

Researchers Find Surprising Pattern of Influenza Spread in South America and Tropics

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Researchers studying influenza transmission patterns in the Southern Hemisphere and in tropical areas, specifically Brazil, uncovered the unexpected finding that each season influenza travels from low populated regions near the equator to the more populated centers. Their work, funded by the Fogarty International Center (NIH), part of the National Institutes of Health (NIH), can improve planning for influenza control in tropical areas.

In their paper, "Seasonality of Influenza in Brazil: A Traveling Wave from the Amazon to the Subtropics," to be published in the *American Journal of Epidemiology*, the researchers document the seasonal spread of influenza viruses and seasonal mortality patterns associated with influenza across Brazil. The interest in Brazil arises because the country covers a range of latitudes and crosses several regions, including tropical and sub-tropical climates.

"This study contributes to the understanding of the role of tropical regions in the global circulation of influenza. It has direct implications for public health by offering guidance for the timing of delivery and composition of influenza vaccines," said Dr. Mark Miller, a co-author and associate director for research at FIC.

As epidemic months of influenza in Brazil are triggered earlier in the year in the equatorial regions, vaccine recommendations using formulations from the Northern Hemisphere could be more appropriate for some countries in the Southern Hemisphere near the equator. This point is becoming increasingly important as more tropical countries introduce and use substantial quantities of vaccine.

Brazilian investigators worked with colleagues at FIC and the National Institute of Allergy and Infectious Diseases (NIAID) in revealing the unexpected spatial transmission patterns in the annual seasonality of influenza across a large area of the South American continent.

Brazil is nearly the same size as the United States; however, most of Brazil's territory lies in the tropical belt. This aspect makes the study valuable since less is known about the circulation of influenza viruses at these latitudes and how epidemics bridge and annually alternate between both hemispheres following the winter seasons.

Given the range of latitude encompassed by Brazil which crosses the equatorial and the southern tropic lines and using sophisticated mathematical analytical tools, the researchers studied the mortality data of influenza and pneumonia from two decades, together with laboratory confirmed data from recent years.

Both sets of independent data sources converged to show that, surprisingly, in Brazil influenza epidemics do not spread from where the highest human population densities are found, but rather from the equator towards more populous regions of the Southeast and South of Brazil.

The study, supported by FIC, results from a collaboration among researchers in different parts of the world. Study authors are Wladimir J. Alonso (FIC), Cécile Viboud (FIC), Lone Simonsen (NIAID), Eduardo W. Hirano (Mechanical Engineering Department, Universidade Federal de Santa Catarina, Florianópolis, Brazil), Luciane Z. Daufenbach (Secretariat of Health Surveillance, Ministry of Health, Brasília, Brazil), and Mark A. Miller (FIC).

Source: National Institutes of Health (NIH)