

*epi*TRENDS

A Monthly Bulletin on Epidemiology and Public Health Practice in Washington

Infectious Risks After Floods

Vol. 17 No. 11

Floods associated with storms or with hurricanes such as Katrina, Irene, and Sandy can result in considerable negative impacts on the health of a population. Most of the flood-associated adverse health effects are non-infectious, such as: injuries; exposure to excess heat or cold from loss of power; skin effects from exposures to fuels, pesticides, and industrial chemicals in floodwater; carbon monoxide poisoning from indoor generators or fireplaces; stress or mental health issues; and exacerbation of chronic diseases including diabetes and cardiovascular disease due to lack of access to health care, medications, power, and safe drinking water.

Infectious Disease Risks

Flooding associated with hurricanes, tsunamis, or heavy precipitation can disrupt critical infrastructure including shelter, utilities, transportation, and health care over wide regions. The infectious disease risks in a community following flooding reflect the endemic communicable conditions, the degree of population displacement, and the duration of interruption of services supporting hygiene, including, power, sanitation and health care.



Hurricane Sandy, 2012, CDC Public Health Image Library

11.12



*epi*TRENDS
P.O. Box 47812
Olympia, WA 98504-7812

Mary C. Selecky
Secretary

Maxine Hayes, MD, MPH
State Health Officer

Sherryl Terletter
Managing Editor

Marcia J. Goldoft, MD, MPH
Scientific Editor

Crowded living conditions, contaminated drinking water, inability to wash hands and to clean contaminated wounds, increased minor trauma, loss of food refrigeration, and chronically damp and dirty clothing can result in infectious diseases among survivors and emergency responders. Animals present risks due to the potential for bites needing rabies assessment or for the spread of endemic zoonoses. Standing water following floods can result in increased mosquito populations, a particular risk if housing is compromised.

In the United States, affected populations typically have few if any cases of severe gastrointestinal pathogens such as cholera, typhoid, or hepatitis A. As a result there is generally low risk of major illness from exposure to sewage, particularly with dilution in flood water. In areas served by shallow wells, contamination with surface water carrying large amounts of animal wastes from domestic or wild animals can be a hazard. Availability of a potable water source such as bottled water also mitigates against waterborne infections. Contrary to common belief, human corpses present low infectious risk.

***epi*TRENDS
Monthly Posting
Alert**

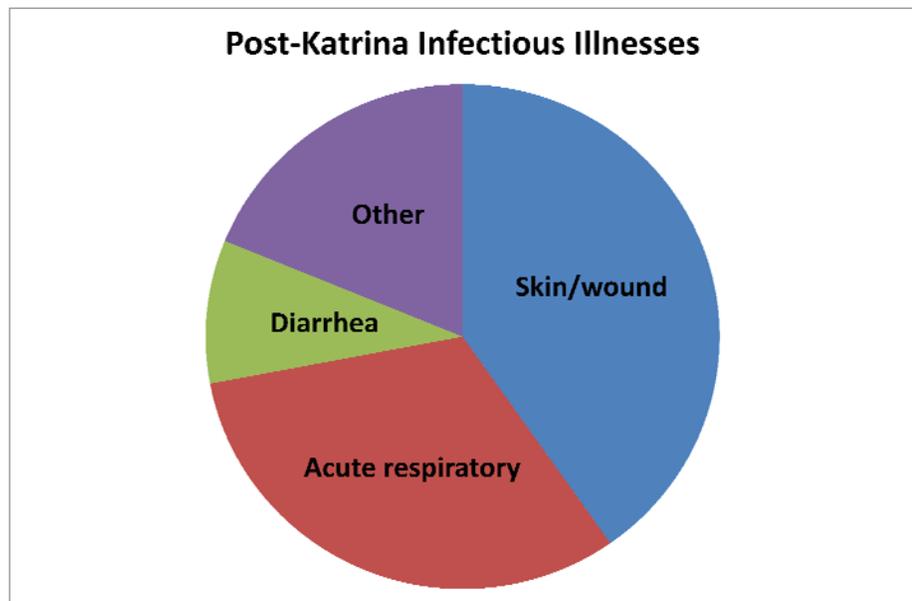
To receive monthly e-mail notification of *epi*TRENDS, please register at this website:

<http://listserv.wa.gov/cgi-bin/wa?SUBED1=epitrends&A=1>

Choose the option to join the listserve. Enter your name and email address.

Common Post-Flooding Infections

Centers for Disease Control and Prevention (CDC) published several MMWR articles about infectious illnesses following Hurricane Katrina (see Resources). In New Orleans, surveillance through acute care facilities did not identify any major outbreaks of diseases among evacuees or rescue workers. The infectious syndromes reported were primarily skin and wound infections, acute respiratory infections, and diarrhea.



Surveillance for Illness and Injury after Hurricane Katrina --- New Orleans, Louisiana, September 8--25, 2005 <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5440a4.htm>

Following a disaster, skin infections can be caused by staphylococci (including methicillin resistant *Staph aureus* or MRSA), streptococci, various viruses, *Pseudomonas*, and fungi (ringworm), particularly for those with minor skin trauma living in crowded settings with reduced hygiene. Infections with marine *Vibrio* species can result if injuries are contaminated with ocean water, a risk with hurricane-related flooding. Scabies or lice can spread in mass shelters. Without routine hand washing, viral conjunctivitis outbreaks can occur.

The typical causes of diarrhea in crowded settings in this country include norovirus, rotavirus, other gastrointestinal viruses, *Cryptosporidium*, *Giardia*, and *Shigella*. Hepatitis A can also spread in unimmunized groups. These agents share the characteristic of ready person-to-person transmission due to low infectious dose and environmental stability. Another concern is food safety due to spoilage without refrigeration and the potential to undercook or cross-contaminate food in improvised kitchens.

Respiratory pathogens of concern in crowded situations include influenza, adenovirus, other respiratory viruses, pneumococcus, pertussis, and tuberculosis. Following Katrina, some persons housed in evacuation centers were potentially exposed to tuberculosis. Respiratory transmission of certain vaccine-preventable conditions such as measles, pertussis and chickenpox can also occur in mass shelters.

In other countries, additional conditions are of concern following flooding. There have been outbreaks of cholera and other severe causes of diarrhea with contaminated drinking water; mosquito-borne infections such as malaria, dengue and St. Louis encephalitis due to loss of shelter; and leptospirosis from exposure to animal urine in flood waters. Polio, typhoid and tularemia are other potential waterborne risks in regions where the agents are present.

Public Health Response



CDC Public Health Image Library

Preparation can mitigate the effects of a natural disaster. Internal continuity of operations planning, emergency response plans, and personal preparedness can maintain public health services. After major floods, it is vital to reestablish infrastructure to provide shelter from the elements and arthropods, safe drinking water and water for washing, and power to support refrigeration and heating or air conditioning. Access to health care is vital to reinstate extended treatment regimens for infectious conditions such as HIV infection and tuberculosis. Water testing and well inspections may be needed. Routine public health activities such as vaccination, disease control, and vector control may also be important; in addition to tetanus boosters for those experiencing trauma, large scale vaccination may also be needed to prevent outbreaks of influenza, chickenpox, measles, or other communicable diseases in emergency shelters. Resuming routine childhood vaccination schedules is also important for populations displaced by a disaster.

Communicable disease surveillance is important to detect risks for severe conditions (e.g., dysentery, hepatitis A) or communicable disease outbreaks so that disease control measures can be instituted, particularly in emergency shelters. Further activities such as community assessment may be appropriate if the effect of the disaster on the population is unknown, the health status and basic needs of the affected population are unknown, or response and recovery efforts need to be evaluated.

Household preparedness and regional emergency response can prevent some adverse health effects after flooding. Though infectious diseases are less common problems after widespread flooding in the United States compared to some other regions, mass shelters and loss of power can increase the risk of acquiring and spreading infectious diseases. With planning and preparedness, public health agencies can provide essential services to protect and assist communities affected by floods and similar disasters.

Resources

Personal preparedness, Washington State Department of Health:

<http://www.doh.wa.gov/Emergencies/EmergencyPreparednessandResponse/Factsheets/Floods.aspx>

Disaster epidemiology including public health surveillance and CDC's Community Assessment for Public Health Emergency Response (CASPER) toolkit:

<http://www.cdc.gov/nceh/hsb/disaster/epidemiology.htm>

Infectious disease after a disaster including specific conditions, immunization, and infection control: <http://emergency.cdc.gov/disasters/disease/>

MMWR Publications for Hurricane Katrina

Surveillance in New Orleans: <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5440a4.htm>

Infectious and dermatologic conditions:

<http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5438a6.htm>

Mortality in Florida and Alabama:

<http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5509a5.htm>

Surveillance in evacuation centers:

<http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5502a3.htm>

Rapid needs assessment in Mississippi

<http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5509a3.htm>

Tuberculosis control activities: <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5512a2.htm>