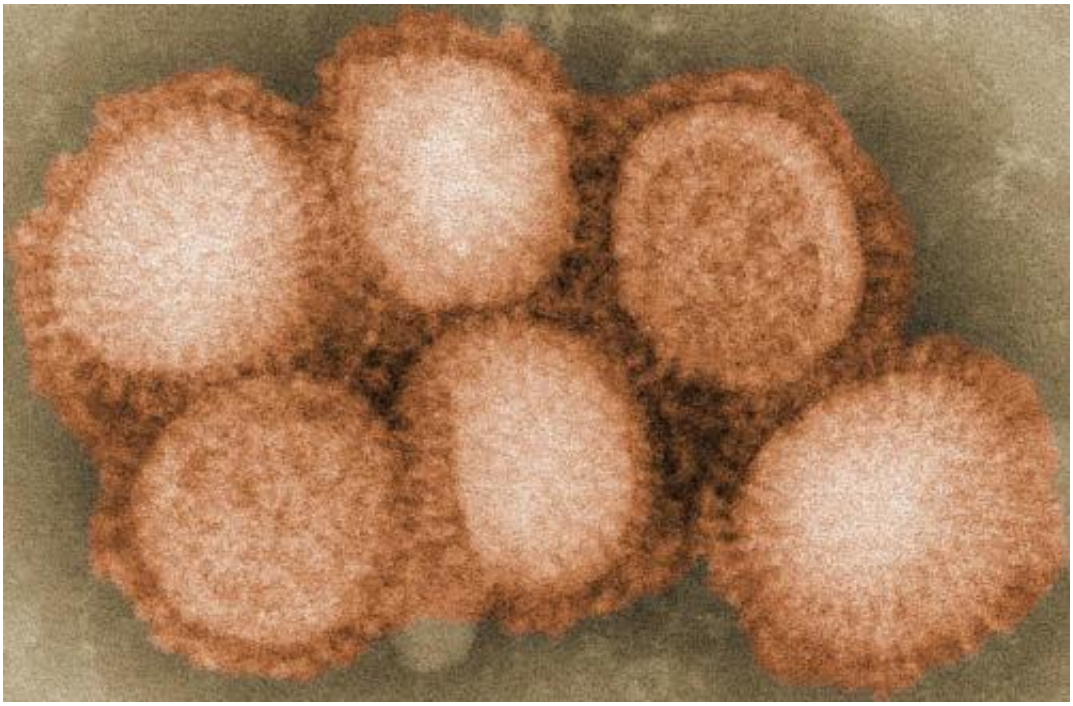
School vacations and humidity linked to multiple waves of influenza in Mexico during the 2009 H1N1 pandemic

August 20 2015



H1N1 virus. Credit: C. S. Goldsmith and A. Balish, CDC

Scientists studying the 2009 A/H1N1 influenza pandemic have found that the inconsistent regional timing of pandemic waves in Mexico was the result of interactions between school breaks and regional variations in humidity.

The research published in *PLOS Computational Biology*, led by Dr. James Tamerius at the University of Iowa and Dr. Gerardo Chowell at Georgia State University, applied mathematical models to understand the social and environmental processes that generated two distinct pandemic outbreaks ("waves") in Mexico during the summer and fall of 2009.

The summer wave occurred in the tropical southeastern states of Mexico, whereas the larger fall wave occurred in the central and northern states. The models suggest that high levels of humidity favored the rapid spread of influenza in the tropical states that led to the early summer wave. On the other hand, moderate levels of humidity slowed transmission in the central and northern states precluding a pandemic wave prior to summer break. The summer break reduced the transmission rate by an estimated 14% thereby delaying the pandemic wave in the central and northern states until students returned to school in August. These processes can explain the two major and distinct pandemic waves that affected the different regions.

The relationship between humidity and pandemic influenza transmission found in this study is consistent with the relationship observed for seasonal influenza. This suggests that a greater understanding of the mechanisms that drive inter-pandemic influenza epidemics may increase our capacity to predict the timing of major outbreaks associated with novel pandemic influenza viruses in the future.

More information: Tamerius J, Viboud C, Shaman J, Chowell G (2015) Impact of School Cycles and Environmental Forcing on the Timing of Pandemic Influenza Activity in Mexican States, May-December 2009. *PLoS Comput Biol* 11(8): e1004337. DOI: 10.1371/journal.pcbi.1004337