Increasing Similarity in the Dynamics of Influenza in Two Adjacent Subtropical Chinese Cities Following the Relaxation of Border Restrictions

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Background/Objective
The drivers of influenza seasonality remain heavily debated, especially in tropical/subtropical regions where influenza activity can peak in winter, during the rainy season, or remain constant throughout the year. In this study, we compared the epidemiological and evolutionary patterns of seasonal influenza epidemics in two adjacent subtropical Chinese cities to identify potential changes in epidemic dynamics over the past decade as cross-border traffic has increased.

Method
We analyzed epidemiological and virological data on influenza recorded over a period of 10 years from Hong Kong and Shenzhen. We used wavelet analysis to estimate the epidemic timing and synchrony in influenza activity between these two cities. We performed phylogenetic analysis to measure the pairwise genetic distance between the influenza isolates in Hong Kong and Shenzhen. We also compared the minimum distance from the isolates of these two cities to the trunk of a global phylogenetic tree, the putative source for global epidemics, in each year.

Result
This comparison represents a unique natural experiment, as connectivity between these two cities has increased over the past decade. We found that, whilst summer influenza epidemics in Shenzhen used to peak 1 – 3 months later than those in Hong Kong, the difference decreased after 2005 ($P<0.0001$). Phylogenetic analysis revealed that influenza isolates from Shenzhen have become genetically closer to those circulating in Hong Kong over time ($P=0.045$). Furthermore, although Shenzhen isolates used to be more distant from the global putative source of influenza viruses than isolates from Hong Kong ($P<0.001$), this difference has narrowed ($P=0.02$).

Conclusion
Overall, our study reveals that influenza activities show remarkably distinct epidemiological and evolutionary patterns in adjacent subtropical cities and suggests that human mobility patterns can play a major role in influenza dynamics in the subtropics.