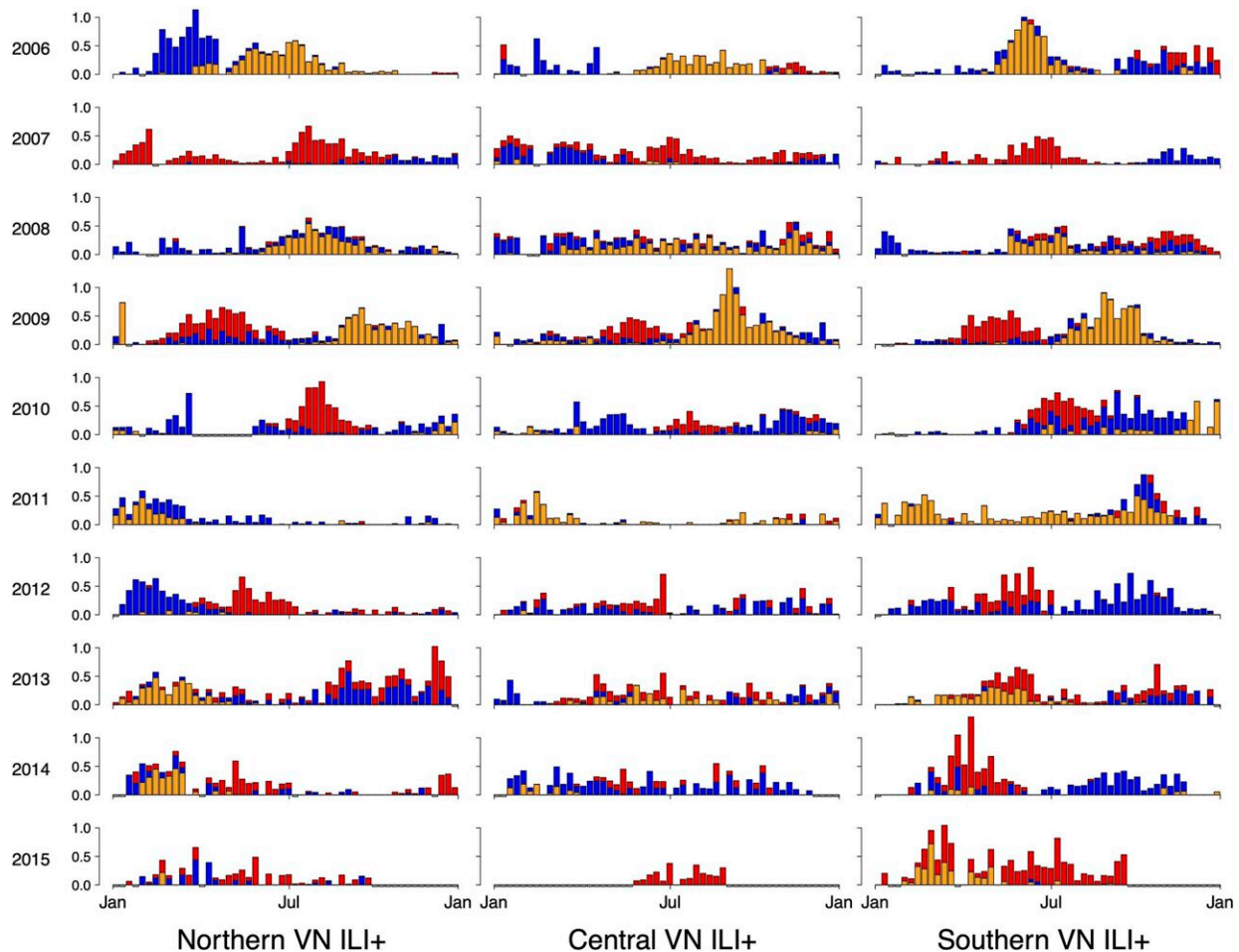


Influenza shows no seasonality in tropics, posing challenges for health care

August 4 2023



Detrended ILI+ is shown for each year between 2006 (top row) and 2015 (bottom row) for each of northern (left column), central (middle column), and southern (right column) Vietnam. Colors denote (sub)types of influenza, with orange representing A/H1, red representing A/H3, and blue representing B. Credit: *PLOS Computational Biology* (2023). DOI: 10.1371/journal.pcbi.1011317

In temperate climates, like North America and Europe, flu season starts in the fall, peaks in the winter and ends in the spring. While public health officials have generally assumed that influenza is also seasonal in tropical climates, new research led by Penn State has found little evidence of a repeatable pattern in influenza cases in Vietnam.

The findings suggest that [influenza](#) is likely unpredictable throughout the tropics, posing substantial challenges for prevention and management of cases for the one-third of the global population living in tropical areas.

"The World Health Organization estimates that [seasonal influenza](#) kills up to 650,000 people worldwide each year due to respiratory disease, alone; this does not include the number of people who die from [cardiovascular disease](#) caused by influenza," said Joseph Servadio, an NIH postdoctoral scholar at Penn State. "Without the ability to identify a regular interval at which epidemics occur in [tropical areas](#), preparations such as timing an annual vaccine campaign or preparing health care settings for higher caseloads are not possible."

The researchers collected weekly counts of patients with influenza from fifteen hospitals over ten years across Vietnam to identify any consistency in the timing of influenza epidemics. Next, they developed a [mathematical model](#) incorporating the peak timings of transmission and the repeatability of these peak timings. They compared these parameters across four temperate locations—including Netherlands, Denmark, and two regions of the United States—and northern, central and southern Vietnam.

After accounting for different subtypes of influenza, the team found little evidence of a repeatable pattern throughout Vietnam. The research published in *PLOS Computational Biology*.

"The lengths of time between epidemics were highly irregular in Vietnam, varying widely," said Maciej Boni, a professor of biology at Penn State. "In contrast, we found strong evidence of annual seasonality in the temperate locations, which suggests that our statistical estimation procedure performed as expected."

Servadio noted that the four temperate locations consistently showed peak transmission during winter months.

"Possible explanations for this winter peak could include seasonal changes in behavior, such as the notable change in indoor versus outdoor gatherings in cold winter months, as well as different conditions for virus transmission, such as having cold, dry air in temperate winters," he said.

In Vietnam, however, peak transmission occurred throughout the year.

"In contrast to temperate regions, where vaccination and health communication efforts can be strategically focused on autumn, the optimal timing for prioritizing vaccines in Vietnam to achieve maximum protection remains uncertain," stated Dr. Pham Quang Thai, vice head of the Communicable Disease Control and Prevention Department at Vietnam's National Institutes for Hygiene and Epidemiology.

"While Vietnam has a vaccine policy targeting specific at-risk groups, influenza vaccination is not yet widespread. The findings of this study underscore the challenges in implementing a comprehensive national vaccination strategy."

More information: Joseph L. Servadio et al, Repeatability and timing of tropical influenza epidemics, *PLOS Computational Biology* (2023).

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