Children's Hospital of Philadelphia
PolicyLab

New Model Shows Competing Influences of Social Distancing, Population Density & Temperature on Local COVID-19 Transmission

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County-level Modeling Could More Strategically Inform Reopening Strategies Across the U.S.

Philadelphia, Pa. – April 22, 2020 – Data from a new county-level model released today by PolicyLab at Children's Hospital of Philadelphia (CHOP) show social distancing policies, population density and temperature are the most impactful factors in the spread of COVID-19. The model, which uses real-time data from 260 counties across the U.S., is the only publicly available model that projects the risk for resurgent disease transmission in small geographic areas through the summer if communities reopen in mid-May, while accounting for other changing factors such as weather.

"As our leaders plan for when and how to reopen communities, understanding the highly contagious nature of this virus and the factors that impact its spread must inform those decisions," said Dr. David Rubin, director of PolicyLab and a professor of Pediatrics at the University of Pennsylvania's Perelman School of Medicine. "Complementary to other national models, our data differ in that they illustrate the situation in our own backyards. With our model, we hope to help city leaders and public health officials build more targeted strategies for reopening communities that consider not only the strain on our health care systems, but also how to deploy other strategies such as masking and workplace safety regulations to maintain some distancing as people leave the confines of their homes."

The model, known as COVID-Lab: Mapping COVID-19 in Your Community, represents 58% of the total U.S. population and includes data from every state. Utilizing data from a variety of publicly available sources, the researchers built their model to observe how population factors—such as age, insurance status, and smoking prevalence—and city characteristics, such as density, affect the number and spread of COVID-19 infections over time across a county. For social distancing, which the model identified as the most important factor in reducing transmission, the researchers used cell phone movement data.

"Measured against a number of local factors, we saw that strict social distancing policies and low population density, and, to a lesser extent, warming weather were all important in slowing the spread of this dangerous virus," said Dr. Gregory Tasian, faculty member at PolicyLab, assistant professor of Urology and Epidemiology and senior scholar in the Center for Clinical Epidemiology and Biostatistics at the University of Pennsylvania's Perelman School of Medicine. "We were especially interested to find that rising temperatures may have helped reduce the spread of COVID-19, particularly in our less populous counties, but unfortunately the effect of weather, in the absence of strict social distancing policies, has not been strong enough to prevent resurgent transmission in our most crowded cities and their metropolitan areas."

An interdisciplinary team of public health, epidemiology, and biostatistics experts from CHOP and the University of Pennsylvania collaborated with global experts to develop and fine-tune the model. The model currently forecasts until early August the effects of relaxing social distancing policies so that we are halfway back to normal activity starting May 15. While the models shows that many less densely populated counties benefit from warmer weather in reducing transmission, the researchers would caution those counties to implement strong mitigation strategies to ensure they can keep cases low by early fall, when temperatures begin to decline. Mitigation strategies might include strong workplace safety regulations, sufficient testing capacity and universal masking in public. The team will continue updating the model based on policy changes and mitigation strategies that counties make to forecast viral transmission well into fall and winter when they anticipate many

more counties will have significant outbreaks. The data are publicly available in the form of interactive maps, here: https://policylab.chop.edu/covid-lab-mapping-covid-19-your-community

“This model not only provides real-time county-level data from the last two months to help officials understand the factors that most influence disease transmission in their communities, it also predicts the risk for resurgent transmission, which could be helpful in predicting future outbreaks,” said Dr. Jing Huang, faculty member at PolicyLab, assistant professor of biostatistics in the Department of Biostatistics, Epidemiology and Informatics, and a senior scholar in the Center for Clinical Epidemiology and Biostatistics at the University of Pennsylvania’s Perelman School of Medicine. “While we designed the model specifically for COVID-19, we continue to refine our methods as we seek to validate them for use in other potential pandemics.”

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About PolicyLab at Children’s Hospital of Philadelphia: PolicyLab at Children’s Hospital of Philadelphia (CHOP) is dedicated to achieving optimal child health and well-being by informing program and policy changes through interdisciplinary research. Founded in 2008, PolicyLab is a Center of Emphasis within the CHOP Research Institute, one of the largest pediatric research institutes in the country. With more than 30 highly regarded faculty and 60 passionate staff who bring expertise from myriad of fields covering health, research and health policy, our work focuses on improving public systems, improving health care delivery and improving child health outcomes. For more information, visit **http://www.policylab.chop.edu**.

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