

Opening borders during the Covid-19 pandemic: Key health considerations

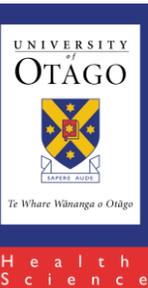
Professor Michael Baker
University of Otago, Wellington



31 May 2021

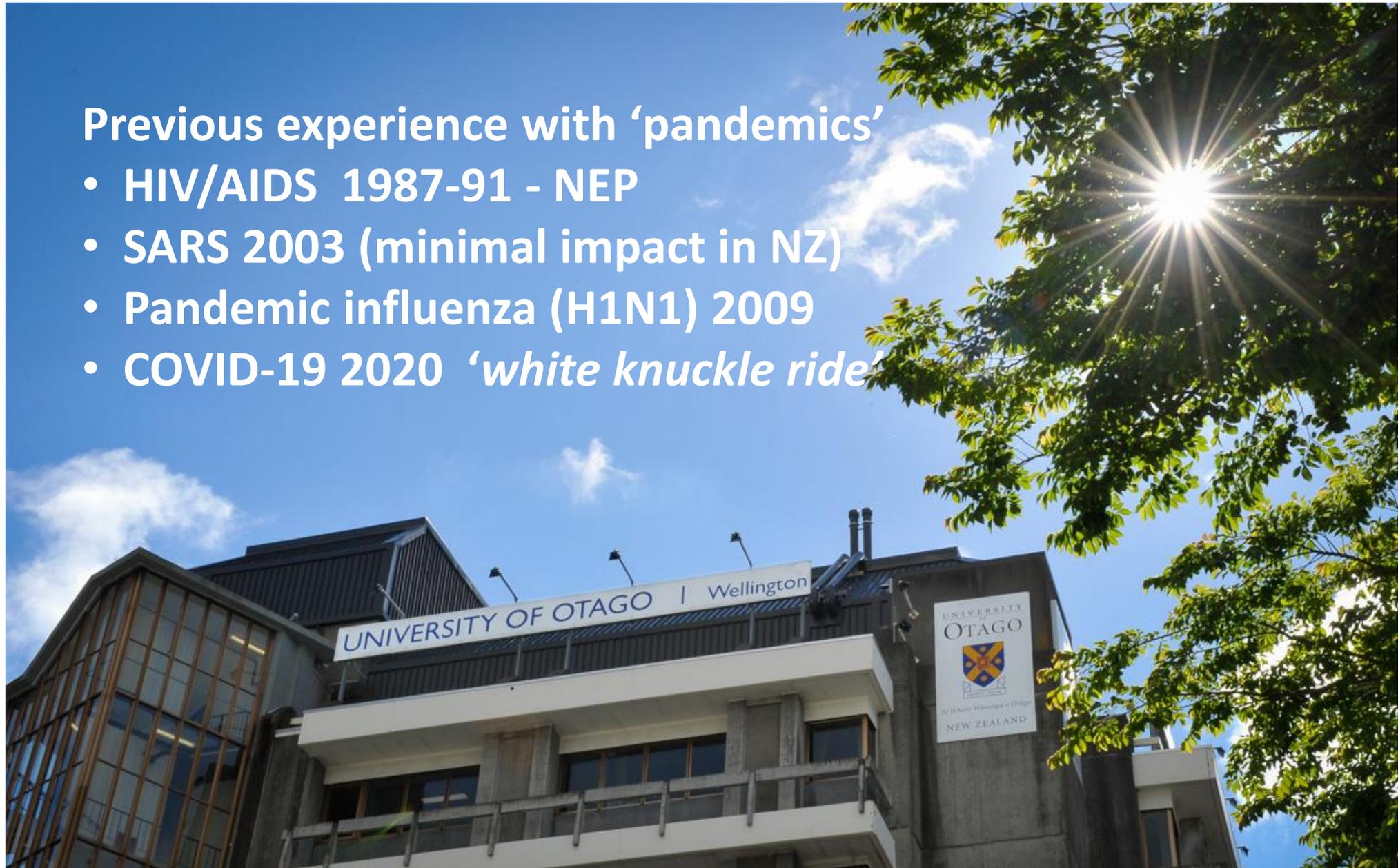


PECC International Virtual Seminar
“Connectivity and Tourism Recovery from Covid-19”



Previous experience with 'pandemics'

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

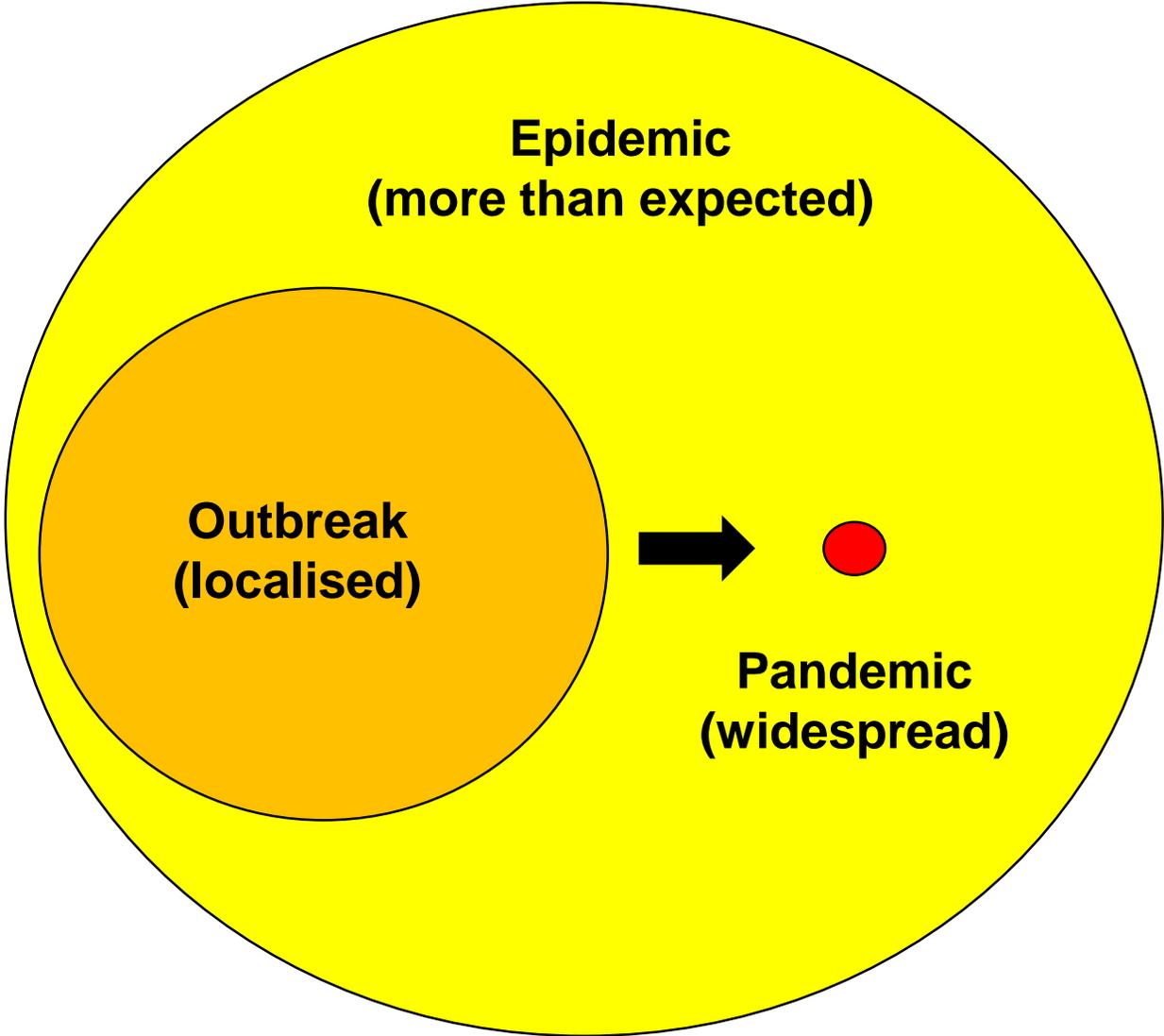


Outline

- **Strategic choices for Covid-19 response**
 - **The Elimination Strategy**
 - **Impact of the elimination strategy**
- **Progression of the pandemic**
 - **Vaccination**
 - **Borders**
 - **Strategic choices for future Covid-19 management**
- **Key lessons for the future**
- **Conclusions**

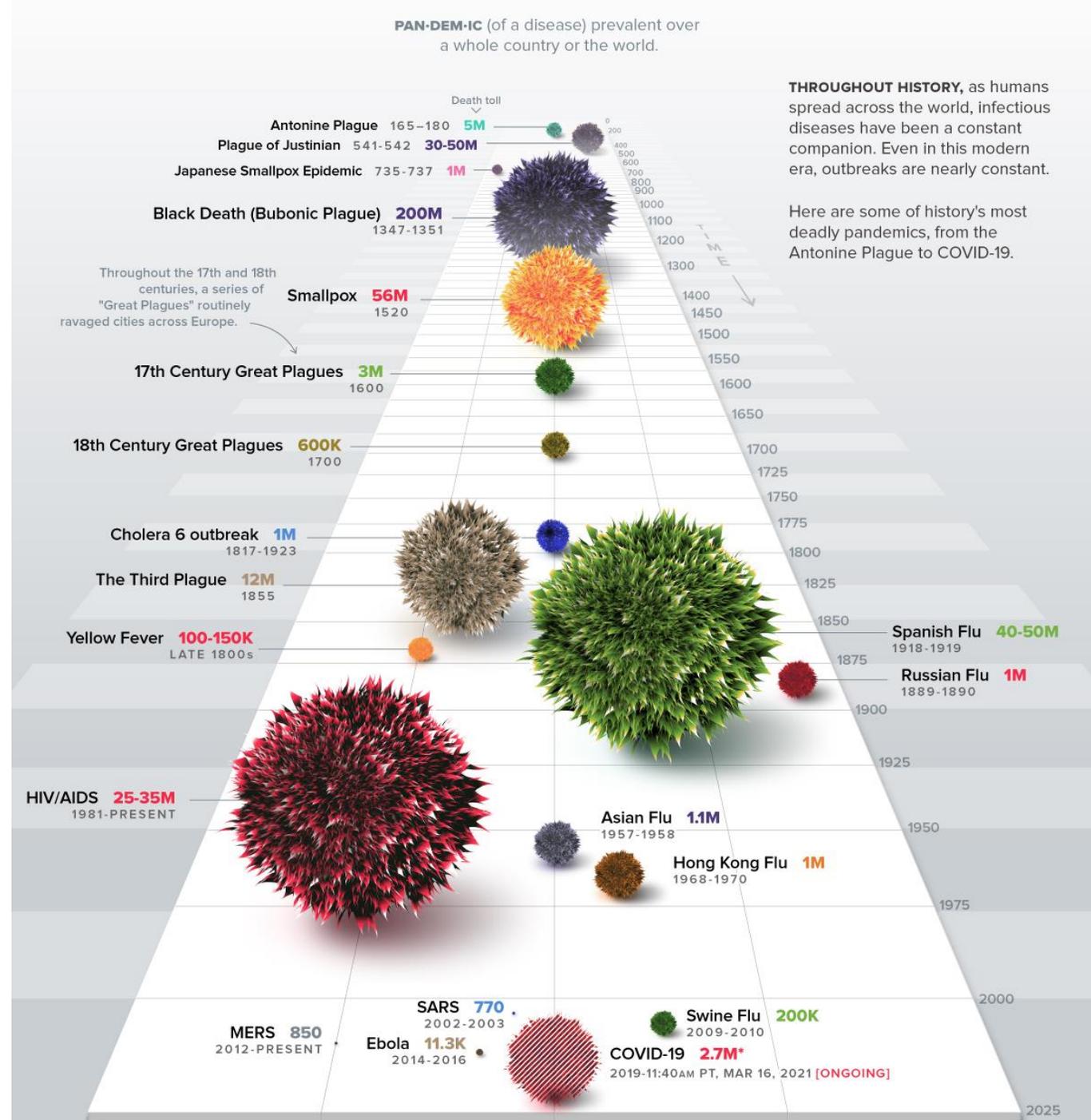


Strategic choices for Covid-19 response

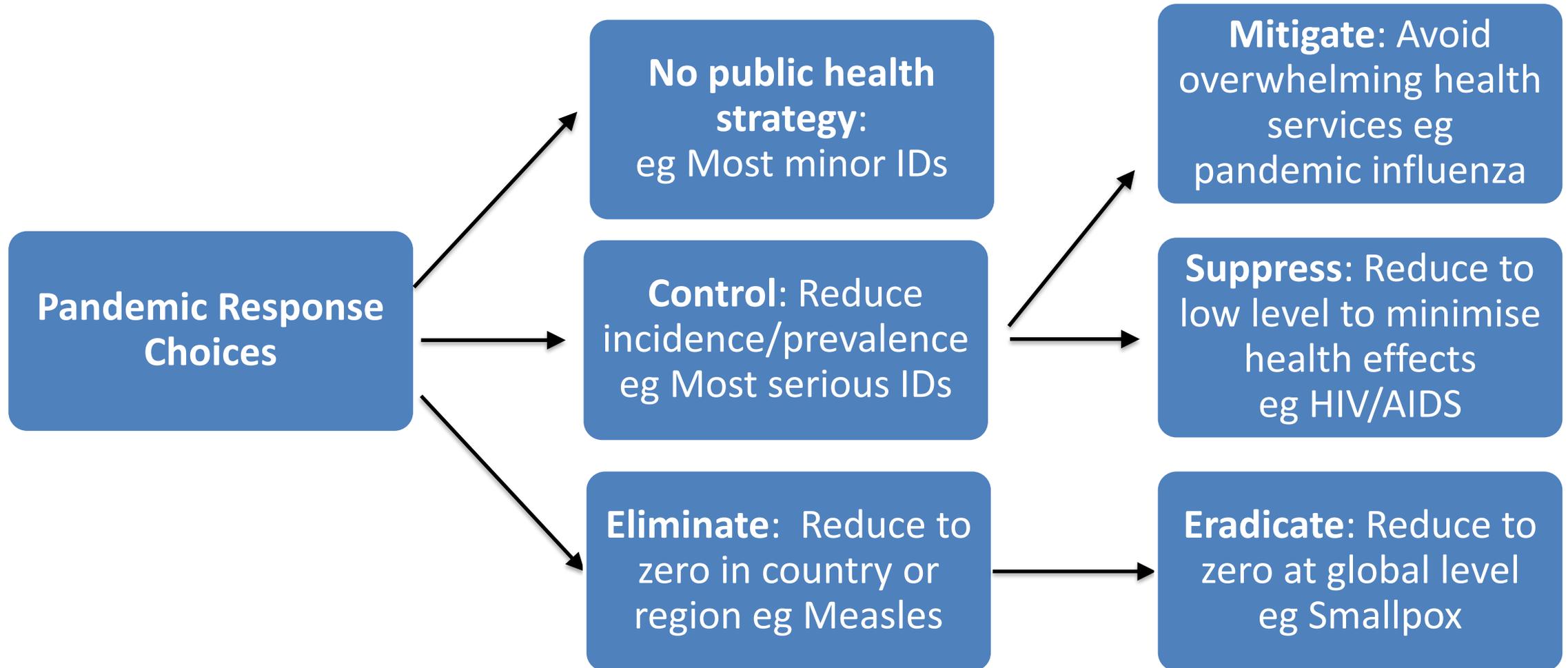


Strategic choices for Covid-19 response

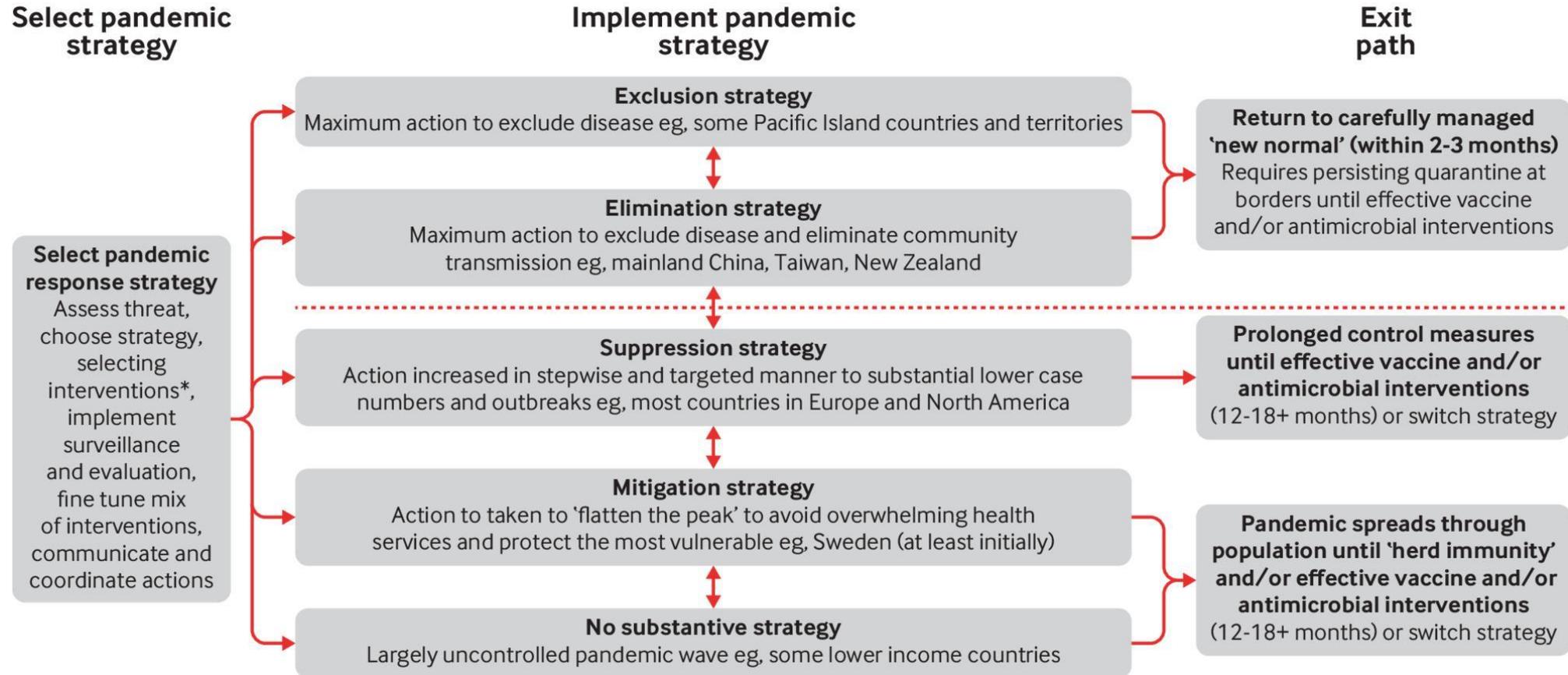
Source: The Visual Capitalist:
<https://www.visualcapitalist.com/history-of-pandemics-deadliest/>



Strategic choices for Covid-19 response



Strategic choices for Covid-19 response



* **Pandemic interventions:** Border controls to "keep it out"; testing, contact tracing, case isolation and contact quarantine to "stamp it out"; improved hygiene behaviours and use of masks; physical distancing; movement restrictions; combinations including "lockdown"; vaccines; antimicrobials
 NB. There are multiple other interventions to reduce harm, including protecting vulnerable populations, reorienting health services, social and economic support

The Elimination Strategy

Effectively adopted by NZ Gov on 23 March with decision to pursue 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

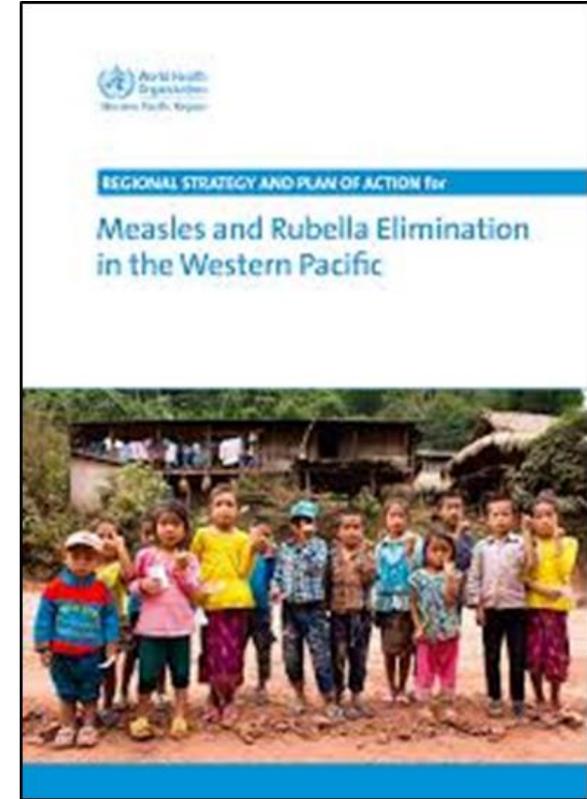
In this editorial we summarise the threat posed by the COVID-19 pandemic, the justification for the elimination strategy adopted by New Zealand, and some of the actions required to maximise the chances of success.

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

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



Source: Baker et al. NZ Med J, 3 April 2020
First published Covid-19 elimination strategy

The Elimination Strategy

1. Exclusion of cases

- *Keep it out* – Border Management

2. Case and outbreak management

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

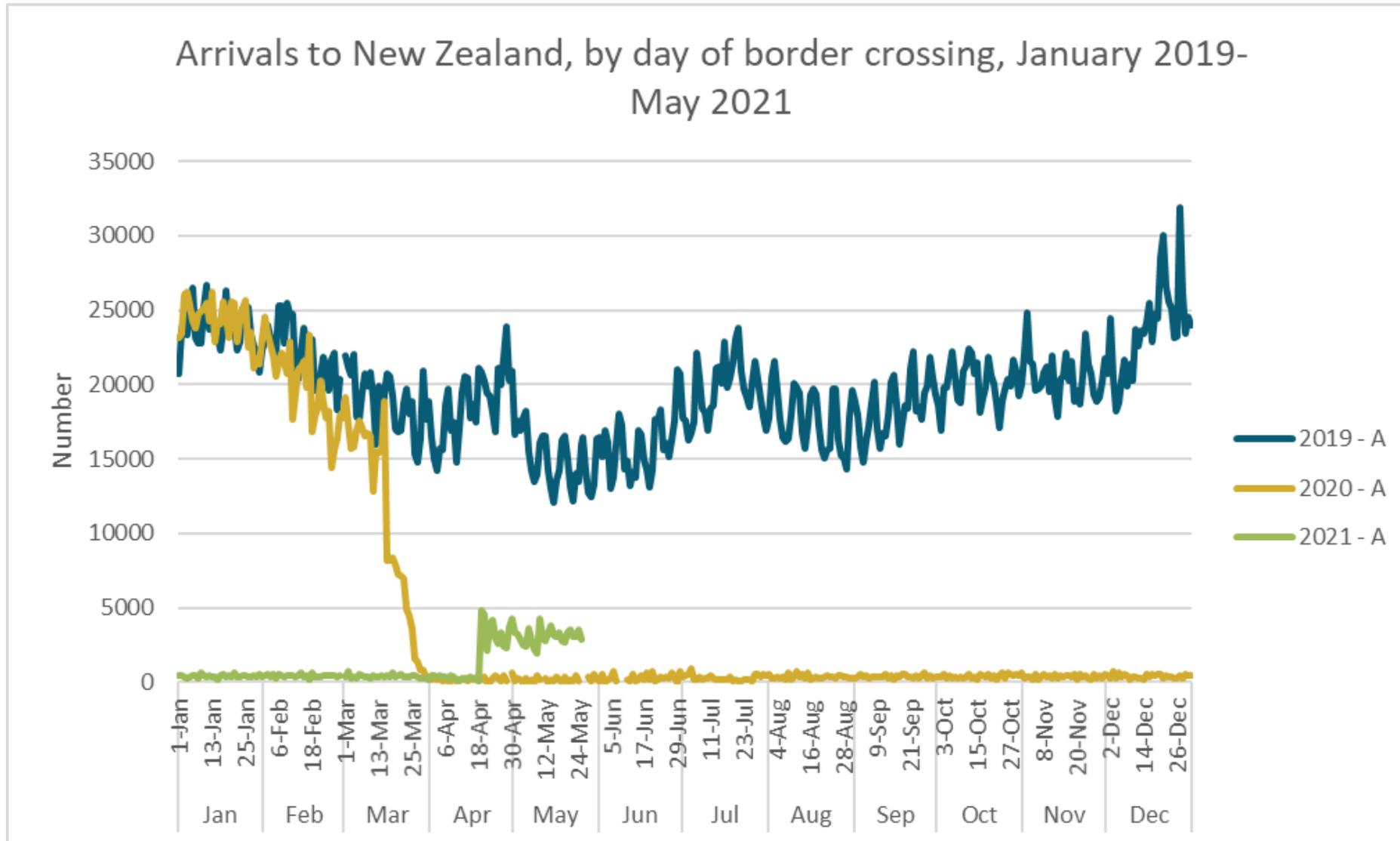
3. Preventing community transmission

- Hygiene measures, masks
- Physical distancing & travel restrictions
- **Vaccination**

4. Social safety net

- Wage subsidy scheme & many other forms of support

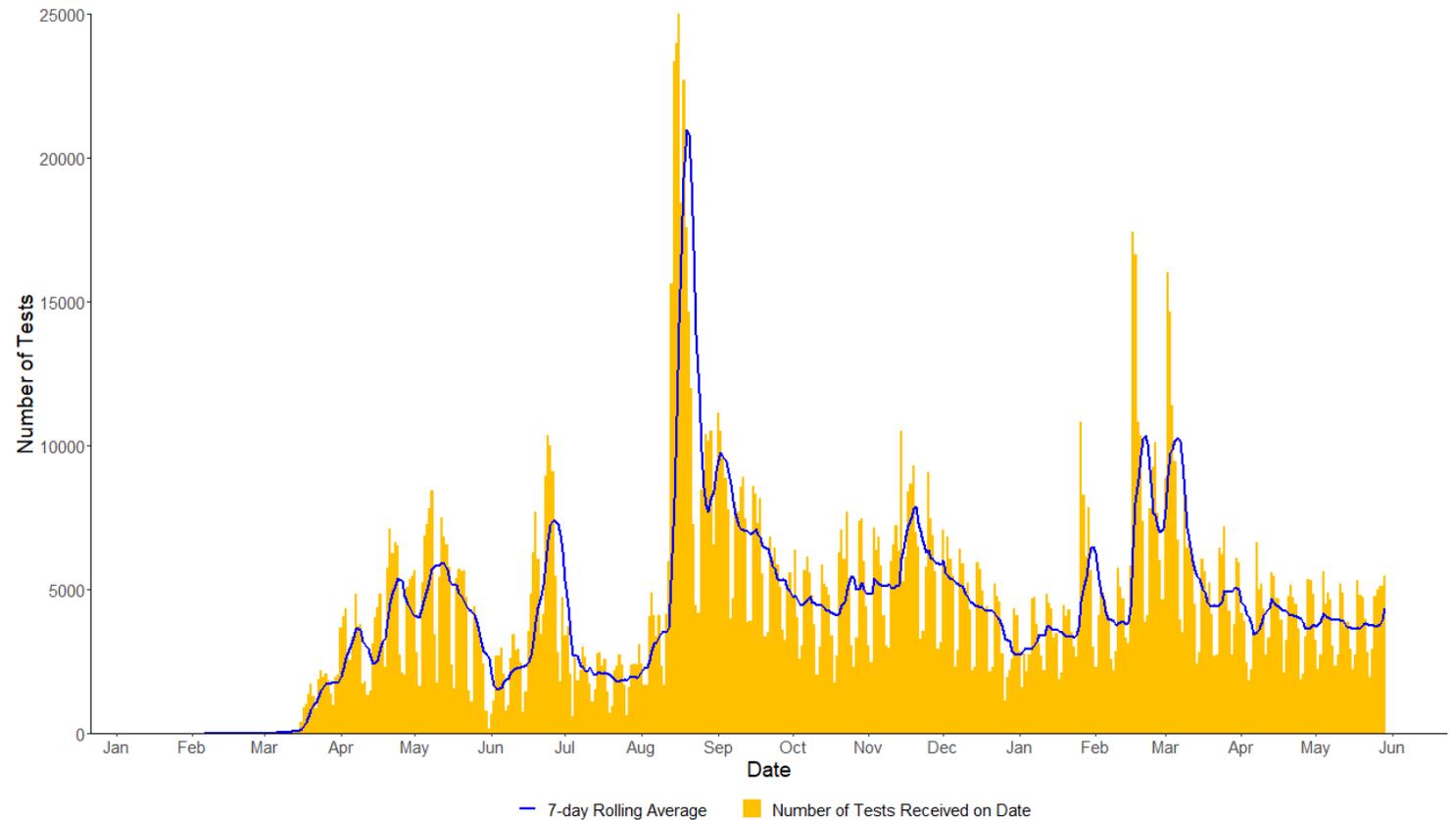
Elimination: Border Management



Elimination: Testing & Contact Tracing



Swabbing for COVID-19, Wellington, May 2020



Source: MoH website.

Intervention: Hygiene measures

Traditional infectious disease hygiene:

- Stay at home if sick
- Wash your hands
- Cough & sneeze into tissue/elbow

COVID-19 transmission:

- Asymptomatic/Presymptomatic source
- Respiratory droplets and aerosols



- **Masks** (Mass Masking = source control & personal protection), plus
- **Improved ventilation/filtration**

Te Papa Face Mask



Elimination: Physical distancing (lockdown)

New Zealand COVID-19 Alert Levels Summary

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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

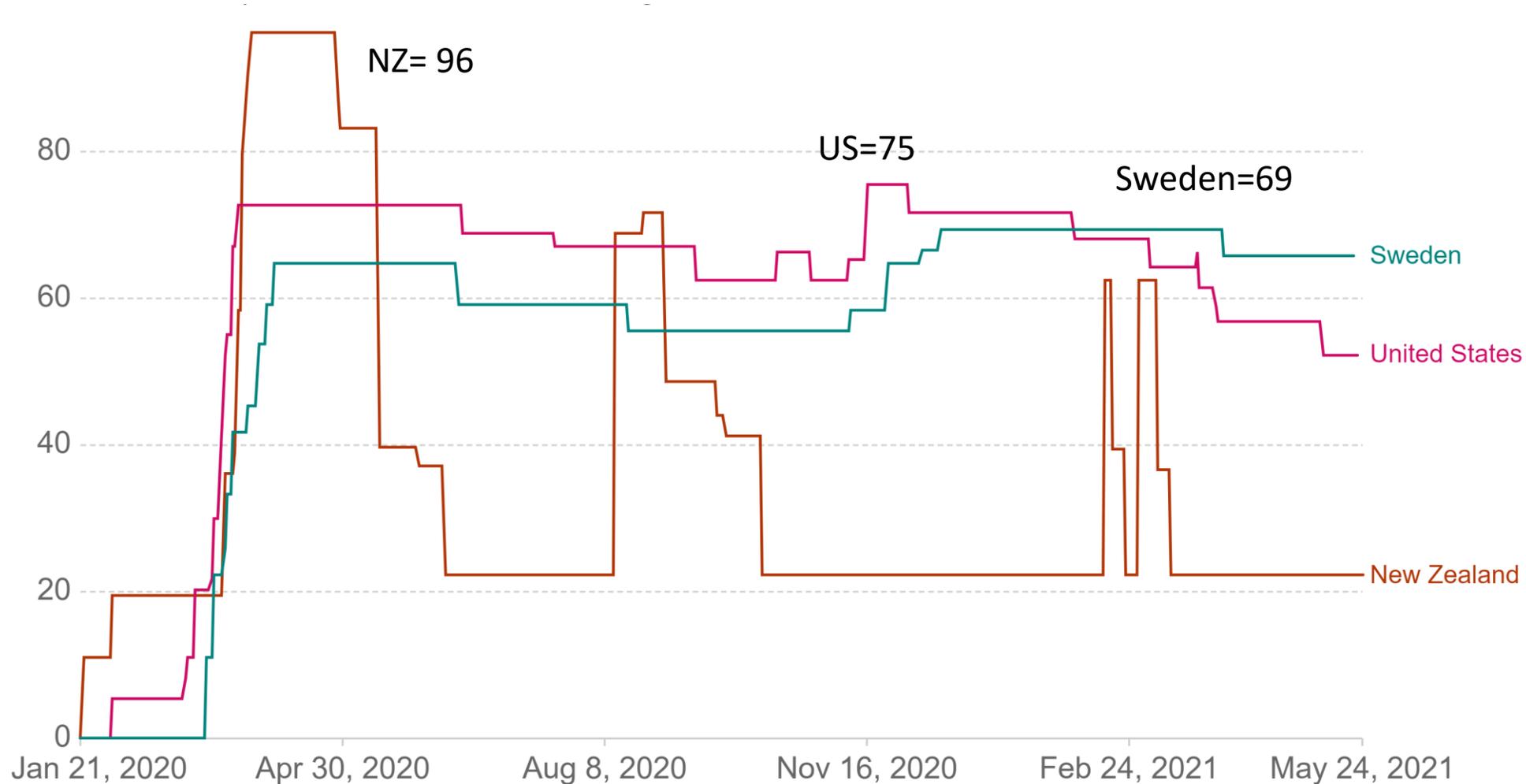
ELIMINATION STRATEGY – New Zealand is working together to eliminate COVID-19

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 is 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 others). 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 schools, 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 seniors) 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, don't touch 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.

Source: NZ Government

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Elimination: Physical distancing (lockdown)



Source: Hale, Angrist, Goldszmidt, Kira, Petherick, Phillips, Webster, Cameron-Blake, Hallas, Majumdar, and Tatlow (2021). "A global panel database of pandemic policies (Oxford COVID-19 Government Response Tracker)." *Nature Human Behaviour*. – Last updated 29 May, 14:00 (London time)

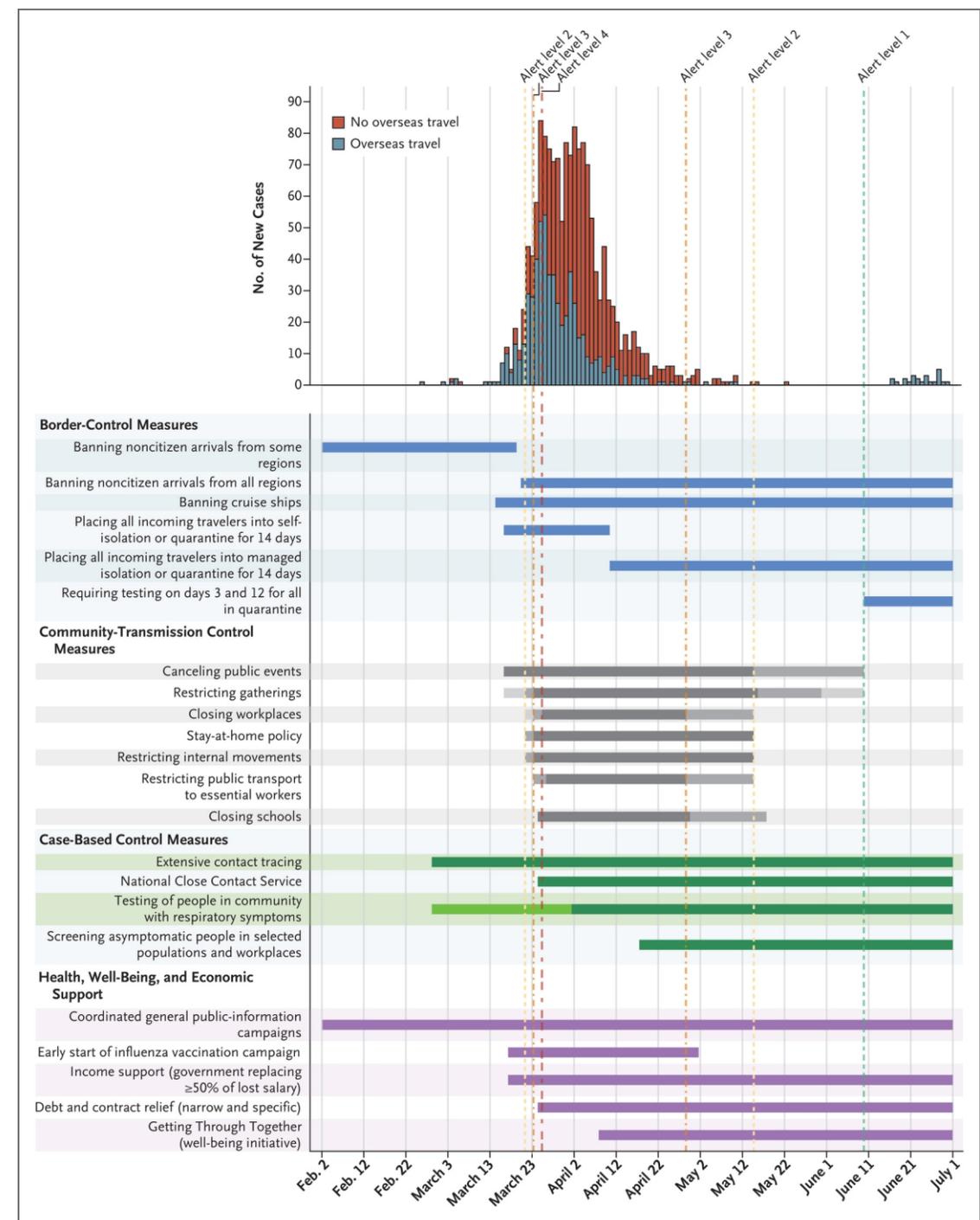
OurWorldInData.org/coronavirus • CC BY

Source: Oxford Stringency Index, Our World in Data

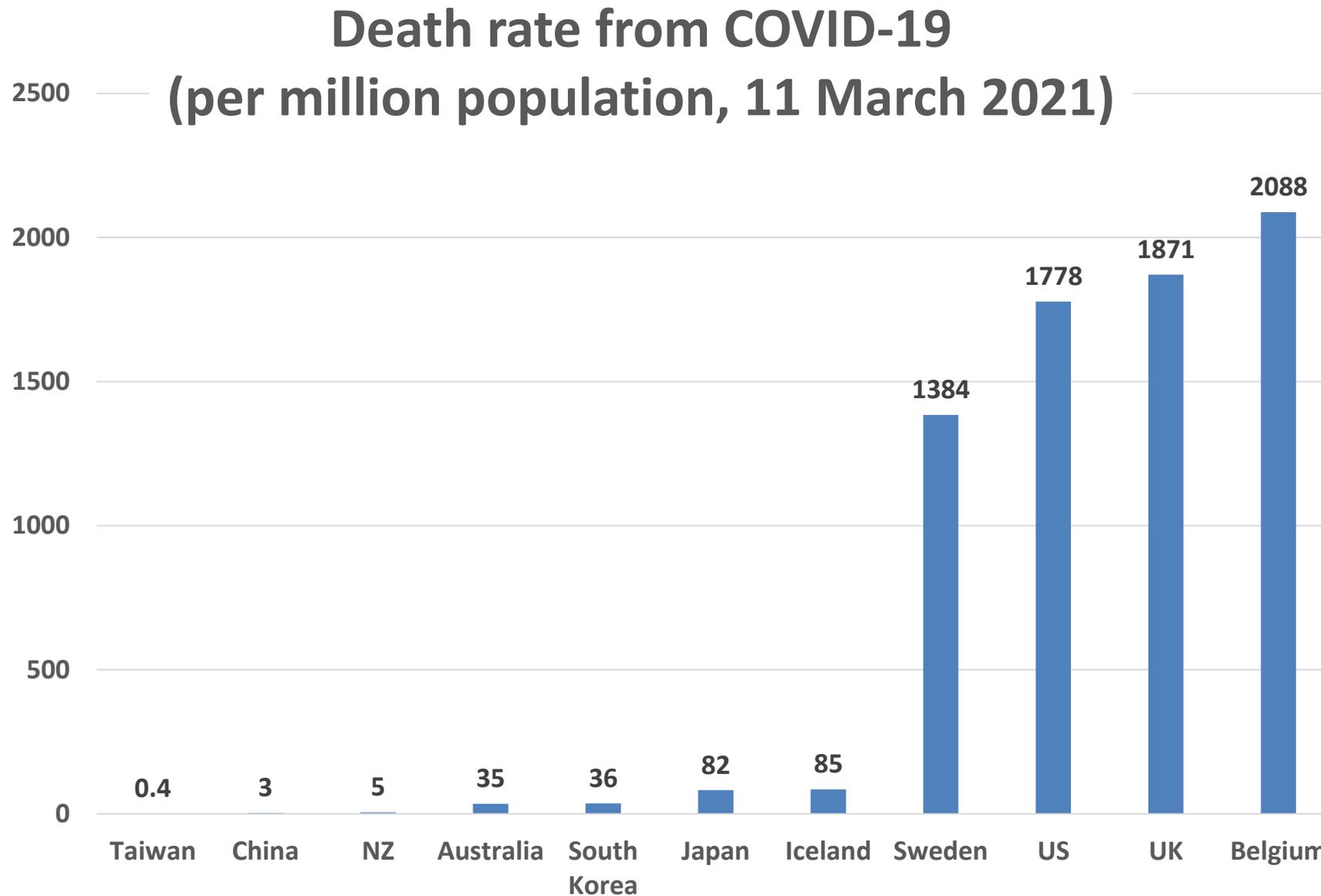
Impact of Elimination Strategy

Rapid decline & end of community transmission of COVID-19

Source: Baker, Wilson, Anglemyer. NEJM e56 DOI: 202010.1056/NEJMc2025203, 20 August 2020



Impact of elimination strategy



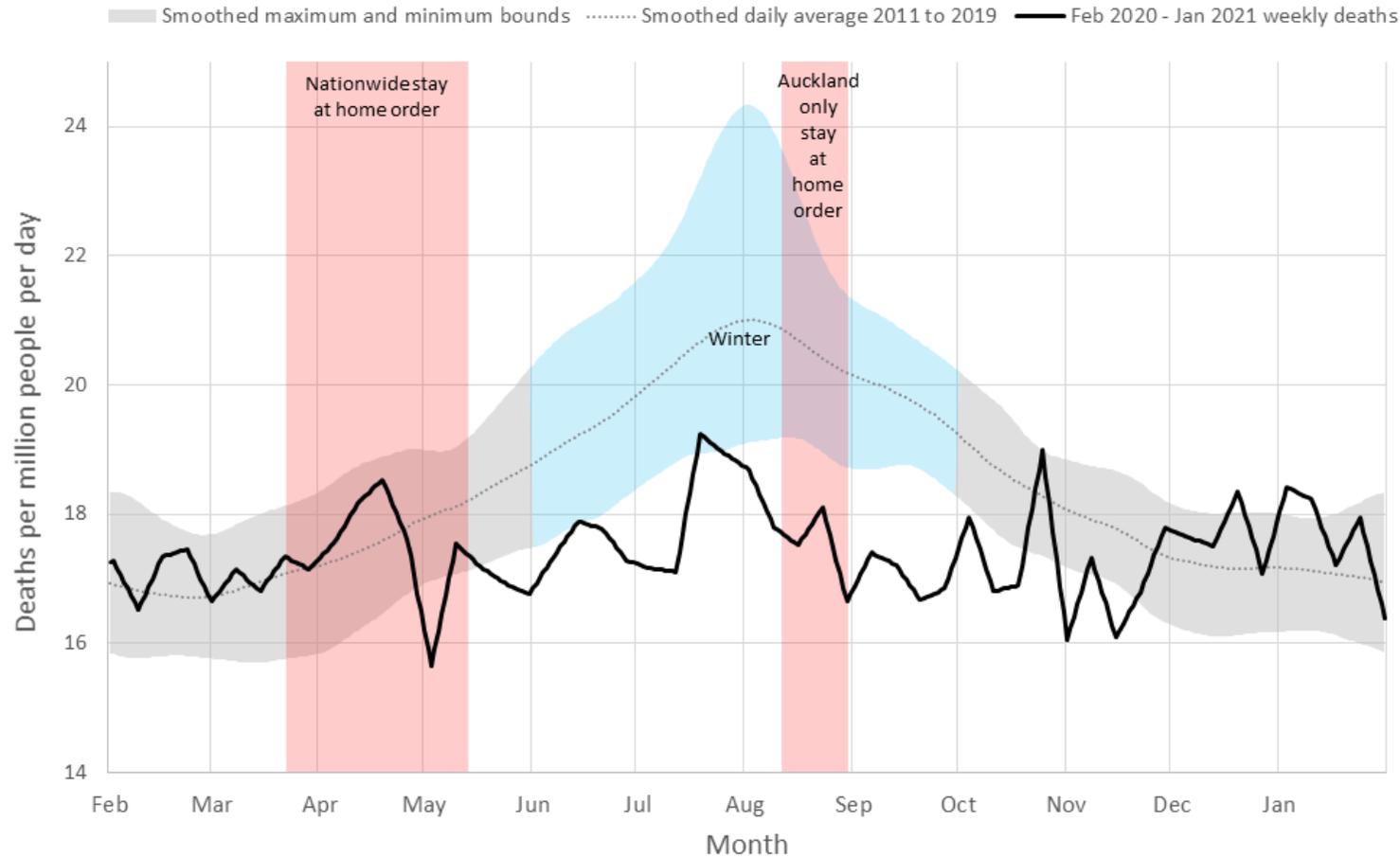
**NZ Lives saved
by elimination
~7,000
(based on
Sweden
mortality =
0.14%)**

**Av 16 YLL per
death**

**Source: Sci
Rep 2021; 11,
3504**

Impact of elimination strategy

Effects on Excess Winter Mortality



**NZ Lives
saved by
reduced
EWM
~1,500**

Impact of elimination strategy: Economy

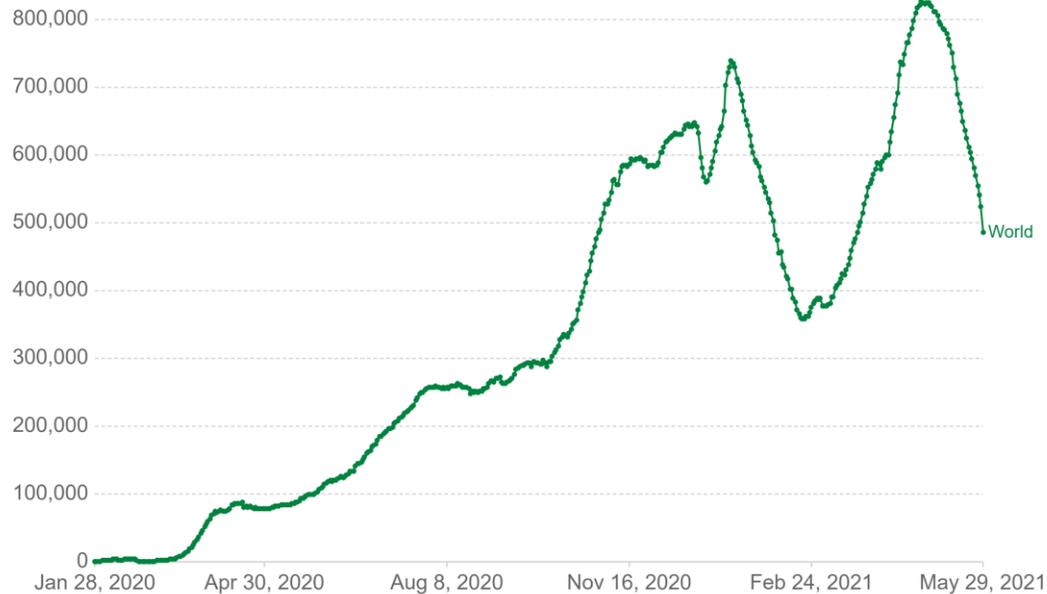
Region	Cumulative mortality rate (per million)	GDP change in 2020 (%), (IMF Projection)
UK	838	-9.8
USA	812	-4.3
Mean Europe +North America (n=16)	618	-7.5
Median Europe +North America (n=16)	606	-7.2
China	3.0	1.9
Taiwan	0.3	0.0
Australia	35.0	-4.2
New Zealand	5.0	-6.1
Mean Asia + Australasia (n=4)	11.0	-2.1
Median Asia + Australasia (n=4)	4.0	-2.1

Progression of the pandemic

Resurgences caused by actions of Governments & virus evolution

Daily new confirmed COVID-19 cases

Shown is the rolling 7-day average. The number of confirmed cases is lower than the number of actual cases; the main reason for that is limited testing.



Source: Johns Hopkins University CSSE COVID-19 Data

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Daily new confirmed COVID-19 deaths

Shown is the rolling 7-day average. Limited testing and challenges in the attribution of the cause of death means that the number of confirmed deaths may not be an accurate count of the true number of deaths from COVID-19.



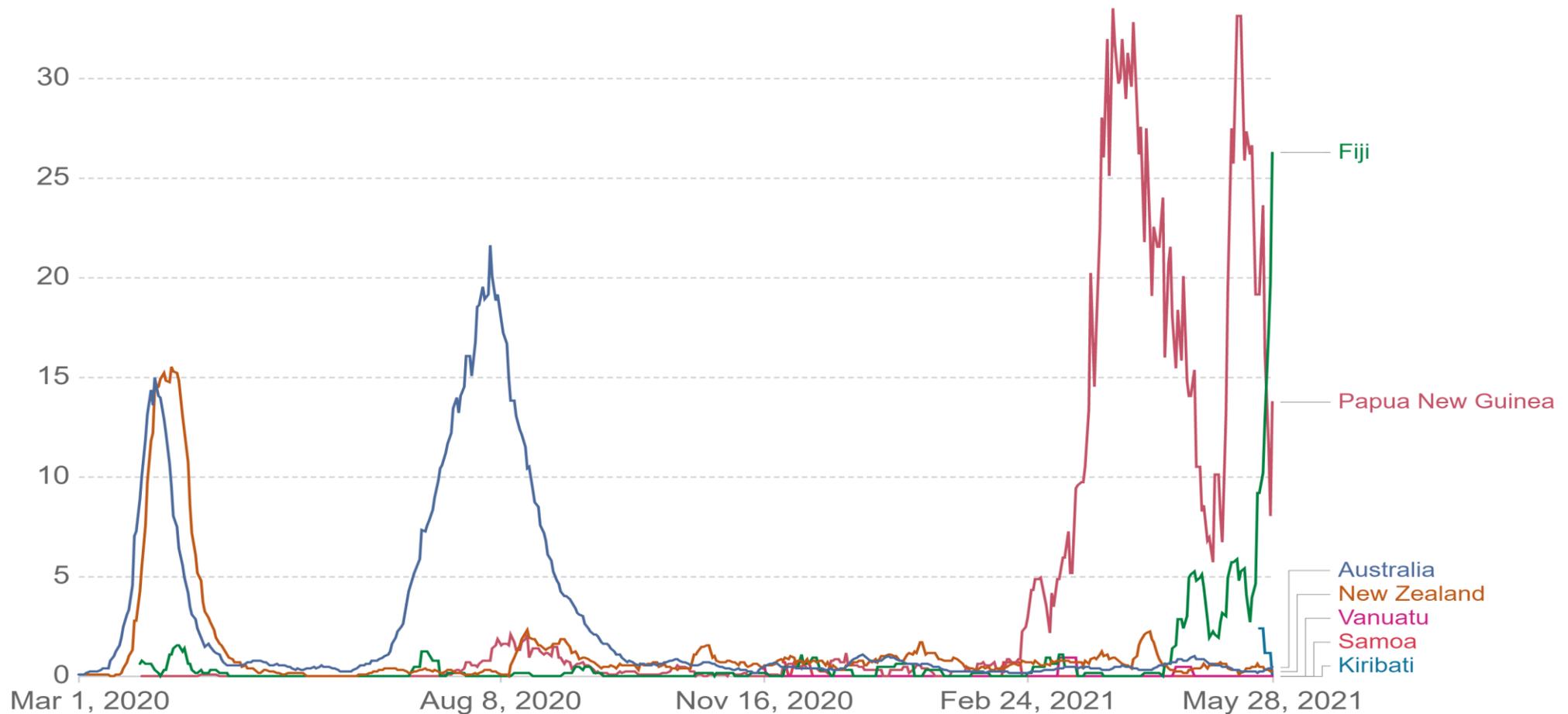
Source: Johns Hopkins University CSSE COVID-19 Data

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Progression of the pandemic: Pacific cases

Daily new confirmed COVID-19 cases per million people

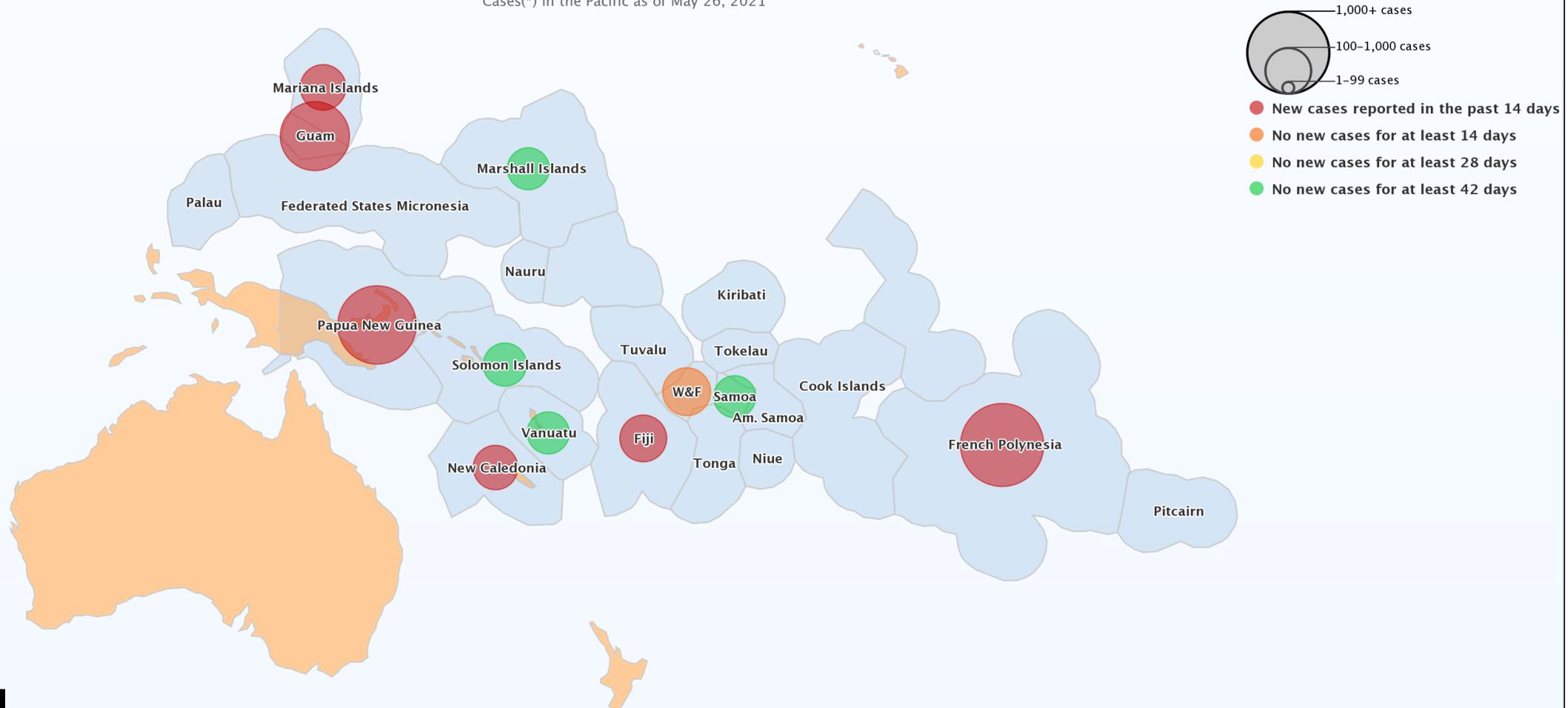
Shown is the rolling 7-day average. The number of confirmed cases is lower than the number of actual cases; the main reason for that is limited testing.



Progression of the pandemic: Pacific cases

Coronavirus Disease 2019 (COVID-19)

Cases(*) in the Pacific as of May 26, 2021



Progression of the pandemic: Pacific cases

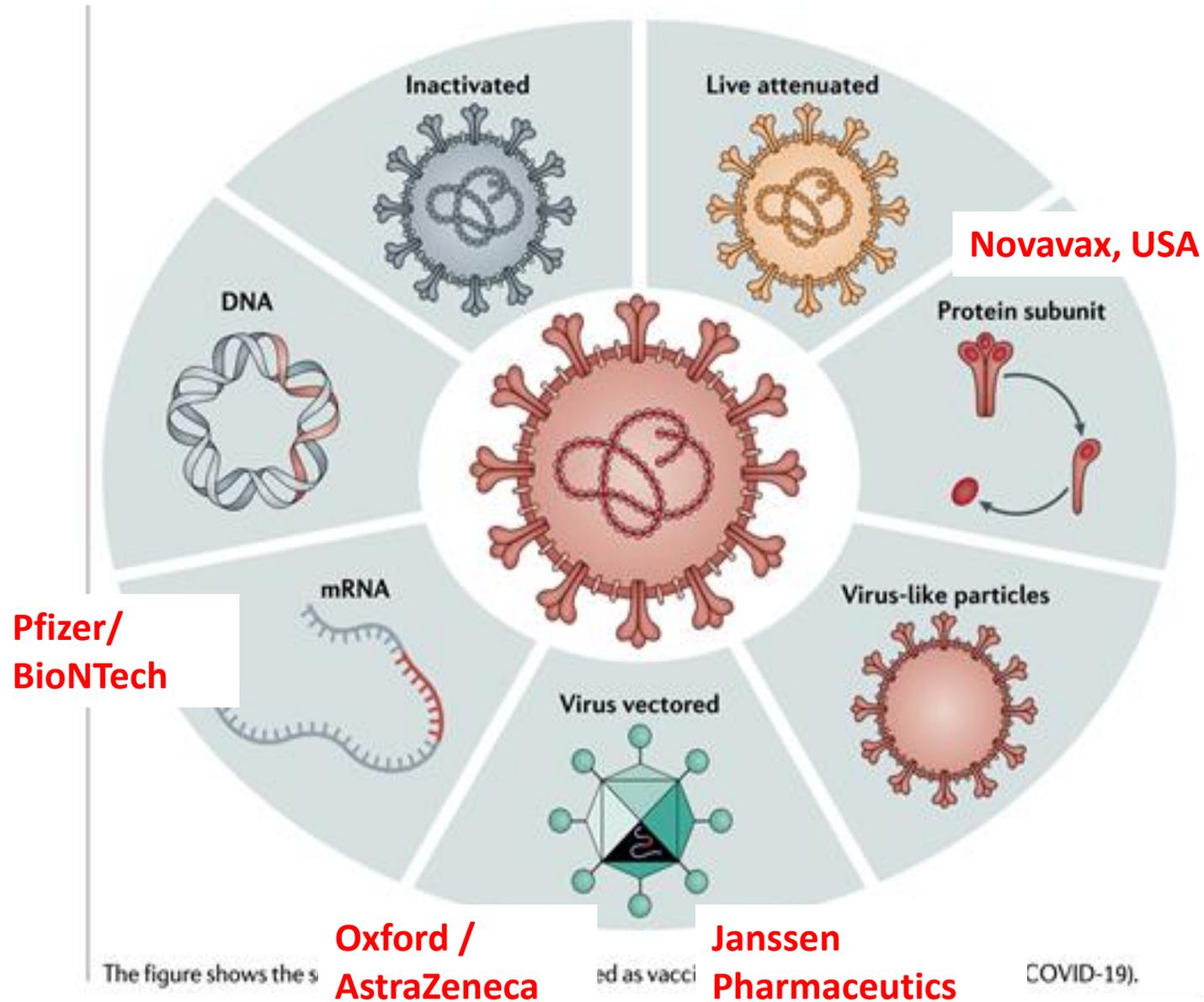
Pacific Country		Past 14 days	Past 28 days	Past 42 days	Total cases	Total deaths
FJ	Fiji	140	175	218	286	4
GU	Guam	82	192	292	8,143	139
MH	Marshall Islands	0	0	0	4	0
MP	Northern Mariana Islands	11	17	20	181	2
NC	New Caledonia	2	2	5	126	0
PF	French Polynesia	58	109	175	18,855	142
PG	Papua New Guinea	1,945	4,331	6,180	15,368	159
SB	Solomon Islands	0	0	0	20	0
VU	Vanuatu	0	0	0	3	0
WF	Wallis and Futuna	0	2	8	454	7
WS	Samoa	0	0	0	1	0
Total		2,238	4,828	6,898	43,441	453

Last update on May 26, 2021

NB. Other countries with no reported cases: Kiribati, Tonga, Palau, Tuvalu, American Samoa, Nauru, Cook Is, Niue, Tokelau, Pitcairn

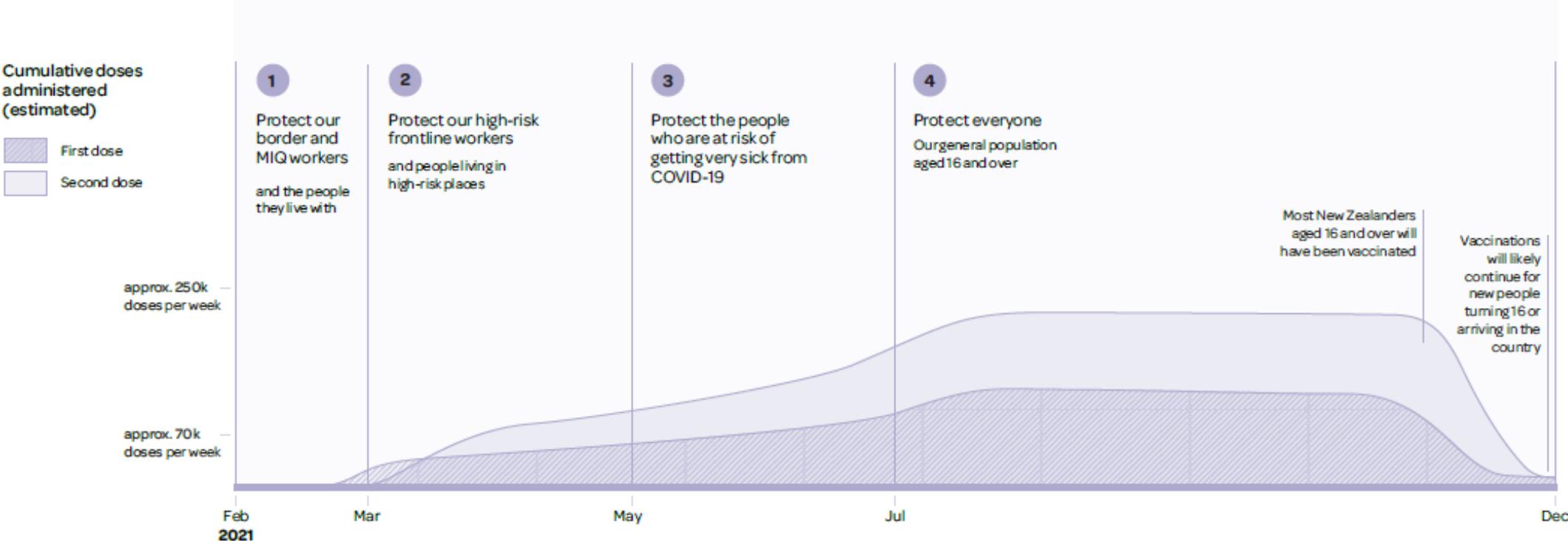
Vaccines

- Multiple vaccines developed & in clinical trials
- Safe and effective at preventing serious disease & death, eg Pfizer/BioNTech vaccine
- Uncertainties: Duration of immunity, Interrupting transmission, Coverage of virus variants, Effectiveness in different age groups



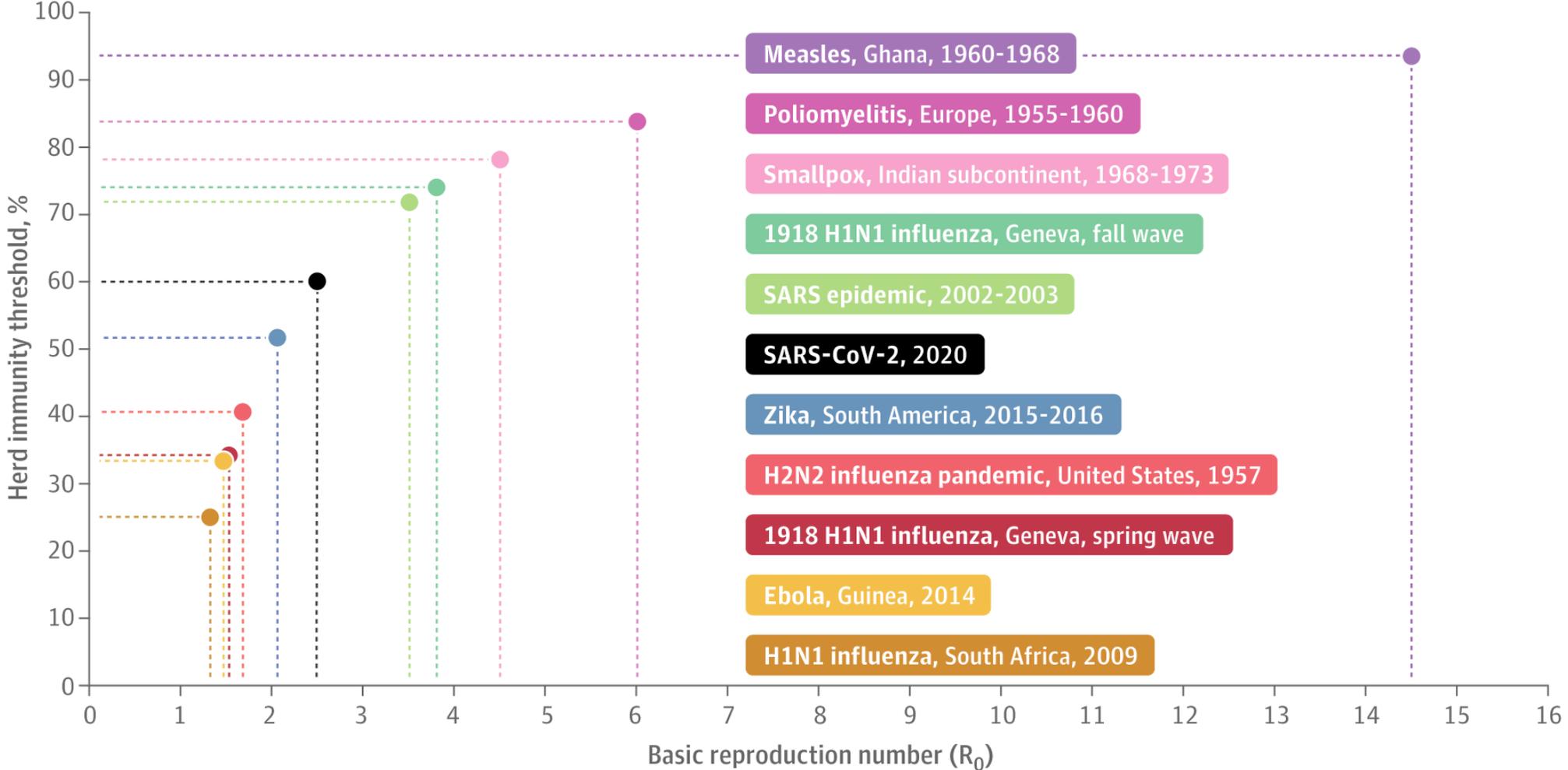
Vaccines

COVID-19 vaccine: Illustration of volumes and timing of vaccination rollout



This graph is illustrative based on expected delivery and uptake. This is based on vaccination of the eligible population – those 16 years and over.

Vaccines

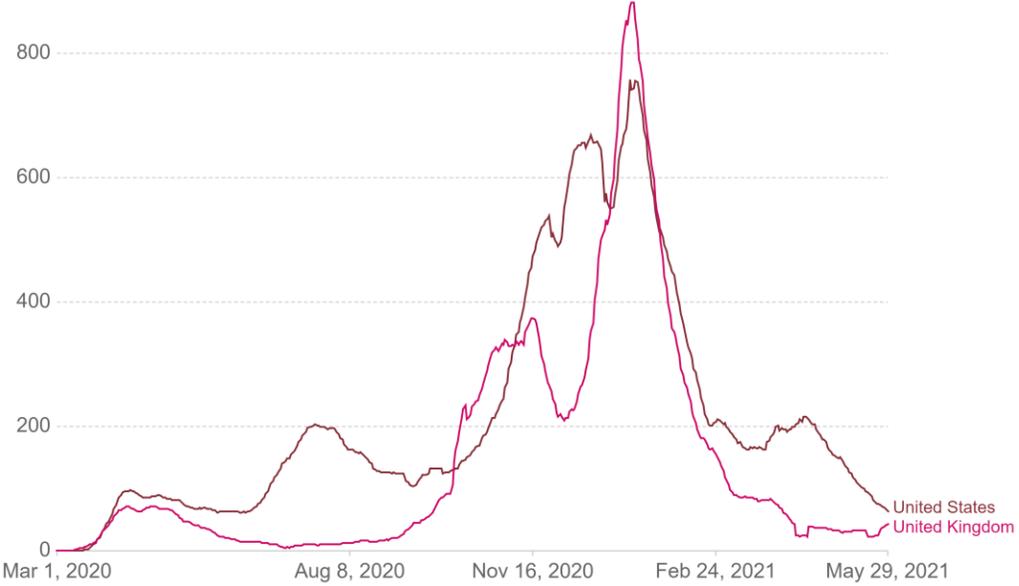


Source: JAMA. 2020;324(20):2095-2096. doi:10.1001/jama.2020.20892

Vaccines

Daily new confirmed COVID-19 cases per million people

Shown is the rolling 7-day average. The number of confirmed cases is lower than the number of actual cases; the main reason for that is limited testing.

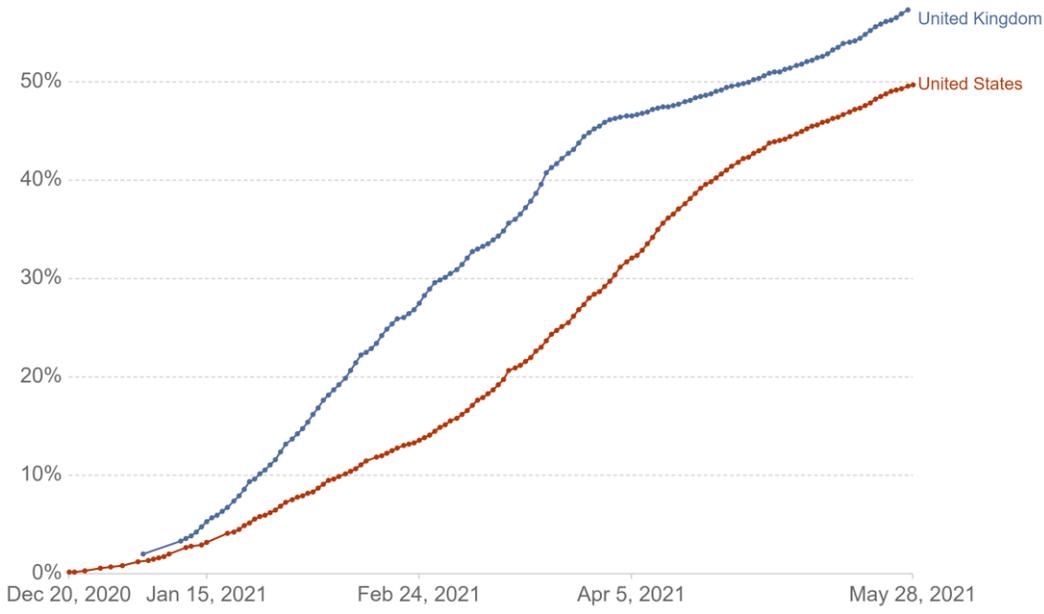


Source: Johns Hopkins University CSSE COVID-19 Data

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Share of people who received at least one dose of COVID-19 vaccine

Share of the total population that received at least one vaccine dose. This may not equal the share that are fully vaccinated if the vaccine requires two doses.



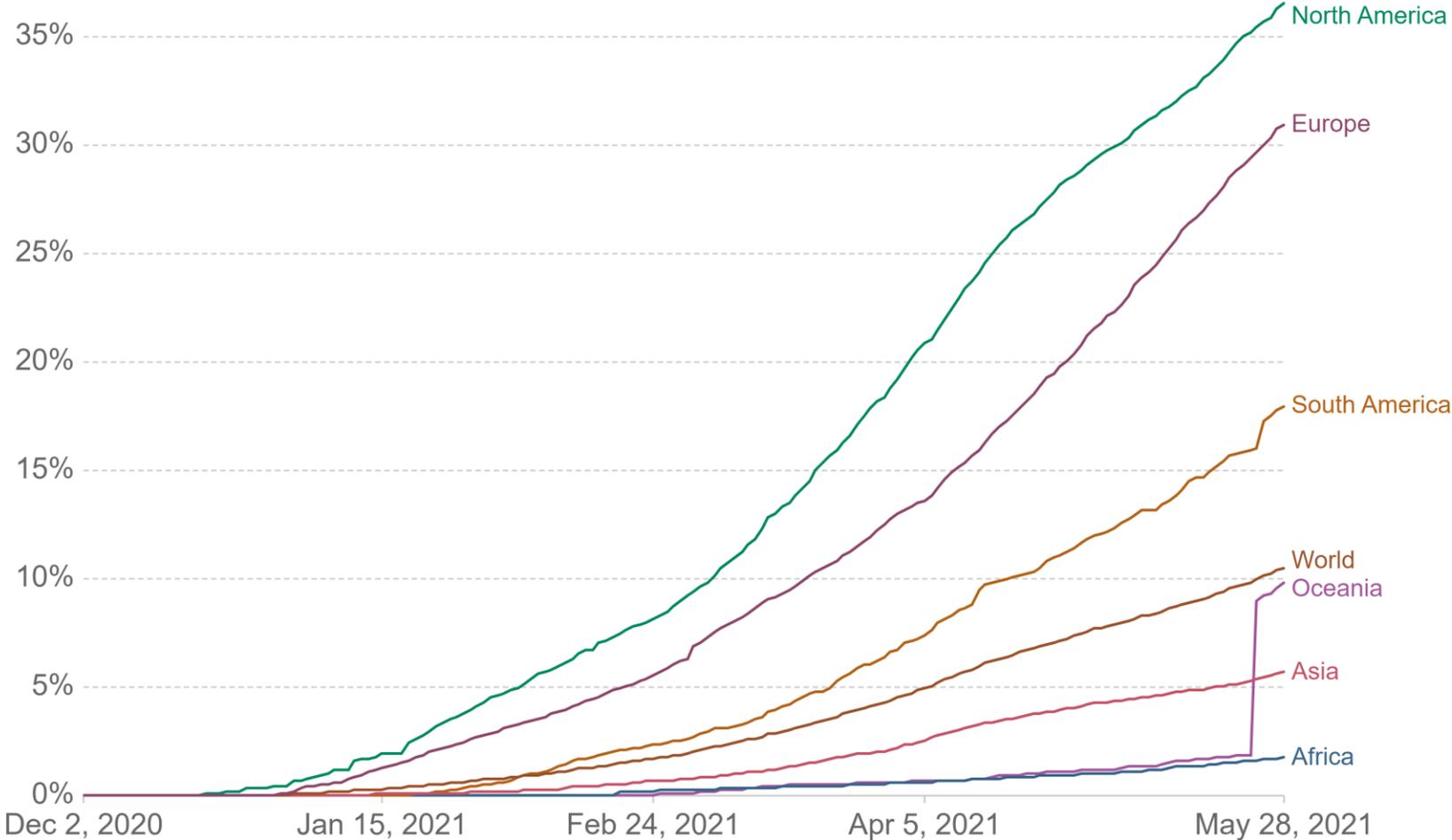
Source: Official data collated by Our World in Data

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Vaccines

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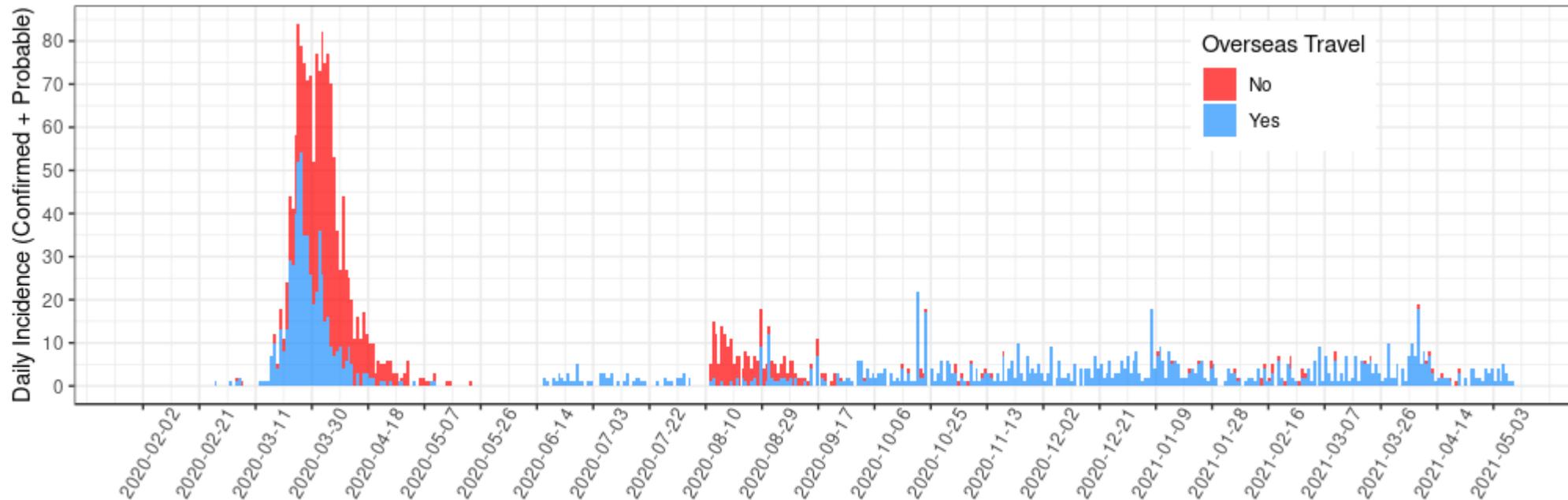


Source: Official data collated by Our World in Data

Borders

Elimination is sustainable with tight border management, ongoing surveillance, and outbreak management

NZ Epidemic curve of Covid-19 cases



NZ Border failures – 13+

1. Auckland August **Community** cluster – 179 cases (incl. 3 deaths)
2. Auckland **MIQ** facility maintenance worker (Aug) – 1 case
3. Auckland **MIQ** facility nurse infected (Sept) – 1 case
4. Christchurch **MIQ** facility cluster (Sept) – 6 cases
5. Auckland **Marine employee** cluster (Oct) – 3 cases
6. Christchurch **MIQ** facility nurse #1 (Nov) – 2 cases
7. Christchurch **MIQ** facility nurse #2 (Nov) – 1 case
8. Auckland **MIQ** armed forces cluster (Nov) – 5 cases (incl. Case D + E)
9. Auckland **MIQ** Pullman case (Jan) – 1 case
10. Auckland **MIQ** Pullman cases (Jan) – 3 cases
11. Auckland Valentines day **Community** cluster (Feb) – 15 cases
12. Auckland **Aircrew** (Feb) – 1 case
13. Auckland **MIQ** (March) – 3 cases

Borders

Risk management – Integrated approach across travel stages:

- **Pre-departure** – 1-2 weeks – Travel restrictions/suspensions, Pre-travel quarantine & Testing
↓
- **During flight & transit** – 0.5-2 days – Consistent PPE, Physical distancing, Precautions at transit points (eg for smokers)
↓
- **During quarantine** – 2 weeks – Multiple MIQ processes, Specialised (non-hotel) facilities, Cohorting
↓
- **Post quarantine** – 1 week – Self-quarantine, Testing, Tracing App

Borders

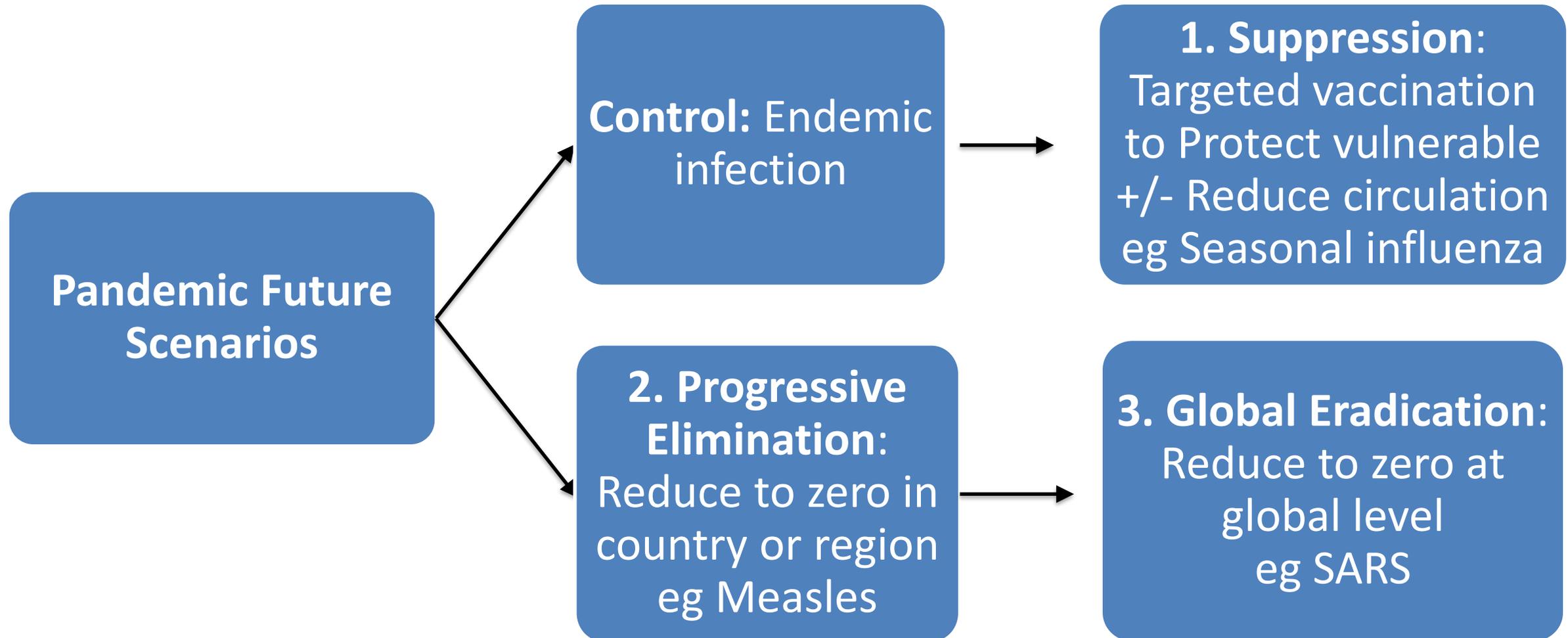
Risk management – Pre-departure – Most important stage:

Move from 'one size fits all' to **risk-based approach** eg 'traffic lights' depending on pandemic intensity in source country

- **Green zone** – **Elimination jurisdictions** eg Australia, Pacific Is, Taiwan
 - Quarantine-free travel with precautions
- **Amber zone** – **Well controlled** eg Singapore, China, Hong Kong
 - Current border quarantine and testing
- **Red zone** – **Poorly controlled** eg India, South America
 - Additional risk reduction measures (eg additional quarantine period + testing) or suspension of travel



Strategic choices for future Covid-19 management



Key lessons for the future

Implications for tackling future pandemics and other public health challenges:

1. Improving evidence-informed decision-making (incl. crises)
2. Adapting responses to future threats ('all hazards')
3. Building effective public health infrastructure
4. Supporting effective global health institutions
5. Seizing public health opportunities provided by the Covid-19 reset

Key lessons for the future

Effective Science + Good Political Leadership
= Evidence-Informed Decision Making



The conversation
Coronavirus outbreak

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](#)

Mon 8 Jun 2020
04.02 BST

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

Key lessons for the future

All hazards approach to other pandemics

	Relatively low transmissibility	Relatively high transmissibility
Relatively high case fatality risk	<ul style="list-style-type: none"> • Middle East Respiratory Syndrome (MERS) • Ebola virus disease (EVD) • Severe Acute Respiratory Syndrome (SARS) • Avian Influenza A(H5N1) 	<ul style="list-style-type: none"> • Severe non-seasonal influenza* • Smallpox • Emerging Disease X (e.g. emerging zoonotic disease) • Novel synthetic Disease X (e.g. a bioweapon)
Relatively low case fatality risk	<ul style="list-style-type: none"> • Influenza A(H1N1) – 2009 pandemic • Poliomyelitis 	<ul style="list-style-type: none"> • Chickenpox • Measles

* Approaching the severity potential of the 1918 influenza pandemic

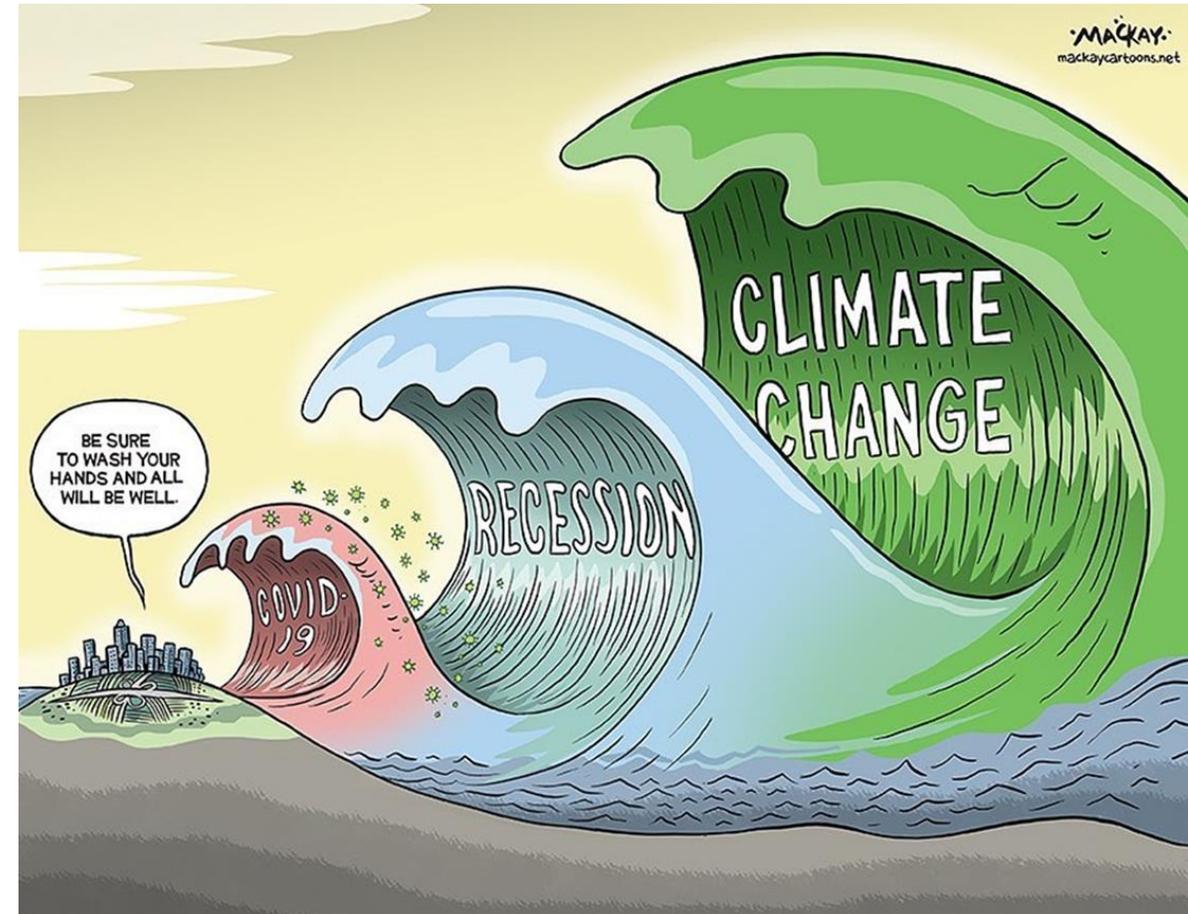
Source: Boyd, Baker, Wilson. Aust N Z J Public Health. 2020 Apr; 44(2): 89–91.

Key lessons for the future

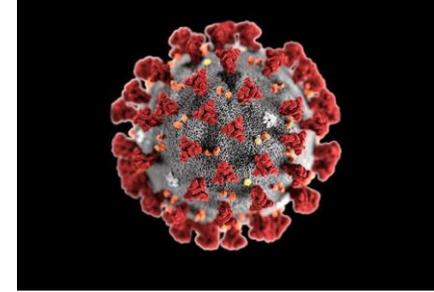
All hazards approach to other threats

- Opportunity for broad **reset** and increased focus on managing major global health threats
- Most NZers want a **green recovery***
- More **equitable** society also assists with collective action against future threats

*Source: Massey Uni Survey, August 2020. 7/10 NZers want a green recovery.



Summary



1. **Elimination strategy appears an optimal response** for new emerging infectious diseases like Covid-19
2. Elimination can be achieved and sustained with **public health measures (incl. border management), vaccines, or both**
3. **Tight border management will be needed until high vaccine coverage achieved**, and some public health measures will probably be required in medium-long term
4. Covid-19 response is an opportunity to build essential national regional, and global **public health infrastructure**

*Source: Baker et al. BMJ 2020;371:bmj.m4907

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
- Photo credits: Luke Pilkinton-Ching

