How circuit breaker measures help to prevent spread of Covid-19 as scientists race for cure

SINGAPORE - The Republic swung into full circuit breaker mode on Wednesday (April 8), with schools closing their doors as students move to home-based learning a day after most workplaces in Singapore were shuttered.

The aim? To contain the outbreak of Covid-19, or in statistical terms, to drive down R0 (pronounced R-naught).

R0 refers to the basic reproduction number of a disease. It provides healthcare officials with a gauge for the average number of people who will catch the disease from a single infected person.

Globally, the R0 for Covid-19 is estimated to be between two and three. This means that on average, every Covid-19 patient will go on to infect about two to three other people.

But this number is not a static one.

It depends on a whole range of factors, including biological factors, such as how easily the virus is transmitted from human to human, and social ones, such as the number of people an infected person is exposed to.

The National Centre for Infectious Diseases said it has no ongoing studies to determine the R0 for Singapore.

But Associate Professor Alex Cook, vice-dean of research at the National University of Singapore’s (NUS) Saw Swee Hock School of Public Health, said data suggests that Singapore’s cumulative measures to contain the outbreak have been successful in driving down R0 for the disease to be at or below one since the start of the outbreak in January.

This means that each infected person in Singapore spread the disease to about one other person, on average.

While this may seem surprising given the growing number of daily cases, many of these were likely to have been infected by people who had caught the virus overseas, where the full-blown epidemics took place, said Prof Cook, an expert in infectious disease modelling.

If R0 had been as high as two to three here, as it was in many of the worst-hit places, then Singapore would have had substantially more than the 1,481 cases it had as of April 7, said Prof Cook.
Prof Cook said Singapore might be able to control the outbreak if the nation shuts its borders fully.

"But these are big demands. We can't turn returning nationals away, and to keep contact tracing going is exhausting," he said.

That is why the circuit breaker measures are so important.

Said Prof Cook: "If everyone adheres to the social distancing, we should see the number of cases drop to a more manageable level over the next few weeks."

**BREAKING THE TRANSMISSION CHAIN**

Tackling the outbreak of an infectious disease - especially one caused by a virus that no one has seen before - is a challenging task requiring all hands on deck.

Scientists around the world are scrutinising the basic biology of Sars-CoV-2, the virus that causes Covid-19, to see how the disease can be best treated - with anti-viral medication or prevented with a vaccine.

But as that work goes on behind the scenes, it is also important to ensure that social distancing measures are in place, said Prof Cook, as this will prevent the number of cases from surging to the extent that it overwhelsms the healthcare system.

R0 indicates the transmissibility of the disease in the absence of control, he said.

"It is difficult for us to control the biological factors, as it is not easy to change the dynamics of how the virus acts within a body," Prof Cook added. "But we can change the social factors, such as the number of people a patient is exposed to, for example."

R0 can be reduced by social actions, such as implementing social distancing measures, and by early isolation of cases through intensive contact tracing.

"Both of these reduce the number of opportunities for the virus to transmit," he said.

**HOW TO GAUGE SUCCESS**

Prof Cook said the enhanced social distancing measures would be deemed successful if the number of daily cases fall to the single digit zone by May 4, when the circuit breaker phase ends.

"That would be a resounding success. If it were in the teens, I think we'd be satisfied that we'd brought it under control," he said.

But if the number of new cases daily far exceeded this, stricter control measures may be required, he said.

"If the number of cases is much more than that, it would paint a rather pessimistic picture of our ability to control the pandemic here without much stricter policies."

But Prof Cook said that from now till then, there might be a delay before the enhanced social distancing measures take effect.

"This is because some people who are infected may not yet be symptomatic, and it can take a while before those who are symptomatic are diagnosed," he said.