# NTU scientists' predictive model can help pare Covid-19 cases

## In a test involving 4 large Asian countries, the fall in infections and death is as high as 89%

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Predictive computer modelling developed by scientists from Nanyang Technological University (NTU) can propose strategies that could have reduced Covid-19 infections and deaths by 59 per cent to 89 per cent in countries studied.

The model takes just a few minutes to produce results, once data has been fed in. It was tested on real pandemic data from four large Asian countries for the whole of 2020.

The model requires at least three days of historical data before predictions can be made. If more historical data is available, the model can be more accurate.

Data is obtained from four open sources: Johns Hopkins University, environmental data collected from the world air quality index project, the Oxford Covid-19 Government Response Tracker, and movement data from the Google Community Mobility Reports.

If more country-specific data is fed into the model, a more accurate prediction will be obtained.

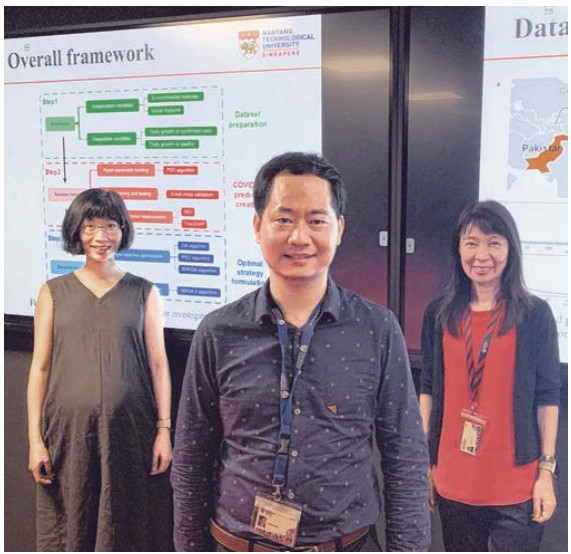
The modelling application, called NSGA-II, can run on a personal computer and alert governments on possible surges in Covid-19 infections and deaths, giving them time to implement the necessary measures.

From the data, the model could have helped reduce the number of infections and deaths by up to 76 per cent in Japan, 65 per cent in South Korea, 59 per cent in Pakistan, and 89 per cent in Nepal, the NTU scientists say. Across the four countries, this works out to an average of 72 per cent.

The model has not been used to predict Singapore's Covid-19 numbers because it will not be as accurate as it is for larger, less densely populated countries with more confirmed Covid-19 cases and deaths. But the team is working with local agencies such as the National Centre for Infectious Diseases to incorporate more data that is not publicly available for future enhancements of the tool.

The model recommended timely and country-specific advice on the optimal application and duration of Covid-19 interventions, such as home quarantines, social distancing measures and personal protective measures, that would help to soften the impact of the pandemic.

Governments would also be able to test the outcome of a strategy before it is implemented.




From left: Assistant Professor Yan Zhenzhen from NTU's School of Physical and Mathematical Sciences, Assistant Professor Zhang Limao from NTU's School of Civil and Environmental Engineering, and Professor May O. Lwin, chair of NTU's Wee Kim Wee School of Communication and Information. The team hopes the model can be part of future pandemic preparedness tools to be used against potential disease threats. PHOTO: NTU

The model was able to predict the daily increases of confirmed cases and deaths with an accuracy of 95 per cent, when compared with the number of actual cases.

To harness the power of machine learning, large amounts of global data on Covid-19 deaths and infections last year were used, allowing the model to learn the dynamics of the pandemic.

The research was reported in peer-reviewed scientific journal Sustainable Cities And Society in August.

Assistant Professor Zhang Limao from NTU's School of Civil and Environmental Engineering, who led the study, said on Wednesday: "The main goal of our study is to aid health authorities to make data-driven decisions... there is no one-size-fits-all solution, and we hope our comprehensive program would be able to help governments tailor the solutions at an early stage to best fit their country's needs at different stages of the pandemic."

The study's co-author, Professor May O. Lwin, chair of NTU's Wee Kim Wee School of Communication and Information, said that Japan and South Korea were selected as these countries were two of the earliest to take measures to control the pandemic.

"We hope the program will be especially useful in relatively less developed countries, as they face greater challenges on medical and economic fronts," she added.

Some of the less developed countries may not have sufficient or real-time data feed capabilities and were often caught by surprise by the steep increase in cases and deaths, Prof Lwin said. The model will allow predictions one to two weeks ahead.

The team plans to introduce more variables, such as vaccination, economic status and cultural differences, into the model to improve its accuracy. The scientists are seeking to validate its efficacy by including data from countries in Europe and North America, providing insights into Covid-19 evolution across different geographies.

The team hopes the model can be part of future pandemic preparedness tools to be used against potential disease threats.

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