

# Behavior change may have the greatest influence on waves of influenza outbreak

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Three waves of the deadliest influenza pandemic in history, known as the Spanish flu, hit England and Wales in 1918, just as World War 1 was coming to an end.

Why flu arrives in multiple waves like this is the focus of a study by McMaster University researchers who discovered three contributing factors: the closing and opening of schools, temperature changes and – most importantly – changes in human behavior.

"We found all three factors were important in 1918 but that [behavioural responses](#) had the largest effect," said David Earn, an investigator with the Michael G. DeGroote Institute for Infectious Disease Research, and a professor in McMaster's Department of Mathematics and Statistics.

The study appears in the July 10 online issue of the *Proceedings of the Royal Society B*.

The researchers did not measure behavioural change directly; instead, their model showed that the three waves could only be explained if people reduced infectious contact rates when recent influenza mortality was high. Possible mechanisms include avoiding large gatherings, keeping distance from other people, and hand-washing.

The study's findings are significant as global health officials keep watch on an emerging virus, Middle East Respiratory Syndrome (MERS), which is said to be more deadly than Severe Acute Respiratory

Syndrome (SARS) and has already spread from Saudi Arabia to France, Germany, Italy and Britain. Dr. Margaret Chan, director-general of the World Health Organization, has called MERS a "threat to the entire world".

To investigate factors underlying the three-wave shape of the 1918 [influenza epidemic](#), McMaster researchers developed what they describe as a simple epidemic model. It incorporates three factors in addition to natural disease spread: school terms, temperature changes during an outbreak and changes in human behavior.

To collect information, researchers scoured available historical documents and collected data about weekly influenza deaths.

The paper concludes that behavioral changes of people, temperature trends and school closure all contributed to the three-wave mortality patterns in the UK during the 1918 [influenza pandemic](#) with behavioral changes having the greatest effect.

Earn conducted the study with his colleague Dr. Jonathan Dushoff, associate professor, Department on Biology, and researchers at Hong Kong Polytechnic University, Queen's University and the University of Victoria.

**More information:** Inferring the causes of the three waves of the 1918 influenza pandemic in England and Wales, [rspb.royalsocietypublishing.org/doi/10.1098/rspb.2013.1345](http://rspb.royalsocietypublishing.org/doi/10.1098/rspb.2013.1345)

Provided by McMaster University

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