

Changes in mobility in response to the COVID-19 pandemic: NZ vs other countries and the stories it suggests

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In this blog we compare recent Google mobility data for New Zealand and a range of other countries in response to the COVID-19 pandemic. The data show the massive behavioural changes that have occurred in New Zealand (73% overall mobility reduction and 90% reduction in one category), which give support to the feasibility of the elimination goal being achievable in this country. The data for other jurisdictions reveals problematic stories for Italy and Sweden, but more favourable ones for Switzerland, Taiwan and South Korea. The latter two settings demonstrate how rapid and early use of various disease control measures may even allow for avoidance of lock-down measures.

The coronavirus causing COVID-19 disease first appeared in Wuhan in China in November 2019. Over the ensuing months it has spread across the world triggering a range of public health responses in different countries. Many of these responses include some form of mandated physical distancing or even 'lock-down' measures, with non-essential activity discouraged or disallowed.

Use of Google data to track mobility reduction

Google has published mobility data across March and April 2020, drawn from its location services datasets, which are normally used to indicate things such as how busy a business usually is at a given hour. The data are compared with baseline data from a five-week period in January and early February 2020 to give a percentage of activity reduction compared with baseline score across the categories of: Retail and Recreation, Grocery and Pharmacy, Parks, Transit Stations, Workplaces, and Residential.

Some countries have achieved activity reduction of greater than 90% in some categories (eg, Spain in retail and recreation) with the greatest average reduction across all non-residential categories being 84% (Italy). All countries with more than 1000 confirmed COVID-19 cases per million population exhibit activity reduction of at least 35%. But not all such countries have quickly and effectively controlled pandemic spread.

Here we present Google location data for New Zealand and a selection of other countries chosen because they represent examples of different policy responses to the Covid-19 pandemic response.

New Zealand

New Zealand initiated a lock-down due to fear of an uncontrolled pandemic spread with major potential mortality impacts [1], with a goal of eliminating COVID-19 [2]. The Google data show that New Zealanders have followed the lock-down rules, which came into effect on the late evening of the 25 March (after being announced on 23 March) with a remarkably high level of behaviour change. Activity dropped almost instantly, by over 90% from baseline levels in some categories (see Figure below), and by an average of 73% overall.

Workplaces

-57%

compared to baseline



Retail & recreation

-90%

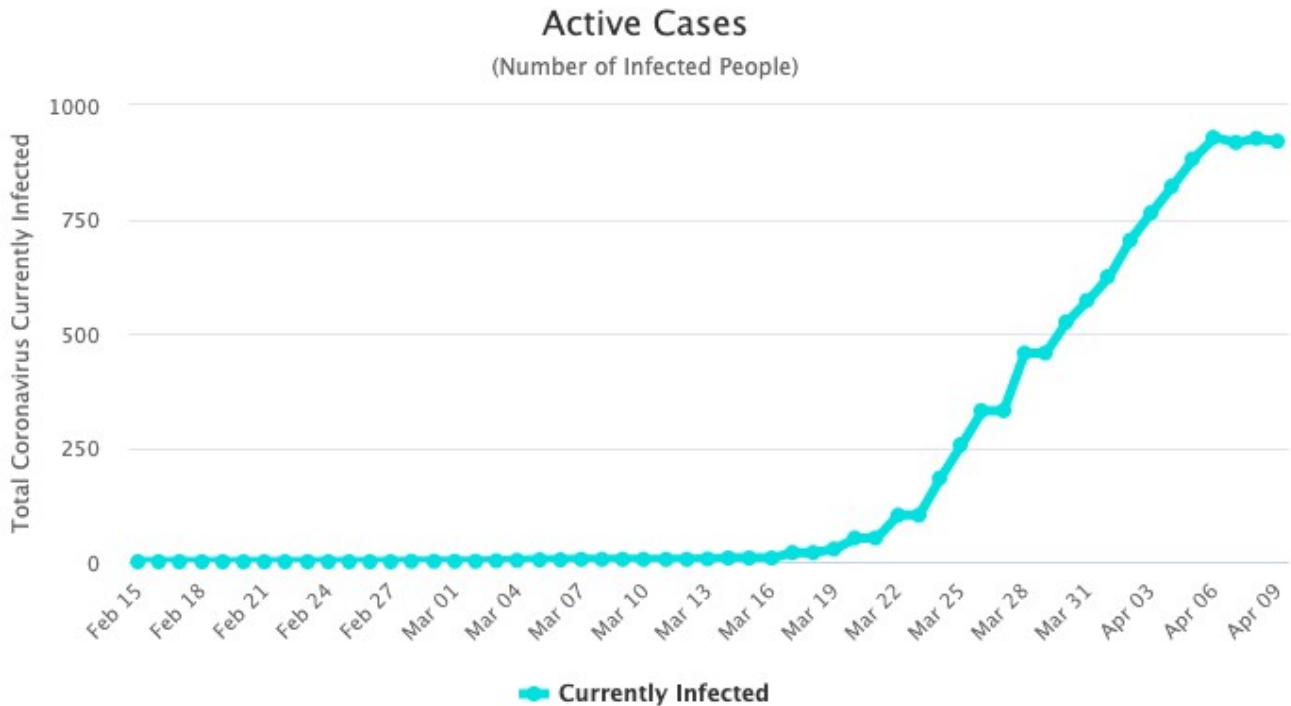
compared to baseline



Source: <https://www.google.com/covid19/mobility/>

We can see the impact of this behaviour change on the number of active cases by day, which levelled off around 6 April, 10 days after the lock-down commenced (see Figure below).

Active Cases in New Zealand



Source: <https://www.worldometers.info/coronavirus/>

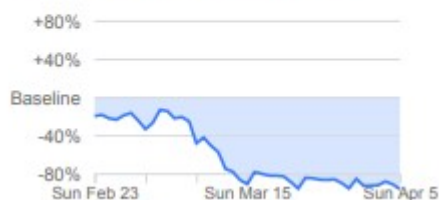
Other countries: particularly Italy, Switzerland & Sweden

Activity in other jurisdictions did not drop as instantaneously when strict measures began to be introduced. Italy initiated lock-down as a response to an uncontrolled outbreak. But the Vice President of the Red Cross Society of China speaking in Milan was described as criticising the 'very lax' approach to lock-down in the city [3].

Google data for Italy confirm that activity reduced slowly over a period of two weeks and although eventually registering a 96% reduction in non-essential activity such as Retail and Recreation, during this time there was still likely substantial community transmission of disease (see Figure below). Lock-down was not universal, complete and immediate.

Retail & recreation

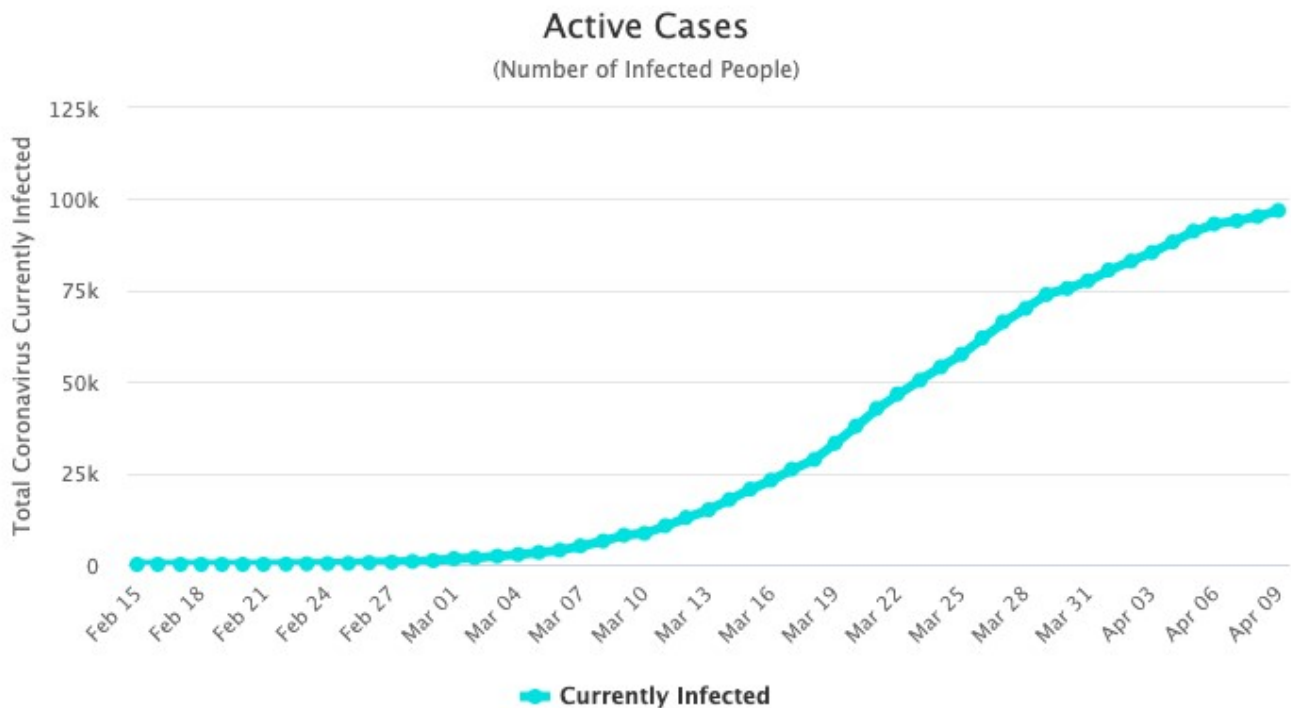
-96% compared to baseline



Source: <https://www.google.com/covid19/mobility/>

The result was that active cases in Italy continued to rise long after activity reducing measures were implemented (see Figure below).

Active Cases in Italy



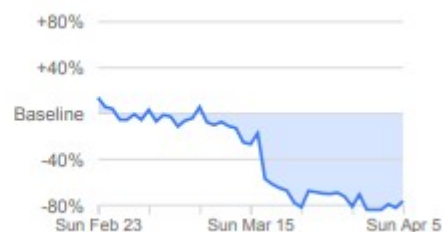
Source: <https://www.worldometers.info/coronavirus/>

In Switzerland, on the other hand, another nation that experienced a high initial number of cases, with over 1000 cases by 13 March, activity reduction appeared to occur much faster (more like the pattern in New Zealand), and the curve of active cases correspondingly reflects relatively good pandemic control within the country.

Retail & recreation

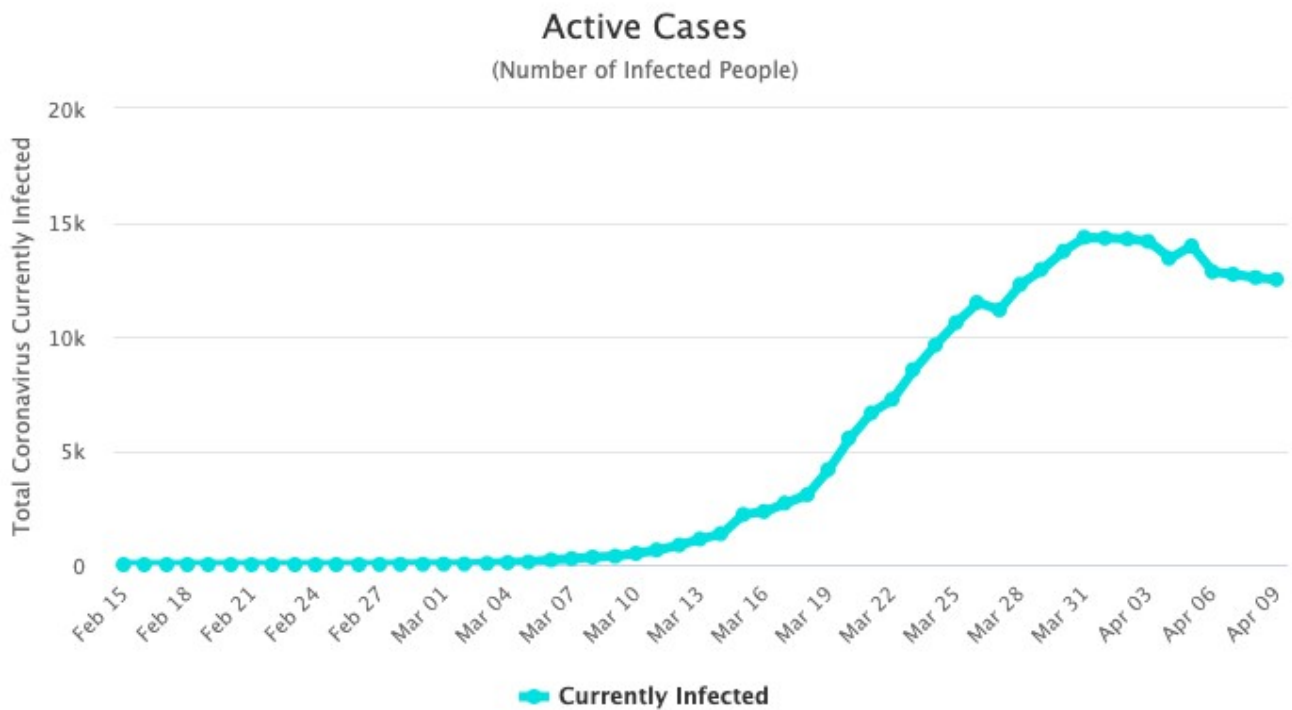
-76%

compared to baseline



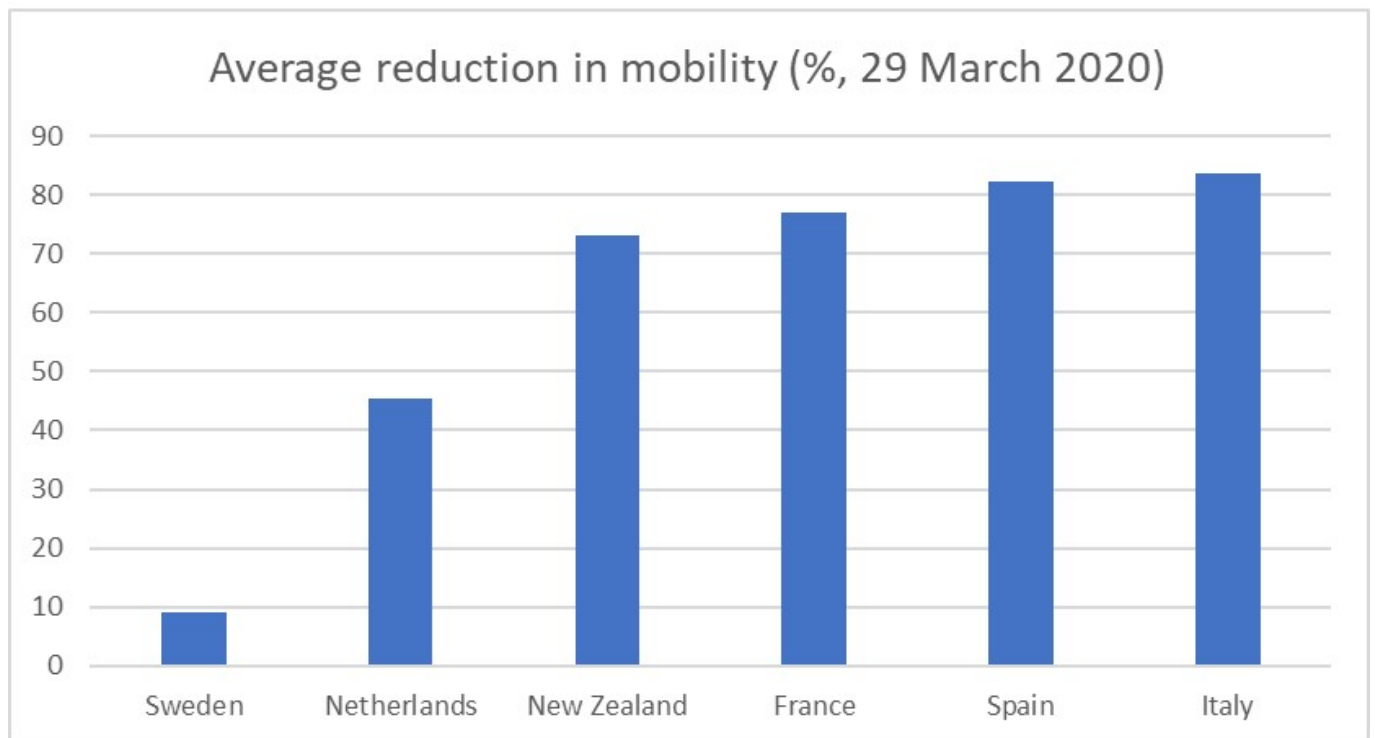
Source: <https://www.google.com/covid19/mobility/>

Active Cases in Switzerland



Source: <https://www.worldometers.info/coronavirus/>

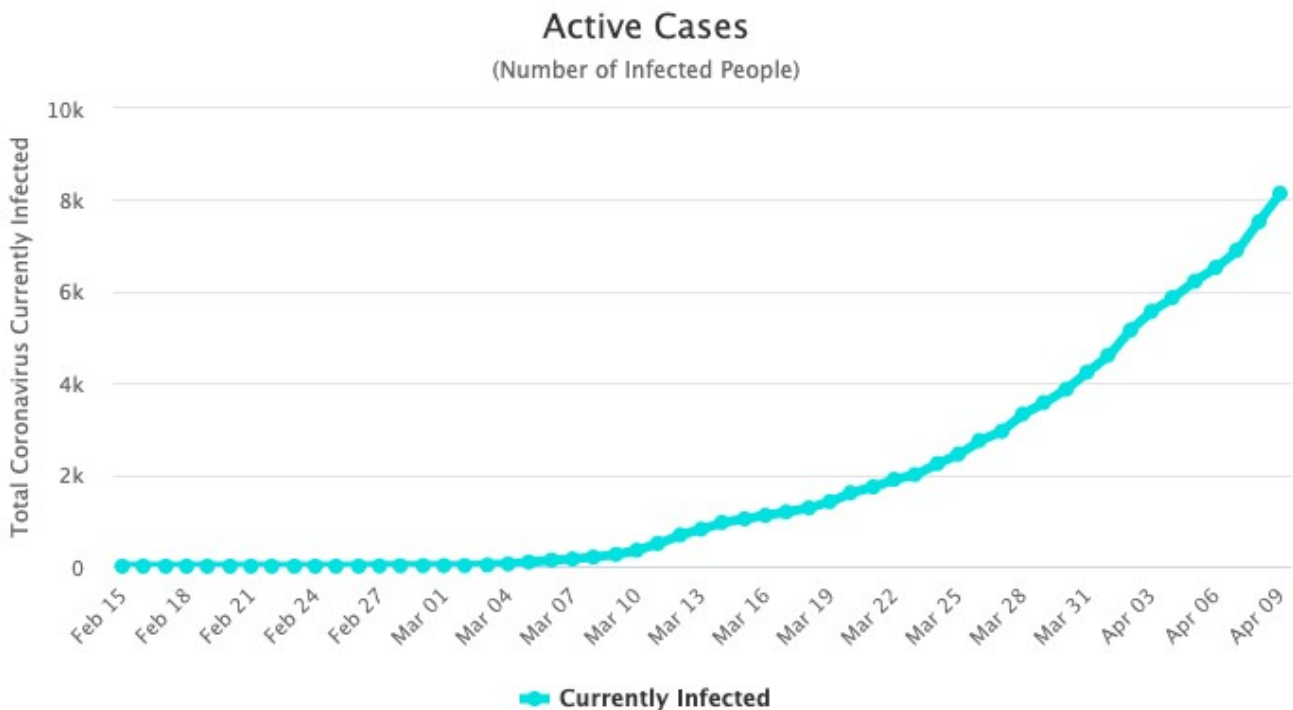
We can contrast the approaches taken to activity reduction in New Zealand, Italy and Switzerland with the less stringent approach in other European nations such as Sweden and the Netherlands. Sweden had an average activity reduction (excluding residential) of only 9% on 29 March.



Source: Adapt Research Ltd

The corresponding trajectory of active case numbers in Sweden is far from what might be desired.

Active Cases in Sweden



Source: <https://www.worldometers.info/coronavirus/>

New Zealand's strategy

New Zealand's results are promising and give added hope to achieving the elimination goal. At the time of the 10 April Google mobility report, there was sustained reduction in retail and recreation activity (90%), grocery and pharmacy (48%), parks (74%), transit stations (84%), and workplaces (57%), with no appreciable change in activity since lock-down began on 26 March.

If New Zealand's elimination strategy succeeds - there will then be the opportunity to phase down the restrictions. And we could save the most discretionary activities for last. This means opening up more workplaces first and allowing expanded recreation and shopping later on. But large public events such as concerts might need to remain on hold until a vaccine is available.

If New Zealand's elimination strategy fails, then we will need to switch to a suppression or mitigation strategy. With suppression we would also need to reduce some restrictions, in particular those that are most economically damaging. Therefore, more workplaces would probably need to be opened up.

Do we also need additional surveillance methods to track physical distancing?

There are other methods that can also be used to measure changes in behaviour in response to physical distancing measures such as lock-downs. One major source is use of mobile phone data [4]. Banking records (electronic transactions) is another form of big data

that could be used in this way.

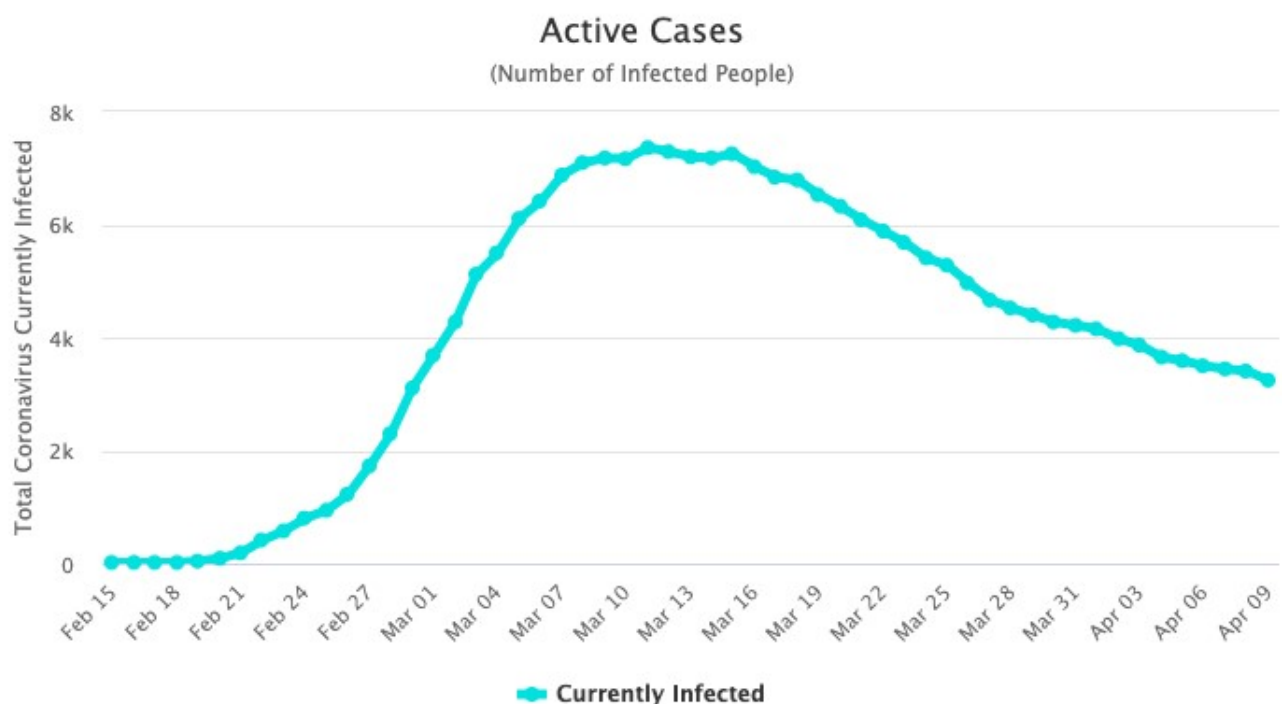
Direct surveys can provide richer data to learn more about what kinds of activity reduction are easy and acceptable for New Zealanders. This will allow the government to select the best mix of appropriate physical distancing measures for any phased return to normal or that might be needed for an extended time if the elimination process is prolonged. It appears from the Google mobility data that New Zealanders can relatively easily avoid retail and recreation activities such as food courts, museums, shopping centres, libraries and movie theatres (90% reduction). But while the coarse Google mobility data help, we could establish a clearer picture of what is essential activity for New Zealanders through online surveys. This would give us a richer understanding of the difficulties of the current control measures among a random sample of New Zealanders. Such surveys could also ask people directly about their contact patterns, which is useful for generating more valid parameters for use in disease modelling [5].

Looking to the future

How might we do even better in the future? As New Zealanders learn more about alternative ways of doing things, for example using video conferencing for work, doing shopping online, using telehealth solutions for online medical consultations, then surveys of the public could be repeated to track the evolving nature of what is essential activity and what can be easily done at a distance.

The Google mobility data from some Asian countries such as Taiwan and South Korea is enlightening. South Korea had shown a 2% *increase* in non-residential activity at 29 March. They also had an on-going decline in active cases at the same time.

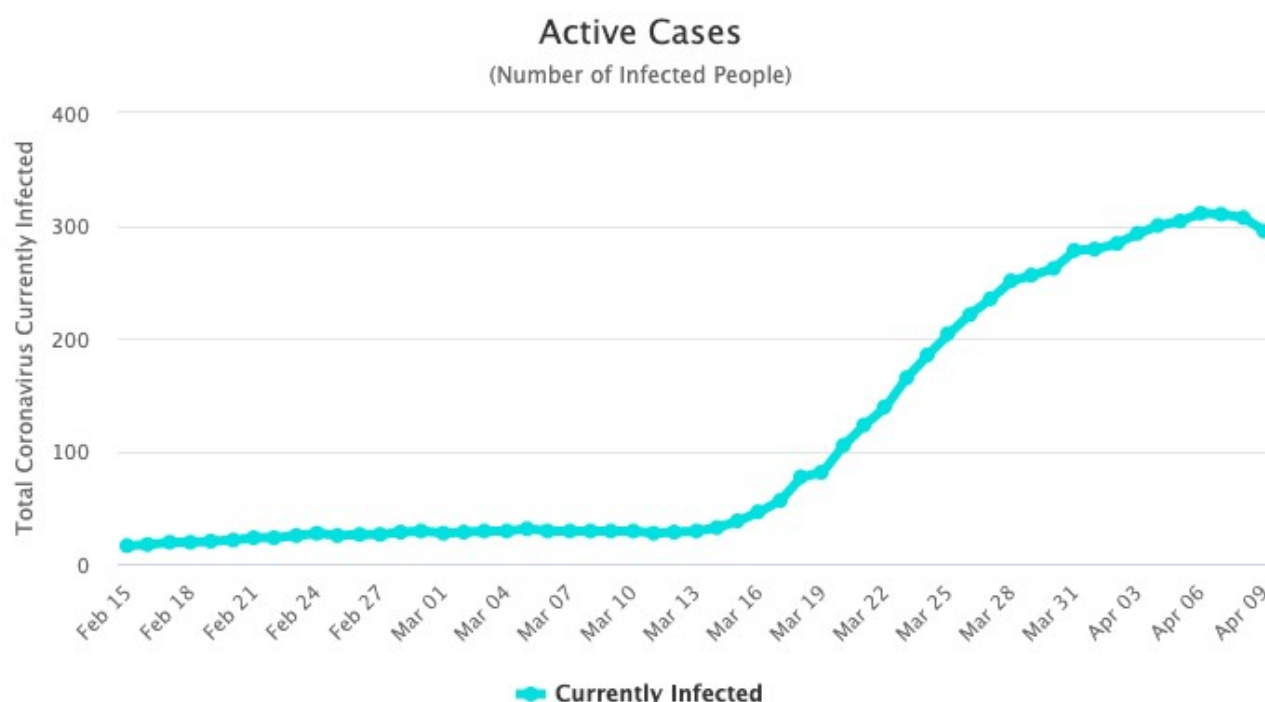
Active Cases in South Korea



Source: <https://www.worldometers.info/coronavirus/>

Taiwan with just a 3% reduction in non-residential activity at 29 March, similarly, seemed to have had pandemic spread under control.

Active Cases in Taiwan



Source: <https://www.worldometers.info/coronavirus/>

So, what was different in these two Asian jurisdictions? Taiwan used emergency powers very early on after the arrival of cases to identify high-risk travellers and restrict movement. As early as 31 December (the day the WHO China Country Office was informed on the new disease) arrivals from Wuhan were being temperature screened. By 29 January there was electronic monitoring of quarantined individuals [6]. Taiwan appears to have learned from its 346 confirmed cases of SARS in 2003 and acted incredibly swiftly with strong measures to quash COVID-19, without the need for lock-down. It is possible that the vice president of Taiwan, being a prominent epidemiologist, brought scientific rigour to the earliest stages of the response.

South Korea had learned about the importance of sufficient test kits following an outbreak of another coronavirus: a Middle East respiratory syndrome (MERS) outbreak in 2015. They had created a system for rapid approval of virus test kits with approval in weeks rather than one year. South Korean firms were already accredited to develop and sell test kits for COVID-19 with local production virtually ready when the first case arrived [7]. Also legislation that was passed after the MERS outbreak gave the government permission to access citizens' credit card and mobile data to facilitate contact and whereabouts tracing [8]. These measures and a range of others *already in place* by the time COVID-19 arrived, likely led to South Korea avoiding the massive costs of lock-down.

It is too late for New Zealand to return to the beginning of the global COVID-19 pandemic in January and respond differently, these lessons must remain for addressing future pandemics. But the lesson is that substantial preparation, and a very early and sustained response may be able to prevent the need for a lock-down in New Zealand again, eg, after

elimination of this current pandemic virus has been successfully achieved.

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