ISSN 2624-0106

Research Note

Lessons from East Asia's Covid-19 Containment

Leonard Hong with assistance from Joel Hernandez

25 May 2020

Introduction

Since the first cases of the Covid-19 virus emerged in the Chinese province of Wuhan, several East Asian countries including Singapore, South Korea and Taiwan have successfully 'flattened the curve' of infection rates. The three countries used common public policies in the first 50 days since each registered their 100th case.

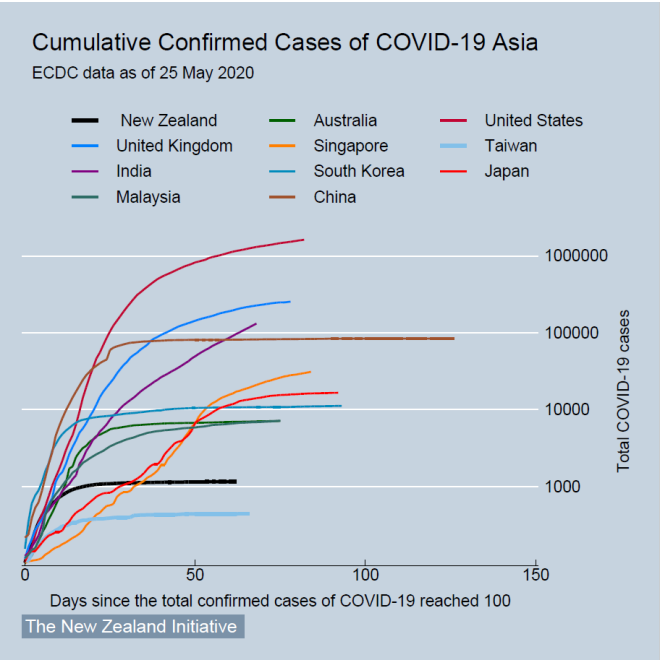
This report summaries how the three countries prepared for a pandemic to create the best possible position for dealing with Covid-19. It offers lessons for New Zealand's efforts to set up efficient epidemiological controls and tracking efforts to help fight any future pandemic.

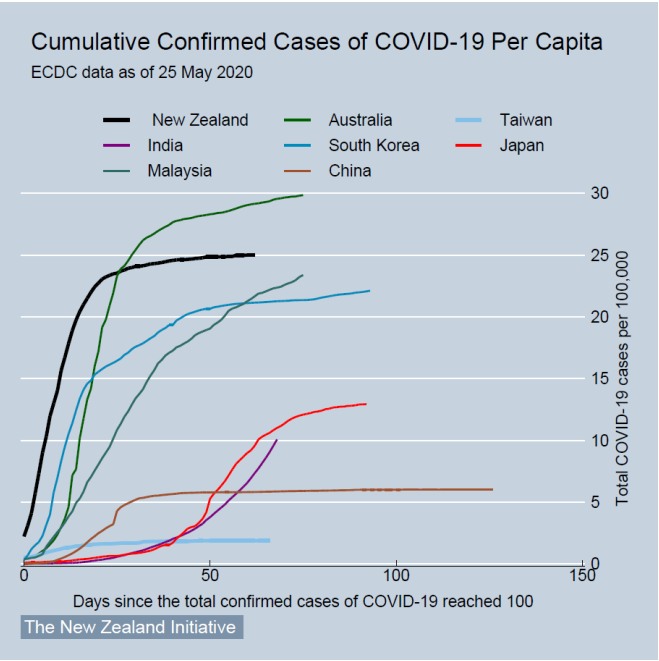
While the report notes some of the unexpected outcomes each of the three East Asian states, these do not negate the exemplary efforts in the early stages of a pandemic.

In the first 50 days of the Covid-19 pandemic, South Korea registered 10,450 total cases with 3125 active cases (which excludes recovered cases and deaths). To the south, Taiwan had 440 total cases and 73 active cases while Singapore had 6588 total cases and 5809 active cases by containing the virus in the wider community, but not for migrant workers living in unsanitary dormitories.

Using the metric of case fatality rates (CFRs) Taiwan, South Korea and Singapore have successfully reduced their figures to 1.6%, 2.4% and 0.08% respectively. By way of contrast, the CFR rates in the US, Italy and New Zealand are 6.0%, 14.2% and 1.4% respectively.

Figure 1 and 2: Cumulative confirmed cases of Covid-19 (L) and cumulative confirmed cases of Covid-19 per capita (R).

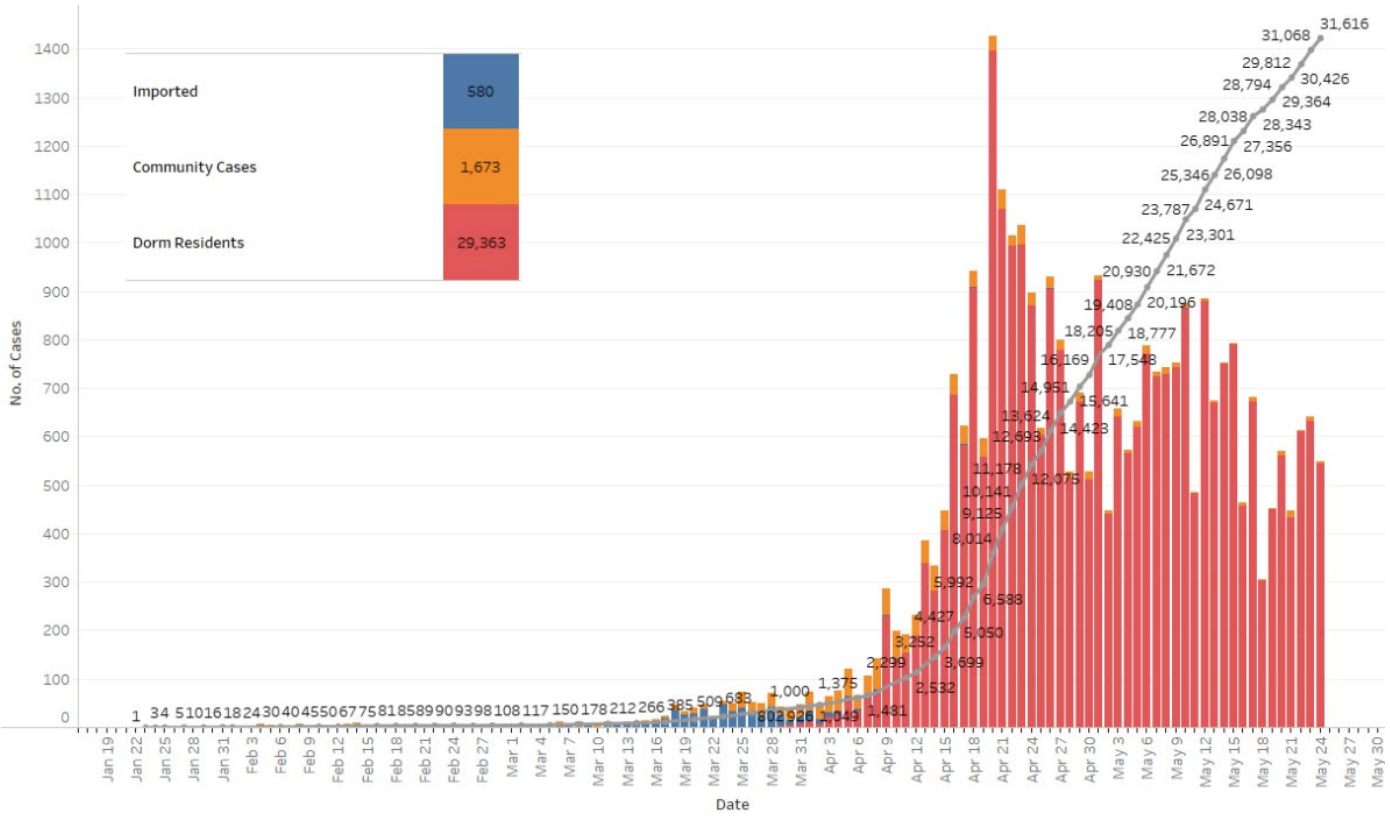




Singapore

In the beginning of the global pandemic, Singapore's containment strategy was praised globally. In both March and April, when many countries were going into lockdown, the city-state maintained an open economy before eventually being forced to switch to a lockdown — which its Government called a 'circuit breaker' — as a second wave of the virus emerged among sections of its migrant worker population.

Figure 3: Daily new cases in Singapore[i] (source: Singapore Ministry of Health).[1]



Singapore's containment policies

The city-state's most successful methods were its strict border restrictions, testing and rapid contact tracing.

The border controls included initial travels bans from hotspot countries such as China and Italy, and eventually a ban on all overseas travellers. For Singaporean citizens moving back home, a mandatory 14-day Stay-Home Notices were combined with severe consequences for breaking the rules.

To facilitate its open economy, Singaporeans followed social distancing rules and participated in regular temperatures checks in public spaces. A smartphone GPS tracking software developed by the

[1] As reflected in the graph, Singapore actually did very well, despite what the numbers tell us. The cases across the wider community are a tiny fraction of Covid-19 cases, in contrast to the numbers reflected in the foreign migrant dormitories. The blue reflects the imported coronavirus cases, the orange shows the internal Singaporean community transmission cases, and the red is for foreign dormitory residents.

Singapore Government, *TraceTogether*, received international praise and New Zealand has already adopted the technology blueprint for its own contact tracing app, although the two are different.[2]

Singapore's low CFR was largely a result of its world-class healthcare system. According to Bloomberg's Health Care Efficiency Index, Singapore's system ranked second in the world behind Hong Kong in 2018.[ii]

However, part of its early success was because of the lessons its Government learned from the 2003 SARS epidemic (Severe Acute Respiratory Syndrome). Following that outbreak, the Government invested in new healthcare facilities for infectious diseases, founded the National Centre for Infectious Diseases as a specific epidemiological medical research department and streamlined intergovernmental coordination.

Results:
While showing initial success in containing Covid-19, a mismanagement of some migrant worker communities did lead to a second wave of infection. Consequently, on April 20, Singapore's new daily confirmed cases peaked at 1426 with 1396 being migrant workers.

As of May 24, out of the 31,616 confirmed cases, 29,363 (93%) were related to migrant dormitory clusters,[iii] a more than hundredfold increase since the Initiative's first report on the city state in April.[iv] The outbreak caused considerable media attention. Former diplomat and National University of Singapore academic Tommy Koh called the conditions of the dormitories "third world" and "a time bomb waiting to explode" on April 7.[v]

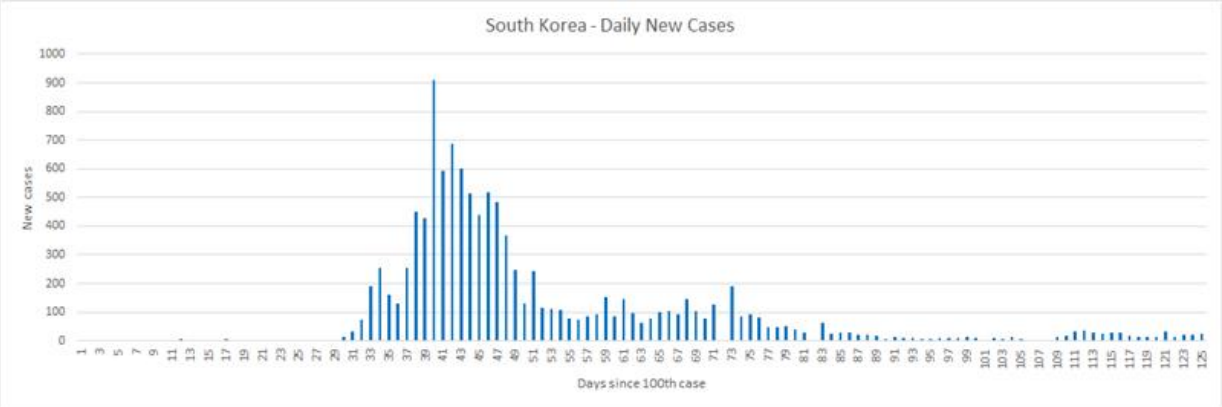
Consequently, the IMF projects the country to experience an economic contraction of 3.5% of all developed economies in 2020.[vi]

Promisingly, Singapore still has one of the lowest case fatality rates (0.08%) due to its robust precautionary measures of isolating riskier sections of the populace, such as over-65s and individuals with pre-existing health conditions, and speedy contact tracing of confirmed cases.

South Korea

South Korea was praised for quickly containing its Covid-19 outbreak and maintaining an open domestic economy without a lockdown.

Figure 4: Daily new cases in South Korea. (Source: ECDC data)



[2] NZ's application is different, as *TraceTogether* is Bluetooth based that requires your phone to have that app always open. NZ's Covid-19 app is just checking-in at locations.

South Korea's containment policies:
The South Korean Government employed mass high-volume testing, strict quarantine measures and rapid digital contact tracing using a nation-wide digital surveillance system.

Moreover, its encouragement for the public to regularly use masks, an extensive fumigation and disinfection of public spaces and world-leading digital epidemiological infrastructure were also contributing factors. These rapid responses effectively stopped greater community transmission.

South Korea did not enact travel bans but instead decreed Special Immigration Procedures such as temperature checks at the border, health questionnaires, enforced download of a Self-Quarantine Safety Protection smartphone app for all passengers arriving at an airport and stringent monitoring of passengers once they leave the airport.

It also created drive-through and walk-through testing programmes and some hospitals used a "glove-wall" contraption to test patients - the glove wall uses a clear Perspex divider to separate patients from the healthcare workers. South Korea quickly ramped up a testing capacity of up to 20,000 per day.[3]

Its Government also began local targeted suppression measures in Daegu City as recommended by Harvard's Edmond J. Safra Center for Ethics to help block any surprise emergence of a "super-spreader" case (an infected individual who infects more than the mathematical average).[vii]

For returning South Koreans, a 14-day GPS-monitored quarantine was mandated to ensure full compliance. The Government's centralisation of its "smart city data hub" system helped create fast public data information flows while the Korean Centre for Disease Control (KCDC) tracked possible cases on its digital surveillance system. Recently in May, as a supplementary contact tracing force, the National Police Agency also sectioned 8559 officers to a supplementary task force for tracking possible cases.[viii]

Like Singapore, South Korea's coherent Covid-19 response was enhanced due to its experience with the 2005 MERS pandemic (Middle East Respiratory Syndrome).

Results:
As of May 24, South Korea has 705 actives cases[ix] and one of the lowest CFR rates (2.4%). It also flattened its epidemiological curve without a national economic lockdown.

Consequently, the IMF projects the country to experience the smallest economic contraction (1.2%) of all developed economies in 2020.

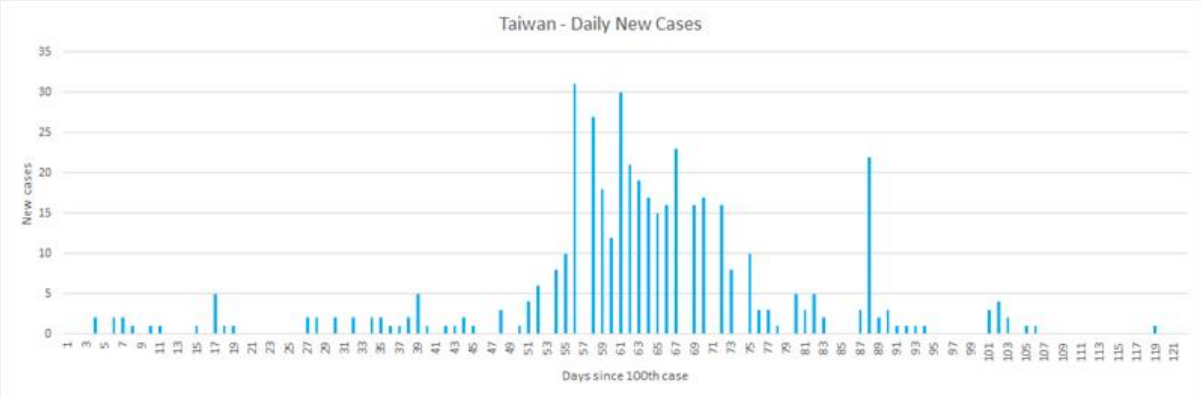
Although an infected Covid-19 individual has caused a new outbreak, South Korea's expansive digital surveillance contact tracing allowed the Government to track many of the newly infected within 10 minutes[x] with its five-person contact tracing teams for every 100,000 people.[xi] The fact that the outbreak didn't get out of control reinforces the efficiency of South Korea's epidemiological infrastructure and contact tracing institutions. According to US-based George Mason University professor of economics Alex Tabarrok, both South Korea and New Zealand are now in the retrospective "green zone" category in which fewer than one individual per 36,000 has Covid-19.

[3] Figure 6 in the appendix shows testing per capita.

Taiwan

Despite projections it would have the highest number of Covid-19 cases outside China, Taiwan's competent public administration steam-rolled its epidemiological curve and was deemed 'near perfection' by Stanford University professor Jason Wang.

Figure 5: Daily new cases in Taiwan (source: ECDC data)



Taiwan's containment policies

While the island-nation has not pursued mass diagnostic testing, its rapid early border restrictions implemented on December 31 and the strict monitoring of flights from Wuhan helped keep the total number of cases low. Taiwan focused on targeted diagnostic testing at hospitals and testing centres, early border controls, temperature screening, rapid digital contact tracing and quick isolation of infected individuals to quarantine zones.

Like South Korea, Taiwan encouraged wider public use of face masks (the public already had a culture of mask-wearing) and the regular disinfection and fumigation of public spaces. Also, like South Korea, Taiwan leveraged its strong epidemiological infrastructure which was constructed after the 2003 SARS epidemic.

On December 31, 2019, the Government acted early to set up protocols for screening arrivals specifically from China, well before other countries began border restrictions with China in late January. The Government eventually banned all overseas visitors on March 19 and set mandatory border quarantine for returning citizens.

The Government regularly monitored anyone under quarantine using a national integrated database system which consists of an individual's travel and medical history. It also has an open, real-time measurement of the Government's total supply of personal protective equipment (PPE). The database and surveillance were both critical to Taiwan's success in tracing susceptible individuals.

Results:

As of May 24, Taiwan has 20 active cases and has completely avoided a national economic lockdown. Consequently, the IMF projects Taiwan's economy to shrink by 4% in 2020. In contrast, New Zealand's economy is expected to dip by 7.2% this year.

Its early border controls on the virus contributed greatly to its overall success. Had the country enacted those policies perhaps a week later, it potentially would have had a different outcome. Fortuitously, at the time of the outbreak, Chen Chien-jen was acting as Taiwan's vice president. Chen is a trained epidemiologist and was minister of health during the 2003 SARS epidemic.

Conclusion

The three East Asian countries provide vital lessons for how New Zealand can build up its epidemiological infrastructure to prepare for the next global pandemic, without the need for a national lockdown. Taiwan and South Korea, especially, offer clear examples of what can be achieved if the correct health and epidemiological preparations are made.

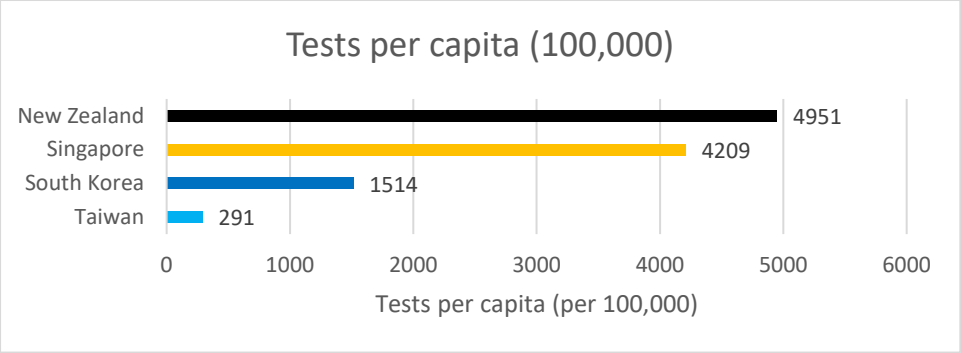
New Zealand's testing capacity[4] has improved drastically since it went into lockdown in late March, but its public health infrastructure is still underprepared for the next pandemic. As Otago University's senior lecturer in epidemiology Dr Ayesha Verrall stated, "New Zealand needs to be able to contact trace up to 1000 cases of Covid-19 – in case of a large outbreak in the next two years."[xii] Otago University professor of preventive and social medicine Dr David Skegg agreed that, like those East Asian countries, New Zealand should utilise its technological capacity for contact tracing.[xiii]

As New Zealand's economy prepares to reopen, it should consider enacting these policies:

- Mandate more significant contact tracing capacity and connect it to the National Close Contact Service (NCCS) data hub while avoiding the creation of a surveillance state;
- To make up for some technological deficiencies, it could create a contact tracing task force of a thousand people kept on standby to perform contact tracing services when necessary;
- Set up better epidemiological infrastructure in international ports of entry in anticipation of the Covid-19 international "bubble zones" proposed by a handful of coronavirus-free countries – which may include Taiwan;
- Encourage the public use of masks without undermining the supply of PPE for public healthcare workers – e.g. home-made cotton masks or purchases from overseas;
- Encourage Kiwis to diligently disinfect frequently touched areas in public spaces;
- Support greater international cooperation and encourage free trade with other well-managed Covid-19 countries such as Taiwan, Australia, and South Korea.

Appendix

Figure 6: Tests per capita (100,00)



[4] See *Appendix* for Tests per capita (100,000) numbers.

END NOTES

[i] Singaporean Ministry of Health. Situation Report – May 24, 2020. https://www.moh.gov.sg/docs/librariesprovider5/local-situation-report/situation-report-24-may-2020.pdf
[ii] Miller, Lee; Lu, Wei. These Are the Economies with the Most (and Least) Efficient Health Care. *Bloomberg*. September 20, 2018. https://www.bloombergquint.com/global-economics/u-s-near-bottom-of-health-index-hong-kong-and-singapore-at-top
[iii] Singaporean Ministry of Health. Situation Report – May 24 2020. https://www.moh.gov.sg/docs/librariesprovider5/local-situation-report/situation-report-24-may-2020.pdf
[iv] Hong, Leonard. Lessons from Abroad: Singapore's Covid-19 Containment Model. *The New Zealand Initiative*. April 8, 2020. https://nzinitiative.org.nz/reports-and-media/reports/lessons-from-abroad-singapores-covid-19-containment-model/
[v] Romero, Anna. Tommy Koh: The way Singapore treats its foreign workers is not First World but Third World. *The Independent*, April 7, 2020. http://theindependent.sg/tommy-koh-the-way-singapore-treats-its-foreign-workers-is-not-first-world-but-third-world/
[vi] International Monetary Fund. Singapore 2020 Projected Real GDP. Accessed on May 25, 2020. https://www.imf.org/en/Countries/SGP
[vii] Siddarth et al. Mitigate/Suppress/Maintain: Local Targets for Victory Over COVID. *Harvard's Edmond J. Safra Center for Ethics*. May 14, 2020. https://ethics.harvard.edu/files/center-for-ethics/files/16localtargets.pdf
[viii] 배준용. [속보] 정부 "경찰 8559명 투입. 이태원 클럽 방문자 1982명 추적". *Chosun News*. May 12, 2020. http://news.chosun.com/site/data/html_dir/2020/05/12/2020051201711.html
[ix] Worldometers. South Korea's Coronavirus Cases. Accessed on May 25, 2020. https://www.worldometers.info/coronavirus/country/south-korea/
[x] Seidel, Jamie. Covid 19 Coronavirus: South Korea hit by superspreader after bars opened. New Zealand Herald. May 12, 2020. https://www.nzherald.co.nz/world/news/article.cfm?c_id=2&objectid=12331182
[xi] Tabarrok, Alex; Ohlhaver, Puja. We could stop the pandemic by July 4 if the government took these steps A $74 billion investment in testing, tracing and isolation could rescue the economy — quickly. *Washington Post.* May 16, 2020. https://www.washingtonpost.com/outlook/we-could-stop-the-pandemic-by-july-4-if-the-government-took-these-steps/2020/05/15/9e527370-954f-11ea-9f5e-56d8239bf9ad_story.html
[xii] 'Dr Ayesha Verrall cautiously optimistic about contact tracing improvements'. *Radio New Zealand.* 20 April 2020. https://www.rnz.co.nz/national/programmes/checkpoint/audio/2018743380/dr-ayesha-verrall-cautiously-optimistic-about-contact-tracing-improvements
[xiii] Cheng, Derek. Covid 19 coronavirus: 700 close contact traces a day but still no use of Bluetooth tracking. *New Zealand Herald.* April 5, 2020.https://www.nzherald.co.nz/nz/news/article.cfm?c_id=1&objectid=12322565