



Original Research

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How Do Past Immunization Strategies Compare With the COVID-19 Immunization Rollout: A New Zealand Analysis

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Abstract

Objective: The aim of this study was to compare past New Zealand immunization strategies with the New Zealand coronavirus disease 2019 (COVID-19) immunization roll-out.

Methods: Using the READ document analysis method, 2 New Zealand immunization strategies (for influenza and measles) were analyzed for how the disease, context, vaccine supply and demand, ethical principles (equity, individual autonomy, and maximizing benefits), and the Treaty of Waitangi impacted the immunization programs. The findings were compared with the ongoing COVID-19 mass immunization program in New Zealand, as of October 15, 2021.

Results: Several themes common to the case-studies and the COVID-19 pandemic were identified including the importance of equity, obligations under the Treaty of Waitangi, ethical mandates, and preparedness.

Conclusions: Future emergency planning should integrate learnings from other infectious disease responses and immunization programs to avoid repeating mistakes and to create better health outcomes. This study has provided a basis for ongoing research into how an appropriate immunization plan can be developed that incorporates ethical values, the Treaty of Waitangi (in the NZ context), and evidence-based research to increase trust, equity, health, and preparedness for future outbreaks.

Coronavirus disease 2019 (COVID-19) has caused millions of infections and deaths worldwide, and impacted economic, political, social, and health systems globally. As a new virus, there was no pre-existing population immunity and little understanding of the long-term health effects of contracting COVID-19.^{1,2} Vaccines have been crucial in controlling the global pandemic due to the improbability of developing herd immunity through infection.³

There are many practical and ethical challenges to a mass immunization program, and the unpredictability and ongoing nature of the COVID-19 pandemic make it difficult to assess the effectiveness of public health measures in advance.⁴ In its mass immunization program in 2021, New Zealand (NZ) aimed to immunize 90% of the population and mandated the COVID-19 vaccine for many front-facing workers.⁵

Success in achieving herd immunity or high immunization rates varies between diseases, contexts, and strategies. Different strategies have been used for immunization against diseases such as measles, influenza, and polio with varying levels of success.^{6,7} Strategies often reflect ethical choices, with potentially significant implications for the success of the strategy in terms of uptake.

Internationally, historical cases of vaccination programs have been used to inform the development of strategies for COVID-19 immunization; for example, the vaccination programs for infectious disease outbreaks of H1N1 informed a framework for equitable COVID-19 vaccine allocation in the United States.⁸ Analyzing the practical and ethical approaches that have worked in other contexts can help to optimize the development and delivery of a new immunization program.

This study analyzed 2 NZ immunization programs—influenza and measles—in the context of the COVID-19 immunization program rolled out in NZ in March 2021. While COVID-19 is a novel disease of pandemic proportions, the influenza and measles programs were selected as case studies for comparison based on their similarities, differences, and applicability to the COVID-19 pandemic. The key objective of this study was to determine what could be learnt and applied from past NZ immunization strategies to the COVID-19 immunization program and future infectious disease responses.

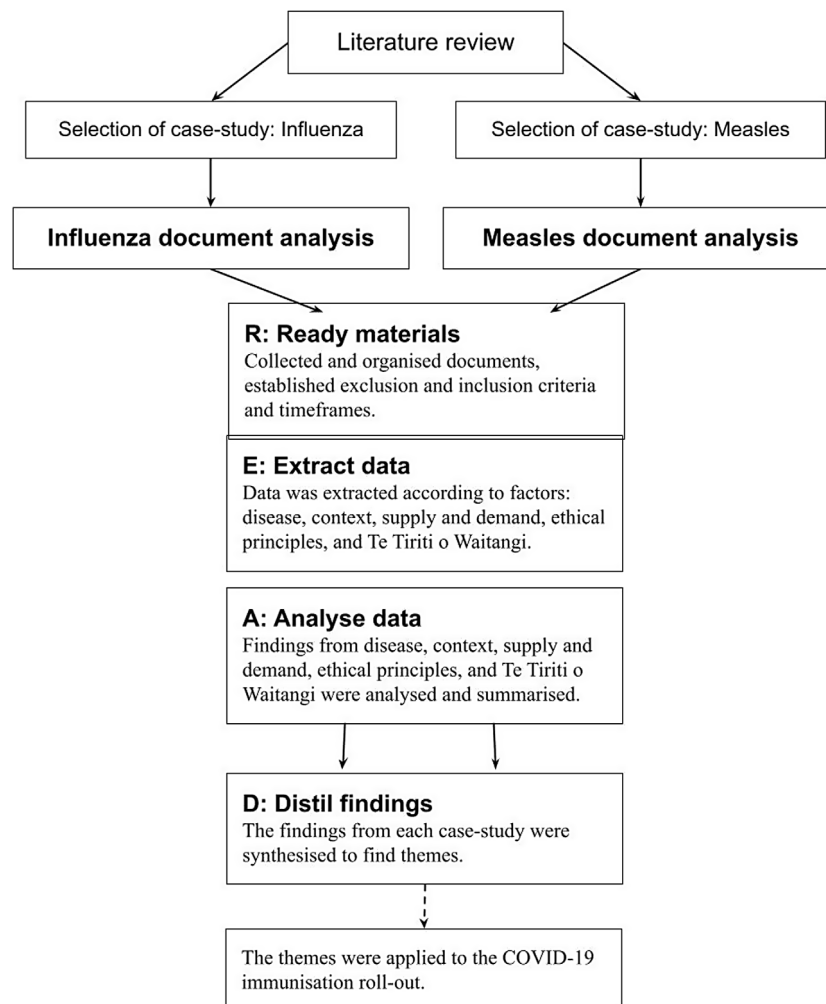
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Methods

This study used the 4-step READ document analysis approach recommended by Dalglish et al.⁹ An overview of the method as applied to the 2 case studies is shown in [Figure 1](#).

Table 1. Table showing analysis categories of documents

1 Category	2 Analysis Questions	3 Examples
4 Disease	5 How did the nature of the disease influence the strategy?	6 Fatality rate, transmissibility, age/ethnic group most affected
7 Context	8 How did the context of the disease influence the strategy?	9 Urgency, epidemic, location
10 Supply and demand	How did the supply of or the demand for the vaccine impact the strategy?	Supply of vaccines, supply chain issues
Ethical framework	How does the strategy reflect or incorporate core ethical principles? ¹¹	Fairness and equity in distribution of burdens and benefits, individual liberty and autonomy, overall balance of benefits over harms
Te Tiriti o Waitangi	How does the strategy incorporate Te Tiriti?	Rangatiratanga, partnership, active protection, equity, and options
Success	How successful was the strategy in achieving equity and/or boosting immunisation rates?	Whole population, disadvantaged groups, Māori

**Figure 1.** Overview of methods, using READ document analysis techniques.

Documents were collected for each case-study separately from August to September 2021. All documents were publicly available online or retrieved through journal databases. The types of documents included were official documents, implementation documents, legal documents, working documents, scholarly work, and media and communication documents.

As recommended by Dalglish *et al.*, categorical aggregation was developed based on findings from the literature review and a

preliminary analysis of documents.^{9,10} The factors selected were disease, context, supply and demand, ethical principles, and Te Tiriti o Waitangi (Treaty of Waitangi or Te Tiriti is NZ's founding document which establishes and guides the NZ Government's relationship toward Māori, the indigenous people of NZ). Data collected from the documents were organized and coded by the key categories as outlined in Table 1. The findings from the document analysis were summarized for each case-study and then compared to define themes.

Results

A total of 42 influenza documents were collected. The most common type of document retrieved was official documents ($n = 15$) with most documents focusing on *seasonal* influenza. However, 13 documents from 2006 to 2021 were about *pandemic* influenza and immunization plans or the risk of pandemic. Of the 54 measles documents collected, most focused on the 2019 NZ outbreak (2019, $n = 27$; 2020, $n = 7$). Documents from 2021 focused on providing measles information, the catch-up program, and the disruption of the COVID-19 pandemic on the measles immunization campaign.

Disease

Constant evaluation, surveillance, and modeling are important to ensure that immunization programs stay effective and can be re-evaluated yearly. For example, modelling helped to predict a 1997 measles outbreak and to inform a mass immunization program, decreasing the severity of the outbreak.¹¹ Documents discussing *pandemic* influenza immunization state that immunization can take too long once an outbreak has begun. The antigenic shift and drift of influenza and the contagiousness of measles also highlight the need for surveillance systems so that current immunization programs can adapt.¹² Surveillance of transmission can also identify which groups are not being reached by immunization programs.¹³

Context

Prioritization of vulnerable groups for influenza immunization, such as the elderly, suggests that the immunization strategy for this disease aims to reduce morbidity and mortality rather than to reduce the spread. However, some groups at higher risk of influenza complications, such as Māori aged under 65, do not receive subsidized vaccination, highlighting inequities in access. Both influenza and measles documents highlight the importance of immunizing frontline and essential workers (including health-care workers [HCWs]) during outbreak and non-outbreak times.^{14,15}

Pandemic influenza and measles outbreak documents highlight the need to be prepared and to have a response plan. However, planning for outbreaks has relied on the *New Zealand Influenza Pandemic Action Plan (NZIPAP)*, published in 2017.¹⁶ Although the report from a 2018 pandemic preparedness training exercise recommended the *NZIPAP* be updated and pandemic training continued, the documentation showed that many of the recommendations were yet to be implemented.¹⁷ Furthermore, despite academic review and emphasis on preparation, before COVID-19 there was little governmental inquiry and analysis into the government's ability to manage a pandemic influenza outbreak.¹⁸

Immunization programs can be slow to roll out. Lack of preparedness has led to measles immunization programs being reactive during an outbreak. For example, during the 2019 measles outbreak in NZ, due to a lack of cross-departmental coordination, there was inconsistent messaging around prioritization and vaccine delivery and supply, creating difficulties in coordinating the immunization program.¹⁹

Government endorsement increases the uptake of a vaccine.^{20,21} However, public communication that precedes inter-agency communication and planning may result in supply shortages or poorly implemented programs. Clear communication across sectors and to the public were key factors in improving

immunization rates for influenza and measles, particularly during an outbreak or pandemic. Community programs aiming to increase influenza and measles immunization were often successful at increasing coverage rates but were resource intensive and needed better funding.

Supply and Demand

Influenza and measles immunization programs have been hampered by the COVID-19 pandemic.²² Programs need to be adaptable to outside factors including the potential impact on vaccine supply. Supply needs to be consistently re-evaluated to match predicted demand, requiring inter-agency coordination.

Ethical Principles

Of the documents reviewed in this study, only a few explicitly mentioned the values guiding their programs. One document that offers guidance for ethical decision-making during a pandemic is the National Ethics Advisory Committee's (NEAC) *Getting Through Together*, which, as of July 2022, is currently undergoing revision.^{23,24} The original 2007 document prioritizes values such as inclusiveness, minimizing harm, unity, respect, and fairness.²³ The draft 2022 NEAC document expands on these values, including equity and collective wellbeing.²⁴ This research found that the value of individual autonomy was of importance in NZ immunization programs, with an emphasis on education and choice. The importance of maximizing benefits and minimizing harm to others during an outbreak is also emphasized across measles and pandemic influenza documents, particularly for HCWs.^{14,15,25,26} This suggests that, during a public health crisis, more weight is given to maximizing population-level benefits than to individual autonomy. Influenza documents highlight the obligation HCWs have to protect their patients, and advocate for mandates to increase immunization rates during a pandemic. During a measles outbreak, unimmunized HCWs cannot treat measles cases, and unimmunized educational staff, such as teachers, must stay at home.²⁶

A core principle considered by the Ministry of Health (MoH) in key official planning documents for both influenza and measles, particularly since 2019, is equity.^{22,27} However, evaluations and media documents commonly reported the need to better incorporate equity and fairness into decision-making and planning. Documents and articles mention the importance of reducing the burden of disease and the associated lack of equity considerations during the delivery of immunization programs, particularly when there is an outbreak.^{13,18,28,29} Documents that incorporated equity also tended to refer to Te Tiriti (discussed below).

Te Tiriti O Waitangi

Māori are often disproportionately impacted by infectious disease outbreaks. Across influenza and measles documents (particularly evaluations of immunization programs by the MoH, media, and scholarly articles) the importance of Te Tiriti in improving Māori health outcomes is emphasized. However, Te Tiriti and its principles are not incorporated well, if at all, in immunization programs.³⁰ For example, the *NZIPAP* highlights the importance of including Māori in decision-making but does not specify how Māori advice will be incorporated into the program's goals and strategy.¹⁶

Discussion

Four main themes emerged from the document analysis of the influenza and measles case studies that can be applied to the current COVID-19 immunization strategy: equity, Te Tiriti, immunization mandates, and planning and preparedness.

Theme 1: Equity

Equity is the absence of avoidable or unjust differences between population groups.³¹ Across all categories of the influenza and measles case-studies, and for COVID-19, inequity in disease and immunization rates and inequitable roll-out of the immunization programs are concerning. As with the influenza and measles programs, the COVID-19 immunization roll-out has been criticized in the media and by public health experts for using a non-targeted approach.³² Like measles, COVID-19 is considered a “magnifying glass,” the transmissibility and immunization data highlighting inequities in the immunization response.^{33,34}

A commitment to equity in public policy goes beyond recognizing and prioritizing vulnerable groups and requires intentional actions to target priority groups and achieve equitable outcomes.³² The need for action to achieve equity is emphasized by King and colleagues: “saying, ‘equity is important’ is different from actually making equity important by means of intentional actions to achieve it.”³² While vulnerable groups are often mentioned in the influenza and measles case-study documents, few official documents incorporated the value of equity, and of those that did, only a few explained how the goal of equity was to be practically achieved. Although the COVID-19 immunization response claims to be predominantly driven by equity, the COVID-19 immunization programs organized by the MoH and District Health Boards (DHB) did not reach their targeted audiences.³⁵ For example, despite the Manakau DHB having a high Māori and Pacific population (38%), less than one-fifth of people immunized at a mass immunization event in August 2021 were Māori or Pacific.³⁶ In comparison, a mass immunization event organized by Pacific providers in Auckland in October 2021 saw 7000 Pasifika immunized over 3 d.³⁷

There is often a tension in public health between achieving equity by prioritizing a specific group of the population and maximizing benefits across the whole population. A one-size-fits-all strategy can be beneficial at the population level—reaching an 80% immunization rate in the whole population, for example—but will likely perform poorly in achieving equitable rates for all population groups. A maximizing strategy can result in a failure to distribute benefits fairly, violating a core tenet of justice. This is evident in NZ, where population COVID-19 immunization levels were high, but lower among Māori. Thus, paying attention to how the benefits of an immunization program are distributed is an important ethical constraint on a maximizing strategy.

However, the “cost” of achieving equitable outcomes might involve sacrificing some benefits for 1 group to prioritize benefits for another.³⁸ For instance, equitable rates of immunization might necessitate the prioritization of subgroups of the population at the expense of a slower rise in immunization rates in the whole population. The ethical trade-off between equity and utility was evident in a few documents compared with the public debate over immunization strategies for measles, influenza, and COVID-19 tended to emphasize 1 value over the other.³⁹ While some degree of trade-off between these values may be necessary, prioritizing

equity in immunization contributes to overall utility due to the promotion of herd immunity and reduces direct and societal costs.³⁸

The major difference between COVID-19, and influenza and measles, was the public, political, and economic pressure to re-open borders to international travel and trade.⁴⁰ Achieving equity in immunization rates across the population has subsequently become increasingly important as NZ no longer seeks COVID-19 elimination.⁴¹ As well as incurring these direct impacts, more vulnerable groups will be disproportionately affected as the health-care system becomes over-burdened, and the opportunity cost of treating COVID-19 patients in place of patients with other health problems increases.⁴¹

A commitment to equity in health policy must, therefore, include and go beyond prioritization in principle and directly incorporate vulnerable groups in immunization planning and delivery. Multimodal, culturally acceptable programs that understand the unique challenges faced by each population group are most effective when the affected communities are involved in decision-making. Funding must be allocated fairly, to support underserved populations and to avoid HCW burnout.⁴²

Theme 2: Te Tiriti O Waitangi

In NZ, equity is underpinned by the Crown’s obligations under Te Tiriti and the goal of equitable health outcomes for Māori.⁴³ Past immunization approaches have not led to equitable outcomes due to a failure to incorporate Māori in the planning and response of immunization strategies.³⁰ Similar to influenza and measles programs, the COVID-19 immunization strategy has been criticized for largely ignoring advice from Māori health experts.³⁹ The principles that underpin Te Tiriti are rangatiratanga (self-determination), partnership, active protection, equity, and options.³⁰ While active protection and equity are often goals of more recent immunization programs (since 2019), without active incorporation of the other principles, immunization will continue to be delivered inequitably due to the one-size-fits-all model.⁴³ To uphold the rights of Māori in NZ, policy-makers need to work directly with Māori to lead, co-design, implement, and evaluate programs. These principles of partnership and co-governance could be applied in contexts other than NZ to uphold equity and justice.

In the traditional Māori context, tikanga (values and standards) guide Māori and help to promote and advance health.⁴⁴ The Māori worldview gives a holistic view of health, which goes beyond the individual to consider the interconnectedness of relationships. A holistic view of health is encapsulated in Māori models of health such as Te Whare Tapa Wha and Te Pae Māhutonga.^{45,46} Other countries have developed similar models which similarly incorporate indigenous values.⁴⁷ The effects of COVID-19 extend beyond an individual’s health, rippling into all aspects of the health-care system, the economy, and collective society. Therefore, the fundamental values of tikanga can help guide an immunization approach. Incorporating Te Tiriti alongside tikanga values may provide solutions to increasing herd immunity among the whole population. As noted earlier, influenza, measles, and COVID-19 immunization strategies designed by Māori, such as outreach programs and drive-in immunization services that offer incentives such as kai (food), held in community gathering places such as marae and churches (emphasizing community wellbeing over individual wellbeing), have increased immunization rates among both Māori and non-Māori.⁴⁸

Theme 3: Immunization Mandates

Measles, influenza, and COVID-19 immunization strategies are dependent on education and awareness. Both influenza and measles documents included discussion of immunization mandates, particularly among certain high-risk professions or during an outbreak. However, the response to COVID-19 is unique in its introduction of population-wide immunization mandates and certificates (discussed below). COVID-19 immunization mandates and certificates highlight the tension between maximizing benefits and individual autonomy.⁴⁹ The public debate on the ethical principle of maximizing benefits and minimizing harms intensifies in the setting of pandemic influenza, measles outbreaks, and COVID-19.

Vaccination certificates are 1 means by which the Government and businesses can attempt to increase immunization rates and minimize disease outbreaks.⁵⁰ Vaccination certificates for COVID-19 could be considered analogous to the measles and childhood immunization certificates required by schools in NZ. This approach has been described as “compulsory choice” because it requires people to reveal their immunization status, which may contribute to increased immunization rates.⁵¹ However, there are no clear consequences for children who are not immunized against measles, although they are recommended to stay home from school during an outbreak. The immunization certificates for COVID-19 (still in the proposal stage at the time of this study) enact consequences of social exclusion for those who are not immunized, providing an incentive to become immunized. A policy of requiring certificates demands that everyone has equal access to the vaccine. Consequently, certificates could compound existing inequities and lead to a mistrust in the government.⁵² The potential harms can be justified on the grounds of widespread benefits to society, such as increasing herd immunity and economic growth. However, these justifications must be balanced against other ethical principles with the values and justifications outlined and communicated in advance.⁵³

In 2020, the NZ government introduced immunization mandates to groups such as border workers, HCWs, and educational workers.^{5,54} These mandates were similar (although on a much larger scale and more punitive) to strategies used in measles outbreaks in which unimmunized teachers are required to stay home during an outbreak. The increased risk of morbidity and mortality of COVID-19 further emphasizes the “duty of care” of HCWs, an aspect that is evident in the influenza documentation.⁵⁵ The key ethical justification for mandates is minimizing harm by keeping the community safe while promoting the benefits of herd immunity and other important social goals, such as ensuring children have access to education.⁵³

Poorly implemented and unjustified mandates can increase distrust among the community.⁵² The urgency of the pandemic and COVID-19 “fatigue” from lockdowns and restrictions, as well as the adverse economic impact, meant that people were perhaps more accepting of an immunization mandate for COVID-19 than for other diseases, such as influenza and measles.⁵⁶ A further risk, however, is that wider community mandates can divert resources away from other immunization campaigns and result in a decrease and reluctance to get immunized for other diseases.⁵³ Considering the impact of the COVID-19 pandemic on the decreasing immunization rates for diseases such as measles, it will be important to consider additional focus and resources for other immunization programs, to prevent further disease outbreaks.⁵⁷

Theme 4: Planning and Preparedness

Planning and public health workforce preparedness for disease outbreaks is imperative to ensuring a cohesive immunization program that targets priority groups, ensures adequate vaccine supply, and builds trust. This study found that, although being prepared for a disease outbreak is considered highly important, disease outbreaks in NZ rely primarily on the *NZIPAP*,¹⁶ which urgently needs updating. Moreover, there are no detailed publicly available immunization plans for use during an infectious disease outbreak.³³ This lack of preparedness results in immunization programs being reactive, rather than preventative to outbreaks. The lack of planning and foresight results in a perpetual cycle of under-funding of the public health system, a system designed primarily for prevention, until there is an emergency or crisis such as the COVID-19 pandemic.

The lack of planning also results in a “crisis mindset,” whereby the immediate threat of disease takes precedence over the long-term approach needed to prevent future outbreaks.⁵⁸ This is evidenced by the decrease in immunization rates for other diseases such as measles, during the COVID-19 pandemic.⁵⁹ There are many uncertainties with the COVID-19 pandemic, and immunization plans are constantly changing and evolving as new evidence emerges.⁶⁰ Using information from modeling and expert advice, which has been successfully used during COVID-19, can help to decrease the severity of an outbreak.⁶¹

Ethical preparedness is fundamental to an effective public health response.⁶² While documents in this study were coded for foundational ethical principles, few NZ documents other than NEAC’s *Getting Through Together* (2007), explicitly note the ethical values that should guide decision-making during a public health emergency.²³ Public health operates in a political context, and in an emergency, political considerations can influence how and when particular measures are implemented or publicly accepted.⁵⁸

Ensuring that ethical values and commitments are transparent is important to the success of public deliberation, trust, and willingness to comply with necessary public health measures.⁶³ This is especially important when rapid action is required in the midst of the fear, uncertainty, and urgency of infectious disease outbreaks.⁵⁸ There are several ethical frameworks that can be used in combination with Te Tiriti and other policy recommendation documents (such as WAI2575 in NZ), to assess and justify policy change, to avoid reactive policy changes, and to ensure equity.^{64,65} Using health promotion to communicate mandates and the underlying values is best practice (as evidenced in other vaccination programs). Clearly articulating the values and justifications behind policies, such as immunization mandates, is important to maintain public trust and transparency, and ensure processes are guided by core values.

Limitations

While this study highlighted some key findings that will be useful for future immunization planning, there were several limitations. The document analysis was not triangulated with other data such as interviews with key stakeholders, including the MoH and community groups, which would have enhanced the study. Moreover, to fit within the scope of this study, only 2 case-studies were used and not all documents were able to be collected pertaining to the case-studies.

Due to the fast-moving nature of the COVID-19 pandemic, updates to the NZ COVID-19 immunization strategy after October

15, 2021, were not included in the analysis. Policy changes and new information after this date are not discussed.

The analysis used NZ documents and data, and as such, the findings may not be applicable to other countries or for immunization programs that do not require herd immunity.

Conclusions

The COVID-19 pandemic has resulted in major economic, social, and health consequences, with immunization a key contributor in the fight against it. The extent to which decision-makers have learned from past immunization programs appears to be limited. Emergency planners should reflect on findings from other infectious disease responses to avoid repeating mistakes and to ensure better health outcomes. As future disease outbreaks and pandemics are likely, governmental reviews into COVID-19 immunization strategies alongside sustained public health resourcing must be considered. A successful immunization plan needs to incorporate ethical values, Te Tiriti (in the NZ context), and evidence-based research to increase equity, trust, health, and preparedness for future outbreaks.

An adaptable and integrated immunization framework, that considers both immediate and sustained actions in different scenarios, across the entire health and disability sector, will help to ensure that decisions can be made quickly, creating a sustainable, equitable, and durable immunization strategy for whatever comes next.

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Competing interests. None.

References

1. **National Ethics Advisory Committee.** Ethical framework for resource allocation in times of scarcity. 2020. Accessed January 16, 2024. <https://neac.health.govt.nz/consultations/past-consultations/public-consultation-ethical-framework-for-resource-allocation-during-times-of-scarcity/>
2. **Galeotti C, Bayry J.** Autoimmune and inflammatory diseases following COVID-19. *Nat Rev Rheumatol.* 2020;16(8):413-414.
3. **Sabino EC, Buss LF, Carvalho MPS, et al.** Resurgence of COVID-19 in Manaus, Brazil, despite high seroprevalence. *Lancet.* 2021;397(10273):452-455.
4. **Smith M, Upshur R.** Pandemic disease, public health, and ethics. In: Mastroianni AC, ed. *The Oxford Handbook of Public Health Ethics.* Oxford Academic; 2019:797-810.
5. **New Zealand Government.** Unite against COVID-19. Accessed January 16, 2024. <https://covid19.govt.nz/>
6. **Field RI, Caplan AL.** A proposed ethical framework for vaccine mandates: competing values and the case of HPV. *Kennedy Inst Ethics J.* 2008; 18(2):111-124.
7. **Attwell K, Navin MC, Lopalco PL, et al.** Recent vaccine mandates in the United States, Europe and Australia: a comparative study. *Vaccine.* 2018; 36(48):7377-7384.
8. **National Academies of Sciences, Engineering, and Medicine.** Framework for equitable allocation of COVID-19 vaccine. The National Academies Press. 2020.
9. **Dalglish SL, Khalid H, McMahon SA.** Document analysis in health policy research: the READ approach. *Health Policy Plan.* 2020;35(10):1424-1431.
10. **Stake RE.** *The Art of Case Study Research.* Sage; 1995.
11. **Cullen RM, Walker WJ.** Measles epidemics 1949-91: the impact of mass immunisation in New Zealand. *N Z Med J.* 1996;109(1032):400-402.
12. **Huang SQ, Lopez LD, McCallum L, et al.** Influenza surveillance and immunisation in New Zealand, 1997–2006. *Influenza Other Respir Viruses.* 2008;2(4):139-145.
13. **Sonder G, Ryan D.** Health sector response to the 2019 measles outbreaks. 2020. Accessed January 16, 2024. <https://www.health.govt.nz/publication/health-sector-response-2019-measles-outbreaks>
14. **Ministry of Health.** Ministry of Health position statement - addressing influenza immunisation of healthcare workers – March 2018. 2018. https://www.tewhatoa.govt.nz/assets/For-the-health-sector/Health-sector-guidance/Diseases-and-conditions/Influenza/moh_position_statement_-_influenza_immunisation_of_hcw_march_2018.docx
15. **Ministry of Health.** Measles Public Health Flyer for Health Professionals - Non-travel “Think measles: There are cases in our community”. 2014. <https://www.rph.org.nz/public-health-topics/illness-and-disease/measles/measles-ph-flyer-hth-profs-non-travel.pdf>
16. **Ministry of Health.** New Zealand Influenza Pandemic Plan: a framework for action. Ministry of Health Wellington; 2017. Accessed January 16, 2024. <https://www.health.govt.nz/publication/new-zealand-influenza-pandemic-plan-framework-action>
17. **Ministry of Health.** Exercise POMARE: Post exercise report. 2018. Accessed January 16, 2024. <https://www.health.govt.nz/publication/exercise-pomare-post-exercise-report>
18. **Charania NA, Turner NM.** 100 years since the 1918 influenza pandemic—progress made, yet questions remain. A synopsis of the 4th New Zealand Influenza Symposium, February 2018. *N Z Med J.* 2018;131(1481):50-55.
19. **Expert Advisory Group.** Minutes from the Ministry of Health Expert Advisory Group (EAG), 10 September 2019. 2019. Accessed January 16, 2024. https://www.health.govt.nz/system/files/documents/pages/measles_eag_minutes_10_sept.pdf
20. **Jennings LC, Baker S.** Government policy change in 1997 was essential for the implementation of an influenza vaccination strategy for New Zealand. *Int Congr Ser.* 2001;1219:697-702. doi: 10.1016/s0531-5131(01)00387-9
21. **Bohmer PD, Jennings LC, Smith LB, et al.** The national influenza immunisation strategy group: a New Zealand model for influenza vaccination promotion. *Int Congr Ser.* 2004;1263:799-804. doi: 10.1016/j.ics.2004.04.003
22. **Immunisation Advisory Committee.** Everything you need to know about FLU 2021: Treasure our Whānau. 2021. https://assets.website-files.com/61f35aad08e65b4f5a55423/61f9f9633a337b30735f9d1b_Flu_handbook_2021-WEB_10-06-21.pdf
23. **National Ethics Advisory Committee.** Getting through together: ethical values for a pandemic. 2007. Accessed January 16, 2024. <https://neac.health.govt.nz/publications-and-resources/neac-publications/getting-through-together-ethical-values-for-a-pandemic/>
24. **National Ethics Advisory Committee.** Ethical Guidance for a Pandemic: Whakapuāwaitia e tatou kia puāwai tātou. 2022. Accessed January 16, 2024. https://consult.health.govt.nz/++preview++/ethics/egap/user_uploads/neac-ethical-guidance-for-a-pandemic-july-2022-1.pdf
25. **Immunisation Advisory Committee.** Should healthcare workers be vaccinated? <https://www.influenza.org.nz/clinical-info/should-healthcare-workers-be-vaccinated>
26. **Ministry of Education.** Measles information. New Zealand Government. <https://www.education.govt.nz/school/health-safety-and-wellbeing/health-and-wellbeing/measles-information/>
27. **Blair K, Pollard G, Woodley D.** Health Report: independent review of the 2019 measles outbreak. July 17, 2020. Accessed January 16, 2024. <https://www.health.govt.nz/system/files/documents/pages/health-report-measles-review-2020.pdf>
28. **Baker MG, Wilson N, Huang QS, et al.** Pandemic influenza A (H1N1) v in New Zealand: the experience from April to August 2009. *Euro Surveill.* 2009;14(34):19319.
29. **Wilson N, Barnard LT, Summers JA, et al.** Differential mortality rates by ethnicity in 3 influenza pandemics over a century, New Zealand. *Emerg Infect Dis.* 2012;18(1):71-77. doi: 10.3201/eid1801.110035
30. **Ministry of Health.** Wai 2575 Health Services and Outcomes Kaupapa Inquiry. 2019. Accessed January 16, 2024. <https://www.health.govt.nz/our-work/populations/maori-health/wai-2575-health-services-and-outcomes-kaupapa-inquiry>

31. **Signal L, Martin J, Cram F, et al.** The Health Equity Assessment Tool: a user's guide. 2008. Accessed January 16, 2024. <https://www.health.govt.nz/publication/health-equity-assessment-tool-users-guide>
32. **King P, Cormack D, McLeod M, et al.** COVID-19 and Māori health – when equity is more than a word. Public Health Communication Centre. 2020. <https://www.phcc.org.nz/briefing/covid-19-and-maori-health-when-equity-more-word>
33. **Kvalsvig A, Baker MG.** How Aotearoa New Zealand rapidly revised its Covid-19 response strategy: lessons for the next pandemic plan. *J R Soc NZ.* 2021;51(1):S143-S166.
34. **Williams JH, Dawson A.** Prioritising access to pandemic influenza vaccine: a review of the ethics literature. *BMC Med Ethics.* 2020;21(1):40.
35. **Ministry of Health.** COVID-19: supporting the vaccine rollout. Updated September 22, 2021. Accessed January 16, 2024. <https://www.health.govt.nz/our-work/diseases-and-conditions/covid-19-novel-coronavirus/covid-19-vaccines/covid-19-vaccine-strategy-planning-insights/covid-19-supporting-vaccine-rollout>
36. **Mayron S, Tokalau T.** Covid-19: South Auckland mass vaccination event ineffective for Pasifika, health expert says. 8 August. Accessed January 16, 2024. <https://www.stuff.co.nz/national/health/126003850/covid19-south-auckland-mass-vaccination-event-ineffective-for-pasifika-health-expert-says>
37. **Foon E.** Over 7000 Pasifika vaccinated at 'Rally your Village' event. October 7, 2021. Accessed January 16, 2024. <https://www.rnz.co.nz/international/pacific-news/453044/over-7000-pasifika-vaccinated-at-rally-your-village-event>
38. **Williams DR, Cooper LA.** COVID-19 and health equity—a new kind of “herd immunity”. *JAMA.* 2020;323(24):2478-2480.
39. **Jacobs M.** Covid-19: Māori leaders brace for impact as Government continues to ignore vaccine priority call. 15 October. Accessed January 16, 2024. <https://www.stuff.co.nz/pou-tiaki/300430020/covid19-mori-leaders-brace-for-impact-as-government-continues-to-ignore-vaccine-priority-call>
40. **Malpass L.** Covid-19: a reopening plan is taking shape, but how will it work? September 25, 2021. Accessed January 16, 2024. <https://www.stuff.co.nz/national/politics/opinion/126480647/covid19-a-reopening-plan-is-taking-shape-but-how-will-it-work>
41. **Tahana J.** Māori health coalition urges return to NZ's covid-19 elimination strategy. Asia Pacific Report. Updated October 14, 2021. Accessed January 16, 2024. <https://asiapacificreport.nz/2021/10/14/maori-health-coalition-urges-return-to-nzs-covid-19-elimination-strategy/>
42. **Stewart L, Gardner D.** Developing Mahi Oranga: a culturally responsive measure of Māori occupational stress and wellbeing. *N Z J Psychol.* 2015;44(2):79-88.
43. **Came H, O'Sullivan D, Kidd J, et al.** The Waitangi Tribunal's WAI 2575 report: implications for decolonizing health systems. *Health Hum Rights.* 2020;22(1):209-220.
44. **Gallagher T.** Tikanga Māori Pre-1840. Te kāhui kura Māori. 2008. Accessed January 16, 2024. <https://nzetc.victoria.ac.nz/tm/scholarly/tei-Bi001Kahu-t1-g1-t1.html>
45. **Durie M.** Te Pae Māhutonga: a model for Māori health promotion. Health Promotion Forum of New Zealand Newsletter 49. 1999. Accessed January 16, 2024. <https://www.cph.co.nz/wp-content/uploads/TePaeMahutonga.pdf>
46. **Rochford T.** “Whare Tapa Wha: A Māori model of a unified theory of health. *J Prim Prev.* 2004;25(1):41-57.
47. **Chino M, Debruyne L.** Building true capacity: indigenous models for indigenous communities. *Am J Public Health.* 2006;96(4):596-599. doi: 10.2105/ajph.2004.053801
48. **Wehipeihana N, Sebire KW, Spee K, et al.** More than just a jab: evaluation of the Māori influenza vaccination programme as part of the COVID-19 Māori health response. 2020. Accessed January 16, 2024. <https://www.health.govt.nz/publication/more-just-jab-evaluation-maori-influenza-vaccination-programme-part-covid-19-maori-health-response>
49. **Gostin LO, Salmon DA.** The dual epidemics of COVID-19 and influenza: vaccine acceptance, coverage, and mandates. *JAMA.* 2020;324(4):335-336.
50. **World Health Organization.** COVID-19 and mandatory vaccination: ethical considerations and caveats: policy brief. April 13, 2021. Accessed January 17, 2024. <https://www.paho.org/en/documents/covid-19-and-mandatory-vaccination-ethical-considerations-and-caveats-policy-brief-13>
51. **Dare T.** Mass immunisation programmes: some philosophical issues. *Bioethics.* 1998;12(2):125-149.
52. **Haire B, Komesaroff P, Leontini R, et al.** Raising rates of childhood vaccination: the trade-off between coercion and trust. *J Bioeth Inq.* 2018;15(2):199-209. doi: 10.1007/s11673-018-9841-1
53. **Gostin LO, Salmon DA, Larson HJ.** Mandating COVID-19 vaccines. *JAMA.* 2021;325(6):532-533.
54. **New Zealand Government.** COVID-19 Public Health Response (Vaccinations) Order 2021. July 14, 2021. Accessed January 17, 2024. <https://www.legislation.govt.nz/regulation/public/2021/0094/latest/whole.html#LMS487853>
55. **Dini G, Toletone A, Sticchi L, et al.** Influenza vaccination in healthcare workers: a comprehensive critical appraisal of the literature. *Hum Vaccin Immunother.* 2018;14(3):772-789. doi: 10.1080/21645515.2017.1348442
56. **Williams C.** Covid-19: lockdown fatigue growing in Auckland as weather warms up. *Stuff.* September 19, 2021. Accessed January 17, 2024. <https://www.stuff.co.nz/national/health/coronavirus/300410556/covid19-lockdown-fatigue-growing-in-auckland-as-weather-warms-up>
57. **Witton B.** Measles epidemic 'in the making' as childhood vaccinations drop - expert. *Stuff.* Accessed January 17, 2024. <https://www.stuff.co.nz/national/health/125761815/measles-epidemic-in-the-making-as-childhood-vaccinations-drop-expert>
58. **Fenton E, Chillag K.** Conditions of global health crisis decision-making—an ethical analysis. *J Bioeth Inq.* 2021;18(3):395-402. doi: 10.1007/s11673-021-10100-8
59. **Ministry of Health.** National and DHB immunisation data. 2021. Accessed January 17, 2024. <https://www.health.govt.nz/our-work/preventative-health-wellness/immunisation/immunisation-coverage/national-and-dhb-immunisation-data>
60. **Manch T.** Government's Covid-19 policies set to drastically change within weeks. October 15, 2021. Accessed January 17, 2024. <https://www.stuff.co.nz/national/politics/126685104/governments-covid19-policies-set-to-dramatically-change-within-weeks>
61. **Steyn N, Plank M, Hendy S.** Modelling to support a future COVID-19 strategy for Aotearoa New Zealand. 2021. Accessed January 17, 2024. <https://bpb-ap-se2.wpmucdn.com/blogs.auckland.ac.nz/dist/d/75/files/2017/01/modelling-to-support-a-future-covid-19-strategy-for-aotearoa-new-zealand.pdf>
62. **Saxena A, Horby P, Amuasi J, et al.** Ethics preparedness: facilitating ethics review during outbreaks—recommendations from an expert panel. *BMC Med Ethics.* 2019;20(1):29.
63. **Gray L, MacDonald C, Mackie B, et al.** Community responses to communication campaigns for influenza A (H1N1): a focus group study. *BMC Public Health.* 2012;12:205.
64. **Kass NE.** An ethics framework for public health. *Am J Public Health.* 2001;91(11):1776-1782.
65. **Upshur REG.** Principles for the justification of public health intervention. *Can J Public Health.* 2002;93(2):101-103.