

Influences and policies that affect immunisation coverage—a summary review of literature

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ABSTRACT

Effective national immunisation programmes require a high proportion of the population to be immunised. Although New Zealand has made significant progress towards immunisation goals over the last two decades, immunisation coverage remains inadequate to prevent intermittent outbreaks of disease, and immunisation inequities persist between geographic, ethnic and socioeconomic groups. Here we summarise a recent literature review that was conducted to identify and examine key factors that influence immunisation coverage, timeliness of vaccinations and the core drivers that affect vaccine uptake. We conclude that well designed systems, taking a holistic approach with multiple components, gain broader community acceptance and trust; early and continual engagement with well-informed healthcare professionals builds trust and improves uptake; the family's experience during vaccination events is important; community-led vaccine advocacy is required to target specific populations to help to promote and improve access to immunisation. Coercive approaches can be marginally effective, but risk disproportionately penalising those already experiencing mistrust and hardship.

A high proportion of the population needs to be immunised to prevent the spread of vaccine-preventable diseases (VPDs). As immunisation programmes succeed in eliminating endemic disease, disease control increasingly relies on sufficient immunisation coverage to maintain population immunity. The public health benefits of immunisation programmes are both medical and financial, resulting in improved health outcomes and lower healthcare costs.

Following historically poor immunisation rates, the clearly defined national immunisation programme has made excellent progress in New Zealand. However, immunisation coverage is not always adequate to prevent disease outbreaks. National immunisation programmes begin in pregnancy and early infancy because infants are at highest risk from infectious disease. The timeliness, as well as the uptake of vaccines, is an important factor in providing protection.

Drivers that impact on vaccine uptake and coverage are complex with a wide range

of influences. However, engagement with health professionals, public support and community opinion play significant roles in influencing the decisions of individuals, families and whānau.

This is a summary of a literature review conducted to identify and examine key factors that influence immunisation coverage and the core drivers that affect vaccine uptake and vaccination timeliness. The reviewed literature was published primarily between January 2012 and July 2018.

Background: immunisation coverage in New Zealand

The National Immunisation Register (NIR) has enabled monitoring of uptake and timeliness of the National Immunisation Schedule vaccines for all those born in New Zealand since 2005. For more than two decades, there have been concerted, successful efforts to improve immunisation coverage to reduce gaps in equity and encourage vaccine uptake in New Zealand.¹

Coverage improved from around 56% fully immunised at the age of two years in 1992 to around 93% in 2017. However, coverage has failed to reach the 95% community immunity threshold consistently, and equity gaps remain in most regions between socioeconomic and ethnic groups.

Health inequities are a human rights concern and the New Zealand Government is responsible for ensuring that the rights of Māori to health and equal health outcomes are met under the Treaty of Waitangi.²

Since 2017, inequity in coverage has been increasing especially in timeliness of delivery at the six-month mark, and particularly for children of Māori ethnicity and children living with socioeconomic deprivation. As of 31 March 2019, only 77.4% of infants overall (61.9% of Māori infants and 69% for highest level of deprivation) were fully immunised-for-age by six months, as compared with 91.1% fully vaccinated at two years of age (86.2% Māori and 89.1% high deprivation).³ More than 20% of infants remain vulnerable to VPDs due to unnecessary delays in vaccination.

Around 5% of parents actively decline at least one vaccination on the Schedule and less than 0.7% chose to opt-off the NIR.³

Vaccine acceptance and decision making

Consent is fundamental to the provision of healthcare services and medical interventions, including immunisation, and is based on ethical obligations supported by legal provisions. With immunisation delivery to healthy populations, the ethics of consent is more complicated than for interventions that treat active disease. It is more difficult to assess the risk of inaction, since the consequence of the disease and the likelihood of acquiring the disease need to be considered.⁴

When negative opinions are expressed by those opposed to vaccination, the informed decision-making process can be influenced or undermined, leaving a community hesitant to accept vaccines. The size of these communities and the ability of opinions to spread are amplified across the internet by social media forums.

Community attitudes and confidence

To cultivate confidence in immunisation programmes, a better understanding of

attitudes towards health and wellbeing was shown to be required by a qualitative study in Australia.⁵

Trust is an important component of the decision-making process leading to consent. Parents may question whether vaccination programmes are working for the best interest of their children or if there are other more pernicious motivations. Also, with the increasing number of vaccines available, parents can question whether it is too many or if the vaccines are too new.⁶ A literature and case-study review identified that trust in the stakeholders implementing immunisation programmes is essential. It concluded that, fundamentally, trust needs to be considered, established and continually maintained by health practitioners and policymakers.⁷

Coercive measures to increase vaccine uptake have been argued to reinforce and broaden mistrust of vaccines and health professionals, particularly in population groups with low levels of perceived social inclusion.⁸ Social inclusion, as defined by the extent of appropriate access to services and systems required for daily living, has been strongly linked to trust.⁷

Vaccination policies that ignore social and ethnic sensitivities risk lacking public support even when they have a strong evidence base. A population survey in Belgium found that equity and autonomy influence incentive preferences differently within different population groups and preferences are driven according to individual social orientation.⁹

The uptake of vaccines is also associated with perceived safety—risk versus benefit. The severity of VPDs is less visible and public focus has turned to the milder or rarer vaccine reactions. Complacency about disease risk and increased focus on vaccine risk and purported risk lead to vaccine hesitancy and scepticism.

Public support for immunisation programmes and positive influences are gained by engaging with communities to promote vaccine confidence. A systematic review found that this is best achieved by other members of those communities, such as health education providers and healthcare workers with similar linguistic, ethnic or cultural backgrounds to the target community.¹⁰

Vaccination attitudes of healthcare workers

Healthcare workers (HCWs) are at risk of exposure, being infected and transmitting pathogens to and from their patients and colleagues, and therefore are potential sources for nosocomial infections. However, vaccination attitudes among HCW are similar to that of the general population and require effective interventions and campaigns to encourage vaccine uptake. For example, a qualitative survey in Belgium found that, although up to 90% of HCW consider it important not to infect their patients, only 20% of those not vaccinated considered influenza vaccination as part of their duty not to harm patients.¹¹ Complacency, inconvenience, a lack of confidence and risk/benefit calculation were identified by a systematic review as barriers to HCW vaccinations.¹²

Vaccination protects both HCWs and their patients, but HCWs experience conflicting motivational forces. A review of psychology and behavioural economic literature reported that individuals are more likely to be vaccinated to protect others if their own personal risk and cost is perceived to be low. Multimodal approaches of advocacy and access were recommended to improve vaccination uptake by HCWs, through designated vaccine advocates with similar healthcare backgrounds and well-organised onsite vaccination programmes.¹³

Role of health professionals in parental decision making

Consensus in messaging

Health professionals can promote public support for vaccination by demonstrating a high degree of consensus among medical scientists through positive messages.¹⁴ The Growing Up in New Zealand longitudinal study identified that the main sources of encouraging information for parents come from health professionals, whereas negative influences most frequently come from family and friends.¹⁵

Knowledge and training

The attitudes of health professionals strongly influence the decisions of the communities they serve. This includes actively demonstrating an acceptance of vaccination, to be vaccinated themselves and to provide up-to-date, knowledgeable

guidance to their patients. Since health professionals are pivotal in decision making for parents, they need to be accountable for their influences on parents and have an ethical responsibility to not provide false or unproven information.

A focus group-based qualitative study concluded that it is important for health professionals to identify what information or autonomy needs the parents may have and to adapt their communication about immunisation to help to promote parents' perceptions of making informed autonomous decisions.¹⁶

In light of the significant role that health professionals have, an important component of immunisation programmes is the provision of funding and time to allow staff development and education. Well-informed health providers are most likely to be positive advocates for immunisation and be able to discuss informatively any concerns their patients may have.

Engagement

Antenatal decision-making is a strong predictor of timely uptake of the infant immunisation programme, as shown in a New Zealand longitudinal study.¹⁷ Early engagement with parents provides opportunities during pregnancy to discuss the benefits and dispel concerns around immunisation, prior to the arrival of the baby. A New Zealand survey of primary care practices found that the highest immunisation coverage was achieved when an early relationship was established between general practice and families, and immunisation was promoted in pregnancy.¹⁸ Partners also play a role in the timeliness and acceptance of vaccination of their children, but the role of partners in decision making is often not considered, they have less access to information than mothers and few opportunities arise during pregnancy to involve both parents.¹⁹

Engagement with health services during pregnancy also encourages wider engagement with other health services, such as preventive, child and general practice services.

Parental attitudes and experiences

Trust in information and vaccine stakeholders was found to be integral to parental decision making by a qualitative systematic

review in the UK.²⁰ First-time parents are more undecided about vaccination than those who already have children. Education and communication about childhood and maternal vaccines is important.

Parental decisions around immunisation are influenced by their experiences and appropriate education. Continued encouragement and education from health professionals and positive experiences during vaccination events are essential to maintain immunisation uptake during infancy. The experiences and knowledge acquired can change parental attitudes, both positively and negatively. Those who may decline in the first instance can be encouraged to accept vaccination given sufficient information, non-judgemental approaches and time to reflect. Ongoing engagement and re-engagement with knowledgeable health providers and positive community confidence were found in a New Zealand-based qualitative study to support positive outcomes to accept vaccination, even for those who have initially rejected vaccination.²¹

Conversely, negative influences can also alter the trust and decision making of parents who may have accepted vaccination initially, but later become hesitant. Attitudes towards immunisation during pregnancy do not predict the likelihood that a child will be fully vaccinated by their second year of life, according to a prospective cohort study in Germany.²² The study found that experiences during the child's first vaccinations can have a lasting effect on parental attitudes and positive experiences are crucial to determine vaccination status later in childhood. As demonstrated in a cluster randomised trial in Canada, interventions to mitigate stress and pain can help to improve the experiences, and hence promote vaccine acceptance.^{23,24}

Access and engagement with health services

Immunisation coverage is dependent on access to vaccines and engagement with health services. Only a small proportion of parents (around 5% in New Zealand) actively refuse to accept vaccinations. Whereas, barriers to access health services have a significant influence on the immunisation status of disadvantaged populations.

Low immunisation coverage in New Zealand is associated with household poverty, younger age of primary caregiver, delayed start to immunisations, later birth order, ethnicity of primary caregiver being Māori or Pacific Island, and high rate of housing mobility of families.¹ A qualitative study in a disadvantaged population in Australia found that inequities are seen in communities with limited engagement with health services or a feeling of social exclusion associated with socioeconomic hardship, and in some areas, fear and mistrust of the health and welfare systems.²⁵

A systematic review identified that multi-component, locally designed interventions best reduced immunisation inequities in children and adolescents, at least in the short-term, particularly in urban, ethnically diverse, low income or deprived populations.¹⁰ In London, timeliness and coverage was found to vary between ethnic groups following analysis of immunisation data. Tailored approaches were suggested to improve vaccine uptake within specific groups.²⁶

Immunisation incentives

Incentives can be used to motivate acceptance, for parents and healthcare providers, and improved uptake of immunisation.

Health service provider incentives and targets

Health provider incentives in New Zealand influence immunisation coverage.²⁷ Pay-for-performance incentives are considered unlikely to directly address health inequities within the target community. However, they can incentivise providers to work harder at increasing vaccine uptake for their enrolled population and improve health outcomes, thereby indirectly reducing inequities.

Immunisation targets, which compare performance between providers and district health boards, were shown in a qualitative study to be beneficial through improved engagement of children with primary care services.²⁸ The establishment of a hierarchy of immunisation target champions from the Ministry of Health to DHBs, primary healthcare organisations and individual practices improved communication and accountability nationally and

locally, and common goals also encouraged collegial collaborations.²⁸

The resources required to achieve such targets and the positive or negative impact their implementation may have on other services and public health need to be considered. Comparative case-studies found that sustained efforts to meet targets can lead to fatigue, and therefore are best implemented in the short term.²⁹ Community-based immunisation champions who most effectively engage their local community can also lessen the strain on the healthcare providers.²⁸

Parental incentives and consequences

Financial incentives for parents are better received when universally available, not just for targeted groups, and equality is perceived. Although some benefits were recognised by three linked studies in the UK, these incentives were not deemed to be the best use of resources for promoting preschool vaccinations.³⁰

Financial consequences for parents, such as liability for treatment costs if an unvaccinated child contracts a VPD, were suggested for parents who actively refuse vaccines.³¹ However, such consequences are not appropriate for those who delay for reasons associated with financial hardship. Accumulative and negative effect on the family's wellbeing could lead to further hardship and social exclusion.

Mandatory vaccination

Vaccination mandates can vary between hard-line penalties for non-compliance, such as legal action or loss of financial benefits, to softer penalties, like exclusion from mass gatherings or sports events, and compulsory decision-making. Public health interventions described as being mandatory can be defined as requiring an active opt-out and some form of penalty for refusing to comply.³²

Historically, there have been three main triggers for a shift to mandatory immunisation:³³

1. Failure to motivate vaccine uptake with less coercive methods (eg, school entry)
2. Outbreak of one or more VPD that has increased harm (eg, measles)

3. To achieve a global disease elimination goal (eg, polio).

To safeguard public health and to achieve a public health objective, it has been argued that governments are obliged to use the least restrictive/invasive measures, but not to use less effective measures because they are voluntary or less invasive.³⁴ From an ethical standpoint, governments have:

1. A duty to reduce infectious disease threats for the common good
2. The power to compel vaccinations to achieve the public good
3. Limits on that power, to explore equally effective and least restrictive alternatives in good faith.

In New Zealand, early childhood services and primary schools are legally required to take all reasonable steps to maintain an immunisation register and to ensure that record of the immunisation status of children aged 15 months or older is requested upon enrolment; caregivers must comply with such requests to supply immunisation certificates for their children. However, the rights of children to attend or enrol are not affected if these requests are not met.³⁵ The effectiveness of this strategy is unknown.

Mandatory vaccination of healthcare workers

Mandates with non-compliance consequences, eg, wearing masks, education, unpaid leave, restriction of duties or termination of employment, were associated with larger increases in hospital HCW vaccination rates than in hospitals with mandates but no such consequences, according to a US-based survey of 150 hospitals requiring influenza vaccination.³⁶

However, coercion can increase mistrust. Multi-modal approaches that include advocating for vaccination, through education and correcting misperceptions, and easier access to vaccines to reduce inconvenience are likely to be as successful in encouraging uptake and positive attitudes.³⁷

Mandatory vaccination of children

Due to increasing public health risks resulting from low immunisation coverage and outbreaks of previously controlled diseases, the implementation of mandatory immunisation of children has increased

internationally. Obligations to vaccinate have been enforced through legal solutions in Australia, the US and Europe.³¹

In Australia, small gains have been achieved in populations that are slow, but not reluctant to vaccinate. Following the use of financial penalty policies alongside other strategies to promote immunisation, positive short-lived gains in immunisation coverage have been reported. Gains were achieved through catch-up vaccinations of adolescents and for children with delayed vaccinations, particularly for indigenous children up to the age of five years. However, such financial penalties or policies precluding access to childcare and education can impose additional hardship on already disadvantaged populations.³⁸

Few gains were observed in communities that actively decline vaccinations. Interviewed parents who are adamantly opposed to vaccines reported that they are likely to find ways to circumvent the penalties and to minimise their impact.³⁹ Communities known for choosing not to vaccinate risk being further marginalised, and the mandates reinforced their beliefs and resolve creating more polarised views.³⁹

The implementation of mandates is resource intensive, with only small gains in improvements in vaccination coverage. Mandates have not been introduced in isolation, and other efforts to improve practice and engagement are likely to have as much of an effect on coverage as the mandates.

Conclusions

Well-designed immunisation systems have multiple components that take a holistic approach across the health system, healthcare providers and parents, and gain broader community acceptance and trust of immunisation, reduce misperceptions and improve access. Coercive methods, such as mandatory vaccination, are marginally effective but risk disproportionately penalising those already experiencing mistrust and hardship. Vaccination advocates with similar backgrounds to the target population can help to increase trust and acceptance—within health services (for healthcare workers) and within demographically identifiable communities (for the public).

Well-informed health professionals play an essential role in educating families about vaccination—they are seen as highly relevant and have a significant influence. Positive education about immunisation needs to start during pregnancy. Attitudes in pregnancy influence parental decisions for timely immunisation of their newborn but may not predict the immunisation status of their child by the age of two years. The family's experiences during vaccination events, and information and attitudes gained further influence vaccine uptake. Reducing pain and stress of infant during vaccination improves the caregiver's experience, and therefore is likely to improve family confidence and uptake for further events.

Table 1: Summary of recommendations.

Key factors	Summary of recommendations
Influences of vaccine uptake and decision-making	<ul style="list-style-type: none"> • Trust and public support for immunisation programmes are gained through community engagement to promote vaccine confidence. • Positive education about vaccination needs to start during pregnancy for both expectant parents. • Attitudes expressed in pregnancy do not necessarily predict the immunisation status of a child—it also depends on experiences during vaccinations events and information gained. • Reducing pain and stress of the infant during vaccination improves mother’s experience.
Role of health professionals in parental decision making	<ul style="list-style-type: none"> • Well-informed health professionals play a central role in educating pregnant women about vaccination—seen as highly relevant and have a significant influence. • Maintaining engagement with well-informed health professionals maintains positive attitudes towards immunisation. • Engagement with communities is best achieved through health education providers with similar linguistic or cultural backgrounds to the target community. • Consensus and positive attitudes strongly influence the decisions of the community the health professionals serve.
Vaccination attitudes of healthcare workers	<ul style="list-style-type: none"> • Vaccine advocates from similar healthcare backgrounds can increase trust and promote positive attitudes towards vaccination, to educate, correct misperceptions and promote benefits. • Well-organised onsite vaccination programmes improve uptake. <ul style="list-style-type: none"> • Encouragement from supervisors and peers • Improved accessibility and increased convenience, such as minimal waiting times and proximity, remove time-constraint excuses.
Overcoming access barriers	<ul style="list-style-type: none"> • Removing barriers and facilitating engagement with health services to access vaccines are essential for improving the health of socially deprived populations. • Positive experiences of engagement with health providers enhance completion and timeliness of a child’s immunisations. • Cultural and socially acceptable practices, with multimodal approaches, are required to overcome barriers and encourage attitude changes. • An understanding of the challenges faced by each population and involvement of those communities in decision-making helps to target programmes to specifically meet their needs. • Achieving equity for Māori children is a right under the Treaty of Waitangi.
Mandatory vaccination	<ul style="list-style-type: none"> • Coercion can increase mistrust. • Multimodal approaches that advocate vaccination are likely to be more successful in improving uptake and positive attitudes. • Implementation of mandates for children is resource intensive, with only small gains in coverage improvement. • Mandates are not implemented in isolation. • Other efforts to improve practice and engagement are likely to have as much an effect on coverage as the mandates.

Competing interests:

Nil.

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REFERENCES:

- Turner NM. Factors associated with immunisation coverage for the childhood immunisation programme in New Zealand : 1999–2012: The University of Auckland; 2014.
- Reid P. Good Governance: The Case of Health Equity. In: Tawhai V, Gray-Sharp K, editors. *Always Speaking : The Treaty of Waitangi and Public Policy* [Internet] Wellington, NEW ZEALAND: Huia (NZ) Ltd; 2013 [cited 18 October 2018]. 64–84. Available from: <http://ebookcentral.proquest.com/lib/auckland/detail.action?docID=1359707>
- Ministry of Health. National and DHB immunisation data Wellington: Ministry of Health; 2019 [updated 1 May 2019]. Available from: <http://www.health.govt.nz/our-work/preventative-health-wellness/immunisation/immunisation-coverage/national-and-dhb-immunisation-data>
- Caplan AL, Schwartz JL. Chapter 84: Ethics. In: Plotkin SA, Orenstein W, Offit P, Edwards K, editors. *Plotkin's Vaccines 7th Edition*. Philadelphia, US: Elsevier; 2018.
- Ward PR, Attwell K, Meyer SB, Rokkas P, Leask J. Understanding the perceived logic of care by vaccine-hesitant and vaccine-refusing parents: A qualitative study in Australia. *PLoS One*. 2017; 12(10):e0185955.
- Larson H. Vaccine trust and the limits of information. *Science*. 2015; 353(6305):1207–08.
- Ward PR. Improving Access to, Use of, and Outcomes from Public Health Programs: The Importance of Building and Maintaining Trust with Patients/Clients. *Front Public Health*. 2017; 5:22.
- Haire B, Komesaroff P, Leontini R, Raina MacIntyre C. Raising Rates of Childhood Vaccination: The Trade-off Between Coercion and Trust. *J Bioeth Inq*. 2018; 15(2):199–209.
- Luyten J, Dorgali V, Hens N, Beutels P. Public preferences over efficiency, equity and autonomy in vaccination policy: an empirical study. *Soc Sci Med*. 2013; 77:84–9.
- Crocker-Buque T, Edelstein M, Mounier-Jack S. Interventions to reduce inequalities in vaccine uptake in children and adolescents aged <19 years: a systematic review. *J Epidemiol Community Health*. 2017; 71(1):87–97.
- Boey L, Bral C, Roelants M, De Schryver A, Godderis L, Hoppenbrouwers K, et al. Attitudes, beliefs, determinants and organisational barriers behind the low seasonal influenza vaccination uptake in healthcare workers - A cross-sectional survey. *Vaccine*. 2018; 36(23):3351–8.
- Schmid P, Rauber D, Betsch C, Lidolt G, Denker ML. Barriers of Influenza Vaccination Intention and Behavior - A Systematic Review of Influenza Vaccine Hesitancy, 2005–2016. *PLoS One*. 2017; 12(1):e0170550.
- Betsch C. Overcoming healthcare workers vaccine refusal—competition between egoism and altruism. *Euro Surveill*. 2014; 19(48):20979.
- van der Linden SL, Clarke CE, Maibach EW. Highlighting consensus among medical scientists increases public support for vaccines: evidence from a randomized experiment. *BMC Public Health*. 2015; 15:1207.

15. Veerasingam P, Grant CC, Chelimo C, Philipson K, Gilchrist CA, Berry S, et al. Vaccine Education During Pregnancy and Timeliness of Infant Immunization. *Pediatrics*. 2017; 140(3).
16. Fadda M, Galimberti E, Carraro V, Schulz PJ. What are parents' perspectives on psychological empowerment in the MMR vaccination decision? A focus group study. *BMJ Open*. 2016; 6(4):e010773.
17. Wroe AL, Turner N, Salkovskis PM. Understanding and predicting parental decisions about early childhood immunizations. *Health Psychol*. 2004; 23(1):33–41.
18. Grant CC, Petousis-Harris H, Turner N, Goodyear-Smith F, Kerse N, Jones R, et al. Primary care practice and health professional determinants of immunisation coverage. *J Paediatr Child Health*. 2011; 47(8):541–9.
19. Grant CC, Chen MH, Bandara DK, Marks EJ, Gilchrist CA, Lewycka S, et al. Antenatal immunisation intentions of expectant parents: Relationship to immunisation timeliness during infancy. *Vaccine*. 2016; 34(11):1379–88.
20. Forster AS, Rockliffe L, Chorley AJ, Marlow LA, Bedford H, Smith SG, et al. A qualitative systematic review of factors influencing parents' vaccination decision-making in the United Kingdom. *SSM Popul Health*. 2016; 2:603–12.
21. Turner N, Taylor L, Chong A, Horrell B. Identifying factors behind the general practice use of the term 'decline' for the childhood immunisation programme in New Zealand. *J Prim Health Care*. 2017; 9(1):69–77.
22. Betsch C, Bodeker B, Schmid P, Wichmann O. How baby's first shot determines the development of maternal attitudes towards vaccination. *Vaccine*. 2018; 36(21):3018–26.
23. Taddio A, Parikh C, Yoon EW, Sgro M, Singh H, Habtom E, et al. Impact of parent-directed education on parental use of pain treatments during routine infant vaccinations: a cluster randomized trial. *Pain*. 2015; 156(1):185–91.
24. Taddio A, Smart S, Sheedy M, Yoon EW, Vyas C, Parikh C, et al. Impact of prenatal education on maternal utilization of analgesic interventions at future infant vaccinations: a cluster randomized trial. *Pain*. 2014; 155(7):1288–92.
25. Thomas S, Cashman P, Islam F, Baker L, Clark K, Leask J, et al. Tailoring immunisation service delivery in a disadvantaged community in Australia; views of health providers and parents. *Vaccine*. 2018; 36(19):2596–603.
26. Tiley KS, White JM, Andrews N, Ramsay M, Edelstein M. Inequalities in childhood vaccination timing and completion in London. *Vaccine*. 2018; 36(45):6726–35.
27. Ministry of Health. System Level Measures and Financial Incentives - Guidance for DHBs 2016/17 [Internet]. Nationwide Service Framework Library: Ministry of Health. Available from: http://nsfl.health.govt.nz/system/files/documents/pages/system_level_measures_and_financial_incentives.pdf
28. Willing E. Hitting the target without missing the point: New Zealand's immunisation health target for two year olds. *Policy Studies*. 2016; 37(6):535–50.
29. Tenbensen T, Chalmers L, Willing E. Comparing the implementation consequences of the immunisation and emergency department health targets in New Zealand. *J Health Organ Manag*. 2016; 30(6):1009–24.
30. Adams J, McNaughton RJ, Wigham S, Flynn D, Ternent L, Shucksmith J. Acceptability of Parental Financial Incentives and Quasi-Mandatory Interventions for Preschool Vaccinations: Triangulation of Findings from Three Linked Studies. *PLoS One*. 2016; 11(6):e0156843.
31. Grzybowski A, Patryn RK, Sak J, Zagaja A. Vaccination refusal. Autonomy and permitted coercion. *Pathog Glob Health*. 2017; 111(4):200–5.
32. Wynia MK. Mandating vaccination: what counts as a "mandate" in public health and when should they be used? *Am J Bioeth*. 2007; 7(12):2–6.
33. MacDonald NE, Harmon S, Dube E, Steenbeek A, Crowcroft N, Opel DJ, et al. Mandatory infant & childhood immunization: Rationales, issues and knowledge gaps. *Vaccine*. 2018; 36(39):5811–8.
34. Gostin LO. Mandatory vaccination: understanding the common good in the midst of the global polio eradication campaign. *Isr J Health Policy Res*. 2018; 7(1):4.
35. Tizard C, [Governor-General]. Health (Immunisation) Regulations 1995 [Internet]. Wellington: Parliamentary Counsel Office; 2012. Available from: [!\[\]\(1207edb9a08751d3d55970560645ed23_img.jpg\)

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36. Nowalk MP, Lin CJ, Raymund M, Bialor J, Zimmerman RK. Impact of hospital policies on health care workers' influenza vaccination rates. *Am J Infect Control.* 2013; 41(8):697–701.
37. Drees M, Wroten K, Smedley M, Mase T, Schwartz JS. Carrots and sticks: achieving high healthcare personnel influenza vaccination rates without a mandate. *Infect Control Hosp Epidemiol.* 2015; 36(6):717–24.
38. Leask J. No JabNo Pay/Play - Is the juice worth the squeeze? PHAA 16th National Immunisation Conference; 6 June 2018; Adelaide, Australia: PHAA; 2018.
39. Helps C, Leask J, Barclay L. “It just forces hardship”: impacts of government financial penalties on non-vaccinating parents. *J Public Health Policy.* 2018; 39(2):156–69.

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