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The changing COVID-19 situation in Taiwan – what can NZ learn from Taiwan's latest outbreak?

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We previously published an assessment of Taiwan's extremely effective response to COVID-19 during 2020. However, a recent surge of community cases in northern Taiwan from April 2021 onwards has resulted in an increasing mortality rate, with large scale restrictions imposed to bring the outbreak under control. This COVID-19 outbreak in Taiwan serves as a reminder to other jurisdictions, including NZ, of the threat posed by COVID-19 and its more infectious variants. We therefore recommend a range of short-term and long-term upgrades to NZ's pandemic defences that we believe the Government needs to consider.

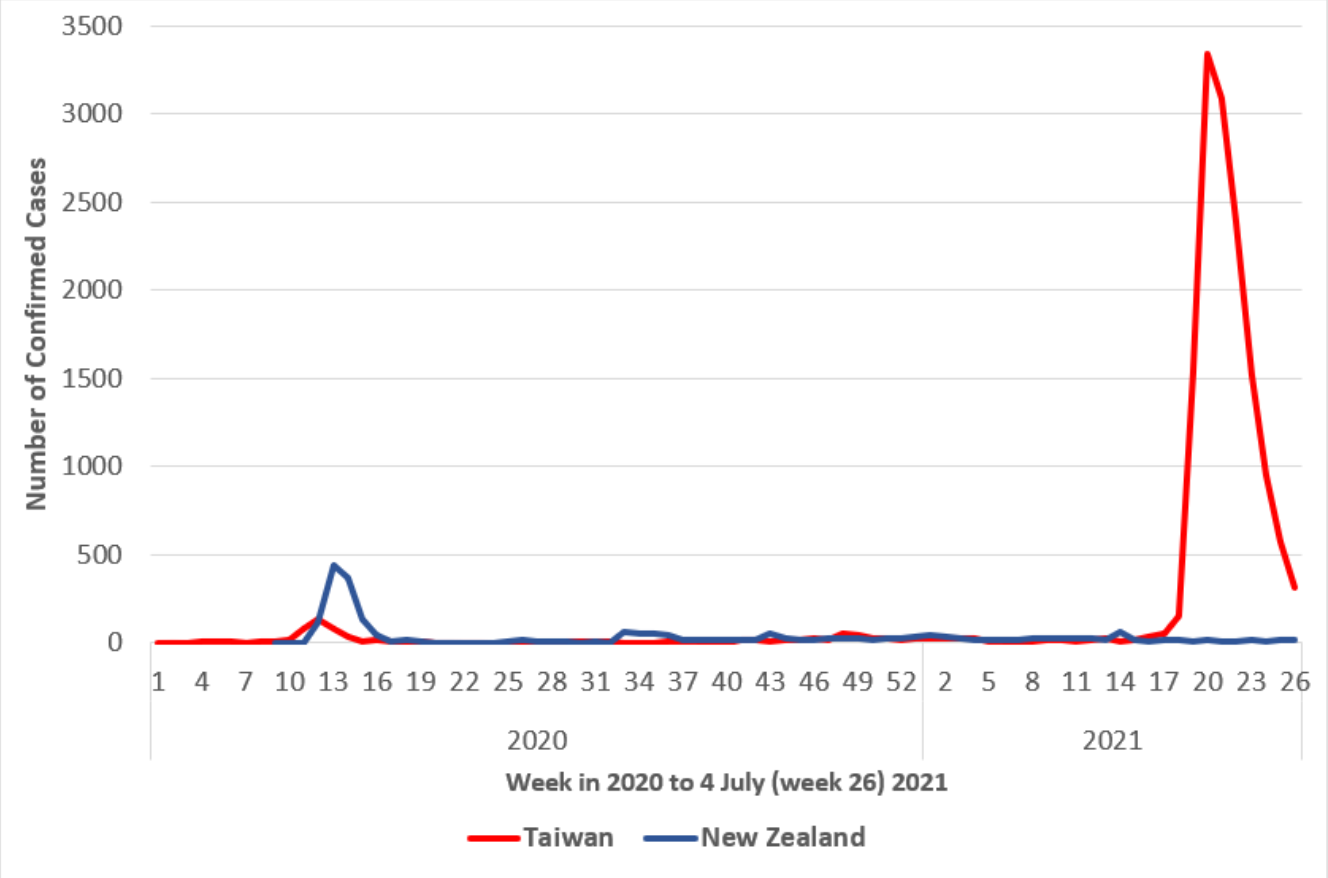
Taiwan learned from its experiences with SARS in 2003 and developed a comprehensive pandemic plan designed to be adapted to future emerging communicable diseases. Part of this pandemic plan involved building up the infrastructure and legal frameworks to deal with a pandemic. For example, Taiwan already had a Centers for Disease Control (CDC) and following the SARS epidemic, Taiwan established the National Health Command centre (NHCC) in 2004 which works alongside the CDC in response to emerging threats, such as pandemics.[1] Taiwan's response to COVID-19 started on 31 December 2019 when WHO was notified of pneumonia of unknown cause in Wuhan. Taiwan started screening passengers from Wuhan immediately and implemented comprehensive contact tracing, digital technologies for identifying potential cases, mass mask use, and clear quarantine rules.[1-3]

Our previously published review of the COVID-19 response in Taiwan and New Zealand (NZ) found that Taiwan's more extensive pre-COVID pandemic planning allowed for a more vigorous and timely response to COVID-19 compared to NZ in 2020.[4] Unfortunately NZ officials were reliant on our existing Influenza Pandemic Plan, as there was no plan for pandemics caused by other pathogens with different characteristics, and did not actively screen or restrict border entry until March 2020.[5] This focus also influenced NZ's slow development of contact tracing methods, which were not centralised until May 2020.[6, 7] By contrast, Taiwan was able to use both manual and digital approaches from January 2020 onwards, along with tracking travel histories to trace potential cases.[8]

Current outbreak details in Taiwan – epidemiological characteristics

In December 2020, Taiwan reported its first community COVID-19 cases since April 2020, ending a remarkably long period of no community transmission. Since then, Taiwan has experienced other outbreaks of COVID-19, such as an infected NZ pilot in December 2020, and the Taoyuan Hospital outbreak in January 2021. However, these outbreaks were relatively small compared to the current situation in Taiwan. Since April 2021, multiple clusters have occurred that have been connected to flight crew from China Airlines, and the Novotel Hotel (which was meant to be an exclusive quarantine facility) at Taoyuan International Airport (Taiwan's largest and busiest airport serving the capital city of Taipei). These outbreaks (potentially due to non-compliance with quarantine rules along with a shortened period of mandated quarantine for pilots) have resulted in a sharp increase in cases, far exceeding the levels observed in 2020, and far surpassing NZ's COVID-19 tally (figure 1). Taiwan does not perform whole genome sequencing of all COVID-19 cases (unlike NZ), however, it has identified the Alpha variant (B.1.1.7, originating in the United Kingdom) and more recently, the Delta variant (B.1.617.2, originating in India) which are both more transmissible compared to the original reference strain of SARS-CoV-2 (the virus that causes COVID-19) from Wuhan, China.[9]

Figure 1: Epidemic curve of weekly notified confirmed COVID-19 cases in Taiwan and New Zealand up to 4 July 2021 (week 26)[10, 11]



In terms of mortality in 2020, Taiwan reported a rate of 0.3 deaths per million, compared to NZ's 4.9 deaths per million. Since the new outbreak in Taiwan, the mortality rate has markedly increased (Table 1).

Table 1: Epidemiological characteristics of COVID-19 (confirmed cases) in Taiwan and New Zealand – data current to 6 July 2021

Jurisdiction	Cases (confirmed)	Total Deaths	Population (million)	Deaths per 1 million population	Reported cases per 1 million population	Case fatality risk
New Zealand	2407[12]	26[12]	5.1[13]	5.1	470.5	1.1%
Taiwan	15,088[14]	706[14]	23.5[15]	30.0	641.7	4.7%

What is the state of public health interventions in Taiwan?

Taiwan uses a four level epidemic alert system (broadly similar to NZ's 4 level alert system).[16] Initially, Taiwan officials activated a localised level 3 (the second-highest alert level) in Taipei and New Taipei in response to the April 2021 cases. However, this alert level was extended nationally on 20 May 2021. Under level 3, mask-wearing outdoors, social distancing, limits of 5 persons for indoor gatherings and 10 persons outdoors, and the closure of many business and public venues is required. To activate a level 4 in Taiwan (essentially a lockdown), 100 daily cases over a period of 14 days are required. A 'semi-level 4' lockdown in late June 2021 has been enacted in certain villages in Pingtung County "amid a local cluster infection involving at least six cases of the Delta variant of COVID-19".

However, Taiwan continues to avoid the use of a national lockdown (as the threshold has not yet been reached in the current outbreak), unlike NZ and Australia where strict (but often quite short) lockdowns in cities or states have previously been successfully used for disease control (albeit at a relatively high short-term economic cost).

Taiwan's COVID-19 vaccination programme began in March 2021 (NZ's began in February 2021) and vaccination rates in Taiwan continue to be lower than in many other high-income jurisdictions. Slow vaccine delivery has been attributed to the late start of the programme along with access/supply issues, which has resulted in officials proposing shortcuts to obtaining regulatory approvals for vaccines. Currently, only ~10.5% of the Taiwanese population has received at least one dose of Oxford-AstraZeneca or the Moderna vaccine (~0.2% fully vaccinated), compared to ~14.3% of the population in NZ receiving at least one dose of the Pfizer-BioNTech vaccine (~9% fully vaccinated). Given the significant COVID-19 outbreak in Taiwan and the ongoing tensions with mainland China regarding vaccines, other nations (ie, Japan, US) have committed to providing millions of additional vaccines to Taiwan.

COVID-19 testing capacity has been an ongoing issue in Taiwan. For example, when comparing testing rates, NZ currently has performed 476 per 1000 population tests compared to Taiwan's 59 per 1000 (as of 1 July 2021). However, until Taiwan's recent outbreak in April 2021, NZ had experienced more frequent and more substantial outbreaks (eg, as a result of quarantine system failures).[17] This difference may explain, in part, the higher per population testing rate in NZ. Taiwan's testing capacity is reported to be under strain,[18] with the testing capacity in May 2021 of 30,000 PCR tests per day. Taiwanese officials are now considering ' implementing rapid polymerase chain reaction (PCR) tests at COVID-19 hotspots nationwide to eliminate diagnosis delays', which can give results in ~20 minutes and may alleviate some of the testing burden and further enhance detection of unknown community outbreaks.[19]

What does this mean for NZ or other countries pursuing an elimination approach?

Employing an elimination strategy may reduce the 'negative health and economic effects of the COVID-19 pandemic',[20] and countries that have used this approach (eg, NZ, Taiwan, and Australia [although called 'aggressive suppression']) have experienced less morbidity and mortality than countries which have employed a "suppression" and/or "mitigation" strategy (eg, US, United Kingdom and Sweden).[4] However, maintaining elimination requires ongoing adaptation to the changing pandemic landscape.

The current COVID-19 variants of concern, recently relabelled by the WHO with letters from the Greek alphabet, serve as a reminder that the pandemic threat is continuing to evolve.[21] The reproduction number of the latest variant 'Delta' suggested to be around R0=5, which is substantially higher than the wild type of COVID-19: R0=2.9.[22] Worryingly, the Delta variant is becoming the dominant COVID-19 strain in many nations and recent evidence suggests that vaccines are also less effective against this variant.[23] This is part of the reasoning behind NZ officials placing Wellington, NZ, into Alert Level 2 at the end of June 2021, after a traveller visited from Sydney, Australia, who was found to have the Delta variant. Therefore, nations, whether using an elimination strategy or other strategies, must adapt their responses accordingly.

Taiwan had established an extensive pandemic framework prior to COVID-19. However,

some level of complacency seems to have taken hold, with relatively low testing rates/capacity when the new outbreak began in April 2021. Although Taiwan had wide-ranging border controls, they were not infallible, and this reality reminds us of the need for very rigorous and multi-layered protective measures at the border. Maintaining and improving existing contact tracing (using both conventional and digital solutions), testing capacity, and clear quarantine rules all add to a nation's defence against COVID-19.

We have previously made several recommendations for how NZ can enhance its COVID-19 response,[4, 24] and expand on these points further below. In light of the serious situation in Taiwan (and indeed Australia and Fiji), these changes have real urgency.

In the short term we recommend that Government:

- Regularly revise and update response measures based on new evidence and international experience (with changes documented on the Ministry of Health's website);
- Ensure all remaining border workers and their household contacts (Group 1) are fully vaccinated, and vaccination coverage of frontline health workers (in Group 2) is rapidly accelerated. Indeed, for some frontline health workers there is a case for making vaccination a requirement for undertaking certain roles (eg, working in Emergency Departments). Given the potential need for updated vaccine designs to address new variants, the Government could consider further negotiations with vaccine companies to allow for fast tracking access to any new updated vaccines.
- Review quarantine and testing rules for air crew and sea crew.
- Continue efforts to maximise the effectiveness of border control measures including MIQ processes (eg, to prevent people mixing in corridors, exercise areas and smoking areas, and further upgrading ventilation in MIQ facilities, or build new facilities – see below). At some point in the near future the NZ Government could require that all incoming travellers have evidence of having at least one dose of a COVID-19 vaccine.
- Further develop our contact tracing capacity using both conventional and digital solutions (eg, mandating QR code scanning and Bluetooth enablement when visiting potential high-risk indoor settings such as bars, night clubs and gyms).
- Update the Alert Level system which worked well in early 2020, but is urgently in need of a further upgrade given our improved knowledge of SARS-CoV-2 transmission and the need to make better use of low cost measures (such as increased mass masking) so that the risk of future lockdowns is minimised. Indeed, Alert Levels in NZ now need to be revised and calibrated to the risk of community transmission across the whole green-zone of quarantine-free travel with Australia. In these situations, particularly when highly transmissible variants are circulating in some Australian cities, additional control measures are needed in NZ to prevent or slow down potential unidentified outbreaks arising from quarantine-free travel.

In the long term:

- Consider establishing a CDC with the authority to coordinate a robust pandemic response across government ministries and departments; just like Taiwan enabled with their CDC.
- Commit to establishing discrete quarantine units, such as the Howard Springs Facility in Australia's Northern Territory.[17]
- Produce a readily adaptable pandemic plan – since we cannot rely on a plan that only fits a hypothetical influenza pandemic.[25]

In summary, Taiwan's serious COVID-19 situation serves as a reminder that even well prepared and organised jurisdictions can suffer large outbreaks. Nations like NZ that wish to maintain a successful elimination strategy for the foreseeable future must continue to revise and update response measures based on new evidence and international experience; optimise border/quarantine controls; ensure vaccination of all border workers and aircrew; revise our Alert Level system to include greater focus on reducing indoor and aerosol spread; and upgrade our contact tracing system by requiring universal use of tools like the COVID Tracer app in high risk indoor public settings.

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