

# North to south gradient and local waves of influenza in Chile: A time-series analysis using wavelets

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## Abstract

### Background

Influenza cause a high burden of disease worldwide. Influenza seasonality is caused by complex interactions of weather factors, virus mutations, population crowding, and human travel. Even though annual surveillance reports of influenza show an annual seasonality in Chile, no studies have estimated the seasonality and latitudinal patterns of seasonal influenza within the country.

### Objective

To evaluate influenza timing across Chile and the presence of travelling patterns through different territories as local waves of influenza.

### Method

We conducted an ecological study of the 29 public health networks from Chile. We obtained ILI surveillance data and estimated the seasonality across health networks using wavelet analysis. Then, we assessed the relationship between the start, the peak of ILI epidemic, and latitude using a linear and piecewise regressions. Finally, we estimated the presence of incoming and outgoing travelling waves (timing vs distance) between networks and the relation to population using linear and logistic regression respectively.

### Results

We found a north to south latitudinal gradient of influenza and travelling waves that were present principally in the center of the country and associated to larger population size.

### Conclusion

Our findings suggest that larger population located in the center of the country drives seasonal influenza epidemics in Chile.