Short Communication

Transmission of SARS-CoV-2 in Different Districts of a County in Istanbul, March to September 2020

Asia Pacific Journal of Public Health
2021, Vol. 33(5) 655–656

DOI: 10.1177/10105395211009008
journals.sagepub.com/home/aph
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The COVID-19 pandemic has turned into an international disaster. As of October 20, 2020, 40 949 107 confirmed infections and 1 127 388 reported deaths were announced, and are not yet showing a tendency to mitigate the outbreak impact.

The COVID-19 outbreak has halted economic development globally and created an obstacle to achieving global health goals.[1] Epidemics caused by airborne viruses in cities with large populations create a big problem as in the current pandemic. Cramped lifestyle, busy workplaces, crowded public transportation, and higher household member counts in cities become essential for transmitting the disease.

The densely populated Wuhan became the epicenter of the epidemic in the world. Also, in Turkey's, Istanbul was the epicenter of the country's epidemic, transmitting the disease to Turkey via Istanbul. Istanbul is the main link for international flights. Suspected cases have entered the country from Europe, Saudi Arabia, and Iran. Tourism and religious rituals such as pilgrimages are known to pose a risk in pandemics.[2] Since the beginning of the epidemic, Istanbul has taken the lead in the number of cases. The excess population density plays a significant role in this situation.

It is essential to monitor the contaminated regions with geographical information systems on city maps. In the H1N1 simulations, early interventions resulted in better control of the epidemic.[3] Outbreak maps visualize and help analyze the patterns of transmission and serve as a communication and education tool.

This article describes a dynamic heat map video of SARS-CoV-2 (severe acute respiratory syndrome coronavirus 2) polymerase chain reaction (PCR)-positive cases in a county of Istanbul (available online).

Marmara University Pendik Research and Education Hospital is in Pendik County, located in the southeastern part of Istanbul. According to their residential information, we categorized unique SARS-CoV-2 PCR-positive cases admitted to inpatient and outpatient clinics. We included cases between March 19, 2020, and September 30, 2020. A total of 1759 cases were recorded. Data were recorded in a Microsoft Excel sheet, and a heat map generated using the 3D Map function.

The video visualizes the cumulative case densities by districts in the county of Istanbul, Turkey. We calculated the cumulative case density per 100 000 district population. The map shows how the epidemic spread to all the districts, and the cumulative cases increased in one county of Istanbul with actual attack rates. Case densities in several districts remain low during the outbreak. Districts with lower case densities are locating in the southern part of the county (bay area). Variation of socioeconomic status of the districts may explain this difference. However, based on our data, we cannot assess a direct relationship between the districts' socioeconomic status and the case densities. The severity of the epidemic is the cumulative number of cases that came with the exponential increase that emerged from the initial days. This video illustrates the case accumulation in the field. The line graph in the video shows a decrease in the number of cases in May, resulting from intermittent lockdown, universal masking, and social distancing precautions.

COVID-19 has features that develop suddenly and spread rapidly due to the possibility of transmission in the early phases of the disease, high contagiousness, and difficulties in diagnosis. Monitoring the outbreak with geographical information system technology is essential for outbreak management and control.[4] The development of the epidemics is more subexponential for non-airborne infections. The exponential increase in airborne infections occurs rapidly, especially in cities, if the transmission from case to case is suppressed.[5,6] Before the exponential increase phase, early intervention to SARS-CoV-2 virus transmission provides an opportunity for transmission suppression strategies. Suppression strategies should be implemented even before the notification of the first case.[7]

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Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

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Supplemental Material

Supplemental material for this article is available online.

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