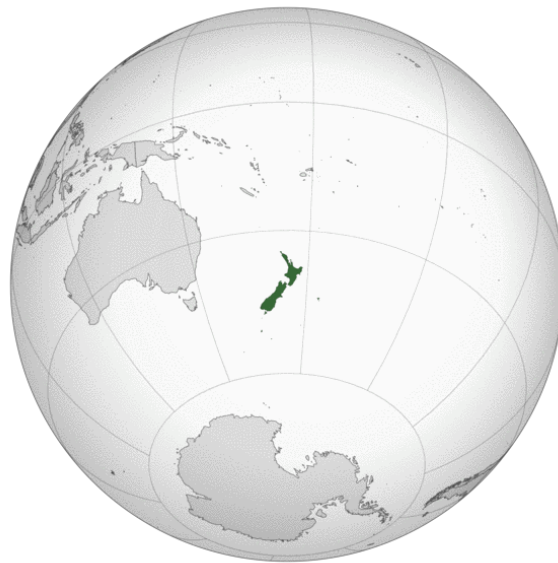


New Zealand physical distancing policies and epidemiology from September 2020 - September 2022: Addendum to January 2020 – September 2020 case report

Policy Frameworks and Epidemiology of COVID-19
Working Group

December 2023



HEALTH SCIENCES
Health Research Methods,
Evidence, and Impact



University of Colorado
Boulder

Policy Frameworks and Epidemiology of COVID-19 – New Zealand case report

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Authors

Motamed, Hossein, Honours Life Science student, School of Interdisciplinary Science, McMaster University, Hamilton, Ontario.

Alvarez, Elizabeth, MD MPH PhD, Associate Professor, Department of Health Research Methods, Evidence and Impact (HEI), McMaster University, Hamilton, Ontario.

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Conflicts of Interest

No conflicts of interest were reported.

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Contact information

For more information on this project, or if you have suggestions or want to join the working group, please contact Dr. Elizabeth Alvarez at alvare@mcmaster.ca or call 905-525-9140 x22248.

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Links to supplementary materials

[Study proposal](#)

[Informed consent](#)

[Interview guide](#)

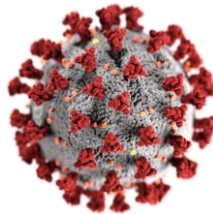
COVID-19 [Country characteristics database](#)



I. Introduction and project description

A new disease that spread around the world

On December 31, 2019, the World Health Organization (WHO) was notified of a cluster of individuals with pneumonia of unknown cause in Wuhan, China. (1) On January 12, 2020, China shared the genetic sequence of the novel coronavirus with other countries to help develop diagnostic tests. (1) Thailand reported the first known case of the novel coronavirus outside of China on January 13, 2020. WHO declared the novel coronavirus (2019-nCoV) outbreak a Public Health Emergency of International Concern on January 30, 2020 with 7,711 confirmed cases, 12,167 suspected cases, and 170 deaths in China and 83 cases in 18 countries outside of China. (1,2) The disease was later named COVID-19 for coronavirus disease 2019 and the virus referred to as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). (1) WHO declared COVID-19 a pandemic on March 11, 2020. (1)



Physical distancing policies and knowledge gaps

As an emerging infectious disease, there were originally no effective vaccines or preventive treatments for SARS-CoV-2. Therefore, governments have had to rely on the use of public policies to combat the spread of the virus. (1–4) Creating policies has been difficult due to the large amount of information and ongoing uncertainty around the characteristics of the virus and who it affects. (3) One of the most commonly used policies to mitigate (slow) the spread of the virus that causes COVID-19 centres on physical or social distancing, which relies on separating people to reduce the transmission of the virus. (5) However, it is still unclear when is the best time to institute such policies and what happens when distancing policies are eased in which contexts. There are many aspects of distancing, such as recommendations for maintaining a physical distance in public, banning group gatherings, or complete lockdowns, that complicate their assessment. (5) There are also many factors that have been attributed to people acquiring or having a worse outcome from COVID-19. (6–11) However, there was no harmonized database available with all the policies, epidemiology and contextual information that were needed to perform comparative analyses useful to informing policy making.



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About this project

The Policy Frameworks and Epidemiology of COVID-19 Working Group was developed after a “CONVERGE Virtual Forum: COVID-19 Working Groups for Public Health and Social Sciences Research.” A group of international researchers convened to explore what physical distancing policies countries implemented and their effects on the epidemiology of COVID-19. The Working Group was further supported through an award from CONVERGE and the Social Science Extreme Events Research (SSEER) Network. CONVERGE is a [National Science Foundation](#)-funded initiative headquartered at the [Natural Hazards Center](#) at the [University of Colorado Boulder](#).

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Policy Frameworks and Epidemiology of COVID-19 – New Zealand case report

Working Group Lead

Elizabeth Alvarez, McMaster University Email: alvare@mcmaster.ca

Working Group Members

<p>Neil Abernethy, University of Washington Edris Alam, Faculty of Resilience, Rabdan Academy, Abu Dhabi, UAE and Department of Geography and Environmental Studies, University of Chittagong Ellen Amster, McMaster University Courtnee Anderson, Royal Roads University Emma Apatu, McMaster University Ehab Abu-Basha, Jordan University of Science and Technology Ahmed A. Belal, McMaster University Alicia Benton, Royal Roads University Iwona Bielska, McMaster University Katherine Boothe, McMaster University Dorsai Boreshnavard, McMaster University Katrina Bouzanis, McMaster University Margie Champion, Royal Roads University Shruthi Dakey, Visvesvaraya National Institute of Technology Agnes Dallison, Royal Roads University Jared Dookie, Western University Alexandra Durocher, Western University Edward Feng, McMaster University Marie-Carmel Gedeon, Heidelberg University Simrat Gill, McMaster University Donna M. Goldstein, University of Colorado Boulder Janany Gunabalasingam, McMaster University Charles Harris, Royal Roads University Bronwyn Hersen, Western University Lyndsey Huynh, McMaster University Irene Israel, York University</p>	<p>Yuna Jang, BC Cancer Centre Yannick Lapierre, Royal Roads University Tamika Jarvis, McMaster University Jinhee Lee, McMaster University Mark Loeb, McMaster University Arielle Luchich, Royal Roads University Claire McFadyen, University of Colorado Boulder Kaelyn McGinty, McMaster University Arielle Milkman, University of Colorado Boulder Peter Miller, McMaster University Nicholas Mitsakakis, University of Toronto Sana Mohammad, McMaster University Hossein Motamed, McMaster University Sarita Panchang, University of South Florida Nandana Parakh, McMaster University Sureka Pavalangathanjah, McMaster University Carla Perrotta, University College Dublin Lisa Schwartz, McMaster University Jean Slick, Royal Roads University Magdalena Stawkowski, University of South Carolina Alice Tan, McMaster University Japleen Thind, McMaster University Rosemary Thuss, Royal Roads University Matthew Van, California State University Long Beach Marg Verbeek, Royal Roads University Simon Wells, Royal Roads University Anna Wynfield, University of Colorado Boulder Sammah Yahya, McMaster University Michelle Yao, McMaster University Song Yegi, York University</p>
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II. Methods

Research design

A qualitative embedded multiple case study research design was used to compare countries (or subnational jurisdictions, such as provinces, states or territories). The suite of public policies and resulting changes in the epidemiology of COVID-19 are examined within their specific country setting. This case report started in September 2020. There is an original case report that started in January 2020. (Please see full [study proposal](#)). Research ethics approval was obtained by the Hamilton Integrated Research Ethics Board (HIREB) (Project # 11243).

Data Collection

For each country, the setting, such as health systems, political systems and demographics were described to help with interpretation of findings and potential transferability, or the degree to which findings are applicable to other sites or future research.

Publicly available data were first collected on the jurisdiction following a standardized data collection form. Epidemiological data were drawn from publicly available data. WHO, World Bank, Central Intelligence Agency and other publicly available sources were used for timelines and country characteristics, where possible. Other sources of information included governmental and non-governmental websites, news articles, government reports, and peer-reviewed journals.

Next, key informant interviews were conducted to fill in gaps, verify information found through the documentary searches, and identify further participants and documentary sources of relevant information. (See [informed consent](#) and [interview guide](#)) Key informant interviews were conducted with policymakers, health workers, researchers and other stakeholders as appropriate to fill in knowledge gaps.

Data Analysis and Presentation

Our [COVID-19 policies](#) and epidemiology databases harmonize data on setting characteristics, policies, demographic characteristics and epidemiological risk factors and outcome metrics. These will further be described in single country or jurisdiction case reports. Comparisons will be selected based on both literal and theoretical replication. Countries that have similarities in either policies or epidemiological trends can be considered literal comparisons, whereas countries that differ will be used as theoretical comparisons. These comparisons will be submitted to peer-reviewed journals for publication.



III. Findings

This report is an addendum to the [“New Zealand physical distancing policies and epidemiology from January – September 2020: A case report”](#). Please see prior report for setting characteristics, population health characteristics, political and health system indicators for New Zealand, and pandemic experience and preparedness.

A. Setting characteristics

Geographic, environmental, social, and economic contextual factors

New Zealand is in the WHO Western Pacific Region. (12) In 2020, New Zealand had a population of 4,822,233 and a population density of 18 people per km². (13) Over three-quarters of New Zealanders, including the Indigenous Māori, live on the north island, mainly in urban areas. Further, 87% of people live in urban centres. (14) The Māori population is estimated to be 850,500, which is 16.7% of the New Zealand population. (15)

Heat map of COVID-19 cases in New Zealand

As of September 30th, 2022, there were 1,785,160 COVID-19 cases across New Zealand. (16) Nearly a third of these cases (578,446) were recorded in New Zealand’s capital, Auckland, and its surrounding regions. (17)

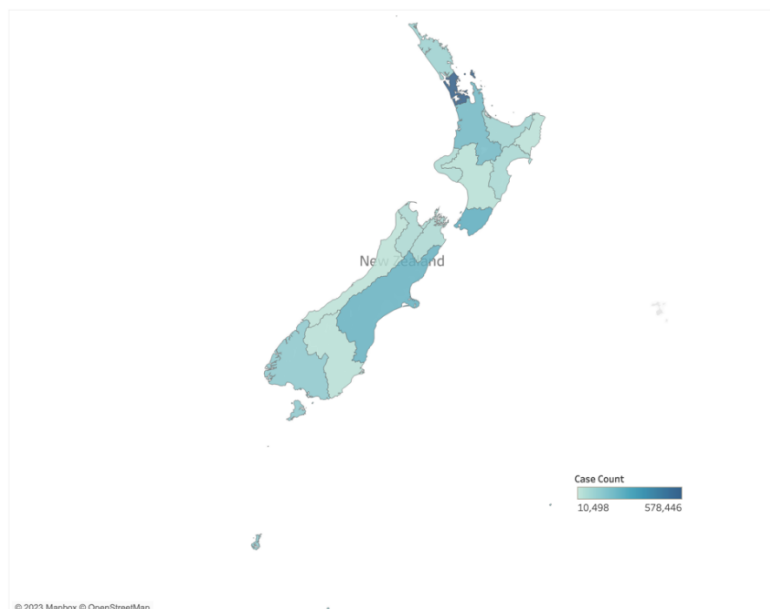


Figure 1. Heat map of total COVID-19 cases in New Zealand as of September 30, 2022 (17)



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Governance and health systems

The two main political parties in New Zealand include the National Party (center-right) and the Labour Party (center-left). (18,19) The Labour Party has been in power since 2017 when Jacinda Ardern was sworn in as Prime Minister. (19) The Labour Party is a member of the international Progressive Alliance, which is a collective of socialist, social-democrat, and progressive political parties. (19,20) An election had been scheduled for September 2020, but this was delayed until October 2020 because of the pandemic. At the end of 2022, PM Jacinda Ardern resigned. (21) On January 24th, 2023, Chris Hipkins, also from the Labour Party, became New Zealand's 41st PM. (22)

New Zealand's government is a parliamentary constitutional monarchy. The Economist Intelligence Unit ranked New Zealand as 4th highest on the 2020 Democracy Index and describes New Zealand as a full democracy. (23) The country has a central government and local governments, but no state/provincial governments. (24) New Zealand has a single chamber of parliament, which is the House of Representatives. (24) Through use of a mixed member proportional representation voting system, Members of the House are elected. (24,25) Although it is a constitutional monarchy, New Zealand does not have a constitution, rather laws passed by parliament. (25) As such, instead of having a constitutional division of power for health, the country has a statutory framework made up of 20 pieces of legislation. (26)

The New Zealand Public Health and Disability Act of 2000 laid the foundations for funding and organization of health services and established strategic priorities. (27) Health financing is mixed since it is mostly publicly funded, but approximately one-third of the population has private insurance to help pay for noncovered services (e.g., private outpatient specialist consultations, elective surgery in private hospitals, supplementary coverage for faster access to nonurgent treatment and copayments). (28) Other key pieces of legislation include the Health Act of 1956 and the Crown Entities Act of 2004. (26) New Zealand has a central Ministry of Health and 20 District Health Boards, as well as some other health related crown entities. (26) Regional public health services are delivered by 12 district health-board owned public health units. (29,30) These services are provided by the district health board as well as non-governmental organizations. (26,27) When considering other comparable countries that are a part of the Organisation for Economic Co-operation and Development, New Zealand's hospital bed and intensive care capacity is less in relation to them. (30) For instance, New Zealand had 4.7 intensive care beds per 100,000 people compared to 35 per 100,000 in the United States. (30) New Zealand also received a score of 39.2 out of 100 on the Global Health Security Index, Epidemic Preparedness, which meant it ranked lower than Italy (score of 47.5) for disease outbreak preparedness.



B. Policies and epidemiology

Cases and social distancing policies

New Zealand’s first case of COVID-19 was recorded on February 28th, 2020. (16) An Epidemic Preparedness (COVID-19) Notice was issued on March 25th, 2020, which activated emergency response powers and a National Emergency was then declared by the Minister of Civil Defence; at that time, there were 283 cases and 0 deaths. (13,30,31) As of September 30th, 2022, there were 1,785,160 cases and 2,979 deaths in New Zealand. (16) Figures 2 and 3 show the number of daily cases, daily deaths, percent of total population of New Zealand that was vaccinated, and dates for selected policies from January 2020 to February 1st, 2022, and from January 2020 to September 30th, 2022, respectively. (33) To accurately depict the epidemiology of COVID-19 in New Zealand prior to February 2022, Figure 2 has been included in this report. Vaccines were first rolled out on February 20th, 2021. (34) By the end of September 2022, just under 84% of the population was fully vaccinated. (33)

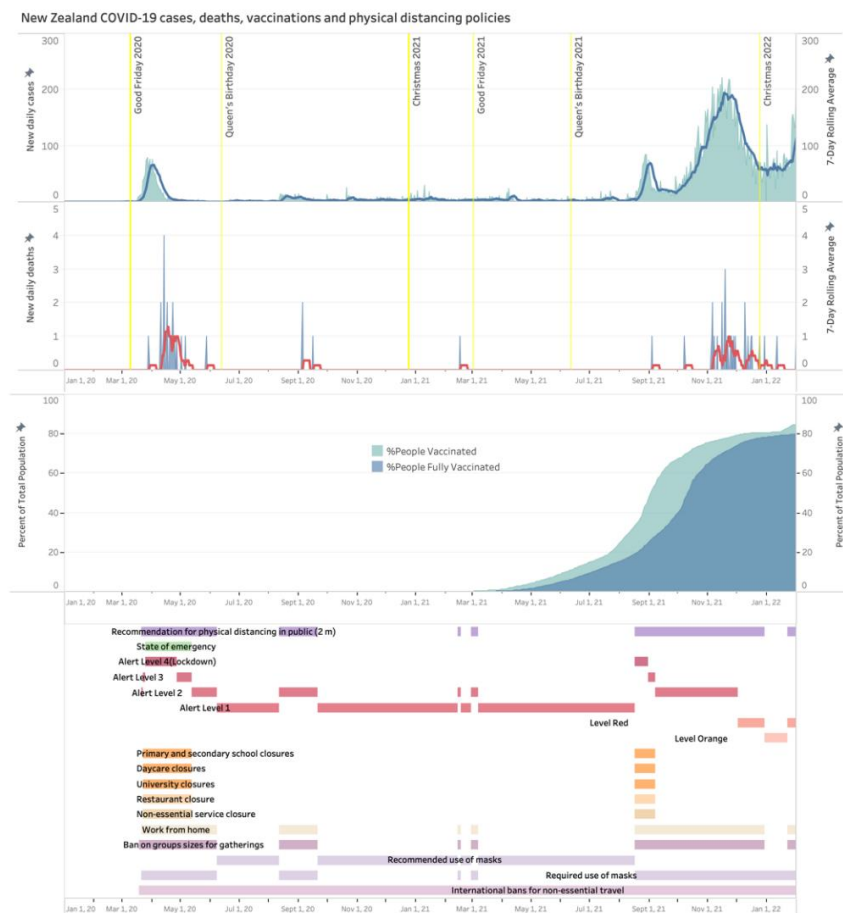


Figure 2. Number of reported daily COVID-19 cases, deaths, and percent of population vaccinated in New Zealand with select policies from January 2020 to February 1, 2022



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New Zealand COVID-19 cases, deaths, vaccinations and physical distancing policies

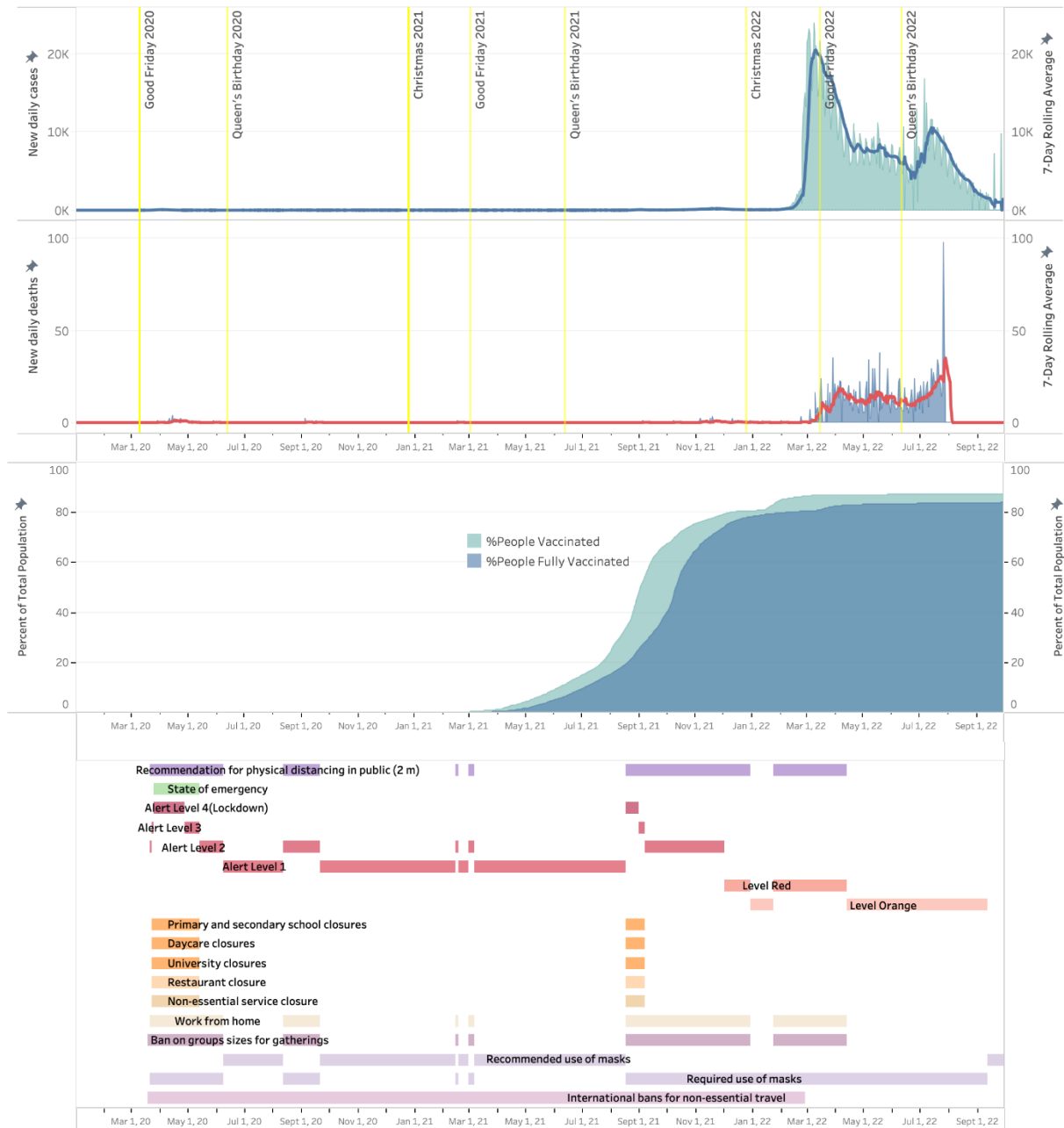


Figure 3. Number of reported daily COVID-19 cases, deaths, and percent of population vaccinated in New Zealand with select policies from January 2020 to September 30, 2022



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Please see prior report for more information about New Zealand’s health policies, economic relief initiatives, management of challenges in the response, and disproportionately affected populations from January 2020 – September 2020.

Description of events in New Zealand

The main spokespeople for New Zealand’s COVID-19 response have been Prime Minister Jacinda Ardern and Dr. Ashley Bloomfield, Director-General of Health, who almost always appeared together at a daily press conference. (30,35,36) The Health Minister David Clark, who also played a critical role in the first months of the response, stepped down on July 1st, 2020. (37) Education Minister Chris Hipkins was appointed the interim Health Minister until the 2020 October election. (37) Chris Hipkins became the Minister for COVID-19 Response from November 16th, 2020 until June 2022, while Dr. Verrall was instated as the Minister for COVID-19 Response from June 14th, 2022 until February 1st, 2023, when she became New Zealand’s 43rd Minister of Health. (38–41) Peter Crabtree, from the Ministry of Business, Innovation and Employment coordinated the development of government strategy and policy response. (30)

Initially, New Zealand followed a *mitigation* strategy. (42) However, on March 21st, 2020, New Zealand changed course and committed to an *elimination* strategy, as the evidence in China, Taiwan, Hong Kong, and South Korea suggested that COVID-19 could effectively be contained. (42–44) Through this strategy, New Zealand intended to eliminate chains of transmission and effectively contain any future imported cases from overseas. On March 21st, 2020, upon introduction of the elimination strategy, the government also introduced a new four-level alert system. Parameters including gathering restrictions, physical distancing, or mask requirements fluctuated based on the Alert Level that was in effect at the time. Alert Level 4 was a strict countrywide lockdown. (31,32,43) At this level, facilities including schools, universities, daycares, non-essential services, and restaurants were closed, and elective medical and dental procedures were suspended. (32,45–47) Vulnerable populations, including persons with underlying medical conditions and immunocompromised individuals, were also instructed to remain indoors/isolated. (32) Further, social interaction was restricted and, with the exception of essential travel, people needed to stay at home in their own social bubble, and public gatherings were not permitted. (32) At Alert Level 3, public venues were closed, only essential services were open, businesses that required close contact were closed, work from home was recommended. People were also required to maintain a home bubble and limit interactions to this bubble, with some exceptions, when outside of work or school. (32) Schools and early learning services remained closed for most students, except children under the age of 10 with essential worker parents or parents that were unable to supervise them due to work. (48) At this level, the majority of tertiary education continued virtually, although universities were allowed to resume laboratory work. (49) Additionally, up to 10 people were permitted for wedding services, funerals and tangihanga (Māori traditional funeral rites). (32) At Alert Level 3 or higher, elective medical procedures were suspended. (50) At Alert Level 2, groups of up to 100 were permitted. (32) At this level, schools, restaurants, and non-essential businesses were



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allowed to reopen while adhering to public health guidelines like physical distancing. (32) Elective dental procedures were allowed to resume at Alert Level 2. (51) At Alert Level 1, remaining requirements including mask usage, social distancing (2 meters expected; 1 meter in “controlled environments”), and bans on group sizes were lifted as well. (32,52) The use of masks was still mandatory on all public transport, including taxi/ride share, buses, trains, and planes, with some exemptions (i.e., children under 12). (32) Vulnerable populations were encouraged to continue to take precautions. (32) Restaurants, cafes, and bars could have as many people on their premise as they wanted but they were legally required to have a QR code poster on display to enable contact tracing via the NZ COVID Tracer app. (32) In Alert Level 4 and 3, domestic travel was only allowed for essential reasons. (32) At Alert Level 2, individuals could travel between regions, but they had to do so in a safe manner. (32) In Alert Level 1, there were no restrictions on domestic travel, however, international border restrictions were still in place. (32) Individuals who were required to self-isolate or those who were symptomatic were not to use public transport. (32) Additionally, New Zealand declared a state of emergency on March 25th, 2020 which continued until May 13th, 2020. (32) Public transportation remained available, but restrictions applied based on the Alert Level. (53)

While New Zealand was COVID-19 free for 102 days, on August 11th, 2020, 4 new community cases of COVID-19 were identified. (32) A day later, on August 12th, 2020, most of the country moved to Alert Level 2. (32) On September 20th, 2020 the number of active cases in New Zealand continued to decrease and were at 71. (54) On September 21st, 2020, all regions except Auckland had moved to Alert Level 1, with Auckland following suit on October 7th, 2020. (32) As such, policies including social distancing, required mask usage, and bans on group sizes for gatherings were now lifted. (32) On October 18th, 2020, a day after PM Jacinda Ardern won her second term in a landslide election victory, New Zealand reported a new case after three weeks with no known community transmission. (55,56) On December 18th, 2020, the government announced the addition of nearly \$3 billion into its COVID-19 responses (i.e., testing and managed isolation regime) after identifying failings with its testing strategy with many border workers not being tested. (54) A few months later, on January 11th, 2021, almost a quarter of the country’s 77 active cases stemmed from the UK COVID-19 variant. (54) On February 14th, 2021 after three new community cases were recorded in a single South Auckland household, Auckland moved to Alert Level 3, and the rest of the country moved to Alert Level 2. (32,54) Despite the emergence of three new community cases at a high school and a fast food outlet, New Zealand moved to Alert Level 1 and Auckland moved to Alert Level 2 on February 17th, 2021. (32,54)

New Zealand started rolling out Pfizer’s COVID-19 vaccines for the first time on February 20th, 2021 and began with vaccinating cleaners, nurses and security staff from Auckland’s Jet Park quarantine hotel. (54) Such vaccine roll out was delayed in comparison to other high income countries, like the United States, where vaccinations started in mid-December 2020. (57) On April 11, 2021 PM Jacinda Ardern stated that New Zealand absolutely accepted not being the first to roll out vaccines, and how important it was to ensure countries hit hardest by COVID-19



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had access to the vaccine first. (58–60) She further emphasized that the situation was simply different in their country, as New Zealanders were not dying. (58–60) Due to how little was known about the queue system of vaccine orders by governments, experts were skeptical of whether this was a deliberate decision made by the government of New Zealand or something that was out of their control. (58–60) Second doses of COVID-19 vaccines were available to individuals 3 weeks after receiving their first dose. (61) Through this, the country aimed to optimise the administration of two doses of COVID-19 vaccines for the most vulnerable citizens. (62)

On February 22nd, 2021, Auckland joined the rest of New Zealand at alert level 1, however, the use of masks in public transport for Alert Levels 1 and 2 became mandatory permanently. (32,54) With the emergence of two new community cases and one being infectious for a week without isolating, PM Jacinda Ardern announced that most of New Zealand would move to Alert Level 2, while Auckland moved to Alert Level 3 as of February 28th, 2021. (32,54) A week and a half later, on March 7th, 2021, New Zealand (except Auckland) moved to Alert Level 1, after no new community cases were discovered in the past 6 days and the experts were confident that the February cluster was contained. (32,54) Auckland proceeded to return to Alert Level 1 on March 12th, 2021. (32,54) As of April 7th, per the Ministry of Health, the total number of vaccinations reached 90,286 of which 19,273 were second doses. (63,64)

The government of New Zealand started to allow quarantine-free visits by Australians from April 19th, 2021, creating a two-way “travel bubble” called the Trans-Tasman travel bubble. (63,65,66) On April 30th, 2021, New Zealand made vaccinations mandatory for all workers in Managed Isolation and Quarantine (MIQ) settings, as well as most border workers. (65) The government announced on June 17th, 2021 that New Zealand’s vaccination roll-out for first doses of Pfizer vaccine would be offered to individuals over the age of 60 from July 28th, over the age of 55 from August 11th, over the age of 45 from mid to late August, and over the age of 35 from mid to late September. (63) Individuals from all other age groups became eligible for vaccination from October 2021. (63) On June 30th 2021, New Zealand’s Business Finance Guarantee Scheme (BFGS), which provided eligible businesses with loans, officially ended. (67) Moreover, nearly 3 months after the start of the Trans-Tasman travel bubble, on July 23rd, 2021, all non-essential flights from anywhere in Australia were suspended, as Australia was experiencing an outbreak of the infectious variant Delta; New Zealanders were allowed to return on managed flights until July 30th, and undergo MIQ for two weeks. (63,65,68)

On August 12th, 2021, Director-General of Health Dr. Ashley Bloomfield announced the time between receiving the first and second doses of the COVID-19 vaccine had increased from 3 weeks to 6 weeks. (69) She added that this modification would allow a large number of people to receive the first dose and have partial immunity at a faster rate against a potential Delta variant outbreak. (69) On August 17th, 2021, a community case of the Delta variant who was believed to have been infectious since August 12th was identified in Auckland; This was New Zealand’s first Coronavirus case in six months and marked the beginning of the Delta outbreak



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in the country. (63,65) Subsequently, as of August 17th, all of New Zealand entered Alert level 4 and lockdown. (32,63,65) This meant that schools, offices, and non-essential businesses closed, and only essential businesses were allowed to be operational. (70) With the announcement of the lockdown, New Zealand's dollar tumbled by 1.5%. (70) Twelve days after the beginning of the lockdown, on August 29th, there were over a total of 500 community cases in New Zealand. (63) On August 31st, all of New Zealand except Auckland and Northland moved to Alert Level 3 since all new cases were only reported in Auckland. (32,63,65) A week later, on September 7th, 2021, all of New Zealand moved to Alert Level 2 while Auckland remained in Alert Level 4. (32,63,65) There were over 1000 Delta community cases in New Zealand as of September 19th, 2021. (63) On October 4th, 2021, PM Jacinda Ardern announced the end of the elimination strategy, and shift to a mitigation strategy as vaccination roll-out targets were being met with 50% of the population being vaccinated at that point; The total number of cases in the Delta outbreak was 1,357 as of that day. (63,71) On October 13th, 2021, New Zealand launched the 'My Covid Record' site which allowed individuals to access COVID-19 vaccination records for vaccine certificates for travel and vaccine mandated activities. (63) On November 8th, 2021, New Zealand opened borders to low-risk and fully vaccinated travellers from Samoa, Tonga, and Tokelau without isolation, in a one-way travel bubble arrangement. (72,73) On November 12th, New Zealand shortened MIQ stays from 14 days to 7 days, followed by 3 days of self-isolation at home. (63,72) The COVID-19 Response Minister Chris Hipkins stated that this change would free up 1500 rooms a month in MIQ, allowing it to be used by community cases and travellers from overseas. (72) Further, My Vaccine Pass was launched on November 17th, 2021, which allowed fully vaccinated individuals with a greater level of access to events and locations. (63,65) On November 29th, 2021, New Zealand started the administration of Pfizer booster vaccines to healthcare, border workers, and Kaumātua (elders in Māori society) who had been fully vaccinated for six months or more. (63,74)

On December 2nd, 2021, New Zealand ended the Alert Level System and moved to the COVID-19 Traffic Light Protection framework with most of New Zealand moving to Red. (32,63,65,75) The new protection framework had three settings: Red, Orange, and Green. (75) At Red, indoor and outdoor gatherings and events are allowed for up to 100 people with 1 meter of physical distancing. (76–78) Individuals could go to cafes, bars, gatherings, indoor events, and the gym while physically distancing one meter at this level. (75) There were public health requirements in place for schools and early childhood centres, and tertiary education had onsite capacity limits based on 1m distancing. (75) Further, face masks were required indoors in most places (i.e., on public transports, flights, retail, events, schools, public facilities, restaurants), and encouraged elsewhere. (75) Remote working was also encouraged for individuals that could work from home at this level. (75) At Orange, the same masking requirements applied as the Red Level, however, when masking was not required, it was encouraged for those above the age of 12 years old. (75) At this level, schools and tertiary education could open while following public health requirements. (75) There were no gatherings and events restrictions at Orange. (75) At Green, individuals were encouraged to wear masks indoors, and there were no further restrictions. (75) On December 16th, 2021, second doses of vaccinations hit 90% for the eligible



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population (>12 year olds), and the first Omicron case was identified in New Zealand's border. (63,65,75) As of December 30th, all of New Zealand except Northland had moved to Orange. (75) As of January 17th, 2022, booster shots were available for those 18 years old and above four months after their second vaccine dose. (79,80) On January 23rd, 2022, the first confirmed Omicron community case was detected, which caused all of New Zealand to move to Red. (63,65,75) At this point, wearing masks became mandatory in most settings when leaving the house. (65)

On January 26th, 2022, New Zealand introduced the 3-Phase Omicron plan which had different approaches to testing and isolation as case numbers grew. (75) In Phase-1, the most restrictive setting, there was a focus on stamping out small outbreaks through PCR testing and 14-day isolation periods for COVID-19 cases. (75) In Phase-2, the aim was to slow the spread and protect those who were at risk of getting seriously ill. (75) Measures for this phase included the shift of contact tracing to online-self assessments and reducing the isolation period to 10 days. (75) Phase-3 focused on safely managing COVID-19 at home through rapid antigen tests and isolation for COVID-19 cases and their contacts. (75) On February 3rd, 2022, in addition to the existing mask rules at Red, mask usage became mandatory for those working in a public facing role, and boosters could have been administered 3 months after receiving a second dose. (75,79,81) New Zealand implemented a Close Contact Exemption Scheme for workers in key sectors in phases 2 and 3 of the Omicron response on February 10th, 2022. (75,82) This scheme allowed workers who were vaccinated and asymptomatic close contacts of a case to continue working, as long as they returned a negative rapid antigen test daily prior to working during the isolation period. (82) Further, these workers were required to follow specific health protocols. (82) On February 16th, 2022, New Zealand moved to Phase-2 of the Omicron response. (65,75) New Zealand proceeded to move to Phase-3 of the Omicron response on February 24th and changed the definition of a case contact to a house-hold member only. (75,79) As of February 24th, the cases in the community reached over 6,000 and by February 25th, there were over 12,000 community cases in New Zealand. (79)

On February 27th, 2022, New Zealand began their first stage of reopening their borders by allowing fully vaccinated New Zealanders and other eligible travellers to enter New Zealand from Australia without having to go through MIQ; They were still required to self-isolate at home. (65,83–85) On March 2nd, there were 22,000 new community cases and rapid antigen tests were delivered to 3.6 million New Zealanders, with 101 million more confirmed for delivery later in March. (79) A day later, on March 3rd, 2022, vaccinated travellers entering New Zealand were no longer required to self-isolate based on advice received from epidemiologist Sir David Skegg and his team. (84) All travellers, however, were required to undergo rapid antigen testing within 24 hours, as well as on their fifth or sixth day of arrival. (84) On March 5th, vaccinated New Zealanders and other eligible critical workers from the rest of the world were allowed to enter New Zealand without having to self-isolate. (84) Originally, at the beginning of February, New Zealand planned on moving to this stage of border reopening on March 13th. (83) Additionally, non-New Zealanders who were working holiday visa holders and



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Recognised Seasonal Employer (RSE) workers were allowed to enter without having to self-isolate as of March 13th, 2022. (84)

As COVID-19 cases soared in early 2022, New Zealand's ability to respond to such high number of infections was limited. Health experts in the country stated that a lack of health care workers and ICU beds rendered New Zealand unprepared for the Omicron variant. (86,87) Further, general practitioners experienced issues with the COVID-19 shared care record, making it more challenging for them to carry out their roles. (88)

On March 25th, 2022 New Zealand removed outdoor gatherings' capacity limits and increased indoor gatherings' capacity limits to 200 people with 1 meter of physical distancing, under alert level Red. (75) On the same day, New Zealand also ended contact tracing and record-keeping requirements for businesses and organizations. (75) As of April 4th, 2022, vaccine passes were no longer required for entry at businesses unless the owner asked for it, and vaccine mandates for most government workers (except health care and border workers) ended. (65,75,79) As community and total cases were continuing to drop, New Zealand moved to Orange on April 13th. (75,79) On April 22nd, the first case of the Omicron XE variant was identified in New Zealand. (89)

On May 2nd, 2022, vaccinated tourists from about 60 countries on a visa-waiver list were allowed to enter New Zealand if they were Covid-negative. (90) This was another step in New Zealand's border reopening plans and was intended to boost tourism ahead of the country's upcoming ski season at the time. (90) Further, on July 2nd, New Zealand's vaccine mandates ended for borders and corrections workers, and on July 7th, 2022, vaccine mandates ended for workers in the Defence Force, Fire and Emergency, and Police. (75) Nearly a month later, on August 1st, 2022, New Zealand fully reopened to international tourists from non-visa waiver countries, international students, and cruise ships entering the country. (91) Visitors were still required to be vaccinated and take two tests upon arrival but did not have to self-isolate. (91) On September 12th, 2022, New Zealand ended the COVID-19 Protection Framework (traffic lights), resulting in the removal of all COVID-19 restrictions and vaccine mandates. (75,79) Masks were no longer required, except in primary healthcare settings like hospitals and aged care settings. (79) Individuals with COVID-19 were required to self-isolate for 7 days, however, household contacts were no longer required to isolate. (79) As such, starting from September 13th, 2022, travellers could enter New Zealand without testing or vaccine requirements. (79,92) Further, on September 26th, 2022, New Zealand's last vaccine mandates for health and disability workers ended. (75)

Management of challenges in the response

While New Zealand was able to contain outbreaks early on throughout the pandemic, the surge in cases with the introduction of the Omicron variant was a significant challenge that the country faced. However, high vaccination rates in New Zealand prior to the beginning of the



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Omicron outbreak helped the country to minimize deaths, risk of sickness, and hospitalisations due to COVID-19. (93) As of January 23rd, 2022, when the Omicron outbreak was starting, 93% of the eligible adult population was fully vaccinated. (93)

However, another major challenge that New Zealand faced during this time was protecting vulnerable groups including Māori and Pasifika. These groups have had lower vaccination rates and have been over-represented among COVID-19 cases and hospitalisations. (94) While these issues existed throughout the pandemic, it became even more prevalent with the country's shift from an elimination strategy to a mitigation strategy as it shifted protection of the population to individual measures like mask use and vaccination. (94) One of the most important practical barriers that existed was the inaccessibility of these groups to vaccination centers as some individuals had to drive for thirty minutes to reach their nearest vaccination center. (95) In Kawerau, where nearly one in four people were out of work, this issue acted as a geographical barrier since not everyone could access a vehicle, and small towns struggled with sustaining public transports of any kind. (95) Further, as of August 18th, 2021, only 6% (28 centers) of the 447 vaccination centers in New Zealand were run by Māori or Pacific providers. (96,97) As of October 19th, 2021, nearly 90% of New Zealanders residing in Auckland were vaccinated, while about 63% of Māori had their first shot. (95) This issue was also attributed to a lack of well-designed and supported outreach services for vaccination services. (97) To combat this, on October 22nd, 2021, the government announced a new fund to accelerate Māori vaccinations. (98) This consisted of the total of a \$120 million New Zealand dollar fund, half of which was to go towards accelerating Māori vaccination rates, and the other half to support Māori initiatives in protecting the communities against COVID-19. (98) On January 25th, 2022, Health Minister Chris Hipkins stated that Māori vaccination rates increased greatly in the past few months as 89% of eligible Māori were partially vaccinated, and 84% of eligible Māori were fully vaccinated. (99) Further, on February 22nd, 2022, the government announced a new \$140 million New Zealand dollar fund to help Māori and Pacific communities against Omicron, as it continued to disproportionately affect them. (100) This fund was to be used by 160 Māori and Pacific health providers and Whānau Ora services. (100)

Disproportionately affected populations

As previously mentioned, Māori and Pacific people were disproportionately affected by COVID-19 during the pandemic. The risk of COVID-19-attributed mortality for Māori and Pacific people was reported to be 2 and 2.5 times higher, respectively, when compared to European and other groups. (101) Māori and Pacific people under 60 years of age had 3.7 and 3.9 times the risk than that of European and other groups. (101) Although the risk of mortality was found to increase with age across all ethnicities, Māori and Pacific people between the ages 70-79 had twice the risk seen in European and other groups. (101) As of December 13th, 2021, Māori made up 38.6% of hospitalisations for the Delta variant, and 45% of associated deaths for Delta in New Zealand; It is worthwhile to note Māori make up only 16.7% of the population. (15,99) The inequality in vaccine rollout for Māori and Pacific people was one of the most important factors that caused



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these populations to be disproportionately affected by COVID-19. (96) Additionally, socio-economically deprived groups were another disproportionately affected population as the risk of COVID-19 related morbidity was higher for them as well. (101) That is, the most deprived 20% of the population had 3 times the risk of the 20% least economically deprived. (101)

Comparison with other country responses

There are many concerns in trying to compare countries' responses to COVID-19. This is shaped by limitations of the data itself and differences in contextual factors. A separate paper by this working group describes limitations of COVID-19 data. (102) Table 1 presents a list of countries included in our work and their use of different physical distancing policies.

Category	Policy	AUS	BGD	BRA	CAN	CHN	CRI	CUB	DNK	DJI	EGY	ENG	FRA	GER	GHA	IND	IRN	IRE	ISR	ITA	KAZ	LBR	NLD	NZL	NIR	PAK	RUS	SCL	SLE	SGP	ZAF	KOR	SRI	SWE	UGA	UAE	VM	WLS			
Government	State of Emergency																																								
	Case Management																																								
Case Management	Recommended self-isolation after travel																																								
	Recommended self-isolation for cases																																								
	Recommended self-isolation for symptoms																																								
	Recommended self-isolation for contacts																																								
Closure	Separation of cases or suspected cases within institutions																																								
	Non-essential service closure																																								
	Restaurant closure																																								
Detection	Suspended elective medical/dental procedures																																								
	Surveillance systems																																								
	Contact tracing																																								
Economics	Assessment centres																																								
	Drive through testing centres																																								
	Mass fever screening in public transportation																																								
	Economic relief policies for individuals/families																																								
Education	Economic relief policies for businesses																																								
	Housing economic relief																																								
	Anti-hoarding																																								
Health Workforce	Anti-price gouging																																								
	School closure- daycare																																								
	School closure- elementary school																																								
Healthcare Resources	School closure- high school																																								
	University closure																																								
Physical Distancing	Health workers allowed to only work at one site																																								
	LTC Health workers allowed to only work at one site																																								
Public Decontamination	Audio/video telehealth																																								
	Telehealth access to prescription medication																																								
	Physical distancing recommendation																																								
	Ban on group size																																								
	Quarantine orders after travel																																								
	Quarantine orders for cases																																								
	Quarantine orders for contacts																																								
	Isolation for vulnerable populations																																								
	Work from home/remote work																																								
	Recommended use of masks/PPE for public																																								
	Required use of masks/PPE for public																																								
	Quarantine for "at risk" or priority neighbourhoods																																								
Lockdown																																									
Travel bans	Public decontamination transit																																								
	Public decontamination streets																																								
	International bans for non-essential travel																																								
Travel bans	Screening at airports/borders																																								
	Closing public transportation																																								

Table 1. Comparative national-level responses to COVID-19 by country as of August 30, 2020 (filled in means policy was implemented)

AUS–Australia, BGD–Bangladesh, BRA–Brazil, CAN–Canada, CHN- China, CRI- Costa Rica, CUB-Cuba, DNK–Denmark, DJI–Djibouti, EGY-Egypt, ENG-England, FRA-France, GER- Germany, GHA-Ghana, IND-India, IRN-Iran, IRE-Ireland, ISR- Israel, ITA- Italy, KAZ-Kazakhstan, LBR- Liberia, NDL-Netherlands, NZL- New Zealand, NIR-Northern Ireland, PAK-Pakistan, RUS-Russia, SCL-Scotland, SLE-Sierra Leone, SGP-Singapore, ZAF-South Africa, KOR-South Korea, SRI-Sri Lanka, SWE- Sweden, UGA- Uganda, UAE-United Arab Emirates, VM-Vietnam, WLS-Wales



IV. Discussion of main findings, limitations, and next steps

New Zealand had a population of 4,822,233 in 2020, and as of April 1st, 2023, there were 2,262,186 reported cases and 4,002 deaths. (13,103) Given that the arrival of first cases of COVID-19 in New Zealand came later than in other countries, New Zealand benefited from watching the experience of others, including seeing how the lockdown in China worked to eliminate the virus, as well as how the mitigation approach in Italy led to spread of the virus, overwhelmed hospital systems, and led to higher death rates, particularly with the elderly. By committing to an elimination strategy early in the pandemic, New Zealand was able to successfully control community transmission and prevent the healthcare system from being overwhelmed. (104) Part of this success can be attributed to strong empathetic leadership from Prime Minister Ardern, clear and consistent communication via the COVID-19 Alert System, the Traffic Light System and risk-based decision-making. (43) There was also strong advocacy for an elimination strategy from the scientific community, who continued to offer advice to the government. Since most sources of the virus came from overseas, the government imposed strict border restrictions as well as quarantine and isolation protocols to prevent further community spread. Further, New Zealand gradually shifted to a mitigation strategy at the end of 2021 after failing to eliminate the Delta variant after 7 weeks of lockdown in Auckland, and with 50% of the eligible population being vaccinated as of October 2021. (43) This shift was also supported by the lower severity of Omicron upon its introduction in early 2022. (105)

While there was inequality in vaccine rollout for Māori and Pacific communities in New Zealand, the government developed new funds and initiatives to improve the COVID-19 response for these populations. (96,98,100) The government should continue to work closely with representatives of these communities to design equitable health-related initiatives. (101). With the surge of Omicron cases in early 2022, New Zealand's capacity to respond to a large surge of COVID-19 cases was limited, as there were not enough nurses or ICU beds. (86,87) Issues with the COVID-19 shared care record were also a challenge that general practitioners faced. (88) The COVID-19 pandemic has highlighted the need for a robust public health system in New Zealand, and there have been calls for implementation of a national public health agency.

Conclusions

Through strong leadership, effective policies and risk-based decision-making, New Zealand experienced fewer cases and deaths of COVID-19 for most of the pandemic, compared to other countries. This was in addition to allowing greater freedom of movement and socialization during the pandemic. This was done through utilization of the Alert Level and Traffic Light System and remaining cautious of a potential increase in cases for quick containment and management. With the end of the Traffic Light System and the shift to a mitigation strategy, New Zealanders are encouraged to wear face masks in crowded and confined spaces and are required to self-isolate if symptomatic or test positive for COVID-19. This work informs a larger project on effects of COVID-19 policies to plan for future pandemics.



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