

Eliminating COVID-19: The New Zealand experience and wider implications

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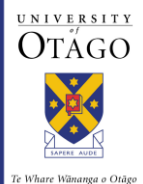


Autumn Conference 2020

Resilient places: from recovery to renewal

Association of Directors of Environment, Economy, Planning and Transport (ADEPT)

Thursday 5th & 6th November 2020



Te Whare Wānanga o Ōtago

Health
Sciences

Previous experienced with 'pandemics'

- HIV/AIDS 1987-91 - NEP
- SARS 2003 (minimal impact in NZ)
- Pandemic influenza (H1N1) 2009
- COVID-19 2020

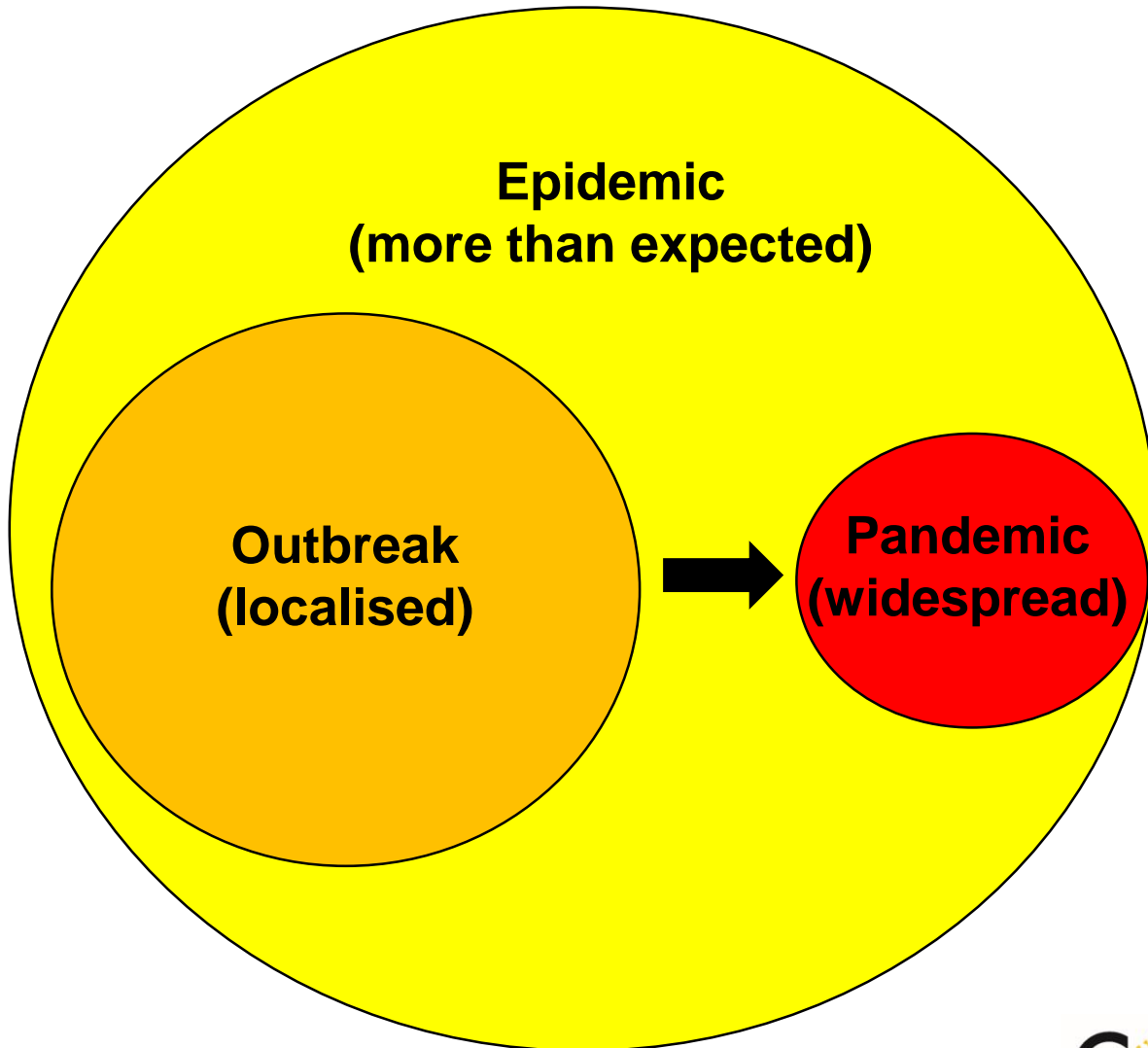


Outline

- Assessing pandemics
- Strategic choices for pandemic response
- Components of elimination strategy
- Impact of COVID-19 elimination strategy
- Key lessons from COVID-19 response



Assessing Pandemics



Assessing pandemics

Factors influencing response to pandemics, include:

- **Transmissibility** of pathogen – R_0 , R_{eff}
- **Severity** – particularly case fatality risk (CFR) & infection fatality risk (IFR)
- **Inequalities** – impact of pandemic & response
- **Controllability** – effectiveness of interventions
- **Feasibility** of response – public sector capacity to respond, public acceptability & adherence
- **Economics** – cost of action and inaction, counterfactuals
- **Certainty** - availability & quality of information, science capacity, awareness of options, experience/dogma

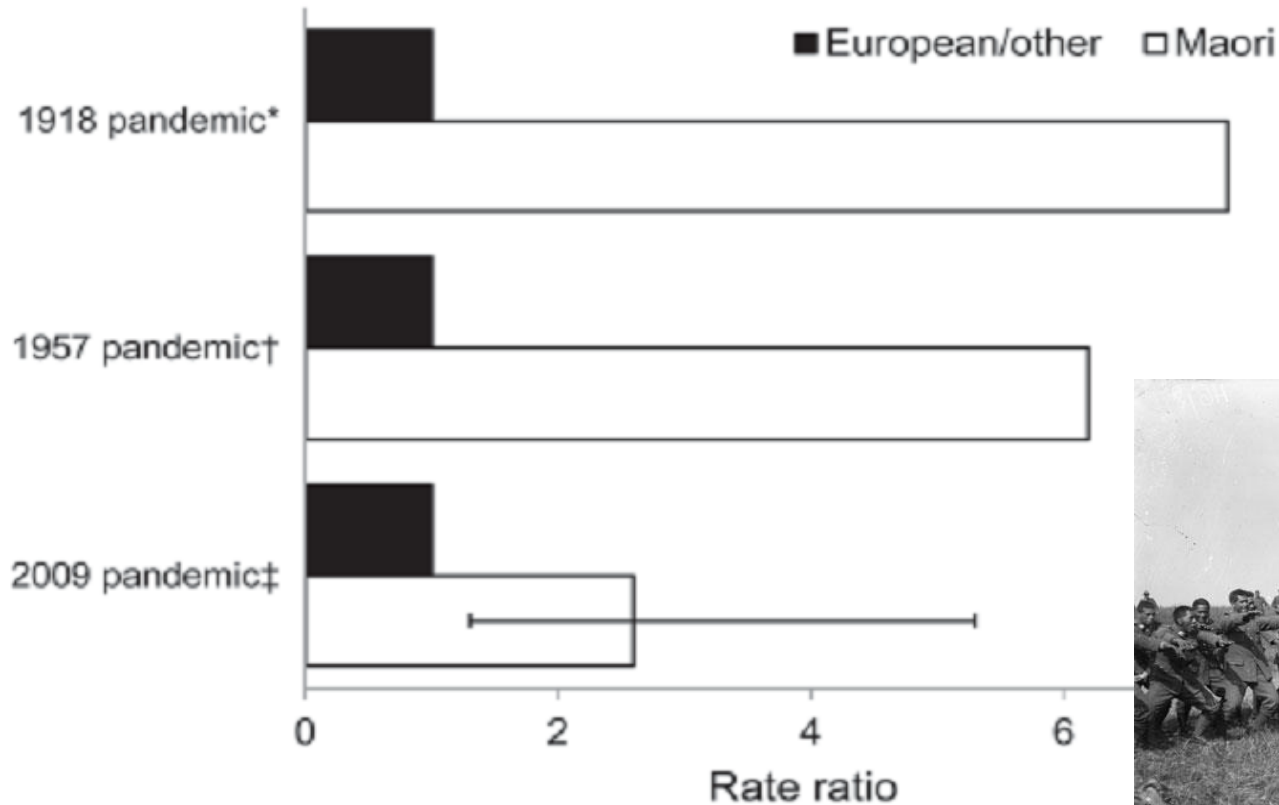
Assessing pandemics

Estimated mortality from COVID-19 pandemic:

- Modelled, assuming $R_0=2.5$, 25% control
- 57% population infected
- Peaks after 5 months – 1650 in ICU
- 28,300 hospitalised (0.6% population)
- **12,700 deaths (0.3% population)**
= mortality of 25 seasonal influenza seasons

Assessing pandemics

Mortality rates for Māori vs non-Māori in 3 successive influenza pandemics



Source: Wilson et al 2012, *Emerg Infect Dis*

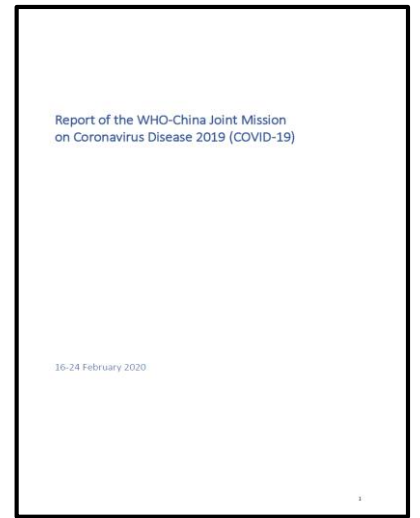


Strategic choices for pandemic response: Light-bulb moments

1. **January 2020** - It's a serious global pandemic
2. **February 2020** - It can be contained/eliminated/stopped
3. **March 2020** - NZ is not ready, 'lockdown' needed



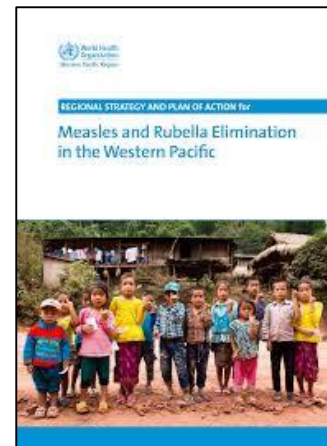
Source: Wu et al.
Lancet 31 Jan 2020



Source: Aylward et al,
WHO, 28 Feb 2020

Strategic Choices for Pandemic Response

- **Control** – Disease rates reduced to an acceptable level
 - **Mitigation** – Manageable levels to avoid overwhelming health care system
 - **Suppression** – Low levels to minimise adverse health effects
- **Elimination** – Disease or infection incidence reduced to zero in a defined area (country or region), eg poliomyelitis, measles, rubella
 - **Eradication** – Infection reduced to zero at a global level, eg smallpox

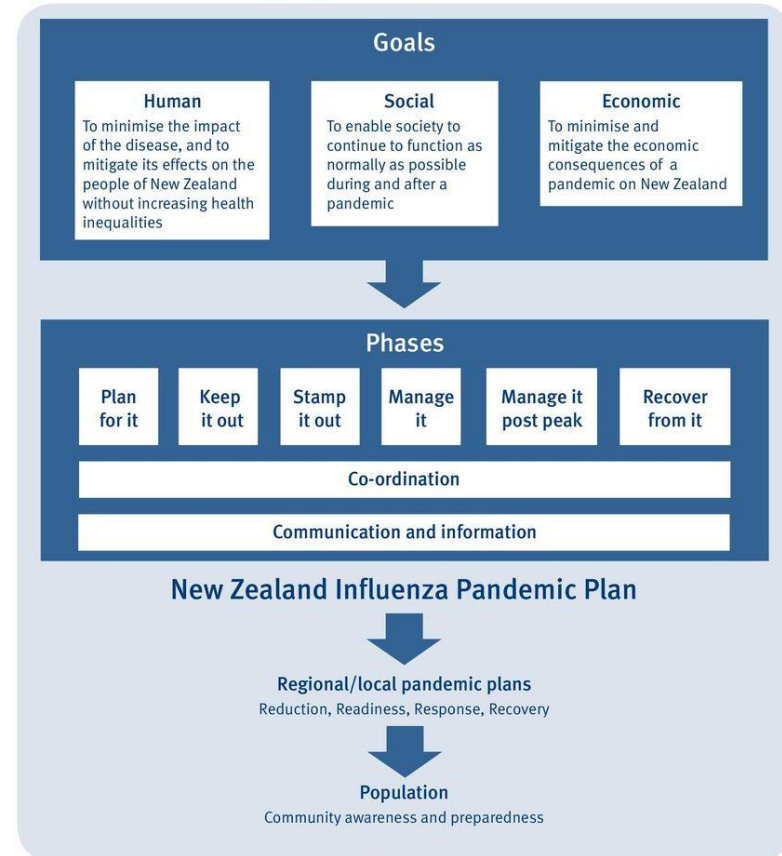


Strategic choices: Mitigation

Mitigation

- Pandemic influenza plan
- Aims to ‘flatten the peak’
- NZ approach up until mid-March

Figure 1: New Zealand strategic approach to a pandemic



Ministry of Health. 2017. New Zealand Influenza Pandemic Plan: A framework for action (2nd edn). Wellington: Ministry of Health.

Strategic choices: Elimination

- Developed elimination strategy in Feb-March 2020
- Effectively adopted by NZ Gov on 23 March with decision to go into rapid lockdown with ~100 COVID-19 cases, no deaths

New Zealand's elimination strategy for the COVID-19 pandemic and what is required to make it work

Michael G Baker, Amanda Kvalsvig, Ayesha J Verrall, Lucy Telfar-Barnard, Nick Wilson

In this editorial we summarise the threat posed by the COVID-19 pandemic, the justification for the elimination strategy adopted by New Zealand, and some of the actions required to maximise the chances of success.

What is the size and nature of the threat?

The COVID-19 pandemic, caused by the SARS-CoV-2 virus, has shown a relentless ability to infect the world's population. The virus is highly infectious, with each case typically infecting 2–3 others (a reproduction number [Ro] of about 2.5). Consequently, it has the potential to infect about 60% (crudely estimated as 1-1/Ro) of the world's population during the next 1–2 years as pandemic waves sweep their way

the fact that populations take measures to protect themselves.³ Under one of the more likely scenarios if the country's current elimination strategy fails, New Zealand could expect approximately 14,400 deaths.³ In addition, large numbers of people who are ill and hospitalised could swamp health services at all levels and prevent the delivery of elective services and preventive care.

A poorly controlled pandemic will greatly increase health inequities. Like seasonal influenza in New Zealand, risk is particularly concentrated in older people and those with severe comorbidities.⁴ Therefore Māori and Pacific peoples could be more vulnerable, as seen in past influenza pandemics.⁵

What are the strategic options?

Source: Baker, Kvalsvig, ...
Wilson, NZ Med J, 3 April
2020

Components of elimination strategy

Intervention logic for pandemic response strategies

Types of control measures

Physical distancing, cough etiquette, masks, hand hygiene, infection control in healthcare settings

Case isolation and contact quarantine, working from home, school closures, restricting mass gatherings, border controls

Antiviral treatment for COVID-19 may have a role in reducing the duration of infectivity

How they work

↓ **Transmissibility**

Risk of transmission per contact

↓ **Contact rate**

Average rate of contact of susceptibles with infected

↓ **Duration**

of infectivity

↓ **R**

The logic: Stopping the pandemic means reducing the reproduction number (R) to less than 1. The 3 drivers are **transmission, contact rate, and duration of infectivity.**

Components of elimination strategy

1. Exclusion of cases

- *Keep it out* – Border Management

2. Case and outbreak management

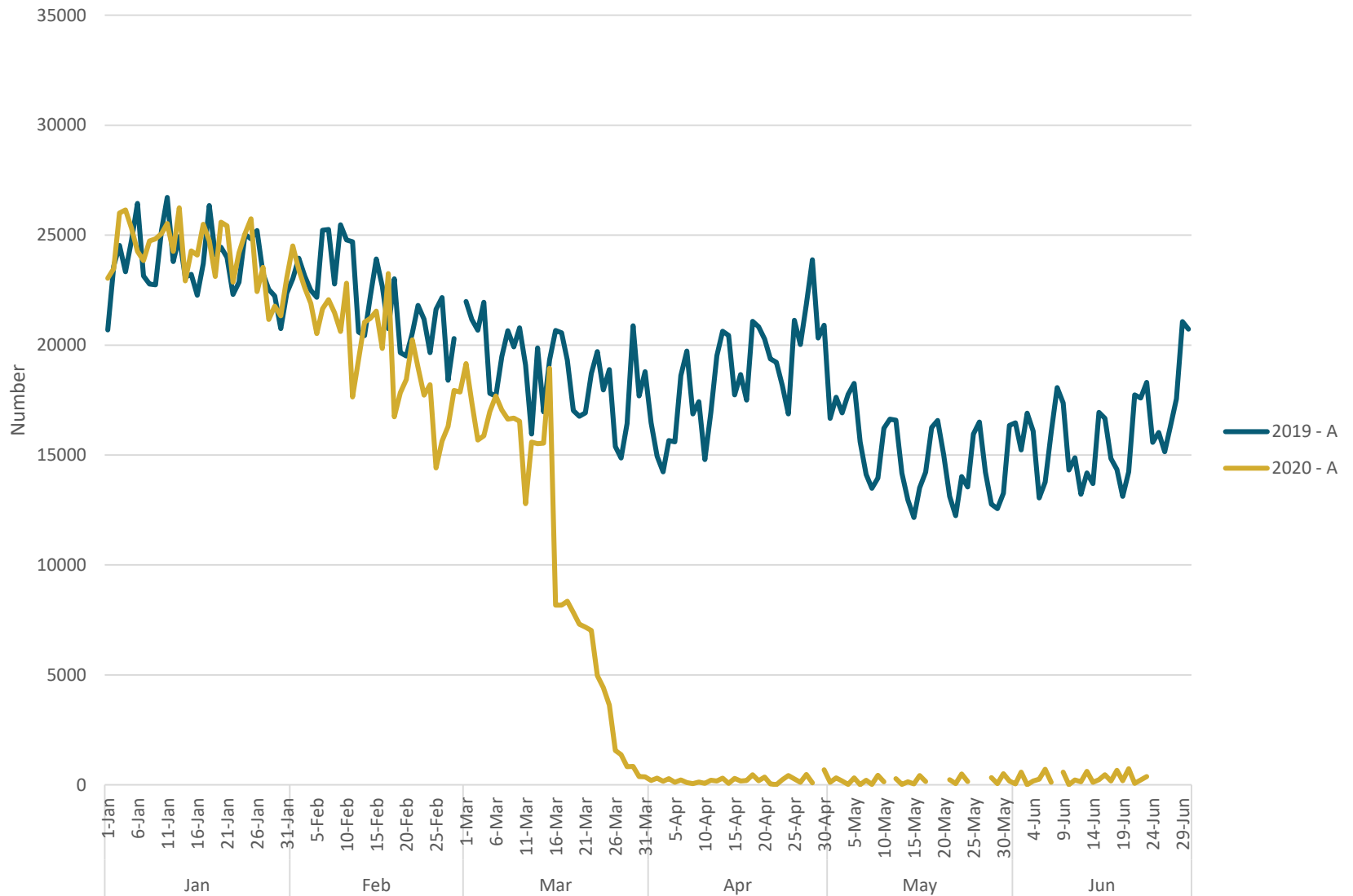
- *Stamp it out* – Testing, contact tracing, isolation/quarantine

3. Reducing transmission

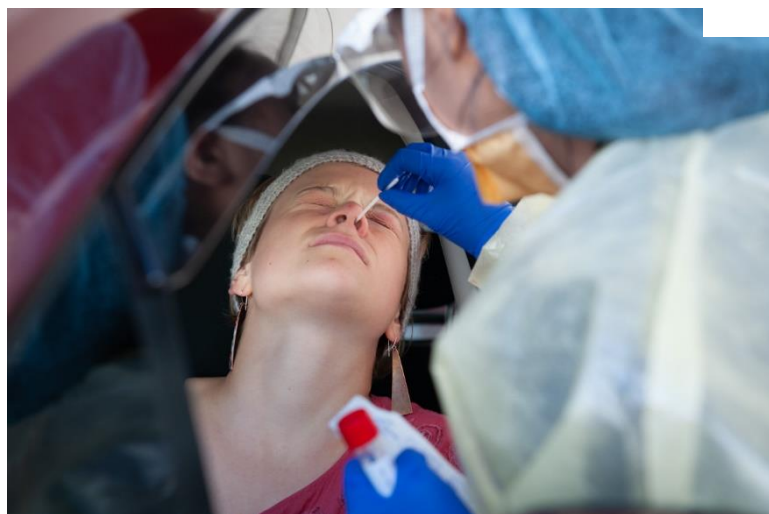
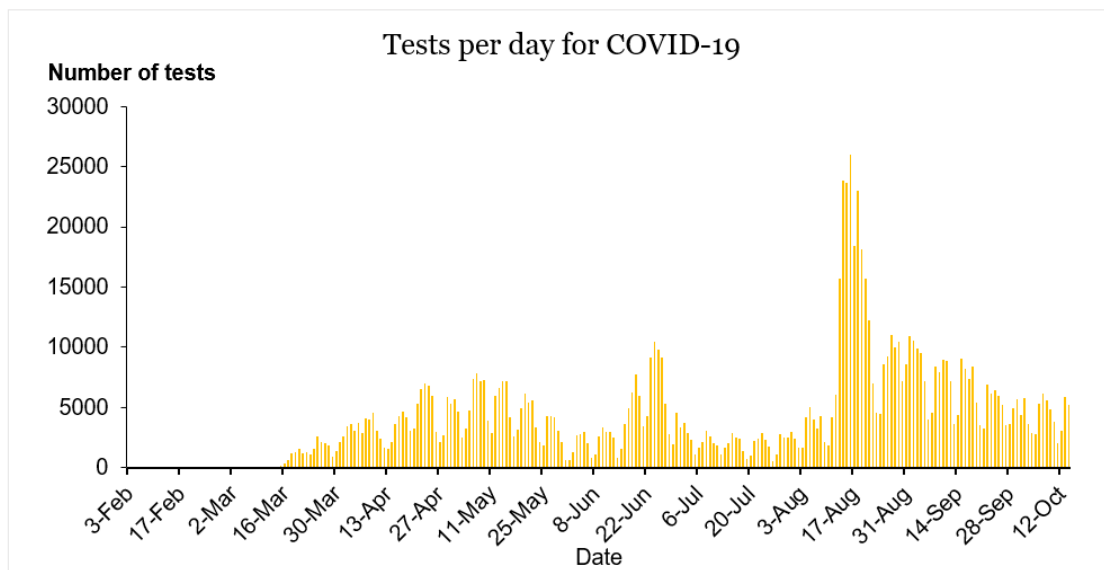
- Reducing transmission per contact – Hygiene measures, Masks
- Reducing contacts – Physical distancing & travel restrictions

Elimination: Border Management

Arrivals to New Zealand, by day of border crossing, January-June, 2019-20



Elimination: Testing & Contact Tracing



Swabbing for Covid-19, Wellington, May 2020

Source: MoH website

Elimination: Physical distancing (lockdown)

New Zealand COVID-19 Alert Levels Summary

Unite
against
COVID-19

- The Alert Levels are determined by the Government and specify the public health and social measures to be taken in the fight against COVID-19. Further guidance is available on the [Covid19.govt.nz](https://www.covid19.govt.nz) website.
- The measures may be updated based on new scientific knowledge about COVID-19, information about the effectiveness of control measures in New Zealand and overseas, or the application of Alert Levels at different times (e.g. the application may be different depending on if New Zealand is moving down or up Alert Levels).

- Different parts of the country may be at different Alert Levels. We can move up and down Alert Levels.
- Essential services including supermarkets, health services, emergency services, utilities and goods transport will continue to operate at any level. Employers in those sectors must continue to meet health and safety obligations.
- Restrictions are cumulative (e.g. at Alert Level 4, all restrictions from Alert Levels 1, 2 and 3 apply).

Updated 5 June 2020

ELIMINATION STRATEGY – New Zealand is working together to eliminate COVID-19

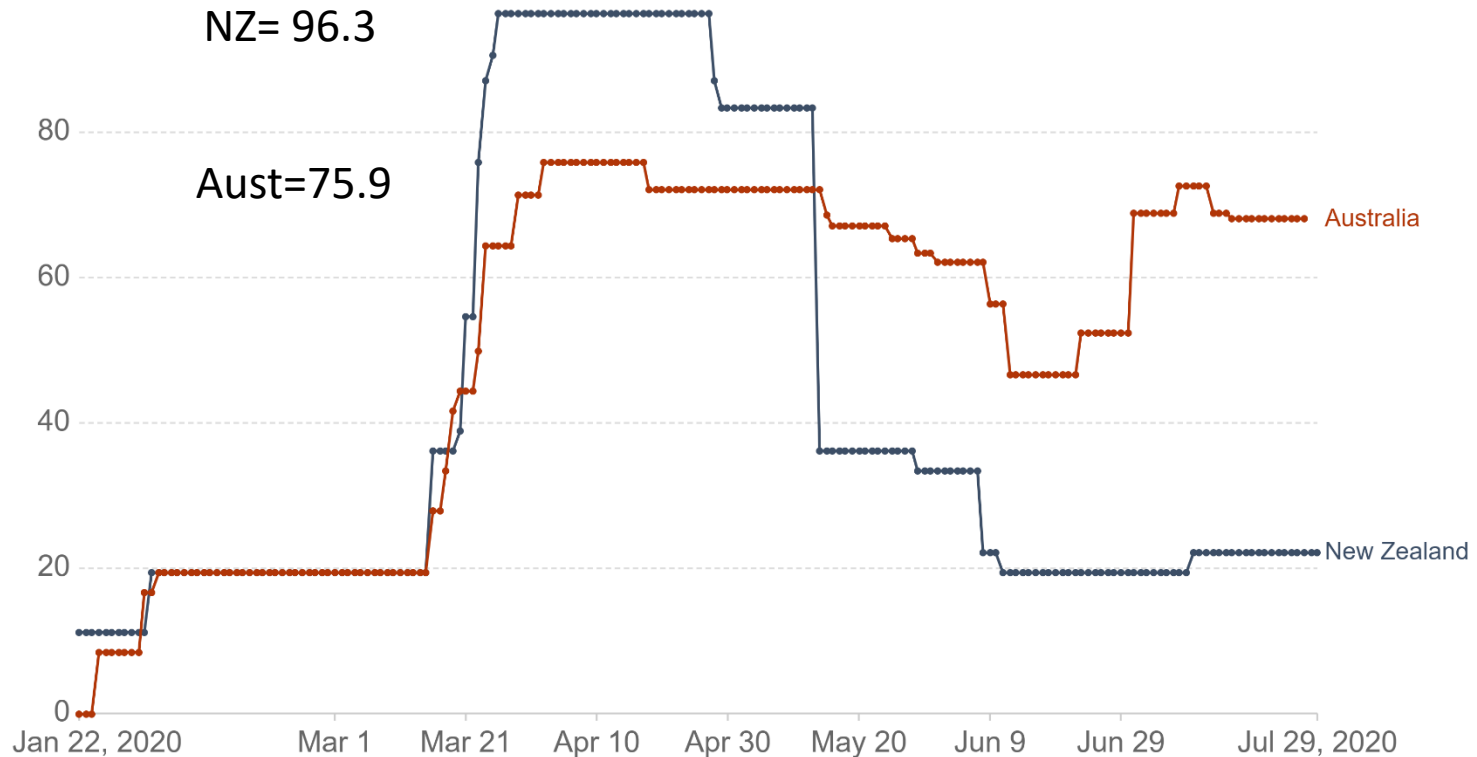
Alert Level	Risk Assessment	Range of Measures (can be applied locally or nationally)
Level 4 – Lockdown Likely the disease is not contained	<ul style="list-style-type: none"> Community transmission is occurring. Widespread outbreaks and new clusters. 	<ul style="list-style-type: none"> People instructed to stay at home in their bubble other than for essential personal movement. Safe recreational activity is allowed in local areas. Travel is severely limited. All gatherings cancelled and all public venues closed. Businesses closed except for essential services (e.g. supermarkets, pharmacies, clinics, petrol stations) and lifeline utilities. Educational facilities closed. Rationing of supplies and requisitioning of facilities possible. Reprioritisation of healthcare services.
Level 3 – Restrict High risk the disease is not contained	<ul style="list-style-type: none"> Community transmission might be happening. New clusters may emerge but can be controlled through testing and contact tracing. 	<ul style="list-style-type: none"> People instructed to stay home in their bubble other than for essential personal movement – including to go to work, school if they have to, or for local recreation. Physical distancing of two metres outside home (including on public transport), or one metre in controlled environments like schools and workplaces. People must stay within their immediate household bubble, but can expand this to reconnect with close family/whānau, or bring in caregivers, or support a dated people. This extended bubble should remain exclusive. Schools (years 1 to 10) and Early Childhood Education centres can safely open, but will have limited capacity. Children should learn at home if possible. People must work from home unless that is not possible. Businesses can open premises, but cannot physically interact with customers. Low risk local recreation activities are allowed. Public venues are closed (e.g. libraries, museums, cinemas, food courts, gyms, pools, playgrounds, markets). Gatherings of up to 10 people are allowed but only for wedding services, funerals and tangihanga. Physical distancing and public health measures must be maintained. Healthcare services use virtual, non-contact consultations where possible. Inter-regional travel is highly limited (e.g. for essential workers, with limited exemptions for other). People at high risk of severe illness (older people and those with existing medical conditions) are encouraged to stay at home where possible, and take additional precautions when leaving home. They may choose to work.
Level 2 – Reduce The disease is contained, but the risk of community transmission remains	<ul style="list-style-type: none"> Household transmission could be occurring. Single or isolated cluster outbreaks. 	<ul style="list-style-type: none"> People can reconnect with friends and family, and socialise in groups of up to 100, go shopping, or travel domestically, if following public health guidance. Keep physical distancing of two metres from people you don't know when out in public or in retail stores. Keep one metre physical distancing in controlled environments like workplaces, where practicable. No more than 100 people at gatherings, including weddings, birthdays and funerals and tangihanga. Businesses can open to the public if following public health guidance including physical distancing and record keeping. Alternative ways of working are encouraged where possible. Hospitality businesses must keep groups of customers separated, seated, and served by a single person. Maximum of 100 people at a time. Sport and recreation activities are allowed, subject to conditions on gatherings, record keeping, and – where practical – physical distancing. Public venues such as museums, libraries and pools can open if they comply with public health measures and ensure 1 metre physical distancing and record keeping. Event facilities, including cinemas, stadiums, concert venues and casinos can have more than 100 people at a time, provided that there are no more than 100 in a defined space, and the groups do not mix. Health and disability care services operate as normally as possible. It is safe to send your children to school, early learning services and tertiary education. There will be appropriate measures in place. People at higher-risk of severe illness from COVID-19 (e.g. those with underlying medical conditions, especially if not well-controlled, and senior) are encouraged to take additional precautions when leaving home. They may work, if they agree with their employer that they can do so safely.
Level 1 – Prepare The disease is contained in New Zealand	<ul style="list-style-type: none"> COVID-19 is uncontrolled overseas. Isolated household transmission could be occurring in New Zealand. 	<ul style="list-style-type: none"> Border entry measures to minimise risk of importing COVID-19 cases. Intensive testing for COVID-19. Rapid contact tracing of any positive case. Self-isolation and quarantine required. Schools and workplaces open, and must operate safely. No restrictions on personal movement but people are encouraged to maintain a record of where they have been. No restrictions on gatherings but organisers encouraged to maintain records to enable contact tracing. Stay home if you're sick, report flu-like symptoms. Wash and dry hands, cough into elbow, avoid touching your face. No restrictions on domestic transport – avoid public transport or travel if sick. No restrictions on workplaces or services but they are encouraged to maintain records to enable contact tracing.

Elimination: Physical distancing (lockdown)

COVID-19: Government Response Stringency Index

The Government Response Stringency Index is a composite measure based on nine response indicators including school closures, workplace closures, and travel bans, rescaled to a value from 0 to 100 (100 = strictest response).

Our World
in Data



Source: Hale, Webster, Petherick, Phillips, and Kira (2020). Oxford COVID-19 Government Response Tracker – Last updated 5 August, 01:30 (London time)

Note: This index simply records the number and strictness of government policies, and should not be interpreted as 'scoring' the appropriateness or effectiveness of a country's response.

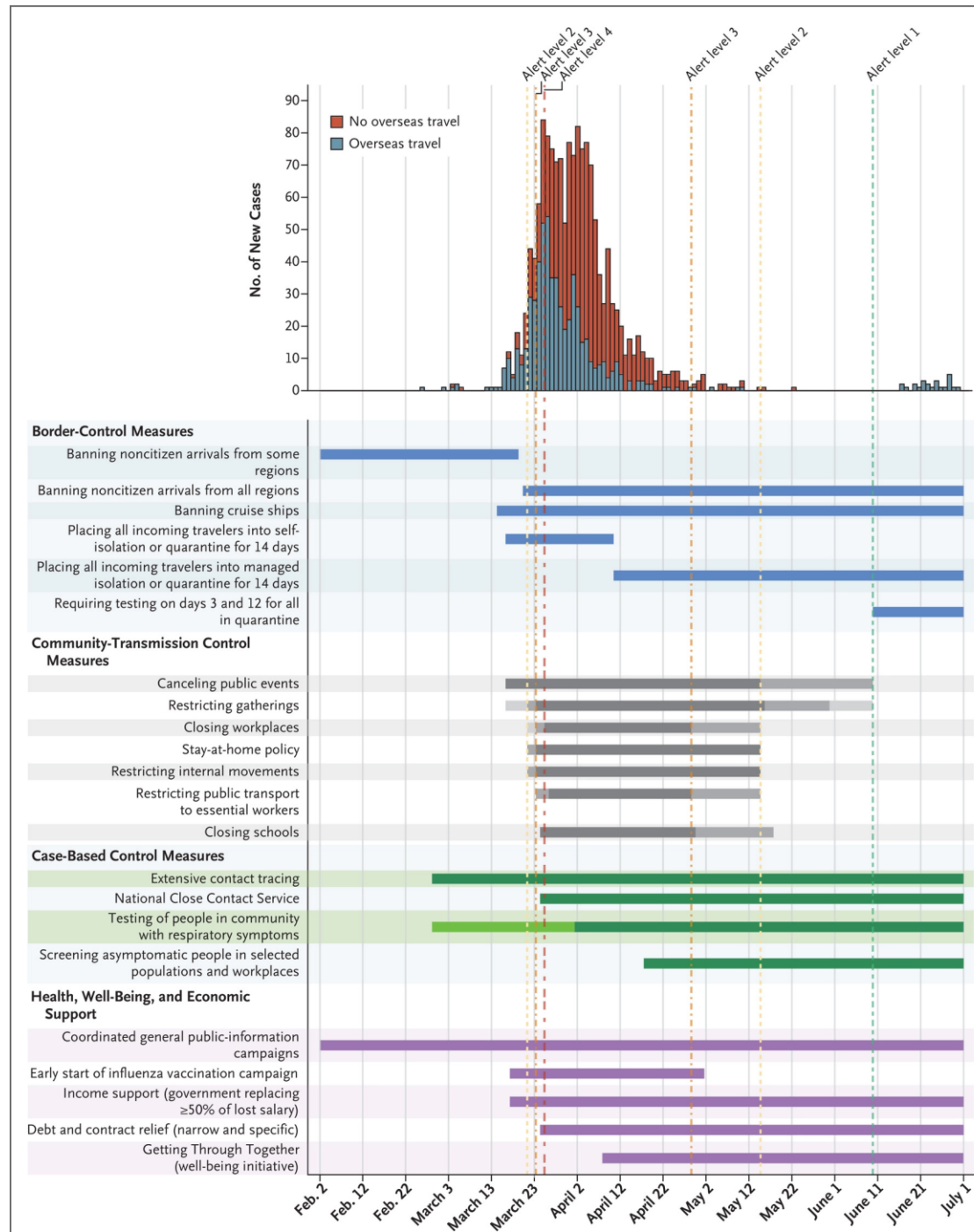
OurWorldInData.org/coronavirus • CC BY



Main motorway into Wellington, Alert Level 4, May 2020

Impact of Elimination Strategy

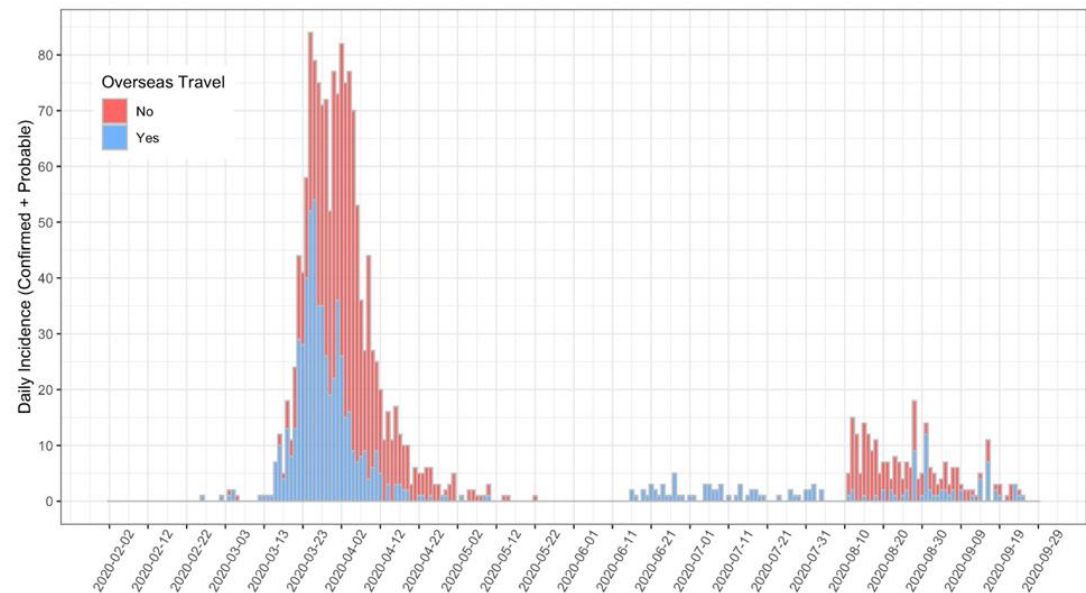
Source: Baker, Wilson, Anglemyer. NEJM e56 DOI: 202010.1056/NEJMc2025203



Components of elimination strategy

Resurgence planning & management

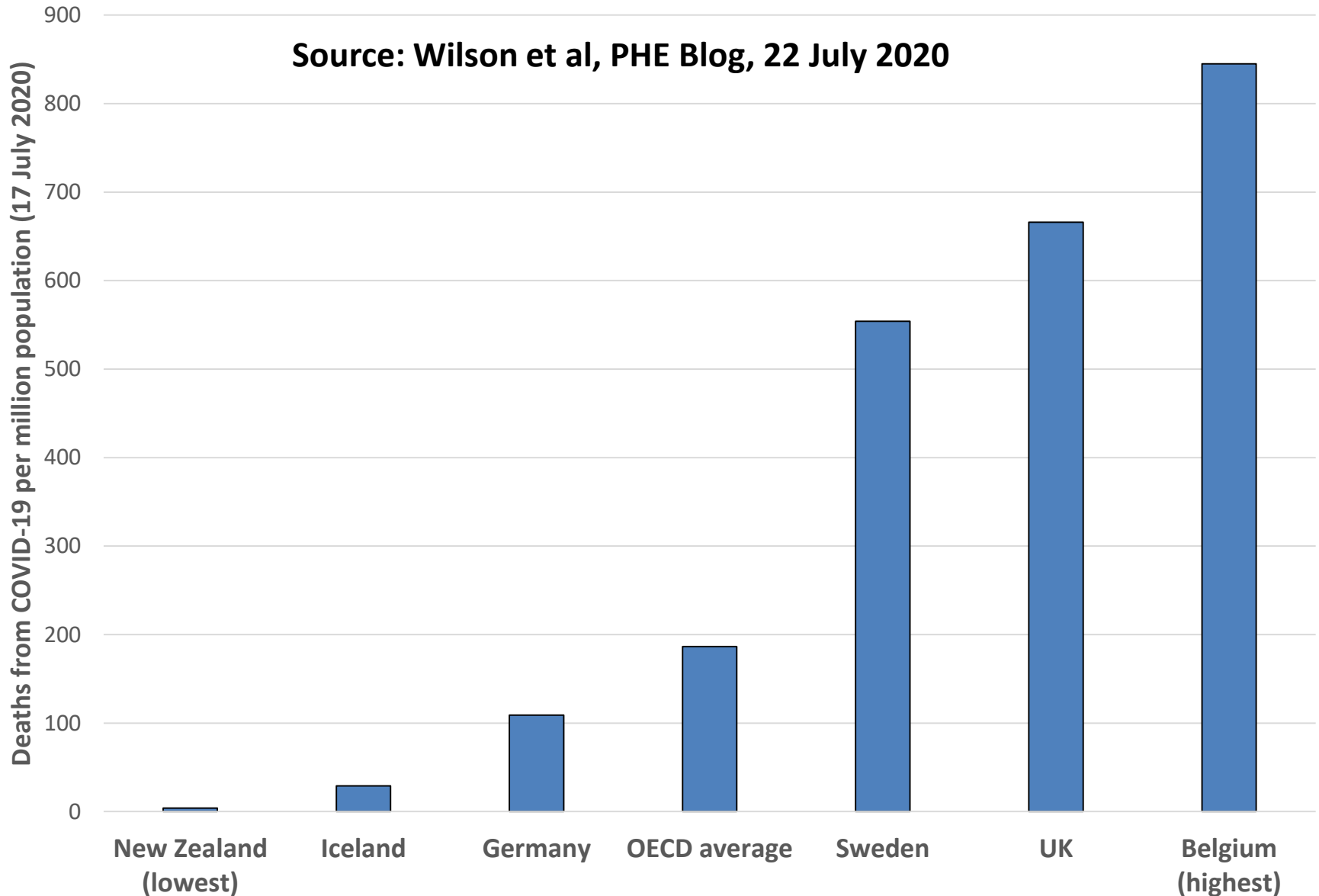
- New extended cluster detected in Auckland 11 August
- 179 cases with same genome lineage
- Rapid response including:
 - High levels of testing & contact tracing
 - Alert levels 3 (Auck), 2 (Rest of NZ)
 - Mass masking on public transport
- Now eliminated



Impact of Elimination Strategy

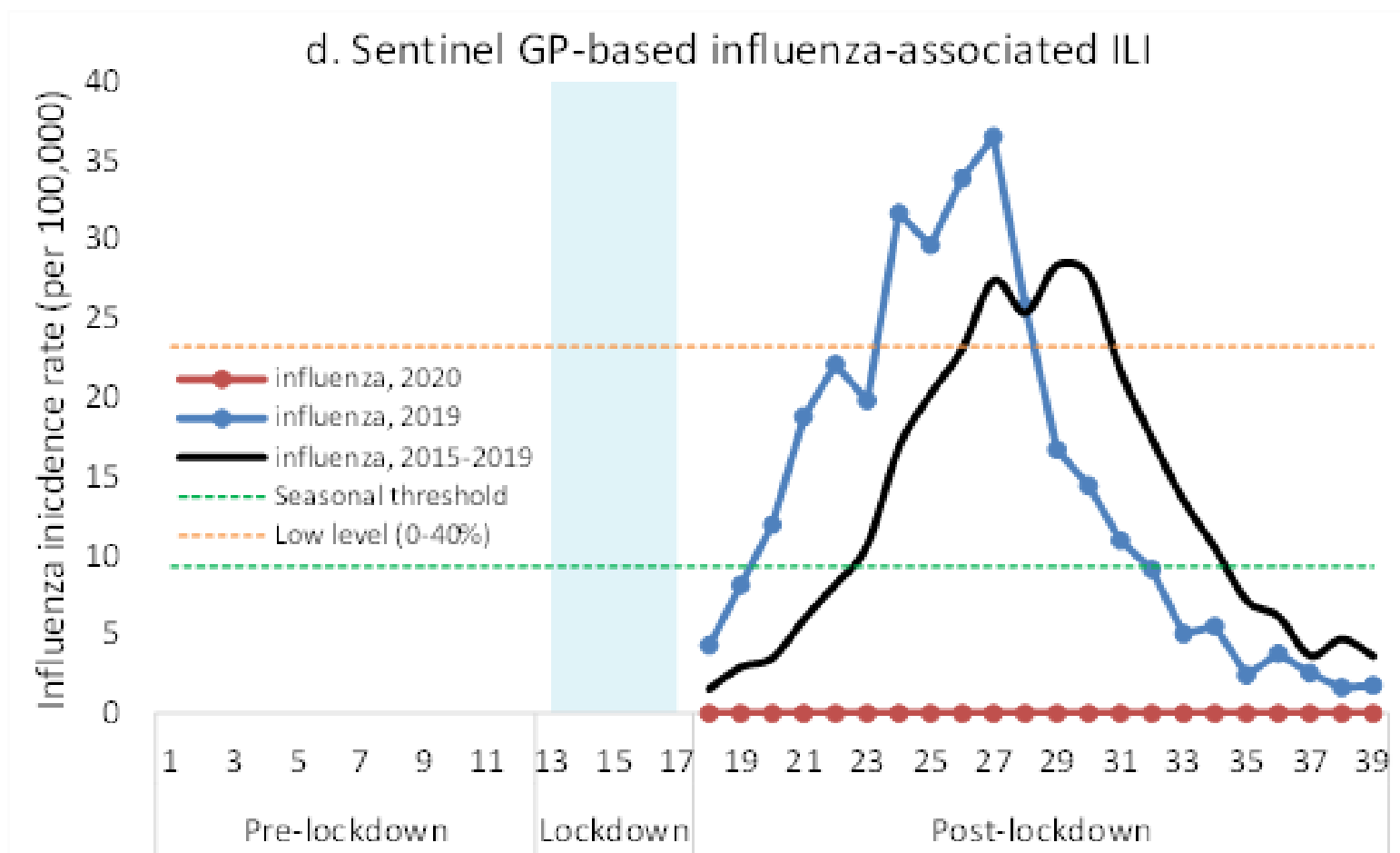
Death rate from COVID-19, OECD countries

Source: Wilson et al, PHE Blog, 22 July 2020



Impact of Elimination Strategy

Near elimination of seasonal influenza



Source: Huang, ESR, Oct 2020

Impact of Elimination Strategy

Region	Country/ Jurisdiction	Pop-ulation (millions)	GDP change in Q2*	Peak string-ency	Cum-ulative COVID-19 cases	Case rate (per million)	Cum-ulative COVID-19 deaths	COVID-19 mortality rate (per million)
European and North American countries with population >10 million								
Europe	Germany	84.0	-9.7	76.9	283,706	3384	9530	114
Europe	France	65.3	-13.8	88.0	513,034	7856	31,459	485
Europe	UK	68.0	-20.4	79.6	423,236	6227	41,936	617
Europe	Italy	60.5	-12.8	93.5	306,235	5067	35,801	592
Europe	Spain	46.8	-17.8	85.2	735,198	15,723	31,232	668
Europe	Ukraine	43.7	-11.4	88.9	191,671	4389	3827	88
Europe	Poland	37.8	-8.9	83.3	84,396	2231	2392	63
Europe	Romania	19.2	-12.3	87.0	119,683	6231	4633	241
Europe	Netherlands	17.1	-8.5	79.6	105,918	6178	6328	369
Europe	Belgium	11.6	-12.1	81.5	108,768	9375	9965	859
Europe	Greece	10.4	-14.1	84.3	16,913	1625	369	35
Europe	Czechia	10.7	-8.7	82.4	61,318	5723	581	54
Europe	Sweden	10.1	-8.3	46.3	90,923	8990	5880	581
Europe	Portugal	10.2	-13.9	88.0	72,055	7071	1936	190
N. America	USA	331.0	-9.1	72.7	7,236,369	21,832	208,369	629
N. America	Canada	37.7	-11.5	74.5	150,456	3978	9255	245
East Asian and Australasian countries with population >10million, plus New Zealand								
East Asia	China	1427.6	+11.5	81.9	85,322	59	4634	3
East Asia	Japan	127.2	-7.9	47.2	80,497	637	1532	12
East Asia	North Korea	25.5	NA	NA	NA	NA	NA	NA
East Asia	South Korea	51.2	-3.2	82.4	23,345	457	395	8
East Asia	Taiwan	23.7	-0.7	30.6	509	21	7	0.3
Australasia	Australia	25.5	-7.0	79.2	27,000	1056	869	34
Australasia	New Zealand	4.8	-12.2	96.3	1829	366	25	5

Key lessons from COVID-19 elimination in NZ

Effective Science + Good Political Leadership



The conversation
Coronavirus outbreak

Michael Baker and Nick Wilson
Mon 8 Jun 2020
04.02 BST

[f](#) [t](#) [e](#)

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This article is more than 2 months old

Five ways New Zealand can keep Covid-19 cases at zero

Modelling shows it is very likely New Zealand has eliminated coronavirus. Keeping it that way is the next big challenge

- [Coronavirus - latest updates](#)
- [See all our coronavirus coverage](#)

A photograph of Jacinda Ardern, the Prime Minister of New Zealand, speaking at a podium. She is smiling and wearing a yellow jacket. Behind her is a banner that says "COVID Alert Level".

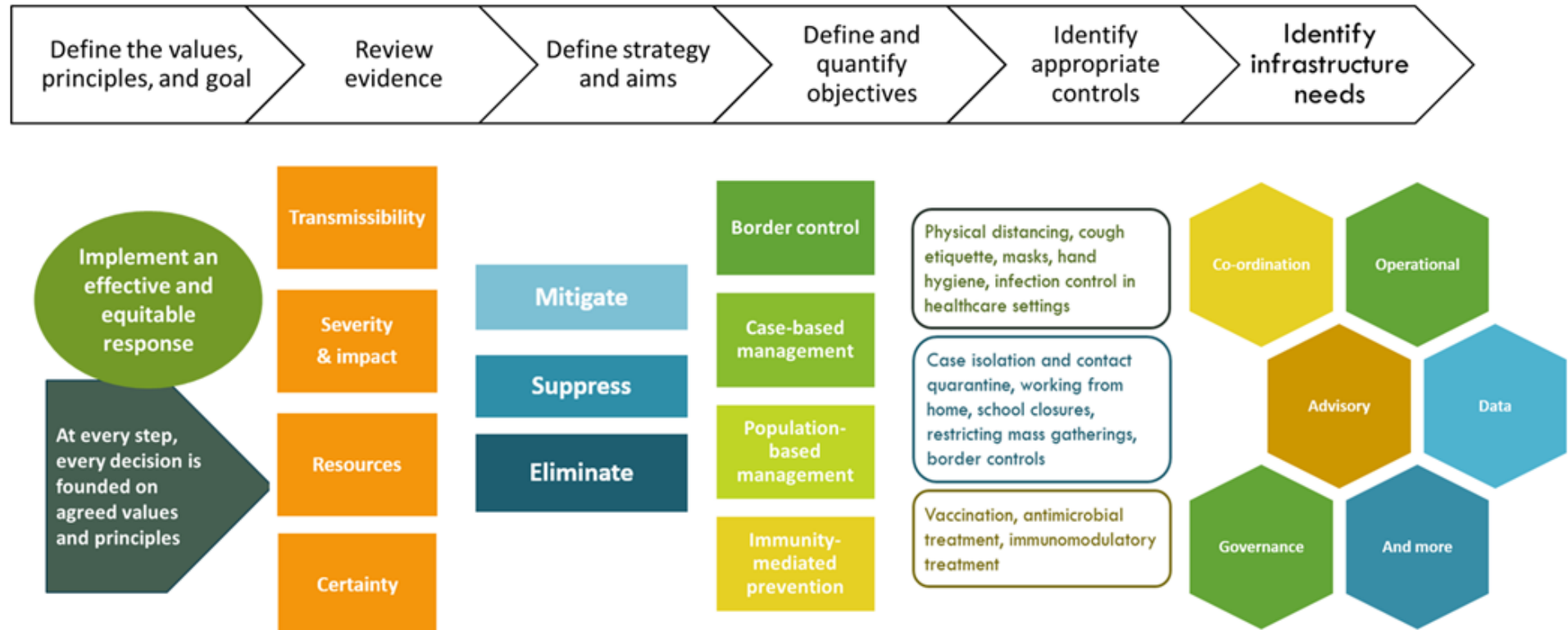
Key lessons from COVID-19 elimination in NZ

Institutional lessons

1. Elimination of COVID-19 **benefits health & economy** compared with alternatives
2. Effective **risk assessment & strategic decision making** is important in public health crises
3. Consider **equity and partnerships** with affected communities
4. Need to **strengthen public health infrastructure** for this and future crises
5. Need to strengthen and **reform global health agencies** like WHO

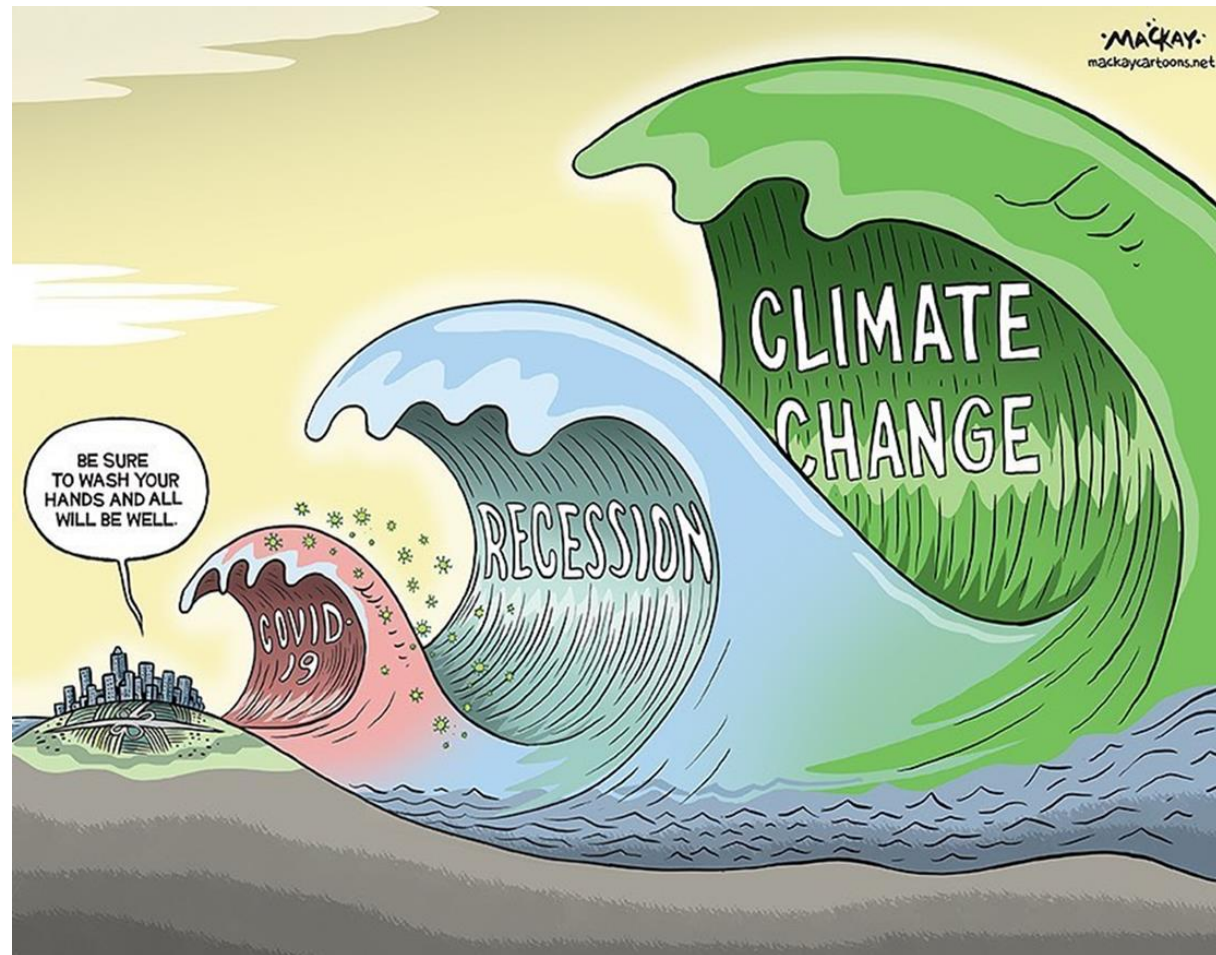
Key lessons from COVID-19 elimination in NZ

Improved decision-making frameworks eg, that can manage diverse range of pandemic threats



Key lessons from COVID-19 elimination in NZ

Opportunity for **broad 'reset'** and increased focus on managing major global health threats



Summary

- Importance of **Effective Science + Good Political Leadership**, with high-quality risk assessment & rapid, decisive response
- NZ choice of **elimination** likely to protect health & economy > than alternative strategies
- Opportunity to **strengthen public health capacity**
- Opportunity for major reset towards a **more equitable & sustainable society**



Acknowledgements



- COVID-19 Research Collaborative
- Based at the University of Otago, multiple collaborations
- Director: Michael Baker, Lead Researchers: Amanda Kvalsvig, Nick Wilson
- Goal: To support an effective and equitable pandemic response
- Researchers from Universities (x3) , CRI, Community group



- Funding from HRC, philanthropic organisations, Universities



Follow-up

Contact: Michael Baker michael.baker@otago.ac.nz

