 15% lower protein concentrations relative to ambient levels (315–400 ppm).

- **Ratio of major macronutrients (carbohydrates to protein)**. It is very likely that rising CO$_2$ will alter the relative proportions of major macronutrients in many crops by increasing carbohydrate content while at the same time decreasing protein content.

- **Micronutrients**: Rising CO$_2$ levels are very likely to lower the concentrations of essential micro- and macroelements in most plants (including major cereals and staple crops).
Key Finding 4:

Extreme Weather Limits Access to Safe Foods

- Increased disruptions of food distribution by damaging existing infrastructure or slowing food shipments.
- Increased risk for food damage, spoilage, or contamination, which will limit availability of and access to safe and nutritious food.
- The risk for food spoilage and contamination in storage facilities, supermarkets, and homes is likely to increase due to the impacts of extreme weather events, particularly those that result in power outages.
Allison Crimmins

crimmins.allison@epa.gov

USGCRP resources: health2016.globalchange.gov