

Long-term threats to public health follow in Hurricane Harvey's wake

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In recent years the residents of US coastal cities and states have experienced, repeatedly, the dire health consequences of hurricanes and their catastrophic flooding and winds. This includes Katrina, which devastated New Orleans in 2005, Harvey, which inundated Houston and southeast Texas with record flood waters less than two weeks ago, and Irma, which is currently barreling through the Caribbean islands on its way to the US mainland.

Repeatedly, residents have been the victims not simply of heavy rains or high winds, but of the lack of preparedness and the failure on the part of the federal government to invest in critical infrastructure to control flooding. As a result, hundreds of lives have been needlessly lost directly from the storms and from the aftermath, with numerous fatalities resulting from injuries, disease and mental distress.

Dr. Peter Hotez, Dean of the National School of Tropical Medicine at the Baylor College of Medicine in Houston told the *Atlantic* that the aftermath of Hurricane Katrina points to the long-term threats to public health which will follow in Hurricane Harvey's wake in the greater Houston area and throughout southeast Texas, even as historic flood waters recede.

However, Hotez noted that the impact would be "a whole order of magnitude greater in size and scope." New Orleans in 2005 had a population of about 400,000. Harris County, where Houston is located, is the second largest county in the United States with a population of over 6 million.

Hotez predicted the spread of Methicillin Resistant Staph Aureus (MRSA), *Vibrio vulnificus* (a so-called flesh-eating bacteria), diarrheal disease from norovirus, as well as pathogens such as *E. coli*, *Shigella* and *Salmonella* from flooded city septic systems, and poisonings from the hundreds of flooded petrochemical facilities and the dozen or more Superfund sites in greater Houston.

The norovirus sickens about 20 million people each year in the US, and accounts for half of all cases of gastroenteritis. A recent Canadian study published in *Clinical Infectious Diseases* strongly suggests that norovirus can be spread through the air, in contrast to previous assumptions of its

being spread only by food and water contamination and hand to mouth.

Hotez also warned about the explosive mosquito bloom which develops when many thousands of stagnant pools are left from the receding flood waters. A hatch is expected to occur in 10 to 14 days. The rise of West Nile infections in Louisiana "continued for a whole year after the (Katrina) flood," Hotez told *The Atlantic*. Mosquitos can also carry and transmit Zika, Chikungunya, dengue and yellow fever.

In July this year, Texas reported its first 2017 case of Zika in Hidalgo County, a five-hour drive from Houston. Meanwhile Houston had its first 6 cases of confirmed Zika this summer, all travel related, and 36 cases of West Nile so far this year.

As of August 31, the Texas Commission on Environmental Quality (TCEQ) reported 21 inoperable waste water plants, 52 inoperable public water systems serving at least 115,000 people, and 18 sewer system overflows, including at Corpus Christi and at Shell's Deer Park manufacturing facility. The agency also issued some 184 boil-water notices to over 189,000 people.

Added to the lack of access to clean water, power outages heat stressed all of the flood victims stranded without air-conditioning in humid Houston, and fostered spoiled food sicknesses for hungry people eating from refrigerators that had been off for many hours.

Thirty cases of MRSA occurred in September 2005 among evacuees from New Orleans that came to Houston. *Vibrio vulnificus*, a disease related to Cholera, made two dozen New Orleans residents sick late that summer, and killed two people. Seventy-five percent of the early Katrina deaths were from drowning. In Louisiana storm shelters an increase in tuberculosis occurred due to the crowded and unsanitary living conditions. Outbreaks of these diseases are now expected throughout southeast Texas.

The floodwaters in Texas will have also carried parasites such as Cryptosporidiosis and Giardia, which can cause prolonged diarrhea, and Hepatitis A virus. Floodwaters often carry Leptospirosis, a bacterium transmitted in the urine of

mice, rats, raccoons, and cattle. Leptospirosis can infect humans and pets from contaminated water and cause liver and kidney failure.

Hospitals, clinics and patients all ran short of critical food and medicines, in both New Orleans and Houston.

With Katrina, many persons appeared at hospital emergency departments after the flood not only for injuries, but to care for their diabetes, since they ran out of insulin. Insulin was said to be in high demand in Houston, according to Thomas Tighe, president of the medical nonprofit Direct Relief.

Tighe told the *Washington Post* that diabetics “who don’t have insulin are going to go into crisis pretty rapidly.” Dialysis patients must have a treatment two to three times per week or they will go into crisis. Tighe worriedly noted that Texas had the lowest health insurance coverage in the US.

Forbes magazine noted in its August 26 edition that all the storm related problems will be amplified because of the “decimation of the public health system” in the US since the early 2000s. The article noted a 40 percent drop in mosquito surveillance, and that proactive surveillance of mosquito borne diseases has dropped in most states to poor or to zero, according to a 2014 report from the Council of State and Territorial Epidemiologists.

An estimated 10 to 20 trillion gallons of water rained on the southern Texas and Louisiana plains in late August, submerging tens of thousands of buildings and homes that will rapidly begin to grow toxic mold on their interiors.

The World Health Organization (WHO) guidelines list a series of serious mold-caused respiratory illnesses including spore infections of the lungs, the triggering of severe asthma attacks, and the beginning of chronic mold lung problems that can lead to death. Post-Katrina mold infections, for example, are said to have killed four professors at the Southern University at New Orleans, all dying within a few months of each other.

A Rutgers University professor of plant biology and pathologist, Joan Bennet, a former resident of New Orleans, told the *Atlantic* that molds produce a so-called mushroom alcohol that she has discovered alters the transport and management of the neurohormone dopamine in fruit flies, which seems to mimic the pathology of Parkinson’s disease.

Finally, mental health problems will be triggered or dramatically exacerbated by Harvey’s impact.

In just one instance, Iashia Nelson, age 36, who had previously been displaced by Katrina in 2005, told CBS News that she had sat huddled in the Harvey rains with her 3 sons on a Houston rooftop with another 30 people for 8 hours without food and water until they were rescued. “I’m gonna need some counseling,” Nelson told medical

personnel at the Houston Convention Center.

She and her sons reported seeing bodies float by as they waited to be rescued. As the waters rose, they witnessed a young mother and her child trapped in a car, the young woman frantically honking the car horn for help, until they drowned in the auto. Another woman clung to a tree in the floods, until she tired and was swept away. An elderly woman, drowned, failed resuscitation attempts by rescuers.

A 2012 study of 392 low-income Katrina victims documented the doubling of mental health problems. Almost half had post-traumatic stress disorder (PTSD). Many persons with serious depression and schizophrenia suddenly found they were without their medicines. Another study of 815 Katrina victims documented a rise in the number having thoughts of suicide from 2 percent to 6 percent.

Two psychiatrists at the Houston Convention Center, where over 10,000 people sheltered during the storm, reported witnessing acute psychosis occurring on the convention floor.

The many health professionals volunteering their time at the shelters are seeing thousands of persons in need with no medical records whatever. Many individuals appear for urgent care without knowing what medicines they are taking. In many instances, their medications are lost in the storm waters and what personal medical records they possessed are washed away. The stress of refugee status is immense, with family members separated from each other, or lost, the loss of persons’ homes, and financial ruination.



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