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[Chapter 1 Cases and deaths]
[Chapter 2 One pandemic; three strategies]

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New Zealand's COVID-19 elimination strategy

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Compared with the mitigation and suppression approaches of most Western countries, elimination can minimise direct health effects and offer an early return to social and economic activity

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On 23 March 2020, New Zealand committed to an elimination strategy in response to the coronavirus disease 2019 (COVID-19) pandemic. Prime Minister Jacinda Ardern announced that on 26 March, NZ would commence an intense lockdown of the country (the highest level of a four-level response framework¹). At the time, NZ had just over 100 COVID-19 cases and no deaths, so this “go early, go hard” approach surprised many. However, there were compelling reasons for NZ to pursue elimination.²

In this article we describe why an elimination strategy made sense for NZ, the distinguishing features of this approach, some of the challenges and how they can be overcome, and where we go from here.

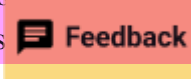
Elimination and other strategic choices

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Until early March 2020, the NZ response to COVID-19 followed the existing pandemic plan, which was based on a mitigation approach for managing pandemic influenza.³ The plan includes steps designed to slow entry of the pandemic, prevent initial spread and then apply physical distancing measures progressively to flatten the curve and avoid overwhelming health services. Because pandemic influenza cannot be contained (except by extreme measures such as total border closure), there was a presumption that case- and contact-based management would fail and the country would inevitably progress to widespread community transmission of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).

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Most Western countries across Europe and North America were following the mitigation approach. However, it was performing poorly, with COVID-19 cases overwhelming health services. These countries were then switching to a suppression strategy.⁴ This strategy involved intens



Q and travel restrictions (lockdowns) to suppress virus transmission. A few countries were continuing with a version of mitigation labelled “herd immunity”, by which they planned to manage the rate of infection in such a way as to avoid overwhelming the health care system and build up enough recovered and likely immune people in the population to ultimately interrupt virus transmission. This approach proved difficult to manage and was largely abandoned (except perhaps by Sweden).

Most low and middle income countries could do very little to manage the pandemic except by applying limited mitigation measures. Vietnam was a notable exception, implementing stringent control measures including quarantine, contact tracing, border controls, school closures and traffic restrictions while case numbers were still low. A number of island states, such as Samoa, Tonga and the Cook Islands, adopted an exclusion approach, primarily by closing their borders to incoming travellers.

By early March the evidence base for elimination was growing, with the increasing realisation that COVID-19 was markedly different to pandemic influenza in terms of its transmission dynamics.⁵ A watershed moment was the report of the World Health Organization joint mission to China, which confirmed that the pandemic there had been contained even after widespread community transmission had commenced.⁶ There was also strong evidence for early success of the elimination approach in Taiwan,⁷ Hong Kong⁸ and South Korea.⁹

The concept of elimination is well known to infectious disease epidemiologists.¹⁰ It refers to the reduction of the incidence of a disease to zero in a defined geographical area. While absence of disease is the ultimate goal, elimination criteria for highly infectious diseases such as measles allow for occasional outbreaks or imported cases, provided they are stamped out within a defined time period.¹¹ By contrast, eradication means that the incidence of a disease has been reduced to zero at the global level, at least outside laboratories.

There is no established definition for COVID-19 elimination. Preliminary thinking suggests that such a definition would need to include a defined period of absence of new cases (perhaps 28 days, which is twice the maximum 14-day incubation period).¹² This definition would also require a high performing surveillance system and would exclude cases infected outside the country and detected in new arrivals while under isolation or quarantine.¹² By late July 2020, NZ had experienced no instances of community-based transmission for more than 80 days and could be considered to have attained elimination. This status can take weeks or even months to achieve, and countries could potentially move in and out of this state depending on their success in containing the pandemic.

Benefits and costs of elimination

At the time NZ chose an elimination strategy, the exact nature of this response and its full justification had not been articulated. The health impact of a poorly contained pandemic had been modelled using a range of scenarios,¹³ demonstrating clear health gains if a widespread pandemic could be prevented in NZ. There was also a concern to avoid repeating the catastrophic impact of previous influenza pandemics on Māori and to protect neighbouring Pacific Islands.¹⁴

The net economic consequences of an elimination strategy were uncertain and extremely difficult to estimate. An additional challenge was that both the pandemic and its response were likely to have a disproportionate impact on disadvantaged populations. While an elimination strategy would have huge

Q economic and social costs, the alternatives (suppression and mitigation) would almost certainly have been far more damaging because of the need to continue costly physical distancing measures until a vaccine or other intervention became available.

An advantage of a successful elimination strategy was that it would provide a medium term exit path for a return to domestic economic activity without the constraints of circulating SARS-CoV-2. Neither mitigation nor suppression provide a firm exit strategy, particularly given major uncertainties about coronavirus immunity and the potential for ongoing epidemic transmission for months to years under some scenarios.¹⁵ As with all COVID-19 strategies, the ultimate exit path will depend on developing effective vaccines and therapeutics.

Components of elimination and their implementation

Elimination requires an array of control measures tailored to local needs and to the transmission characteristics of the organism concerned. For COVID-19, the major components are similar to those used for pandemic control more generally. The main difference is the intensity and timing of their application ([Box](#)).

Box 1

Components of pandemic control and features that distinguish an elimination strategy from mitigation and suppression

Pandemic control system component	Feature that distinguishes elimination from mitigation and suppression
Planning, coordination and logistics	Potentially increased to manage intense elimination measures, including dedicated agencies, infrastructure and trained public health workforce
Border management, including exclusion, quarantine	Increased intensity is critical to creating and sustaining elimination
Case, contact and outbreak management, including case isolation and contact tracing and quarantine	Increased intensity is critical to creating and sustaining elimination, including expanded testing capacity and contact tracing systems and workforce
Disease surveillance, including high volume laboratory testing and sentinel surveillance	Increased intensity is critical to creating and sustaining elimination, including strong emphasis on rapid, sensitive case identification and additional methods to confirm elimination
Physical distancing and movement restriction at various levels (up to lockdown)	Ability to introduce early and intensely to suppress community transmissions and outbreaks
Public communication to improve hand washing, cough etiquette, mask wearing, physical distancing	Potentially increased to communicate intense elimination measures
Protecting vulnerable populations	Similar, but duration will be shorter if elimination is successful
Primary care capacity	Adapted to increase testing capacity
Hospital capacity (eg, expansion of intensive care unit and ventilator capacity)	Similar, but duration will be shorter and demand less intense if elimination is successful
Protecting health care workers	Similar, but demand will be less intense if elimination is successful
Research and evaluation	Potentially increased given limited evidence base for elimination measures

COVID-19 elimination requires a very strong emphasis on border management to keep the virus out. That intervention would usually be combined with case and contact management to stamp out transmission, along with highly developed surveillance and testing to rapidly identify cases and outbreaks. If started early, these measures may be sufficient for elimination without the need for lockdowns, as was achieved in Taiwan.

An elimination strategy requires highly functioning public health infrastructure. Similar to many other countries, NZ has supplemented traditional approaches with newer tools, such as the use of digital technology to speed up contact tracing.¹⁶ The NZ COVID Tracer app is now operational,¹⁷ although it has yet to be used for contact tracing given the lack of community cases. Additional surveillance approaches can be used to provide increased assurance of elimination (eg, sentinel surveillance, sewage testing). However, even in the presence of a highly sophisticated surveillance system, transmission will continue if isolation and quarantine adherence is suboptimal.

Barriers to successful elimination and how to overcome them

The COVID-19 pandemic was halted in China, demonstrating that there are no absolute biological barriers to its elimination.⁶ Having no important animal or environmental reservoirs is a necessary condition, and this appears to be the case for SARS-CoV-2 (although its actual origin in nature has not been determined, so cases could in theory arise from this source). The combination of high infectiousness and presymptomatic transmission poses challenges for control.¹⁸ Fortunately, its relatively long incubation period (about 5 days) makes contact tracing and quarantining effective, unlike for influenza.⁵

Changing human behaviour to reduce transmission is challenging with a virus as infectious as SARS-CoV-2. This is why mandated extreme physical distancing and movement control (lockdown) may be needed. The intense lockdown carried out in NZ suppressed transmission and gave the country time to expand border controls, improve contact tracing, and undertake large scale testing. Coming out of lockdown (which began progressively on 28 April) must be managed carefully, as the goal is to emerge into a country that is free from community transmission (unlike the lockdowns in countries pursuing mitigation or suppression). Widespread use of face masks was not a feature of the NZ strategy but might in future reduce the need for lockdowns.¹⁹

Successful implementation of an elimination strategy requires early risk assessment, effective response planning, infrastructure, resources and political will. The global response to SARS-CoV-2 has been described as the “greatest science policy failure of our generation”.²⁰ An elimination strategy could potentially have been widely used to contain COVID-19 and protect populations in countries across the globe.

Where to from here?

NZ and Australia appear to have joined a small group of countries and jurisdictions pursuing an explicit, or implied, elimination goal, albeit by different strategies. Others including mainland China, Hong Kong, Taiwan, South Korea, Vietnam and a number of small island states and territories. This set of countries is likely to expand in the future. It is not hard to imagine travel between them being relaxed once the risks are well understood and can be managed. It may be time for these countries to actively share knowledge and evidence about the approaches that are supporting them to contain and eliminate COVID-19.

There are multiple potential future scenarios. By pursuing and maintaining an elimination strategy, countries can prevent disease and death from COVID-19 and avoid further exacerbation of existing health inequities. They can also move from having to manage ongoing pandemic transmission within their populations to being able to make informed strategic choices about prevention and control options such as vaccines and therapeutics as they become available.

Competing interests

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Notes

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