

Analyzing the Control Measures for the Homeless Population and Quantifying their Impact on the COVID-19 Epidemic in New York City

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An outbreak of Coronavirus Disease 2019 (COVID-19) emerged in Wuhan, China in late December. Within four months, the World Health Organization (WHO) characterized the disease as a pandemic. As of July 10, 2020, the United States has reported more confirmed cases than any other country, and the count continues to increase. The state of New York has been the hardest hit with 404,000 confirmed cases, 223,000 of which are attributed to New York City (NYC) alone. Given that homelessness in NYC has reached its highest level since the Great Depression and many of the precautionary measures for preventing COVID-19 are not an option for the homeless, a major concern is the contribution of this group to the prolongation of the epidemic. In order to analyze the role of the homeless population in NYC's COVID-19 dynamics, we use a SEIR-like, two-group epidemic model, for the homeless and housed populations under preferential mixing. Parameter values and initial states, whenever possible, were defined using publicly available data about COVID-19 and homelessness in NYC. Our findings indicate that preferential mixing and compliance with precautionary measures have a significant influence on the final epidemic size for NYC. We use these results to discuss the importance of the homeless population when considering the wellness of the city.