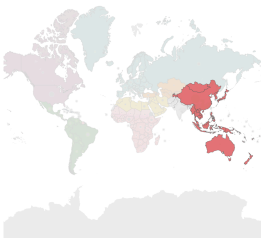


# East Asia and the Pacific Surveillance of SARS-CoV-2 Wave Two: Longitudinal Trend Analysis

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## Background



The COVID-19 pandemic has had a profound global impact on governments, healthcare systems, economies, and populations around the world. Within the East Asia and Pacific region, some countries have mitigated the spread of the novel coronavirus effectively and largely avoided severe negative consequences, while others still struggle with containment. As the second wave reaches East Asia and the Pacific, it becomes more obvious that additional SARS-CoV-2 surveillance is needed to track recent shifts in the pandemic, rates of increase, and persistence.

## Research Objectives

The goal of this study is to provide advanced surveillance metrics for COVID-19 transmission that account for speed, acceleration, jerk, persistence, and weekly shifts in the pandemic, to better understand country risk for explosive growth and those who are managing the pandemic successfully. Existing surveillance coupled with our dynamic metrics of transmission will inform health policy to control the COVID-19 pandemic until an effective vaccine is developed. We provide novel indicators to measure the transmission of disease.

## Methods

Using a longitudinal trend analysis study design, we extracted 330 days of COVID data from public health registries. We use an empirical difference equation to measure the daily number of cases in East Asia and the Pacific as a function of the prior number of cases, the level of testing, and weekly shift variables based on a dynamic panel model that was estimated using the generalized method of moments (GMM) approach by implementing the Arellano-Bond estimator in R.

Figure 1: Timeline of Major Events

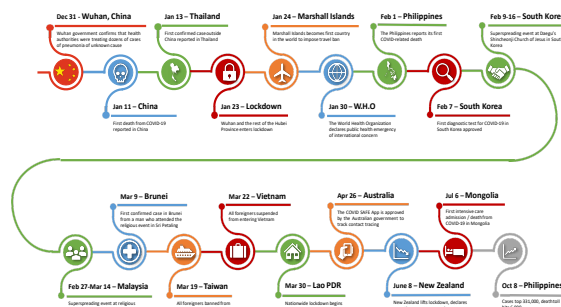


Figure 2: Weekly SARS-CoV-2 Cases by Country

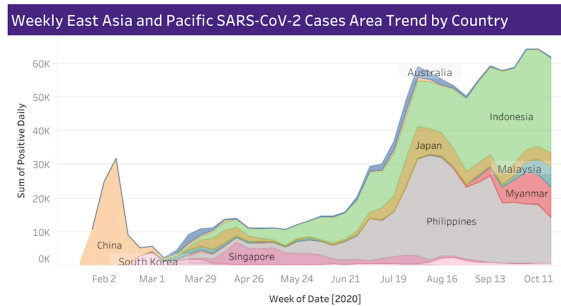


Figure 3: Weekly SARS-CoV-2 Trends by Country

Country	7 Day Persistence	Acceleration	Jerk	Speed
Australia	Low	Low	Low	Low
Brunei	Low	Low	Low	Low
China	High	High	High	High
Indonesia	Low	Low	Low	Low
Japan	Low	Low	Low	Low
Malaysia	Low	High	High	High
Mongolia	Low	Low	Low	Low
Myanmar	Low	Low	Low	Low
New Zealand	Low	Low	Low	Low
Philippines	Low	High	High	High
Singapore	Low	Low	Low	Low
South Korea	High	High	High	High
Taiwan	Low	Low	Low	Low
Thailand	Low	Low	Low	Low
Vietnam	Low	Low	Low	Low

## Results

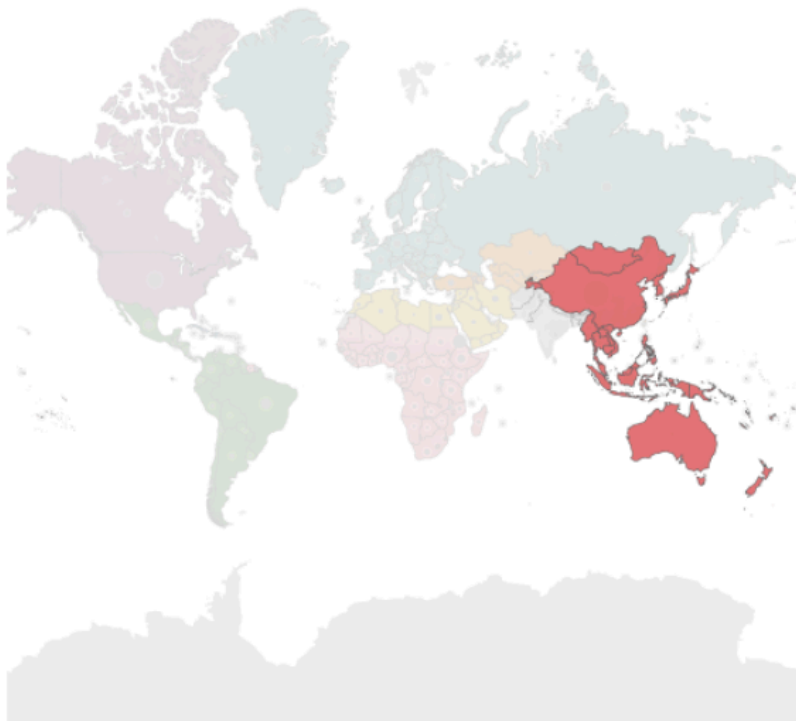
- Based on standard surveillance metrics, Indonesia, Philippines, and Myanmar have the largest new caseloads at 4,301, 2,588, and 1,387 respectively.
- When looking at the acceleration of new COVID-19 infections, we find that French Polynesia, Malaysia, and Philippines have the highest rates at 3.17, .22, and .06 per 100,000. These three countries also rank highest in jerk at 15.45, .10 and .04 respectively.

## Conclusions

Surveillance of two of the most populous countries in East Asia and the Pacific, Indonesia and the Philippines, indicates some alarming outbreaks. These two countries rank highest in new infections in the region. The highest rates of speed, acceleration and positive upwards jerk belong to French Polynesia, Malaysia and the Philippines. Positive rates of speed, acceleration and upwards jerk are more likely to result in explosive growth. While all countries in East Asia and Pacific need to be cautious in regards to opening their countries because outbreaks are likely to occur in the second wave of COVID-19, the country of greatest concern remains the Philippines. Based on standard and enhanced surveillance, the Philippines has not gained control of the COVID-19 epidemic, which is particularly troubling because the country ranks 4th in population in the region. Without extreme and rigid social distancing, quarantines, hygiene, and masking to reverse trends, the Philippines will remain on the global top 5 list of worst COVID-19 outbreaks resulting in high morbidity and mortality. The second wave will only exacerbate existing conditions and increase COVID-19 transmissions.

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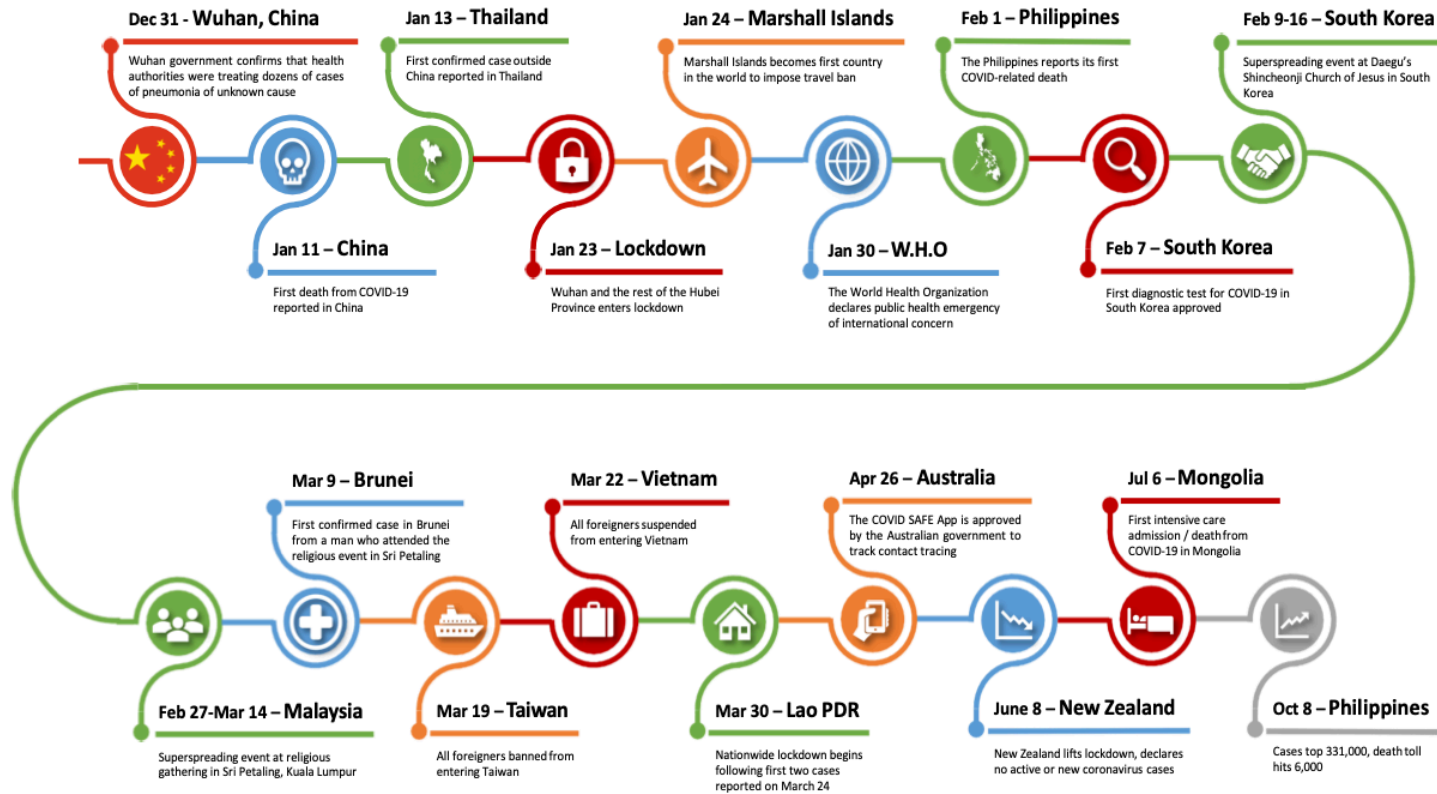
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## Methods

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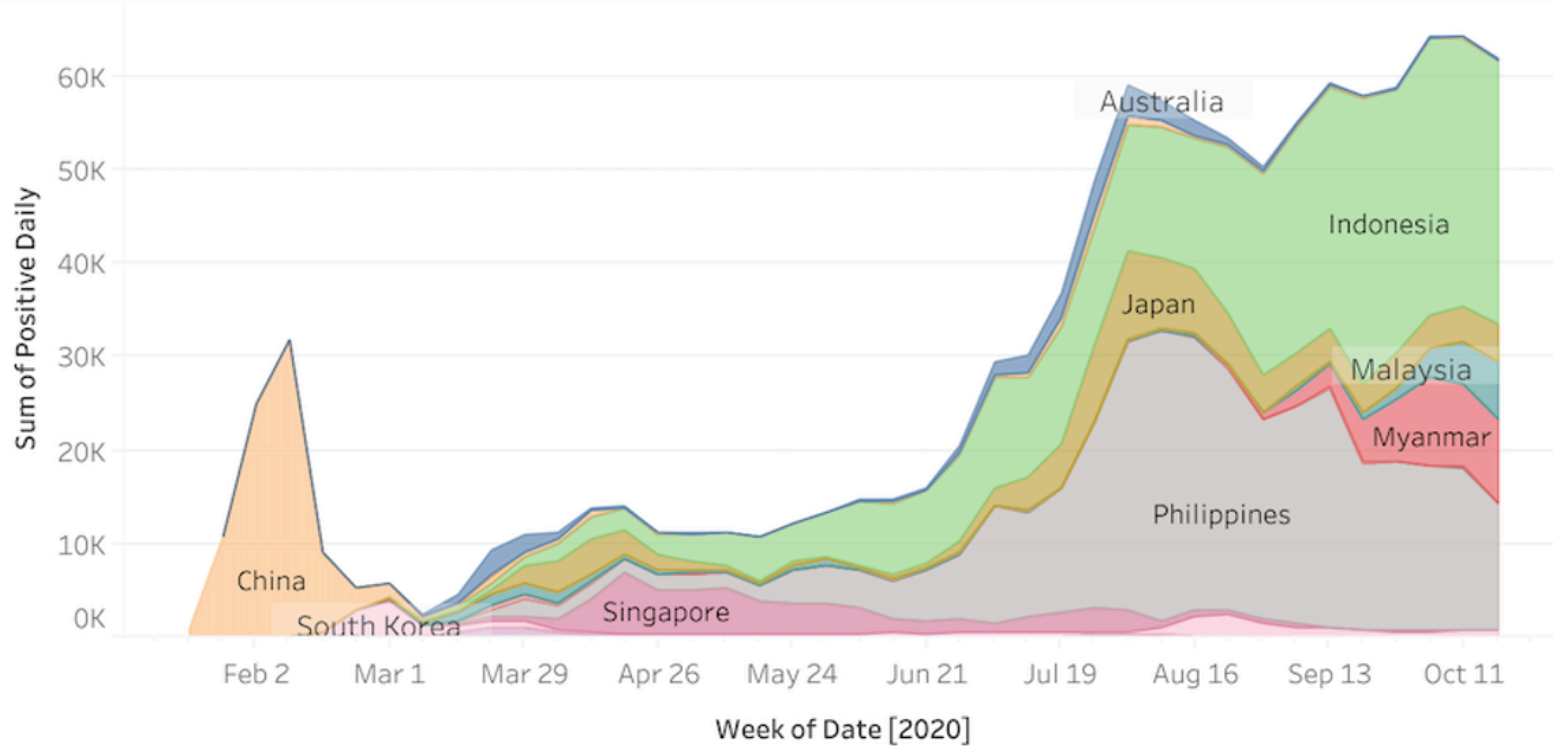
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## Weekly East Asia and Pacific SARS-CoV-2 Cases Area Trend by Country





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