Combined sewer systems lead to risk of illness after heavy rains

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Consumers whose drinking water can be contaminated by the release of untreated wastewater after heavy rains face increased risk for gastrointestinal illness, according to a report in the journal *Environmental Health Perspectives*.

"Combined" sewer systems collect both sewage and stormwater runoff on the way to treatment facilities. When heavy rainfall fills these systems beyond their capacity, untreated wastewater can back up into homes. To reduce the risk of home flooding during heavy precipitation, municipalities often discharge some of the untreated flow into nearby bodies of water. The release of untreated waste is known as a combined sewer overflow.

Many older cities such as Chicago have combined sewer systems—along with 772 other communities, primarily in the Northeast, Great Lakes and Pacific Northwest, serving a total of 40 million people. While some cities are building infrastructure to handle sewage and runoff separately, other regions with combined systems depend on reservoirs to provide extra capacity during extreme rainfalls. Chicago's Deep Tunnel was designed to hold 2.3 billion gallons of untreated wastewater during storms to prevent combined sewer overflows and flooding of basements. During one massive 2013 storm, the tunnel reached capacity and its entire contents were rerouted and ultimately discharged into Lake Michigan.

"Existing infrastructure is already stretched beyond its ability to manage severe precipitation, and with climate change, extreme rainfall events are

becoming more frequent, and so are combined sewer overflows," says epidemiologist Jyotsna Jagai of the University of Illinois at Chicago School of Public Health and lead author of the study.

"These overflows can have serious health impacts on communities if untreated water carrying viruses and bacteria contaminate drinking waters," she said.

The researchers looked at the daily rate of ER visits for gastrointestinal illnesses between 2003 and 2007 for eight days following extreme rainfall events in three areas of Massachusetts - 11 neighboring towns with combined sewer systems that overflow into the Merrimack River, a source of drinking water; 24 adjacent cities and towns with combined sewer systems that overflow into Boston Harbor, a recreational body of water; and nine neighboring towns without combined sewer systems in the Plymouth region.

Extreme precipitation events—defined as those at or above the 99th percentile of daily rainfall—numbered 18 in the areas they studied between 2003 and 2007.

Emergency room visits related to gastrointestinal illness went up 13 percent in the eight days following extreme precipitation events in areas with combined sewer systems that discharged untreated sewage and storm water into drinking water sources, while no significant increase in such visits was seen at hospitals in areas where combined discharge overflowed into recreational waters or in areas without combined sewer overflows.

But the true number who felt ill is probably much higher, says Jagai, who is research assistant professor of environmental and occupational health sciences at UIC.

"Not everyone with gastrointestinal symptoms goes to the emergency room, so the increase we saw in ER visits in areas where there were combined sewer overflows into drinking water sources is just a fraction of the people whose health may have been impacted," she said.

Provided by University of Illinois at Chicago

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