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Public Health Aspects of the Covid-19 Response and Opportunities for the Post-Pandemic Era

Abstract

This article takes a public health perspective on New Zealand's pandemic preparations, its pandemic response, and the successful outcome (as of June 2020) of its Covid-19 elimination strategy. The health outcome appears to be the best in the OECD, but some other countries made better use of certain control strategies. In the post-pandemic era there are many emerging opportunities for society to be gained by embedding better plans for controlling future emerging diseases, strengthening public health infrastructure and consolidating the evident benefits of reduced pollution during the lockdown.

Keywords Covid-19, SARS-CoV-2, pandemic preparedness, pandemic response, public health infrastructure

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New Zealand was the first OECD country to eliminate Covid-19 within its borders. Nevertheless, the pandemic, and the response to it, had a massive societal-wide impact on New Zealand. This article takes an initial public health perspective on the pandemic experience (up to mid-June 2020) and then considers the emerging opportunities for advancing health and environmental protection in the future.

Was New Zealand adequately prepared?

In 2019, New Zealand was given a poor assessment of its pandemic preparedness, with a score of only 54/100 on the Global Health Security Index. This score seemed reasonable when analysed by New Zealand authors in detail (Boyd et al., 2020), given New Zealand's poorly developed epidemiology workforce and underfunded public health infrastructure. Furthermore, New Zealand had done negligible work on refining the border control aspects of its pandemic plan, despite calls for this in preceding years (Boyd et al., 2017; Boyd

et al., 2018). Other problematic signs were the lack of any Ministry of Health evaluation of the New Zealand response to the 2009 influenza pandemic or of how the country had failed to prevent a resurgence of measles outbreaks (Baker, Wilson et al., 2020).

Furthermore, while New Zealand had a plan for pandemic influenza, this was fundamentally the wrong plan for the Covid-19 pandemic. The influenza pandemic plan did not have guidance for other pandemics or the lessons from previous coronavirus pandemics (e.g., SARS) around being ready for developing a new laboratory test and being able to massively scale up contact tracing systems. This inappropriate plan contributed to New Zealand initially following a mitigation strategy ('flattening the curve'), with a resultant delay before the more appropriate 'elimination' strategy was eventually adopted (Baker, Kvalsvig et al., 2020).

Comparative outcomes

New Zealand's control of the pandemic was extremely successful when compared to that of other high-income countries (as of 15 June 2020). At this time the country had experienced just 22 deaths (4.6 per million population), and was the only OECD country to have achieved the elimination of community transmission of COVID-19. In comparison, Belgium had 832 deaths per million, the UK 611, Spain 580, Italy 566, Sweden 481, the US 346, Canada 213, Iceland 29 and South Korea 5.4 (Ritchie et al., 2020). Nevertheless, comparing it with other relatively high-income jurisdictions outside the OECD, New Zealand performance (for mortality) was poorer than Taiwan's (0.3) and Singapore's (4.3).

The successful control measures taken by New Zealand are likely to have prevented the pandemic from exacerbating pre-existing ethnic inequalities in health – with this differential having been seen for Māori versus non-Māori in three previous influenza pandemics (Wilson et al., 2012). Indeed, the high health burden from infectious diseases among Māori and Pasifika peoples in New Zealand (M.G. Baker et al., 2012) is a persisting contributor to such inequalities.

Table 1: Key control measures used to address the Covid-19 pandemic threat in New Zealand (with these largely working synergistically)

Pandemic control measure	Comment
Border controls – restriction to New Zealand citizens	By making use of such border control, New Zealand made good use of its remote island status.
Border controls – self-quarantine and then supervised quarantine at the border	There was an initial period of no effective monitoring or supervision of the voluntary home quarantine due to the inflow of travellers being uncontrolled (i.e., no limits were set on arrivals per day). This lack of supervision is likely to have contributed to additional secondary cases in the New Zealand community.
Marked physical distancing induced by lockdowns (at alert levels 3 and 4), with travel limited to essential workers and essential activities	This intense lockdown was probably essential given that other control measures were not well developed in March 2020. But it has probably had high social and economic costs (see below).
Contact tracing, with detected cases isolated and contacts going into quarantine	An officially commissioned report published on 10 April was highly critical of the performance of New Zealand's contact tracing system (Verrall, 2020). Another indicator of the system's limited quality was that 38% of large clusters (6/16) had no known source (29 May data). The lack of details on contact tracing performance is also one of the many limitations of the Covid-19 data presented on the Ministry of Health's website (Purdie, Wilson and Baker, 2020).
Testing of symptomatic people in the community (including some modest level of testing asymptomatic people)	After an initial slow start, New Zealand did reach relatively high per capita testing levels. But as of mid-June 2020 there was still no published official surveillance strategy for Covid-19.
Promotion of hygiene (hand washing and cough etiquette) and staying at home when unwell	Mask use may be more important in many situations (e.g., in indoor environments such as public transport), and New Zealand performed poorly with its lack of requirements for mask use (Wilson, Febery et al., 2020).

Pandemic control measures

The key pandemic control measures taken by New Zealand are summarised in Table 1. A striking feature was the rapid introduction of a package of intense 'lockdown' measures with a level of 'stringency' that was the highest out of all high-income countries (peaking with a score of 96.3/100, but also dropping markedly in mid-May to 36.1/100, with the equivalent scores for Australia being 73.2/100 and 64.5/100) (Hale et al., 2020). The lockdown move was a strong political decision by the government led by the prime minister, Jacinda Ardern, who was noted for the quality and frequency of her communication with the public (Cousins, 2020). But this decision was informed by science advice and modelling evidence – for example, from

epidemiologists (Wilson, Telford Barnard et al., 2020), modellers (James et al., 2020) and economists (Pallippadan-Johny et al., 2020). A range of prominent business leaders (e.g., Sam Morgan, Graeme Hart, Rob Fyfe, Stephen Tindall and Rodney Jones) also gave strong encouragement for the government to act. The relatively high trust that New Zealanders appear to have in scientific experts and officials (such as Ashley Bloomfield, the director-general of health) may also have helped ensure the extensive public support for the control measures as reflected in surveys and media discourse.

Comparative disease-control performance

Despite the success of New Zealand's elimination, it is possible that it could still have done better if it had been more

prepared. Indeed, with the benefit of hindsight, it is possible that New Zealand could have applied more effective border controls at an earlier stage and could have avoided such a less stringent lockdown. For example, Taiwan avoided an intense lockdown with its much stronger focus on rapid introduction of intensive border control measures, use of digital contact tracing and use of face masks (Wang, Ing and Brook, 2020). Some other high-income nations also made better use of particular interventions, such as the speed of adopting testing and the scale of its use in, for example, South Korea and Iceland.

Health in the post-pandemic era

The border closure and lockdown measures have had major societal and economic impacts, along with the global downturn in international travel and tourism. These have increased unemployment, and potentially housing/food insecurity (albeit with government responses to help minimise these). Increased levels of unemployment are associated with increased suicide risk (Stuckler et al., 2009) and job insecurity is associated with increased risk of cardiovascular disease (Virtanen et al., 2013). But there is also evidence that the overall impacts from recessions on health can be beneficial (Tapia Granados and Ionides, 2017), since lives are saved by reduced road traffic crashes, reduced occupational injuries, reduced tobacco affordability and reductions in air pollution.

Likely post-pandemic upsides for public health are an increased focus by the government and society on prevention and building public health infrastructure. This is much needed after decades of under-investment, as revealed by outbreaks of measles (Baker, Wilson et al., 2020) and the disaster in Havelock North with the world's largest waterborne campylobacteriosis outbreak (Baker, Wilson and Woodward, 2017). Also, there might be a greater willingness by the Ministry of Health to plan for future pandemic threats arising, for example, from both emerging zoonoses and synthetic bioweapons (Boyd, Baker and Wilson, 2020). The focus on personal infection control measures (hand washing, cough etiquette, physical distancing, staying at home when sick) may result in

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lasting impacts on New Zealand's high rates of serious infectious diseases (M.G. Baker et al., 2012).

A 'green reset'

The forced experiment of the lockdown on New Zealand society has shown how much 'normal' life contributes to air pollution (Longley, 2020). Indeed, the country had the second highest reduction in its carbon emissions (at 41% reduction) out of a group of 69 countries (Le Quéré et al., 2020). The New Zealand experience has also (at least for some) given insights into the benefits of walking and cycling on near-empty streets, working from home,

using videoconferencing to replace travel, and even home vegetable gardening. The challenge will be to embed some of these things in the post-pandemic world; for example:

- the expansion of investment by some local governments in walking and cycling infrastructure in towns and cities;
- support for the more routine use of videoconferencing and working from home (at least for some of the week) by employers in particular sectors;
- the more routine use of online healthcare consultations for perhaps a majority of these events.

Fortunately, the government's Covid-19 economic recovery package included a \$1.1 billion investment in projects contributing to a 'green reset'. These projects include waterway restoration, pest control and various nature-based jobs. Restoring waterways will have potential health co-benefits given that run-off from agriculture is associated with elevated nitrate levels in waterways (a potential cause of bowel cancer when such water is extracted for drinking (Schullehner et al., 2018)) and with zoonotic pathogens in waterways. Pest control might also have health co-benefits in terms of preventing zoonotic diseases (Wilson et al., 2018).

However, one of the greatest opportunities provided by the post-pandemic economic crisis is the opportunity for tax reform. Government revenue is projected to decrease over the next two years, while there will be pressure to maintain social spending. 'Green' and 'health-protecting' tax reform could allow the government to maintain such spending while reaping health and environmental co-benefits. These tax reforms could include a fertiliser tax (Wilson et al., 2019), a pesticide tax and higher carbon taxes. Higher taxes could be imposed on harmful commodities, including those on tobacco, alcohol and gambling, and new taxes on sugary drinks and junk food. Somewhat surprisingly, some of these taxes can actually be pro-equity, as low-income people are more price sensitive; low-income people experience disproportionately greater disease reduction from the tax-related consumption changes (due to higher

background disease risk); and these taxes can allow for reductions in income tax for low-income groups. For example, it is well established in systematic reviews that tobacco taxes are pro-equity (e.g., Hill et al., 2013). Also, when tax revenue is recycled to the community, these types of taxes can sometimes be popular with a majority of the population, as with British Columbia's carbon tax (Demerse, 2014).

Finally, at the international level the New Zealand government could make more of its success in eliminating Covid-19 to help build desperately needed international cooperation. Indeed, New

Zealand could lead efforts for collaboration among other island nations (in the Pacific and more widely) and share lessons around the response to Covid-19. This is particularly relevant for border control issues, which give islands a natural advantage for pandemic response. A key focus should be on strengthening the World Health Organization, and on coordinating international efforts to improve surveillance of Covid-19 and to produce a vaccine against it. This focus should also include preventing new pandemic threats by strengthening the Biological Weapons Convention,

eliminating the wildlife trade and abolishing wet markets. Other global institutions, such as the United Nations, also need to be strengthened so that we can better tackle climate disruption and other catastrophic threats, the two most critical potentially being pandemics from synthetic biology and that posed by artificial intelligence (Ord, 2020). Each of these threats requires a coordinated international response, as they cannot be effectively managed by individual jurisdictions acting alone.

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