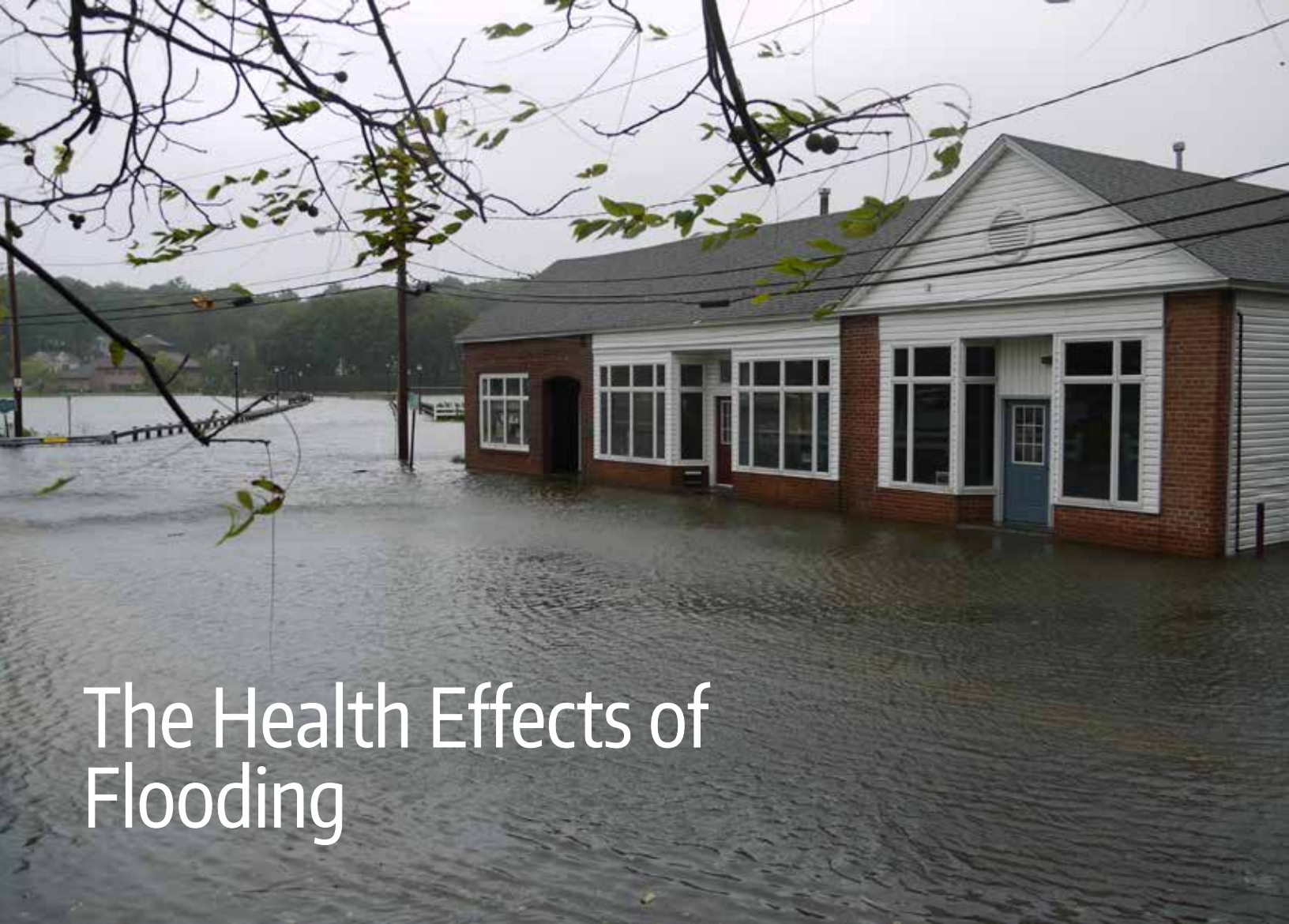




The Health Effects of Flooding

Introduction

Floods occur more frequently than any other natural hazard worldwide, and their prevalence is increasing with climate change.^{1, 2} Flooding can be dangerous at the time of the event, resulting in drowning, orthopedic injuries, electrocution, and other health issues.¹ Flash floods, or the rapid accumulation of water in low-lying areas, may be caused by heavy precipitation or the collapse of natural or human made dams.³ Flash floods can amplify immediate health impacts as they may be more hazardous due to their rapid and possibly unexpected onset. Persistent floodwater and resulting human displacement can cause a variety of human health issues long after the onset of the flood including communicable disease transmission, difficulties with access to healthcare and prescription medications, and mental health implications.¹ This factsheet provides an overview of flood-related health impacts, the effects of flooding on at-risk populations, and implications for healthcare and response efforts.

Health Impacts

Flash floods can cause fatalities and other acute health impacts, and the lasting presence of floodwater in homes and communities can also result in a variety of health impacts. This fact sheet outlines common physical and mental health impacts and their causes in a flood environment. Notably, this is not an exhaustive list.

Flash flood due to heavy precipitation, ice melt, dam collapse, tsunami, or king tide:

- Burns caused by downed power lines, explosions, and other electrical issues²
- Injuries^{2, 4}
- Fatalities^{3, 5}

Presence of floodwater in homes and communities:

- Infected wounds⁶

Rashes and skin irritation⁷

- Electrocutation¹
- Mosquito-borne illnesses^{1, 8}
- Insect bites⁹
- Viral and bacterial infections^{4, 8}
- Drowning¹⁻³

Disruption of sanitation systems, food systems and water treatment facilities:

- Infectious and parasitic diseases⁵
- Gastroenteritis¹
- Upset stomach^{7, 10}
- Diarrhea^{8, 11, 12}
- Salmonellosis¹³

Flooded roadways:

- Fatalities for drivers and pedestrians¹⁴
- Health complications due to inability to access hospitals, grocery stores, or other necessities¹¹
- Delays in response due to inability of first responders to travel¹⁵

Unsafe or altered living environment due to displacement:

- Hypothermia⁶
- Heat stroke¹⁶
- Exhaustion⁶
- Mental health issues
 - Increased stress levels^{7, 10, 16}
 - Anxiety^{7, 10, 17}
 - Sleeping problems⁷
 - Depression⁷
 - Post-traumatic stress disorder^{17, 18}

Flood clean-up:

- Carbon monoxide poisoning from equipment (e.g., generators) used in enclosed environments (such as a basement)¹
- Orthopedic injuries and lacerations²
- Tetanus⁹

Multiple or Unexplained Causes:

- Respiratory illness & pneumonia^{1, 19}
- Cholera²⁰
- Ear infections⁹
- Musculoskeletal pain⁹
- Exacerbation of chronic illnesses^{10, 21}
- Maternal stress resulting in lower birth weight and other infant impacts^{22, 23}





At-Risk Populations

Flooding can have significant impacts on anyone, but certain populations are more vulnerable. While impacts are specific to the context and location of each flood, some lessons learned from past flooding events may help at-risk populations such as older adults, people who are chronically ill, people with low-socioeconomic status, and caregivers prepare for flooding. Here are some of the key takeaways from past flooding events:

- Home-care patients, older adults, and other residents with access or functional needs are more likely to be injured or die during a flood evacuation^{24, 25}
- People taking prescription medications may experience treatment interruptions and be unable to access refills during a flood event^{26, 27}
- Flood-impacted individuals may experience confusion or shock during the event, making it difficult to make decisions about whether or not to evacuate and what to bring with them.¹⁰
- Recovery workers may have to sort through debris, operate flood water removal machinery, and treat patients with infectious diseases, putting them at risk of injury and illness.^{6, 15, 28}

Impacts to Healthcare

Due to the variety of health issues that arise during and after floods, healthcare workers must be prepared to respond immediately and sustain their extended operations for many months. Here are some impacts to healthcare workers and healthcare infrastructure:

- Healthcare systems and individual workers may lose access to communication systems due to storms.⁶
- Healthcare workers may have to work without access to some healthcare resources due to power outages or overwhelming numbers of patients.⁹
- Hospitals and healthcare facilities may need reserves of food, water, medicine, oxygen cylinders, and other supplies.²⁹
- Hospitals and healthcare facilities may have a staff shortage or run out of space to care for individuals impacted by the flood.¹⁵
- Healthcare workers may also experience property damages and health impacts during floods, potentially affecting their ability to work.¹⁰



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