Coronavirus modeling, impact on India's pandemic response

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Bhramar Mukherjee, a professor and chair of biostatistics at the University of Michigan's School of Public Health, leads a team of researchers that, as the coronavirus pandemic unfolded around the

world, used standard epidemiologic models to do a situational assessment of the crisis in India—providing real-time data for authorities to assist leadership in addressing this global pandemic.

Based on the report, the team published an analysis of their data highlighting the benefits of social distancing. Now, the team has published a second article that predicts that a 21-day lockdown has a high chance to reduce the number of COVID-19 cases in the short term and buy India invaluable time to prepare its health care and disease monitoring system.

Mukherjee, who is originally from India, is a professor of biostatistics, epidemiology and global health. She discusses the team's work.

In your initial study, you outline how social distancing in an inherently community-based culture like India, with a population of 1.3+ billion people and intergenerational extended families, might be difficult. Prime Minister Narendra Modi has been criticized for some of the lockdown measures and how they've been implemented. What are your thoughts?

Lockdown may not be as efficiently implemented in India as some of the other Eastern countries but still will reduce the probability of an infected individual to meet a susceptible individual. If rightly done, this is a highly effective measure in arresting the spread of the virus. It also enables India to prepare its health care infrastructure. However, the decision of a lockdown has other collateral damage in economic and social terms. Different decisions will lead to different types of anxiety, misery, pain and inconvenience for the public in such a situation. In my opinion, we have no choice but to stop the virus and then revive the

economy.

In this new article we also introduce an app, COV-IND-19, which provides a new interactive visualization platform for COVID-19 data in India for public use with open-source software. With this app, we aim to provide a resource to describe the COVID-19 outbreak in India to date, as well as prediction models under various hypothetical scenarios. The figure and forecasting models update as new data becomes available (i.e., at least daily). This has been a massive undertaking and we pulled it off in a few days and are now extending to other countries/regions.

What prompted you and your team to conduct this work?

As an immigrant scientist, a part of you always remains with the country that you were born in and the friends and family you left behind, in particular, all of my family including aging parents are back in India. With the travel ban, I felt helpless that I cannot go see my parents even if something were to happen to them. Many of us were in the same situation so we decided to channel our restless energy into a positive synergy. I reached out to students and faculty of Indian origin in the biostatistics department. Everyone was motivated to contribute. After the initial layout many other programming gurus joined to build the app. Time was of the essence here, so we had to work at a lightning speed, around the clock. I was getting interested in disease transmission models after the outbreak in Wuhan but I had to escalate my speed of learning. We all did.

One of the things that's very interesting about your work is that it didn't follow the traditional peer-review process. Can you discuss why?

We did not pursue the traditional academic path of writing a paper because we wanted to ride the course of the virus in real time with data, influencing policy, informing the public in real time, instead of an after-the-fact post-hoc analysis, but I never expected this report to have such an impact. There was urgency in us in getting a data driven product out. Academics were not the audience we wanted to reach with the initial piece. It is amazing that two weeks later, we have an open-source code visualization platform and we're working on the peer-reviewed paper submission.

One of the things you make very clear is that there's a lot of unknowns on this study, but you also felt a sense of urgency to get the information out as soon as possible. Could you explain why?

There are uncertainties and wide variability in our projections. All models are wrinkled with assumptions. However, I think the main takeaway message from all of these models is the same: intervention measures early in the path of COVID-19 are most effective and can reduce the disease spread. When public health and economic interests are pitted against each other for a nation, it is really hard for policymakers to make a decision. Any decision will have massive consequences on either side. But if you have to do a lockdown, the effectiveness is highest when done early before the number of cases explode. More than the exact numbers, the lesson from this data-driven exercise was that interventions work. I am really grateful and happy that the report was quoted as a catalyzing piece of evidence by the media and thankful to the authorities who noted our science.

Is there anything else you would like to address?

We, as quarantined data scientists, did this work as our service to the

community at this catastrophic time. We are grateful that our work received media attention. Our students found tremendous energy and inspiration in this process. Data scientists have a huge role to play in this collective war against the virus, not just for forecasting but for optimally deploying resources. As we go through this pandemic, I root for public health, for science and innovation, and for the magic of human kindness.

Provided by University of Michigan