

CLIMATE CHANGE AND FOOD SAFETY

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Key Messages:

- 1) Climate change threatens food safety in a range of direct and indirect ways, putting health – particularly children’s health - and development at risk.
- 2) Health professionals have a responsibility to advocate for strong measures to combat climate change, to protect the health and nutritional status of their patients.
- 3) The UN climate negotiations in December present a major opportunity for health professionals from across the international health community can come together to advocate for a strong global climate agreement that protects health.

Introduction

To mark World Health Day on April 7th 2015, which focused on food safety, the World Health Organisation released a range of online resources.¹ Following this, this factsheet explores the connections between climate change and food safety. Food and water-borne illnesses are caused by the ingestion of bacteria, viruses, parasites or chemicals, in food or water, and they can have severe effects on health. For example, food- and water-borne diarrheal disease kills an estimated 2 million people annually, the majority of whom are children.¹ This also increases malnutrition, can cause infections such as meningitis, and associated malnutrition can have long-term effects such as stunting and impaired cognitive development. Overall, unsafe food undermines socioeconomic development,¹ which is central to improving health. The WHO states that “climate change is... predicted to impact food safety, where temperature changes modify food safety risks associated with food production, storage and distribution.”

Climate change increases the risks from food- and water-borne diseases in various ways, its effect modulated by interaction with other global trends such as increasing travel. Average temperatures and rainfall levels are both influenced by global climate change, with higher temperatures and an overall increase in extreme rainfall events, alongside increased droughts in some regions, projected by climate scientists. Both temperature and rainfall can influence pathogens’ growth, survival, transmission and virulence, and they can also affect food safety indirectly by altering the habitats of host species which are reservoirs for zoonotic pathogens (those which can spread from other species to humans).²

Climate-sensitive food and water-borne pathogens

Associations between higher temperatures and diarrhea have been found in many settings, although the precise mechanisms underlying this are not always well-understood, likely representing a combination of factors.^{2,3} For example, the incidences of two of the most common food-borne illnesses worldwide, *Salmonella* and *Campylobacter*, show clear seasonal trends, with more cases (particularly sporadic, ie. non-outbreak, cases) when temperatures are warmer.⁴ In Arctic Canada, higher rainfall and increased snowmelt have are associated both with lower water quality and increased cases of infectious gastroenteritis.⁵



Image: © UN Photo/Logan

Vibrio cholerae is the bacterium responsible for cholera, a severe illness causing vomiting, abdominal pain and severe diarrhea; if the resulting dehydration is not treated adequately, it can be fatal. Ingestion of contaminated shellfish, drinking water or crops are risk factors for contracting cholera, and the risk is influenced by temperature, rainfall and the chemistry of seawater, all of which are affected by climate change. In countries with endemic cholera, a strong positive relationship exists between temperature and incidence.^{6,7,8} Alongside bacterial infections, there is also evidence that higher temperatures increase the

risk of viral infections: for example, rotavirus – a major childhood killer - peaks during summer in temperate and subtropical regions,⁹ whilst enterovirus peaks in summer and autumn in the US.¹⁰

Local weather patterns – which are influenced by climate change – have significant influence on many food- and water-borne diseases, including several of the most important pathogens that cause diarrheal disease, such as cholera, salmonella and rotavirus; it is therefore a threat which must not be overlooked.

Climate change and algal blooms

Climate change has been described as a ‘catalyst for the global expansion’ of cyanobacterial algal blooms,¹¹ interacting with increased nutrient loading from fertilizer run-off into water bodies. Harmful algal blooms not only produce toxins, but also deplete dissolved oxygen and alter aquatic food webs, and threaten both fishing and water supplies. Higher water temperatures, reduced vertical mixing of water, and increased droughts, storms and floods are all projected to increase as a result of climate change, increasing the incidence of harmful cyanobacterial blooms in nutrient-rich waters.¹³ Over the past three decades, such blooms have become more frequent and affected a larger area, and the incidence of illness associated with novel algal sources has also increased, although the reasons for this are multiple.¹²

Food safety and nutrition



Families face drought in Niger
Image: UN Photo/WFP/Phil Behan

Climate change threatens food security and nutrition directly, through its projected impacts on food production of changing temperatures and rainfall; for example, approximately 25 million additional children are projected to be malnourished by 2050 as a result of climate change.¹³ Climate change is also expected to contribute to malnutrition indirectly, through impacts on food safety and diarrheal disease discussed previously. According to the WHO, “unsafe food creates a vicious cycle of diarrhea and malnutrition, threatening the nutritional status of the most vulnerable. Where food supplies are insecure, people tend to shift to less healthy diets and consume more “unsafe foods” – in which chemical, microbiological and other hazards pose health risks.”²

This may apply to various climate change scenarios; for example, to households turning towards alternative food sources such as bush-meat during times of food scarcity¹⁴ or following the collapse of alternative livelihoods,¹⁵ and the poorest are most likely to be affected. There is also a possibility that climate change could reduce availability of fuel, for example as a result of infrastructure damage following flooding, or if firewood is scarce following a wildfire, increasing the likelihood of inadequate cooking.

Summary

Climate change threatens not only food security as a result of crop failures, but also food safety (and therefore public health) in a range of ways, including direct effects on pathogens’ growth and survival, the distribution of harmful algal blooms, faecal contamination of crops due to increased flooding, and impacts of climate-related water scarcity on hygiene and sanitation. These impacts interact with other drivers such as globalization and changes in food production to increase the threat to health from unsafe food.

It is essential that health professionals worldwide are aware of these linkages, and engage with stakeholders from other sectors to conduct research and ensure that adequate surveillance and response mechanisms are in place. Measures to minimize these additional risks to food safety should be incorporated into national climate adaptation plans, as well as broader public health policy-making. Perhaps the most important role the health sector can play to protect food safety and nutrition in the face of climate change is in advocacy for strong national and international climate policy which recognises the public health risks posed by unmitigated climate change, including at COP21 in Paris this December.

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