

New Zealand's pandemic response:

Best practice or just a practice run?

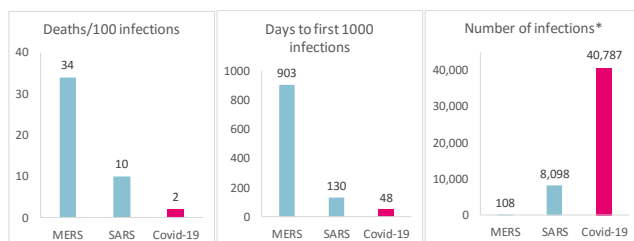
In “(Nearly) nothing to fear but fear itself”, a 2009 article for *The Economist*, French economist Olivier Jean Blanchard argued that in a crisis, policy makers should focus on reducing uncertainty: “*Crises feed uncertainty. And uncertainty affects behaviour, which feeds the crisis*”. Blanchard was writing about the global financial crisis, but his argument also applies to a threat of pandemic. In a world of extreme uncertainty, he wrote, the result is often extreme prudence and the adoption of “better safe than sorry” as the motto. So far, we have seen exactly this response to Covid-19.

Better information will reduce uncertainty

January 2020 saw the emergence of (what was at least initially believed to be)¹ the most significant pandemic threat since the emergence of the Middle East Respiratory Syndrome (MERS) in 2012, another coronavirus, with an alarming fatality rate but ultimately fewer infections over three years than Covid-19 has generated on some days. Prior to MERS, the Severe Acute Respiratory Syndrome (SARS) showed in 2002–2003 the importance of international collaboration and timely response to limit the impact of these highly infectious viruses.

By mid-February nearly 70,000 cases of Covid-19 had been confirmed in China and over 700 cases confirmed outside of China (Johns Hopkins University, 2020). The virus spread rapidly, surpassing SARS in total infections and speed, although not in severity (deaths per number of infections) as of yet (see Figure 1).

Figure 1 Covid-19 key statistics



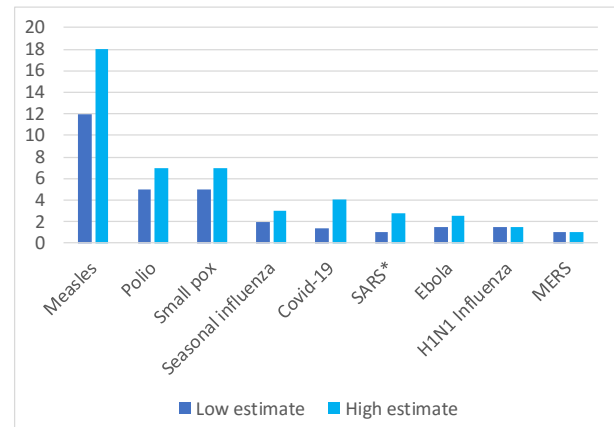
*As at 11 February, 2020

Sources: [Reuters Graphics](#), [Coronavirus Covid-19 Global Cases by Johns Hopkins](#)

So, the world is bracing itself again for a possible pandemic (at this stage it has been labelled a public health

emergency of international concern by the World Health Organization). There is still much that is unknown about Covid-19, particularly how it will spread outside China, how serious a pandemic of this type could be, and how long it will last. Scientists are scrambling to develop a vaccine and identify key variables relevant to how a country responds.

Figure 2 Estimates of Covid-19 R0 compared with other diseases



Source: Eisenberg, 2020²

One of these variables is known as R0 (“R naught”), a number that describes how many people an infected person is expected to pass the virus on to in the absence of any deliberate intervention (see Figure 2). Measles has a R0 value of 15, making it a highly infectious disease. Knowing the R0 value helps planners decide how aggressive the response needs to be: Should people be asked to self-isolate, for example, or be required to self-isolate? Should travellers be discouraged or banned? Should schools close or distribute hand sanitisers?

¹ This is now in question as severe outbreak with significant mortality rate appears to be confined to China.

² Credible modelling is beginning to point towards the lower estimate for Covid-19. See for example, Li et al. (2020).

Our government has responded to the uncertainty and fear generated by the looming threat of pandemic by imposing travel restrictions – essentially refusing entry to non-residents and non-citizens travelling from or through China – while asking returning residents to quarantine themselves for 14 days and register with Healthline. But what is the rationale for and evidence on travel restrictions? And what else could our government be doing?

Travel restrictions are not very effective

Travel restrictions could be justifiable on several grounds: If they are likely to prevent or reduce the impact of an outbreak; if they are likely to change the timing of an outbreak to allow a better response; or, similarly, if they allow us to protect neighbouring countries with weaker health systems.

Experience with travel restrictions, however, suggests they will do little to prevent or reduce the impact of an outbreak. For example, a 2011 study (Bajardi et al., 2011) of the effects of travel restrictions during the H1N1 pandemic that reduced air traffic to Mexico by 40 percent still failed to contain the virus. According to their analysis, even stricter regimes would have achieved at most a two-week delay.

Another study (Brownstein, et al., 2006) shows that the grounding of air traffic in the US after the 9/11 attacks had the effect of delaying the 2001–2002 influenza season by around two weeks.

Figure 3 Spread of Covid-19 across China



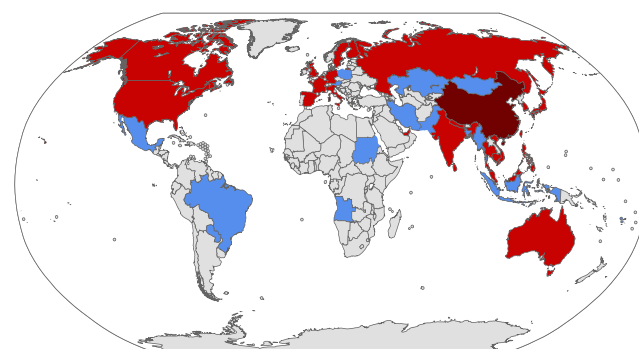
Source: Griffiths J and Murphy P. “Millions are living in isolation in Hubei province” CNN. 30/01/2020

A systematic review published in the Bulletin of the WHO (Mateus et al., 2004) reviewed evidence from 23 studies and found that “low-level restrictions – i.e. restrictions of

less than 70% (of air traffic) – were the least effective in containing the spread of epidemics between countries”.

Within China, despite significant efforts to limit movements, Covid-19 had spread far and wide by the end of January (see Figure 3). And despite many countries effecting travel restrictions, the virus has spread across Asia, Europe, North America and Australia, with suspected cases in South America and Africa (see Figure 4).

Figure 4 Spread of Coronavirus around the world



Outbreak map as of 7 February 2020. Dark red denotes country of origin; blue, suspected cases; light red, confirmed cases.

Source: Data compiled from the USCDC, NYT, and CNBC.

Original author: Pharexia - Map derived from BlankMap-World-Microstates.svg Data derived from The Centers for Disease Control and Prevention, New York Times, CNBC

But New Zealand is different. As a small island nation, we don't have the 'leaky' land borders that are typical of countries and districts that studies have typically been based on. So could New Zealand (and our Pacific Island neighbours) be an exception where travel restrictions might actually work?

In theory, the answer is likely to be yes. There is also historical evidence. For example, a strict seven-day compulsory quarantine imposed on all arrivals to New Caledonia successfully delayed the arrival of the 1918 flu influenza until 1921 (McLeod et al., 2008).

It is *possible* in New Zealand to put a stop to all incoming visitors or to reduce arrivals in a very controlled way. But in practice there is more than just a geographic dimension that is likely to impact on the effectiveness of these policies: There is also a time dimension. Travel restrictions in the Covid-19 context, were imposed weeks after the outbreak in China, allowing cases to have already arrived. Furthermore, our travel restrictions have been selective: They don't apply to New Zealand residents and citizens, thousands of which have arrived from China in recent weeks.

These issues highlight the importance of governments acting decisively. If travel restrictions are warranted by the

severity of a pandemic or outbreak, then they need to be imposed early and consistently to be effective even on an island. But governments hesitate because travel restrictions can be politically unpopular, so delays are to be expected, unless policy makers are armed with the most robust scenario-based evidence (including known and unknown viruses, as well as other, potentially catastrophic, risks).

Even if all we achieve is a slight delay, this can still be beneficial in some situations. It can give authorities some time to distribute vaccinations ahead of an outbreak, and it can prevent an outbreak occurring at the same time as the usual winter influenza season when health system resources are often stretched.

However, in this case, there is no vaccination. Although vaccination development is proceeding at pace, it will be months before a vaccination is ready to be distributed. Travel restrictions are unlikely to buy enough time. And our winter influenza season runs from June to October, not December to March.

The WHO has specifically advised against travel restrictions...

The World Health Organization (WHO), convened by the United Nations to provide leadership on health, develop and promote the use of evidence-based tools, and articulate evidence-based policy options to member states, has expressed opposition to travel restrictions at present. The WHO has reviewed the evidence of travel restrictions for preventing outbreaks of disease in a pandemic situation and concluded that they would offer little protection, at most delaying the inevitable, but not reducing the number of cases.

The International Health Regulations (2005) (WHO, 2016) specifically state that in pandemic situations countries should not enact policies to restrict the flow of people or trade and that if governments decide to do so, they must supply the health rationale and scientific evidence justifying such measures. It is not clear that our government has supplied any such evidence.

The WHO has also indicated concern about two other important effects: First, that travel restrictions can prevent flows of people and medical supplies destined to help with pandemic response, and secondly, that they can have significant negative economic effects that worsen the human impact of the pandemic. The first of these is not yet a concern, but if the coronavirus spreads and a pandemic develops, travel restrictions here and abroad may be politically unpopular to relax and this is when they may

hamper efforts to help. If a serious outbreak occurred in Niue, for example, where the potential for loss of life is greater than in New Zealand, travel restrictions that hamper the flow of medical personnel back and forth could have devastating effects.

...but is there ever a case for island states?

If we were facing a significant threat of severe morbidity and loss of life, most New Zealanders would likely agree that our government should not be concerned about the cost of pandemic response and should act fast without concern for cost.

But it is looking increasingly likely that Covid-19 is not the major threat that was initially feared. Scott Gottlieb, former commissioner of the US Food and Drug Administration, has indicated that the case fatality rate is likely to be much lower than what is being reported, due to widespread failure to diagnose milder cases (Griffiths, 2020). This makes intervention to prevent or reduce Covid-19 infections in New Zealand an appropriate question for economic analysis. For example, we might ask:

- How much are we prepared to pay to avoid getting sick?
- Would the savings to the health sector from travel restrictions offset the costs to the tourism sector?
- Would the benefits of reduced pandemic impact (on top of other health and social benefits) make additional investments in health and housing (crowding and pre-existing respiratory illness contribute to infection susceptibility) worthwhile from a cost-benefit point of view?

A New Zealand study of travel restrictions on an island nation in the context of pandemic threat (Boyd et al., 2017) found that such measures could result in societal net benefit. But the scenarios modelled for this result had significantly higher mortality rates than the current Covid-19 threat. The scenarios that represented a lower level threat had more mixed results. Some effects were not included, such as labour shortages in agriculture, where seasonal migrant workers are an important source of labour, and the distributional impact across sectors was not specifically modelled.

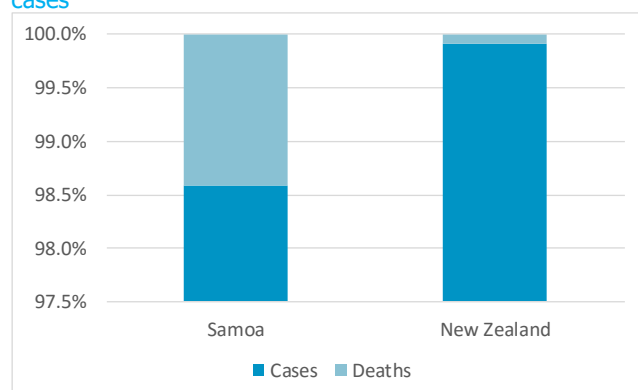
The results of this study are nevertheless indicative of the *potential* societal benefit of extensive travel restrictions, but more modelling is needed to understand the trade-offs and the distribution of impacts – essential information to inform decisions on our response to milder threats.

A strong health system is a crucial element of pandemic planning

Given that our travel restrictions are probably too late and too inconsistent to keep Covid-19 out of New Zealand, the best we can hope for is probably a delay before the virus begins to have an impact here. Travel restrictions that only buy a few weeks or even months won't help a country with a weak health system resulting from years of under-investment in key areas. An adequate and skilled health workforce, hospital wards, intensive care capacity and medical technologies can't be built up only when and if needed. Therefore our investments in the health system year-on-year are key to being prepared for a pandemic.

The strength of health systems is a key reason for the strong association between infectious disease mortality and GDP per capita. This association exists not just because of the ability to invest heavily in effective public health measures like sanitation, hygiene and vaccination, but also because of improved access to well-resourced health centres and hospitals with screening, diagnostic technologies, good access to drugs, a highly trained and specialised workforce, and intensive care capabilities that can prevent deaths even in those who become very ill. Primary and secondary prevention are a potent, even essential combination in a fight against a pandemic.

Figure 5 Measles' fatalities as a proportion of measles cases



Source: <https://www.rnz.co.nz/international/pacific-news/406802/two-more-deaths-from-measles-in-samoa-over-new-year-period>

We saw this in the 2019 measles outbreak: There were over 2,100 measles cases in New Zealand since January 2019, but only two deaths. When the measles outbreak hit Samoa, it caused 5,700 cases and 83 deaths, a fatality rate over 15 times that of New Zealand. Lack of immunisation drove the infections in both countries, but the difference in mortality is attributable to health care access and quality.

In cases where vaccination is not possible – such as Covid-19 – well-resourced health centres and hospitals play an even more important role in limiting the human impact of the outbreak through secondary prevention. Adequate investment to support screening, timely diagnostics, and treatment are essential and these are where richer countries with universal public health systems like New Zealand have an advantage.

New Zealand does have a pandemic plan

New Zealand's first pandemic plan was published in 2003 and was updated in 2017. So, we've had 17 years to think about this and to refine our plan through experience with previous pandemics. But how fit-for-purpose is our current plan?

This is a question that the Johns Hopkins Centre for Health Security and the Nuclear Threat Initiative have been exploring from an international perspective. In collaboration with The Economist Intelligence Unit, they have developed a Global Health Security (GHS) Index, which allows for the first comprehensive assessment and benchmarking of health security and related capabilities across 195 countries. The report, published in October 2019, reveals how well-prepared countries are to handle and epidemic or pandemic.

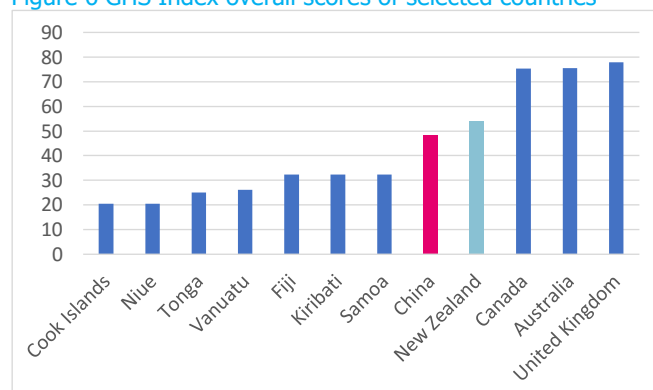
Overall, the GHS report reveals that fewer than 5 percent of countries score in the highest tier in rapid response to and mitigation of spread of an epidemic.

Our plan has significant weaknesses

New Zealand ranks 35th out of 195 countries. This earned us the label of a "more prepared" country, rather than a "most prepared" country. "More prepared" than whom? More prepared than Greece, Croatia, Albania and Turkey (they're just below us on the rankings). But we're less prepared than Hungary, South Africa, Lithuania and Poland (the countries just above us). So where are the countries we aspire to be like? Australia, Canada, the UK? They all score significantly above us, in the "most prepared" category. We are closer in score to China than to Australia (see Figure 6).

Another point to note, our neighbouring Pacific countries all score very low and rank amongst the "least prepared" countries in the world. Clearly there is a role for better prepared countries to assist them. It's just not clear that we are the best to do that.

Figure 6 GHS Index overall scores of selected countries



Source: NZIER, based on data from: GHS Index. "The Global Health Security Index. Building Collective Action and Accountability" October 2019

Across the six categories on which pandemic plans were evaluated (see Figure 7), New Zealand scored lowest on Category 2, Detection and Reporting. In particular, the GHS report raises concerns about our epidemiology workforce. A lack of government support for international training and concerns about the size of the workforce were key issues.

But our slightly better scores in other categories also hide some concerning weaknesses. One indicator that received a score of 0 (out of 100) was in Category 4, Health System. On this indicator, infection control practices and availability of equipment, the report states: "*There is no publicly available evidence of a plan, strategy, or similar document to address Personal Protective Equipment (PPE) supply issues for both routine national use and during a public health emergency in New Zealand.*"

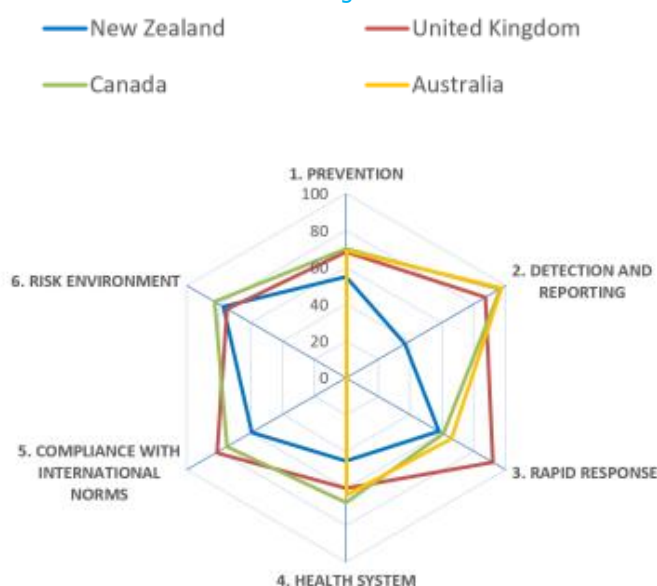
This is the very same equipment that the WHO has indicated is now in chronic shortage around the world (CBC, 2020). Our GPs have already begun raising concerns that they are not equipped to deal with a pandemic (Cardwell, 2020). China is a major producer of PPE (China's total market share is over 30% of the global medical device industry), and some manufacturers there have had to scale back production due to workers being affected by travel restrictions (Hufford and Evans, 2020).

Interestingly, within Category 3, we scored 100% on travel and trade restrictions because in the year before the report was written, New Zealand had *not* imposed any travel or trade restrictions or indicated any intention to do so in response to infectious disease. So, our score would actually

be lower now, in light of our government's decision to restrict travel.

Also in Category 3, we scored 0% on exercising response plans because we had not completed any simulation exercises or any identification of gaps and best practice exercise.³

Figure 7 New Zealand compared with Australia, Canada and the UK on six scored categories in the GHS index



Source: Global Health Security Report, 2019

But what can we do in the short term?

New Zealand runs a lean, mean health system with little spare capacity (Association of Salaried Medical Specialists, 2019). This is how we get good health outcomes at relatively little cost. But variations in health care demand can be difficult to manage in a system like ours. We see this in our hospital emergency departments during winter flu season, when high occupancy of hospital beds creates a blockage that interferes with safe and efficient flow of patients. Hospitals can only handle so much of this pressure before patients are put at risk.

If our travel restrictions are only going to delay the arrival of a Covid-19 outbreak, potentially to coincide with seasonal influenza, it may be prudent to take steps to minimise this risk. This was the message of another study (Epstein et al., 2007) which found that although travel restrictions could provide a small delay, interactions with seasonality could result in a larger epidemic peak and more infections overall. Innovative solutions like Hospital at

³ The GHS report is compiled on available evidence of countries' preparedness. There is a possibility that evidence was not made available.

Home and emergency department diversions provide options for short term investment that would free up hospital beds and may help prevent viral spread within our hospitals.

Another important task is ensuring that there are appropriate policies and procedures across our health system to protect our health workforce to the extent possible. This was one of the key lessons learned from the SARS epidemic (WHO 2003). Policy makers might consider restricting sales of whatever PPE stock there is in New Zealand to health professionals. Ultimately, we will need to depend on our health workforce and we may also want to deploy many of them to the Pacific Islands to assist those countries to respond.

Finally, the travel restrictions imposed by many governments have generated negative externalities that need to be minimised. News media outlets are reporting that pandemic fear is bordering on xenophobia and racism. People of Asian descent living in the US, Canada, Britain, and Italy have reported many incidents of racial discrimination at school, at work, and in other public places (Ma, 2020). Similar reports can be found across New Zealand news sites (see for example Leahy 2019). Government can work to reduce uncertainty and fear, the root causes of these behaviours, by communicating clearly about evidence-based practices and behaviours that minimise infection risk and by showing that decisions are being made based on good evidence.

Lessons for future pandemics

We may be lucky with Covid-19: Any outbreak of this virus that occurs in New Zealand may well be relatively easy to contain, affect fewer people than anticipated, and avoid the loss of life that is the worst impact of a pandemic. If this is the case, it will nevertheless have served as a warning or test case for how we may respond when a truly severe pandemic presents itself.

New Zealand needs to address its epidemiology workforce issues with better international training and increased numbers. And all of our health workforce needs to be prioritised for protection, with this ensured by maintaining adequate stocks of PPE for a range of possible threats and scenarios.

If we want to go against WHO recommendations on travel restrictions in future (on the basis of better effectiveness for island nations), we should be ready to back up such a decision with evidence. Compliance with international norms supports international transparency and cooperation – essential elements of a global response to

pandemics. Evidence would also help our government act fast and decisively if in fact closing the borders is warranted by and needs to happen very quickly to be effective.

Using evidence and modelling to optimise pandemic response

The likely economic and social impacts of travel restrictions and other interventions could be quantified using NZIER's Computable General Equilibrium (CGE) model. This type of analysis would allow policy makers to identify the cost of travel restrictions and the distribution of impacts, for example across the tourism sector (China generated 12 percent of New Zealand's international visitors in 2018 (Tourism New Zealand), the tertiary education sector (up to half of our international tertiary students are Chinese (Lock 2020)) and the ripple effects across the wider economy. This is one way in which economics can add to scientific evidence to provide the best possible evidence base for policy to ensure maximum reduction of morbidity and mortality at minimum cost.

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