## **Global Health Day**

## The Global COVID Surveillance System: Policy, Persistence, and Transmission in Central Asia

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**Background**: The COVID-19 pandemic has swept the world, including Central Asia. Political leaders and their public health advisors responded with a variety of measures that ranged from restrictive lockdowns to denying a single infection within their country. For nations looking to develop policies that will quell the spread of the virus, an accurate surveillance system is required.

**Objectives**: This study aims to provide enhanced surveillance metrics for SARS-Cov-2 transmission that more accurately tracks shifts in the pandemic, speed, acceleration, jerk, and persistence of COVID19 than existing metrics. Such a system will help facilitate the development and implementation of effective public health policies and track their adherence in Central Asia.

**Methods**: Using a longitudinal trend analysis study design, we extracted 60 days of COVID data from public health registries. We use an empirical difference equation to measure the daily number of cases in the Central Asia region 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 the weeks of 9/30-10/06 and 10/07 to 10/13 in Central Asia. The region averaged 11,730 new cases per day for the week ending in 10/06 and 14,514 for the week ending in 10/13. Infection rates increased across the region from 4.74 per 100,000 in the population to 5.66. Infection rates varied by country. Russia and Turkey had the highest seven-day moving averages in the region, at 9,836 and 1,469 respectively for the week of 10/06 and 12,501 and 1,603 respectively for the week of 10/13. Russia has the fourth highest speed in the region and continues to have positive acceleration, driving the negative trend for the entire region as the largest country by population. Armenia is experiencing explosive growth of COVID-19, with an infection rate of 13.73 for the week of 10/06 quickly jumping to 25.19, the highest in the region, the following week. The pandemic speed in Armenia, consistent with the infection rate trajectory, increased from 15.4 to 21.7, with an acceleration increase from 0.4 to 1.6 meaning acceleration has increased fourfold. The region overall is experiencing increases in seven-day moving average of new cases, infection, rate and speed, with continued positive acceleration and no sign of a reversal in sight.

**Conclusions**: The rapidly evolving COVID-19 pandemic requires novel dynamic surveillance metrics in addition to static metrics to effectively analyze pandemic trajectory and control spread. Policymakers need to know the magnitude of transmission rates, how quickly they are accelerating, and how previous cases are impacting current caseload due to a lag effect. These metrics applied to Central Asia suggest that the region is trending negatively, primarily due to minimal restrictions in Russia. Russia already has the fourth highest number of cases in the world and current metrics suggest Russia will continue on that trajectory.

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