

Why is the flu more common during the winter season?

December 13 2012, by Lindsey A Haugh

(Medical Xpress)—Influenza, commonly known as the flu, has distinct transmission patterns around the world. In temperate regions, influenza's occurrence peaks during the winter season, while in some tropical regions, the disease's occurrence tends to correspond with the rainy season.

Linsey Marr, associate professor of civil and environmental engineering at Virginia Tech, and her colleagues, Wan Yang of Blacksburg, Va., one of her doctoral students, and Elankumaran Subbiah, a [virologist](#) in the biomedical sciences and pathobiology department of the Virginia-Maryland College of Veterinary Medicine, measured the influenza A virus survival rate at various levels of humidity.

Their study presents for the first time the relationship between the [influenza A virus](#) viability in human mucus and humidity over a large range of relative humidities, from 17 percent to 100 percent. They found the viability of the flu A virus was highest when the [relative humidity](#) was either close to 100 percent or below 50 percent. The results in human mucus may help explain influenza's seasonality in different regions.

"We added [flu viruses](#) to droplets of simulated respiratory fluid and to actual human mucus and then measured what fraction survived after exposure to low, medium, and high relative humidities," said Marr.

At low humidity, respiratory droplets evaporate completely and the virus

survives well under dry conditions. But at moderate humidity, the droplets evaporate some, but not completely, leaving the virus exposed to higher levels of chemicals in the fluid and compromising the virus' ability to infect cells.

In a past study also conducted by Marr, Yang, and Subbiah, published in United Kingdom's *Journal of the Royal Society Interface*, the researchers collected samples from a waiting room of a health care center, two toddlers' rooms and one babies' area of a day care center, as well as three cross-country flights. Findings showed the average concentration was 16,000 viruses per cubic meter of air, and the majority of the viruses were associated with fine particles, less than 2.5 micrometers, which can remain suspended for hours.

Possible explanations for the seasonality of the flu have been investigated, such as the return of kids to school, people spending more time indoors in the winter, and lower light levels that affect the immune system, but there is no agreement on them, said the NSF CAREER award recipient.

The researchers found humidity could explain the [seasonality](#) of influenza by controlling the ability of viruses to remain infectious while they are in droplets or aerosols. The viruses survived best at low humidity, such as those found indoors in the winter, and at extremely high humidity. [Humidity](#) affects the composition of the fluid, namely the concentrations of salts and proteins in respiratory droplets, and this affects the [survival rates](#) of the flu virus.

More information: [rsif.royalsocietypublishing.org ...
tent/8/61/1176.full](https://royalsocietypublishing.org/doi/10.1098/rsif.2011.0176)

Provided by Virginia Tech

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