

Improving our pandemic preparedness: Counterfactuals and continuous quality improvement

15 April 2025

Michael Baker, Adele Broadbent, Amanda Kvalsvig, Nick Wilson

Summary

Phase two of the Royal Commission of Inquiry into the Covid-19 pandemic is asking New Zealanders to comment on how pandemics should be responded to in future. One approach is to think about strategic decisions and their counterfactuals. That means comparing our experience of using an elimination strategy for almost two years with what is likely to have happened if we had followed the conventional path taken by most countries. There is considerable evidence favouring elimination for pandemics that have similar or greater clinical severity to Covid-19.

We can also draw on growing evidence about interventions that worked well and those that need to be improved or delivered more effectively in the next pandemic. For example, receiving Covid-19 vaccines before being exposed to the virus greatly improved outcomes. And N95 respirator masks are highly effective at stopping airborne pathogens but were underused in Aotearoa New Zealand (NZ). There is a lot to learn and put in place given the increasing threats of pandemic diseases.

[Phase two of NZ's Covid-19 Inquiry](#) is focused on people's experiences of pandemic measures during 2021-22, providing an opportunity for those who faced hardship during that period to articulate their perspectives.

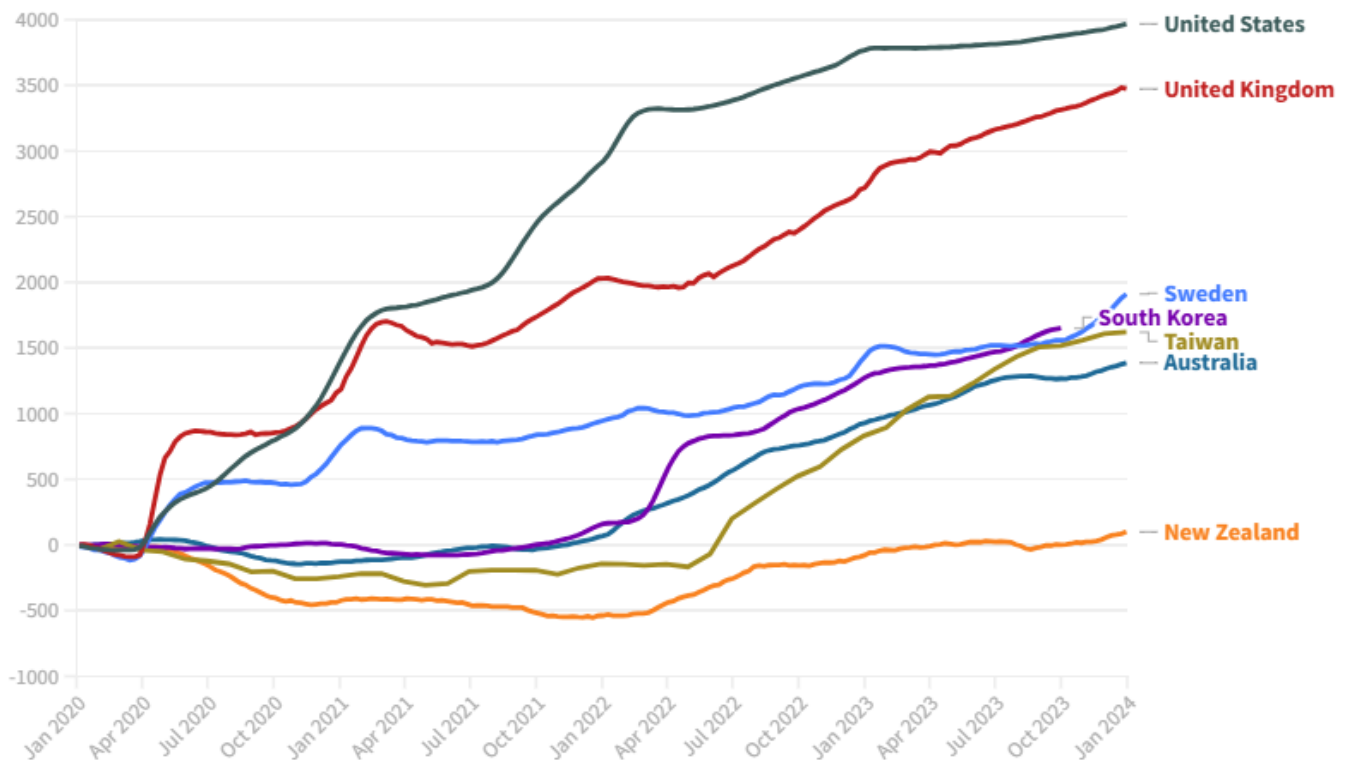
As we reflect on these experiences, it is essential to also consider the counterfactual—this is the thought experiment of what might have happened if NZ had taken a different path.¹ Rather than imagining a world without the pandemic, a more realistic comparison comes from looking at how other countries managed it differently. NZ chose to use an elimination strategy from March 2020 until December 2021, allowing time to achieve high vaccination coverage. The country transitioned through a brief suppression phase to mitigation in February 2022.²

We can consider counterfactuals in a range of ways, including quantitative measures such as excess mortality and the personal stories of people living in NZ and those in other countries. The first phase of the Covid Inquiry has already heard and acknowledged many of these personal accounts, reaffirming that [NZ's response was highly effective in preventing illness and death](#).

A key measure is excess mortality, where NZ sustained very low mortality throughout the 2020-22 period (Figure 1). More comprehensive analyses have also confirmed that countries like NZ that pursued elimination achieved markedly lower excess mortality during 2020-21 than countries that followed different approaches.³

Figure 1. Excess mortality (all cause) per million people, 2020-2023

The cumulative difference between the reported number of deaths since 1 January 2020 and the projected number of deaths for the same period based on previous years.



Source: Our World in Data, Covid-19 Inquiry Lessons Learned Summary report

phce

Jurisdictions that used mitigation/suppression responses to the pandemic offer stark counterfactual experiences. The UK is a well-documented comparison, partly because of the country's extensive [Covid-19 inquiry](#) ([see Appendix](#)).⁴ The British Medical Association also [reported](#) on the devastating impact of the pandemic on UK health care delivery.⁵

The Phase 2 Inquiry has a particular focus on “...key decisions made by the New Zealand Government in 2021 and 2022 in the following areas:

- Vaccines, including mandates, approvals, and safety
- Lockdowns, especially the lockdowns of late 2021
- Testing and tracing technologies (like RATs or the COVID-19 Tracer app), and public health materials (like masks).”

We highlight evidence related to each of these areas below.

The role of vaccines

The inquiry has asked for views on vaccines, including mandates, approvals, and safety. While opinions are divided on these issues, there is a strong evidence base on several of these questions:

- The vaccines used in NZ (mainly the Pfizer mRNA vaccine) [are effective](#) at reducing the risk of infection, serious illness, death and [Long Covid](#).^{6 7}
- Use of these vaccines in NZ is estimated to have saved 6,650 lives and prevented 45,100 hospitalisations during the period January 2022 to June 2023.⁸

- The mRNA vaccine is very safe. However, feedback from the public shows that it is important to strengthen safety surveillance of every Covid-19 vaccine used in NZ and [communicate these findings](#) in a transparent way.⁹
- We also need comprehensive measures to achieve high vaccine coverage and health equity in all facets of our response.¹⁰

Lockdowns

Lockdowns ('stay at home orders') were used in NZ and other countries pursuing elimination as a tool to stamp out Covid-19 outbreaks and maintain elimination. This use was very different from countries pursuing suppression/mitigation. In these countries, lockdowns were used for long periods to reduce case numbers and avoid overwhelming the health system.

By using 'lockdowns' for generally short periods to help maintain elimination during 2020-21, NZ maintained average levels of restrictions that were lower than most countries taking a suppression/mitigation approach.²

Maintaining the elimination strategy throughout 2020 and 2021 provided NZ with more time to achieve high vaccine coverage and is likely to have saved lives.¹¹ The timing of the transition to mitigation in February 2022 meant that NZ avoided widespread infection with the Delta variant, which had a markedly higher hospitalisation and case fatality risk than Omicron which followed.¹² But there were serious trade-offs, particularly for the Auckland region which experienced a prolonged lockdown.

Testing, tracing, masks and ventilation

NZ made extensive use of technologies to support its elimination strategy. Available evidence suggests that these measures could have been used more effectively.

Evaluation of tracing technologies (Covid Tracer App, Bluetooth, QR-codes) showed that they generally performed poorly. Uptake was high, but the data they generated were not well linked to contact identification and control measures.¹³⁻¹⁵

NZ was slow to respond to early evidence about the importance of aerosol transmission of SARS-CoV-2 in indoor environments.¹⁶ This lack of engagement probably contributed to NZ being slow to adopt masking despite increasing evidence about the effectiveness of respirator style masks (notably N95).^{17 18} This position may have undermined NZ's ability to gain rapid control of the Delta outbreak in late 2021.¹⁹

Conclusion - the urgent need to improve pandemic preparedness

Modelling suggests pandemics of the scale of Covid-19—or worse—have about a 20% chance of occurring every 10 years.^{20 21} Therefore, lessons learnt from NZ's experience with Covid-19 are vital to guide a strong, evidence-informed plan for combatting the next pandemic.

There are many key areas where we need to learn and build on insights from the pandemic. Most were covered by the Phase one report so work to implement improvements can begin immediately. The Phase two investigation can hopefully expand on that evidence base. We also need to maintain and build the critical infrastructure needed to support an effective response.²²

What this Briefing adds

- When considering different policy options, such as how we respond to pandemics, it is useful to think about counterfactuals. For example, when reviewing NZ's pandemic response (elimination) we can compare our experience with countries such as the UK which took a different approach (suppression/mitigation).
- Measures such as excess mortality show that countries like NZ, which pursued elimination, had little or no excess mortality during 2020-21, saving thousands of lives. The reported stories and evidence from people living in countries with poorly controlled pandemics also help us to understand the consequences of these alternative scenarios.
- Reviewing evidence about the technologies used to support Covid-19 control (eg contact tracing, mask use) shows that we need to improve our delivery of these measures in future pandemics. We also need comprehensive approaches to achieve high vaccine coverage and health equity in all facets of our response.

Implications for policy and practice

- Given the ongoing risk of future pandemics, NZ needs to start implementing the recommendations of the Phase one report now, and strengthen our essential public health workforce and infrastructure.

Make a submission

New Zealanders are encouraged to make submissions on Phase Two of the Covid-19 Inquiry [here](#). **Submissions close on 27 April.**

Author details

[Prof Michael Baker](#), Director, Public Health Communication Centre, and Department of Public Health, Ōtākou Whakaihu Waka, Pōneke - University of Otago, Wellington

[Adele Broadbent](#), Communications Lead, Public Health Communication Centre, and Department of Public Health, Ōtākou Whakaihu Waka, Pōneke - University of Otago, Wellington

[Assoc Prof Amanda Kvalsvig](#), Research Associate Professor of Public Health, University of Otago

[Prof Nick Wilson](#), Co-Director, Public Health Communication Centre, and Department of Public Health, Ōtākou Whakaihu Waka, Pōneke - University of Otago, Wellington

Appendix: Understanding counterfactuals - Stories from the UK Covid-19 experience

Excerpts from the British Medical Association's report [COVID-19: Impact of the pandemic on healthcare delivery](#). Published on BMA website, 18 September 2024.

This report focussed on the impact of the Covid-19 pandemic on the delivery of healthcare across the UK.

First wave (Feb 2020 - Sept 2020)

...This shortage of staff necessitated redeploying staff to high-need services to help maintain a base level of service provision across critical and emergency care.

Other measures included asking retired and non-practicing doctors to return, enabling medical students to join the health services early and establishing volunteer programmes for the public.

...A lack of system capacity meant all but the most urgent of non-COVID care had to be cancelled, including many cancer treatments. This created a mounting backlog which exacerbated pressures in later waves and likely had a significant impact on patients' mental and physical health.

In an attempt to free up capacity, hospitals were encouraged to discharge patients into care homes or their own homes. At the time testing for COVID-19 was not widely available and, even where tests were available, many people were discharged without being tested - a mistake that likely led to the deaths of many.

"Everyone is doing their best given the situation but there simply aren't sufficient staff or beds to care for patients adequately. It's been heart-breaking to see patients develop avoidable complications such as pressure sores or have delayed diagnoses due largely to lack of staff."

—GP Contractor/Principal in Scotland

Second wave (Sept 2020 - Apr 2021)

Record numbers of patients were admitted to hospitals, the number of ambulances held outside hospitals or diverted elsewhere was rapidly worsening, and A&E waits skyrocketed. Increasing staff absences further reduced capacity, which impacted on patient care and pushed services into dangerously unsafe levels of staffing.

"With the workload now higher than at any time on record, we are drowning. We do not have extra staff to deal with the extra patients we are seeing. The only change is staff are having to work harder and for longer. It is breaking people."

—Consultant in England

Third and fourth waves (May 2021 to present)

While cases of COVID-19 remained high throughout summer 2021, the exponential growth of the Omicron variant pushed the delivery of the vaccination programme to new heights through the swift delivery of third dose and booster vaccinations.

....Amid (false) media and UK Government narratives about GPs not being open for business, primary care staff faced increasing levels of abuse from patients and, in some cases, sadly violence.

A selection of personal reflections from [Every Story Matters: The UK Covid-19 Inquiry](#). Published on September 9, 2024.

This was the second report published by the UK Covid-19 Inquiry. This report and the inquiry website record details of experiences of the UK healthcare systems during the pandemic. The UK inquiry includes 10 modules to be released between 2022 to 2027.

"All three of us who went for training became ill... with Covid-19 symptoms. Another friend and I (all nurses and paramedics) improved but within two weeks our other friend was dead, found by paramedics at home alone after calling for help because at the time people were getting advised not to travel to hospital. She was 29 years old and died alone."

—Healthcare professional

"Everything was shut down, they were overrun with patients...they stopped everything, people died because of not getting their appointments, and not getting their treatment, and not going and getting checked for more lumps, like myself."

—Hospital patient

"My husband was taken into hospital and basically written off because of age and other conditions... he was negative for Covid and he was put on a ward where it was rife. We were not allowed to visit, had no idea of what was happening. He passed away and I received a phone call at 3:15am telling me he had gone."

—Bereaved family member

"You just couldn't get through to anybody, you couldn't talk to anybody, we were all ringing for an update... my father rang daily for her [grandmother] to be released to us... We have everything set up here [at home]. She even had an electric bed, we had wheelchairs and everything for her. We could have helped her."

—Carer for an elderly family member

"We were being made to play God in deciding on who went to ITU – who was given a change to live and who wasn't."

—Hospital nurse

"It was like a war zone, overnight 18 people became Covid-19 positive with nowhere to isolate them. They were dropping like flies, it was awful. You can't underestimate what this did to nursing staff, not being able to offer comfort to patients was soul destroying."

—Nurse with Long Covid

"I don't think I've come back to 100% of how I normally was. It takes its toll. But it's almost like having this piece of paper, that's nice, and flat, and straight, and then you've crumpled it and then you try and straighten out that piece of paper again. It's still creased up, no matter how much you try and straighten it out."

—Paramedic

References

1. World Health Organization. WHO evaluation practice handbook: World Health

Organization 2013.

[https://www.who.int/publications/m/item/who-evaluation-practice-handbook-\(2013\)](https://www.who.int/publications/m/item/who-evaluation-practice-handbook-(2013))

2. Baker MG, Kvalsvig A, Plank MJ, et al. Continued mitigation needed to minimise the high health burden from COVID-19 in Aotearoa New Zealand. *New Zealand Medical Journal* 2023;136(1583):67-91. <https://doi.org/10.26635/6965.6247>
3. Boyd M, Baker MG, Kvalsvig A, et al. Impact of Covid-19 Control Strategies on Health and GDP Growth Outcomes in 193 Sovereign Jurisdictions. *medRxiv* 2025:2025.04.08.25325452. <https://www.medrxiv.org/content/medrxiv/early/2025/04/10/2025.04.08.25325452.full.pdf>
4. UK Covid-19 Inquiry. Module 1 Report – The resilience and preparedness of the United Kingdom. <https://covid19.public-inquiry.uk/documents/module-1-full-report/>
5. British Medical Association. COVID-19: Impact of the pandemic on healthcare delivery. <https://www.bma.org.uk/advice-and-support/covid-19/what-the-bma-is-doing/covid-19-impact-of-the-pandemic-on-healthcare-delivery>
6. Potter JD, Baker M, Ingram J. Covid-19 vaccines still protect us: How do we get the best out of them? *Public Health Expert Briefing* 2024;1 Aug <https://www.phcc.org.nz/briefing/covid-19-vaccines-still-protect-us-how-do-we-get-best-out-them>
7. Potter JD, Baker M, Kvalsvig A. Long Covid Update—a threat that continues to demand a strong response. *Public Health Expert Briefing* 2025;Mar 6. <https://www.phcc.org.nz/briefing/long-covid-update-threat-continues-demand-strong-response>
8. Datta S, Vattiato G, Maclaren OJ, et al. The impact of Covid-19 vaccination in Aotearoa New Zealand: A modelling study. *Vaccine* 2024;42(6):1383-91. <https://www.ncbi.nlm.nih.gov/pubmed/38307744>
9. Petousis-Harris H, Paynter J, Chisholm H, et al. Robust vaccine surveillance shows safety – we need to communicate this better. *Public Health Expert Briefing* 2024(19 September) <https://www.phcc.org.nz/briefing/robust-vaccine-surveillance-shows-safety-we-need-to-communicate-better>
10. Curtis E, Jaung R, Paine S-J, et al. Examining the impact of COVID-19 on Māori:non-Māori health inequities in Aotearoa, New Zealand: an observational study protocol. *BMJ open* 2024;14(3):e083564. <https://bmjopen.bmj.com/content/bmjopen/14/3/e083564.full.pdf>
11. Boyd MJ, Baker MG, Wilson N. Global Health Security Index Scores are associated with Covid-19 Pandemic Health and Macroeconomic Outcomes. *medRxiv* 2024:2024.09. <https://www.medrxiv.org/content/10.1101/2024.09.02.24312964v1>
12. Relan P, Motaze NV, Kothari K, et al. Severity and outcomes of Omicron variant of SARS-CoV-2 compared to Delta variant and severity of Omicron sublineages: a systematic review and metanalysis. *BMJ Glob Health* 2023;8(7). <https://doi.org/10.1136/bmjgh-2023-012328>
13. Chambers T, Anglemeyer A, Chen AT, et al. An evaluation of the COVID-19 self-service digital contact tracing system in New Zealand. *Health policy* 2024;144:105073. <https://www.ncbi.nlm.nih.gov/pubmed/38657315>
14. Chambers T, Anglemeyer A, Chen A, et al. An evaluation of the population uptake and contact tracer utilisation of the Covid-19 Bluetooth Exposure Notification Framework in New Zealand. *Aust NZ J Public Health* 2024;48(6):100197. <https://www.ncbi.nlm.nih.gov/pubmed/39500072>
15. Chambers T, Anglemeyer A, Chen A, et al. Population and contact tracer uptake of New Zealand's QR-code-based digital contact tracing app for COVID-19. *Epidemiol Infect*

- 2024;152:e66. <https://www.ncbi.nlm.nih.gov/pubmed/38629265>
16. Morawska L, Cao J. Airborne transmission of SARS-CoV-2: The world should face the reality. *Environment international* 2020;139:105730. <https://doi.org/10.1016/j.envint.2020.105730>
17. MacIntyre CR, Chughtai AA, Kunasekaran M, et al. The role of masks and respirators in preventing respiratory infections in healthcare and community settings. *BMJ* 2025;388:e078573. <https://www.ncbi.nlm.nih.gov/pubmed/40015737>
18. Greenhalgh T, MacIntyre CR, Baker MG, et al. Masks and respirators for prevention of respiratory infections: a state of the science review. *Clin Microbiol Rev* 2024;37(2):e0012423. <https://www.ncbi.nlm.nih.gov/pubmed/38775460>
19. Kvalsvig A, Wilson N, Chan L, et al. Mass masking: an alternative to a second lockdown in Aotearoa. *New Zealand Medical Journal* 2020;133(1517):8-13. <https://www.ncbi.nlm.nih.gov/pubmed/32595216>
20. Marani M, Katul GG, Pan WK, et al. Intensity and frequency of extreme novel epidemics. *Proceedings of the National Academy of Sciences* 2021;118(35):e2105482118. <https://doi.org/10.1073/pnas.2105482118>
21. Karger E RJ, Jacobs Z, et al. . Forecasting Existential Risks Evidence from a Long-Run Forecasting Tournament: . *Forecasting Research Institute*; 2023 <https://forecastingresearch.org/s/XPT.pdf>
22. Baker M, Kvalsvig A, Tukuitonga C, et al. The Covid inquiry report is an excellent guide to preparing for the next pandemic-health cuts put that at risk. *Public Health Expert Briefing* 2024;Dec 5 <https://www.phcc.org.nz/briefing/covid-inquiry-report-excellent-guide-preparing-next-pandemic-health-cuts-put-risk>



Public Health Expert Briefing (ISSN 2816-1203)

Source URL:

<https://www.phcc.org.nz/briefing/improving-our-pandemic-preparedness-counterfactuals-and-continuous-quality-improvement>