

A sudden drop in outdoor temperature increases the risk of respiratory infections

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Nicklas Sundell. Credit: University of Gothenburg

You can pretty much put a mark in your calendar for when the annual flu epidemic begins. Using 20,000 virus samples and weather statistics, researchers have now discovered more details about how outdoor temperature and flu outbreaks are linked.

"According to our calculations, a cold week with an average temperature below zero degree Celsius precedes the start of the flu epidemic" says Nicklas Sundell, a researcher at Sahlgrenska Academy and infectious diseases specialist at Sahlgrenska University Hospital.

The study comprised three seasons and 20,000 [virus samples](#) taken with nasal swabs from people who sought medical care in the Gothenburg area. The incidence of respiratory viruses was then compared over time with weather data from the Swedish Meteorological and Hydrological Institute (SMHI) and the results are clear: Flu outbreaks seem to be activated about one week after the first really cold period with low outdoor temperatures and low humidity.

Kickstarting the epidemic

"We believe that this sudden drop in temperature contributes to "kickstart" the epidemic. Once the epidemic has started, it continues even if temperatures rise. Once people are sick and contagious, many more may become infected," says Nicklas Sundell.

The study supports the theory that [aerosol particles](#) containing virus and liquid are more able to spread in cold and dry weather. If the surrounding air is dry, it absorbs moisture and the aerosol particles shrink and can remain airborne.

Of interest, according to the researchers, is the predictable timing with the [flu outbreak](#) each studied season starting the week after a cold snap.

Nicklas Sundell says that, at least at our latitudes, this is probably a more important factor for the [flu epidemics](#) than indoor crowding during poor weather wintertime.

Other viruses too

"Cold and dry weather and small aerosol particles are important prerequisites for the flu epidemic to take off. But cold weather isn't the only contributing factor. The virus has to be present among the population and there have to be enough people susceptible to the infection," he says.

The study shows that weather conditions are not only important for the seasonal flu (Influenza A), but also for a number of other common viruses that cause respiratory tract infections, such as RS-virus and coronavirus. These viruses seem to have the same behavior with a significant increase of incidence during cold and [dry weather](#). On the other hand some viruses such as rhinovirus, that are a common cause of [cold](#), are independent of [weather](#) factors and is present all year around.

"If you can predict the start of the annual epidemics of the flu and other [respiratory viruses](#), you can use this knowledge to promote campaigns for the [flu vaccine](#) and prepare emergency wards and hospital staff in advance for an increased number of patients seeking care. The recommendations are the same as previous years: vaccination of risk groups, cough and sneeze into your elbow, and remember to wash your hands," says Nicklas Sundell.

More information: Nicklas Sundell et al. A four year seasonal survey of the relationship between outdoor climate and epidemiology of viral respiratory tract infections in a temperate climate, *Journal of Clinical Virology* (2016). [DOI: 10.1016/j.jcv.2016.10.005](https://doi.org/10.1016/j.jcv.2016.10.005)

Provided by University of Gothenburg

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