

Flu season lingers in big cities

October 5 2018, by Dennis Thompson, Healthday Reporter



The size and structure of cities can affect how influenza transmission rates respond to climatic conditions. Credit: Oregon State University/Jordan Masse on Unsplash

Big cities with a large commuting workforce tend to have longer, more grinding flu seasons, a new study suggests.

Researchers found that a [city's flu season](#) is apt to last longer as its population increases and workplaces become more focused within a few key spots, said lead researcher Benjamin Dalziel, a population biologist with Oregon State University.

"Larger cities have more organized movement patterns, and these patterns connect pockets of high population density together," Dalziel said. "We found this structure makes a difference for how the flu spreads at different times of the year."

Armed with this knowledge, public health experts could better predict how bad a flu season is going to be by looking at early infection rates in big cities, said co-researcher Cecile Viboud. She is a staff scientist with the Fogarty International Center at the U.S. National Institutes of Health.

"If we could strengthen surveillance in these cities, we would have an earlier window on the severity of epidemics, and we may use those data to help predict epidemics on a regional or national scale," Viboud explained.

Such an edge could be critical given that U.S. health officials announced just last week that influenza killed an estimated 80,000 Americans

during last winter's flu season, making it the deadliest season in more than four decades.

A particularly virulent flu strain, H3N2, rampaged across the country during the 2017-2018 season, causing a record number of deaths and hospitalizations, the U.S. Centers for Disease Control and Prevention reported.

Compounding the problem, flu vaccination rates also dipped last year, officials noted, leaving more people vulnerable to the virus and making flu shots even more imperative this flu season.

In general, the flu season spikes during the winter due to lower humidity, Dalziel said.

"Flu spreads from person to person by virus-bearing moisture droplets that an infected person exhales or coughs or sneezes out. This creates what you can think of as a moving cloud of risk around an infected individual," Dalziel said.

During the winter, humidity decreases "and this causes the virus to remain viable in the air for longer, which effectively expands that cloud of risk," he explained.

But in larger cities where people are packed in tight, the dry winter weather matters less, the researchers found.

"If an infected person is sitting right beside you, it matters less what the specific humidity is," Dalziel said. "It helps the virus find a host even when climactic conditions are not at their most favorable."

Dalziel and his colleagues combined six years of data on influenza cases with census data showing where people live and work in 603 different

cities across the United States.

The investigators found that in large metropolitan areas, [flu cases](#) are more spread out, including early and late in the season when weather is not the best for transmission. New York City and Miami are examples of cities that have a more prolonged flu season, the study authors said.

On the other hand, smaller cities tend to have short flu seasons tightly grouped around the usual peak in winter. Atlanta and Nashville are examples of this, where the flu hits during in a more concentrated period.

The researchers noted that the risk for getting the flu remains the same in all cities.

Viboud said, "This does not show that some cities are safer than others for flu. Rather, it shows the relative difference in the timing of cases."

The data show that public health officials need to take their metropolitan area's structure into account when planning for each flu season, the researchers suggested.

Larger cities with a longer flu [season](#) will need to prepare for cases to start appearing earlier, for example.

"In contrast," Viboud said, "in smaller cities a more intense outbreak may overload the health care system, making it particularly challenging to respond to epidemics."

The study shows how the rise of megacities could make a new flu pandemic more likely, said Dr. Amesh Adalja, a senior scholar at the Johns Hopkins Center for Health Security in Baltimore. He was not involved with the new study.

"Influenza in large cities behaves differently with longer transmission chains, prolonged seasons and less vulnerability to changes in humidity versus smaller cities," Adalja said.

"This study underscores the need for pandemic preparedness efforts to be heightened in the biggest cities of the world, for they may be the major drivers of the looming influenza pandemic," he added.

The study was published Oct. 5 in the journal *Science*.

More information: Jacco Wallinga. Metropolitan versus small-town influenza, *Science* (2018). [DOI: 10.1126/science.aav1003](https://doi.org/10.1126/science.aav1003)

Benjamin D. Dalziel et al. Urbanization and humidity shape the intensity of influenza epidemics in U.S. cities, *Science* (2018). [DOI: 10.1126/science.aat6030](https://doi.org/10.1126/science.aat6030)

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Citation: Flu season lingers in big cities (2018, October 5) retrieved 3 May 2024 from <https://medicalxpress.com/news/2018-10-flu-season-lingers-big-cities.html>

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