PUBLIC HEALTH COMMUNICATION CENTRE AOTEAROA

NZ's "Team of 5 million" has achieved the lowest COVID-19 death rate in the OECD – but there are still gaps in our pandemic response

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NZ has now achieved the lowest death rate from the COVID-19 pandemic out of 37 OECD countries and appears to be the only one to succeed with elimination at a national level. But despite the success of the "team of 5 million" – there are

still a number of gaps in our defences. In particular, there is a need to upgrade: (i) border controls; (ii) the Alert Level system; (iii) the use of digital technologies to support contact tracing; (iv) testing & surveillance for early outbreak detection; (v) the kinds of policies, institutions and laws needed to sustain our world-class response.

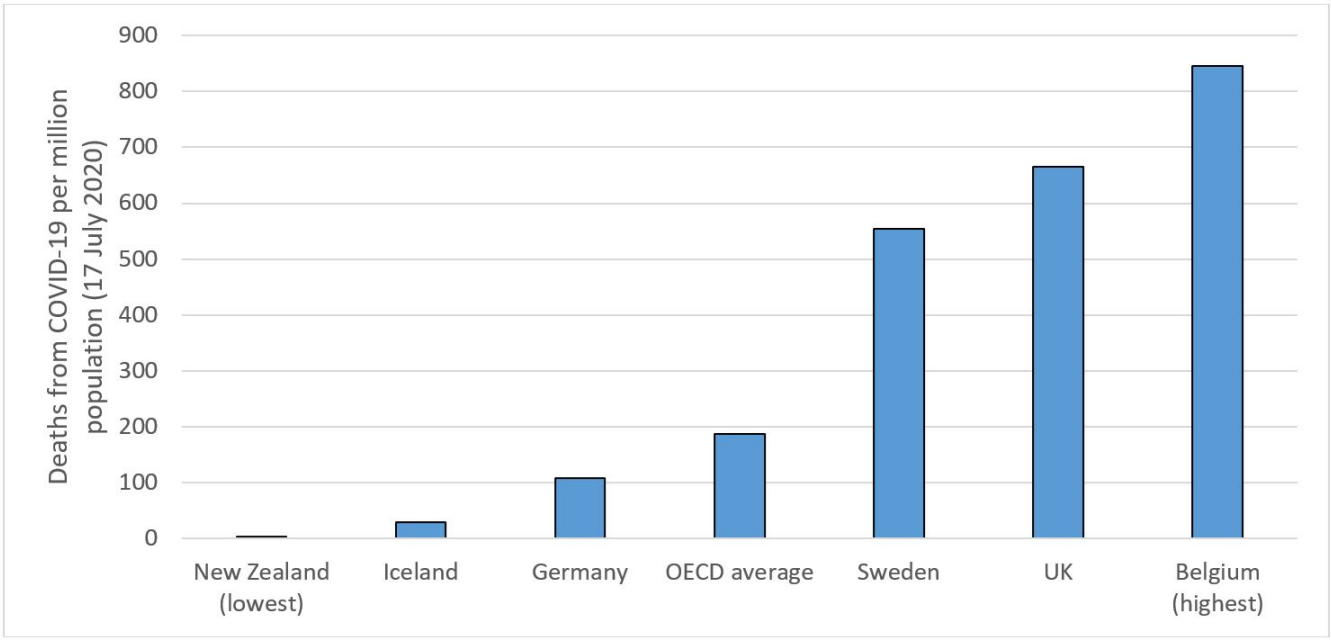
The OECD comprises a grouping of 37 relatively wealthy countries and so is frequently the basis for cross-country comparisons. We considered this grouping for the most important COVID-19 pandemic metric, which is probably having achieved and sustained elimination (ie, 28+ days of no cases from community transmission). NZ appears to be the only OECD country to have achieved this target, though Iceland is close with no reported domestic cases for over two weeks (ie, none since 2 July [1], as per 17 July).

The next most important pandemic metric is probably the cumulative death rate. Here NZ is lowest in the OECD at 4 deaths per million population (see Appendix 1, data for 17 July). This was 49 times lower than the OECD average (at 198 per million) and 20 times lower than the OECD median (79 per million), (see Figure). If NZ had experienced the OECD average death rate it would have had 990 deaths so far, but if it had the worst OECD rate (as per Belgium at 845 per million), it would have had 4200 deaths at this time.

Not only did NZ have a very low death rate from COVID-19, it appears that the weekly death rate for all causes declined during the lockdown [2]. This result was probably due to many factors but likely ones included reduced traffic crash deaths and reduced respiratory deaths (from both respiratory infectious diseases and reduced air pollution).

NZ has also had the third lowest rate of reported cases at 310 per million population (above Japan at 181 and South Korea at 267; as per 17 July). But this finding could partly be an artefact of the much higher level of testing by NZ (ie, at 87,700 per million population vs 4740 for Japan and 28,300 for South Korea – see Appendix 1).

Figure 1: Death rate from COVID-19 (per million population) in selected OECD countries.



Why was NZ successful?

The success of NZ is likely due to the relatively early use of border restrictions and the intensity of the "lockdown" measures. That is, the "stringency" of these control measures was the highest out of all high-income countries (peaking with a score of 96.3/100 but also dropping markedly in mid-May (move to Alert Level 2) to 36.1/100; with the equivalent scores for Australia being 73.2/100 and 64.5/100) [3]. Other success features were probably the quality and frequency of the Prime Minister's and Director General's communication with the public [4], which built public trust; use of science advice and modelling evidence by the political leadership; and advocacy by key business leaders. Rapid and cohesive government action is known to promote public confidence during a national crisis, and the NZ Government's decisive response may have contributed to the increase in sense of community and trust in NZ politicians that was observed during lockdown [5]. This increase in turn is likely to have been a factor in the NZ population's high adherence to movement restrictions, as demonstrated by telecommunications data [6]. Other advantages were the country's small population, the relative lack of overcrowding (including on public transport), and being an island nation that is not a major transit hub.

What remains to be done in NZ from a pandemic control perspective?

NZ is currently in a very favourable state having achieved elimination and with the economic impact of the pandemic being not as detrimental as might have been expected (eg, see the various Statistics NZ economic indicators here: https://www.stats.govt.nz/experimental/covid-19-data-portal). The post-elimination state for COVID-19 is new territory with little international experience to draw on, other than historical literature on past pandemics. It seems obvious to restate the need to avoid complacency. We can also adopt an evaluative culture of continuous quality improvement, the risk management maxim of learning from errors, and the health protection approach of building multi-barrier defences.

Here we list five important actions that are still needed to strengthen protection and improve the chances of controlling any outbreaks that arise from any future border control failures.

1. **Further strengthen the border controls.** This is currently underway by the NZ Government after several well-publicised events indicating inadequate systems and security. The managed quarantine and isolation system are described online. There is obvious potential to learn from any breaches or near misses here and overseas. For example, one potential security improvement would be to confine new arrivals to their rooms until their first negative test result was available after 3-4 days. Arrivals with substance addictions could be supported during that period (eg, nicotine replacement therapy for smokers). It would also be useful to assess the pros/cons of various wearable electronic devices for all those in isolation and quarantine (as used elsewhere eg, Hong Kong). There may also be a case for military and security personnel at these facilities to be given additional powers of detainment (as the police have), to increase their utility (albeit with appropriate additional training).
2. **Upgrade the Alert Level system.** This system needs to be upgraded to include masks at Alert Level 2 and above, as argued in this *NZ Medical Journal* article: [7]. It is disappointing that the Prime Minister missed yet another opportunity to raise the importance of masks if outbreaks occur in a recent speech on COVID-19 response planning [8]. NZ is now one of the few countries not to have mass mask use built into

its pandemic response (eg, when moving to higher Alert Levels). For example, public use of face coverings (mass masking) is now required by health authorities in Victoria Australia to help control their COVID-19 outbreak.

3. **Upgrade digital technologies to support contact tracing.** The NZ Government's favoured smartphone app for facilitating contact tracing (the "NZ Covid Tracer app") is widely described by commentators as not working appropriately (see Appendix 2). Therefore, there is an urgent need to either progress other options such as a Bluetooth-enabled smartcard system, or the South Korean approach of using telecoms data, or both (see Appendix 2).
4. **Continue to optimise methods for COVID-19 surveillance.** In the post-elimination stage, COVID-19 testing is almost entirely focused on minimising the risk of importing cases and detecting any outbreaks at the earliest possible stage. Testing is expensive, so it is worth investing substantial resources to optimise the approach used. It is also challenging to target in primary care settings during wintertime when there are many other cause of respiratory infections. One promising surveillance method is testing for the pandemic virus in wastewater. This approach is being explored in several jurisdictions internationally [9, 10] and could speed the time to early outbreak detection (eg, after a border control failure). Indeed, in the NZ setting, ESR has reported detecting the pandemic virus (SARS-CoV-2) in wastewater [11] and is continuing to develop this methodology. However, we would like to see much faster progress with a publicly available plan for roll-out for major cities in the near future.
5. **Review our response and plan for the next year.** As highlighted in this blog, the NZ COVID-19 response has been very successful. It has also maintained a high level of support from the public, scientific and business communities and avoided the kind of politicisation seen in some countries. Given the challenges of maintaining elimination, and the complex trade-offs that may be needed, it is time to review our response to date via an Official Inquiry and consider improvements to policies, institutions and legal arrangements. Part of this process should include ways of making the COVID-19 response policy options more transparent to the public so that the "team of 5 million" continues to understand the direction of travel and can critique it.

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Appendix 1: Key pandemic-related data for OECD countries

Table A1: Key COVID-19 pandemic data (ordered by increasing cumulative death rate from COVID-19 as per 17 July 2020; probable and confirmed cases and data from the Worldometer website: https://www.worldometers.info/coronavirus/#countries; with slight differences from other sources that just use confirmed cases).

Country in OECD	Total cases of COVID-19	Total deaths from COVID-19	Cumulative cases per 1 million (m) population	Cumulative deaths per 1 m population	Total tests per 1 m population
New Zealand	1,549	22	310	4	87,707

Country in OECD	Total cases of COVID-19	Total deaths from COVID-19	Cumulative cases per 1 million (m) population	Cumulative deaths per 1 m population	Total tests per 1 m population
Slovakia	1,965	28	360	5	43,525
Australia	11,235	116	440	5	131,329
South Korea	13,672	293	267	6	28,301
Japan	22,890	985	181	8	4,739
Latvia	1,185	31	629	16	94,362
Greece	3,964	194	380	19	38,642
Lithuania	1,908	79	701	29	175,026
Iceland	1,916	10	5,613	29	313,129
Czechia	13,682	358	1,278	33	57,358
Poland	39,407	1,612	1,041	43	49,838
Israel	47,459	392	5,160	43	153,507
Norway	9,018	255	1,663	47	73,226
Estonia	2,020	69	1,523	52	85,933
Slovenia	1,916	111	922	53	57,912
Finland	7,301	328	1,318	59	54,213
Hungary	4,293	595	444	62	31,343
Turkey	217,799	5,458	2,581	65	49,672
Austria	19,439	711	2,158	79	81,523
Denmark	13,173	611	2,274	105	225,568
Germany	202,025	9,159	2,411	109	82,159
Colombia	173,206	6,029	3,403	118	21,874
Portugal	48,077	1,682	4,716	165	138,644
Luxembourg	5,409	111	8,636	177	520,048
Switzerland	33,382	1,969	3,856	227	82,645
Canada	109,516	8,835	2,901	234	89,727
Mexico	324,041	37,574	2,512	291	6,063
Ireland	25,730	1,752	5,208	355	109,630
Netherlands	51,454	6,138	3,003	358	44,588
Chile	326,539	7,290	17,076	381	71,673

Country in OECD	Total cases of COVID-19	Total deaths from COVID-19	Cumulative cases per 1 million (m) population	Cumulative deaths per 1 m population	Total tests per 1 m population
United States	3,737,841	141,617	11,290	428	139,302
France	174,674	30,152	2,676	462	39,868
Sweden	76,877	5,593	7,610	554	67,494
Italy	243,967	35,028	4,035	579	101,795
Spain	307,335	28,420	6,573	608	128,892
United Kingdom	293,239	45,233	4,319	666	186,588
Belgium	63,238	9,795	5,455	845	123,281

Appendix 2: Extra detail on upgrading contact tracing with digital technologies in NZ

The NZ Government's favoured smartphone app for facilitating contact tracing (the "NZ Covid Tracer app") is widely described by commentators as not working appropriately (eg, by AUT Professor Dave Parry; by an AUT data analytics expert Dr Vaithianathan; by the tech entrepreneur Sam Morgan; by a CQUniversity academic Dr Mahmoud Elkhodr; and even by one of the contributors to this app's development, Alan Chew). To replace this smartphone app with a better system, there seem to be two plausible options that could be progressed in the NZ setting. Both are detailed further below.

1) **The Bluetooth-enabled smartcard ("CovidCard"):** This system involves providing citizens with a smartcard that when in close proximity to other such cards then exchanges the digital signature of the other card. It has had some favourable piloting work in the NZ setting where the card picked up "about 90 percent of close contacts and up to 10 percent of false close contacts, which were people too far away to be clinically considered a close contact" [12]. However, the Government has been criticised for not yet making a decision about using this system or not [12].

Advantages (relative to the South Korean style option below) are:

- Privacy concerns are sufficiently addressed as contact data are stored only on the card (not in the cloud or elsewhere), card identifiers continually change and can only be resolved by the approved authority and it does not track user location (ie, the card does not have GPS capability).
- It will potentially protect those who don't have a smartphone (eg, some low-income New Zealanders and some older people).
- It may provide more accuracy than the use of telecoms data.
- It could potentially be used in quarantine and isolation facilities to detect close contact between those detained there, and also close contact with staff (ie, as part of assessing quality control for these processes).

2) **South Korean style use of telecoms data:** This system has been used in South Korea where a law (developed after the experience with the disease MERS) allows such data collection by the Government during an epidemic [13]. So in NZ this approach would also require an enabling law that built in high levels of data security and privacy – and limited its use by the Government to epidemic control. It could be that for NZ this approach is limited to telecoms data and not include other digital data (eg, credit card and EFTPOS transactions) and that personal data were only available to officials (and not shared with likely contacts).

Advantages (relative to the smartcard option above) are:

- There is real-world experience suggesting that it works to facilitate contact tracing. Indeed, South Korea has been able to control large outbreaks (up to 850 new cases of COVID-19 in a single day) without lockdowns, albeit with a range of simultaneous pandemic control measures including high mask use [13].
- There is no requirement for people to carry anything special (ie, most people carry their smartphone when out of their home, anyway).
- It may ultimately be more successful in that the health authorities can check that contacts (who have been exposed to cases), are adhering to quarantine. (For the smartcard option above – the authorities do not know who has been exposed and it is up to individuals to make their own decisions about self-quarantine).
- There is no reliance on batteries (ie, the smartcard will need to be replaced every year or so).
- The system may be less expensive than the smartcard one (ie, no smartcards have to be produced). However, the final cost would depend on the associated workforce required to interpret the telecoms data.

Options considered by the NZ Government and rationale for including/excluding a particular approach should be provided as a publicly available report.

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