

Global Health Day

South Asia SARS-CoV-2 Surveillance System: Race to the Top

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Background: The SARS-CoV-2 virus, that causes COVID-19, has led to a global pandemic resulting in significant morbidity and mortality. Countries have had varying success at implementing COVID-19 control policies to mitigate infections and prevent transmission. Public health surveillance is needed to inform South Asian leaders and understand when and where transmission rates are increasing.

Objective: To improve surveillance by using standard surveillance metrics with novel complementary decomposable surveillance metrics that overcome data limitations and contamination inherent in surveillance systems. In addition to prevalence of observed daily and cumulative testing, testing positivity rates, morbidity and mortality, we surveil COVID transmission in terms of: 1) speed, 2) acceleration/deceleration, 3) change in acceleration/deceleration (jerk), and 4) 7-day persistence (the number of new cases today that are statistically attributable to new cases seven days ago). These additional indicators improve our understanding of where and how rapidly SARS-CoV-2 is transmitting, and quantifies shifts to inform policy targeting mitigation and prevention strategies.

Methods: We extracted 60 days of COVID data from public health registries and employed longitudinal trend analysis. In addition, we used an empirical difference equation to measure daily case numbers in eight South Asian countries 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.

Results: COVID-19 transmission rates were tracked for South Asia during the weeks of 9/15-9/22 and 9/22-9/29. Observed regional new cases totaled 568,427 (average of 10,150 observed new cases per day per country) while observed new cases totaled 604,704 (average of 10,798 observed new cases per day per country). Both acceleration and jerk were negative or close to 0 in all countries. Maldives, India, and Nepal had the most promising numbers at -1.0, -0.9, and -0.1 respectively. For the week of 9/29, acceleration increased to -0.3 and 0.1 in the Maldives and Nepal respectively, while their jerk moved to -0.6 and 0 respectively. Surveillance data must be contextualized by country population. India is the most populous country in South Asia. Therefore, surveillance results in India will have an overwhelming effect on regional results and outrank the U.S. in COVID-19 caseloads given current rates of transmission.

Conclusions: Standard surveillance metrics (e.g. daily observed new COVID-19 cases or deaths) are necessary but insufficient to mitigate and prevent COVID-19 transmission. Public health leaders must know where and how COVID-19 transmission rates are accelerating, changing rates over short time frames, and how many cases are a function of new infections 7 days ago. Development and population size are not necessarily predictive of COVID-19 transmission. Although the United States leads the world in COVID-19 infections and deaths, India's caseload will soon outnumber the U.S. due to rapid speed, rising acceleration, and positive jerk. Unless the transmission rates reverse course, current trends combined with the large population of India assure it will become the global leader in COVID-19 caseloads in the near future.

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