



# **The Immunisation Advisory Centre**

## **Influences and policies that affect immunisation coverage – a review of literature**

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## Executive summary

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### Introduction

To provide adequate direct and indirect protection against vaccine-preventable diseases (VPD), a high proportion of the population needs to be immune. Specific immunity against certain diseases can be achieved through immunisation with vaccines or exposure to the pathogen itself. The aim of immunisation programmes is to generate immunity in individuals and within the community to prevent the spread of disease and to reduce the impact of such diseases.

Infants and young children are at highest risk of infectious disease due to a lack of prior experience and immunity, and immature immune responses. For this reason, national immunisation programmes begin in early infancy (at 6 weeks of age in New Zealand). The timeliness as well as the uptake of vaccines is an important factor in providing protection to young children. Delays in vaccine dose timing can leave infants unprotected and vulnerable to severe disease. Optimally, immunisation coverage needs to be over 95% to provide the best protection against VPDs, especially the most contagious diseases such as pertussis and measles.

The Ministry of Health has monitored immunisation coverage and timeliness since the 1990s. For more than two decades, there has been concerted and successful efforts to improve immunisation coverage in New Zealand (NZ) and elsewhere to reduce gaps in equity and encourage uptake of vaccines by all. However, in NZ, despite excellent progress, coverage has failed to consistently reach the 95% community immunity threshold, and barriers and equity gaps remain. Recently, gaps in coverage have been widening, particularly at the 6-months mark, as measurement of timeliness of delivery and equity gaps have widened, particularly for children of Māori ethnicity and for those living with high socioeconomic deprivation.

This evidence-based review of recently published literature was conducted to identify and examine core drivers that potentially affect vaccine uptake and immunisation coverage of the National Immunisation Schedule childhood vaccines. The literature reviewed was published primarily between January 2012 and July 2018.

### Vaccine acceptance and decision-making

As with all medical interventions, consent from the parent or the individual is required to vaccinate. Trust is an important component of the decision-making process leading to consent. Trust needs to be considered, established and maintained by health practitioners and policy makers. Social exclusion and disempowerment resulting from barriers against appropriate access to services and systems can be linked to generalised mistrust.

Public support of immunisation programmes and community opinion play a significant role in influencing the decisions of individuals, families and whānau. Trust in the motives and stakeholders implementing immunisation programmes is essential. Coercive vaccination measures are likely to reinforce mistrust, particularly in groups with a low sense of social inclusion. Positive engagement with communities is best achieved through community members, with similar beliefs and languages, working as vaccination advocates. The influences of positive, knowledgeable informants outweigh negative influences.

Early discussions about vaccination, particularly during pregnancy, can reduce delays in immunisation of infants by providing the information required to make decisions beforehand and provide the opportunity to discuss concerns. Parents, predominantly mothers, who accept vaccinations during pregnancy are more likely to immunise their baby on time. The role of partners in decision-making is often not considered and few opportunities arise during pregnancy to involve both parents. Continued encouragement from health professionals and positive experiences during vaccinations are essential to maintain immunisation uptake in infancy.

Parental decisions around vaccinations are influenced by their experiences and appropriate education. Parents require to be continually educated and encouraged to vaccinate their children. Those who may decline in the first instance can be encouraged to accept vaccination given sufficient information, non-judgemental approaches and time to reflect. Conversely, negative influences can also alter the trust and decision-making of parents who may have accepted vaccination initially but later become hesitant.

The attitudes of health professionals strongly influence the decisions of the communities they serve. It is important for them to actively demonstrate an acceptance of vaccination, to be vaccinated themselves and to provide up-to-date, knowledgeable guidance to their patients.

Well-informed health providers are most likely to be positive advocates for immunisation. Provision of funding and time to allow staff development and education needs to be considered an important component of an immunisation programme.

Health care workers (HCWs) are at high risk of being infected by VPDs and risk transmitting these diseases on to vulnerable patients. Education of health professionals is essential in overcoming their own misperceptions and gaining trust. Multimodal approaches, utilising peer-pressure, education and accountability, are best implemented to encourage immunisation of HCWs. Vaccine advocates with similar healthcare backgrounds can help to increase trust and promote positive attitudes towards vaccination. Improved accessibility and increased convenience, such as minimal waiting times and proximity to services, remove time-constraint excuses. Gaining trust in the authorities and providing evidence of vaccine effectiveness may also encourage vaccine uptake by HCWs, especially for the seasonal influenza vaccine.

### **Access and engagement with health services**

Significantly, immunisation coverage is also dependent on the access to vaccines and health services for families. Social disadvantage is an important influence on immunisation coverage, particularly for those experiencing poverty or living in remote (rural) or socially isolated communities (urban or rural).

Removing the barriers to access vaccines and facilitating engagement with health services are important for improving the health of socially deprived populations. Multi-dimensional barriers can include a lack of transport, practice opening hours and waiting times, greater priorities for limited time and financial resources, family size and transience, a lack of trust of health and government services, and other health and wellbeing issues. An understanding of the challenges faced by each population is required to target programmes to meet the needs specifically. Locally designed and implemented multi-component interventions are most effective in increasing vaccine uptake and immunisation timeliness, at least in the short-term.

Positive experiences of engagement with health providers enhance completion and timeliness of a child's immunisation schedule. Continued encouragement from health professionals and positive experiences of vaccinations are essential during infancy to maintain immunisation uptake into childhood. The first experiences of vaccination can alter decisions made during pregnancy and have a lasting effect on parental attitudes to immunisation. The use of evidence-based pain mitigating interventions help to maintain positive experiences of vaccination for both the parents and the child, which increases the likelihood that the child will be fully immunised in a timely way.

### **Immunisation incentives**

Health provider incentives are in place in NZ to monitor and influence immunisation coverage. Pay-for-performance incentives are unlikely to directly address health inequities within the target community but can incentivise providers to work harder at increasing vaccine uptake for their enrolled population and improve health outcomes, thereby indirectly reducing inequities. Well-designed immunisation targets can encourage collegial collaborations between health service providers to achieve common goals. The resources necessary to achieve targets and the effect that using these resources has on other services must be considered when implementing targets.

Financial incentives for parents are better received when universally available and equality is perceived. Financial consequences for not vaccinating risk having an accumulative and negative impact on family wellbeing, which may increase equity gaps for lower socioeconomic groups.

Immunisation mandates can help to increase the uptake of vaccines by HCWs, but risk increasing mistrust through perceived coercion. Advocacy, using education to correct misperceptions and providing easier access to vaccines, is likely to be more successful in encouraging uptake and promoting positive attitudes than mandatory vaccinations.

Due to falls in immunisation coverage and the spread of previously eliminated diseases, the implementation of mandatory immunisation of children has increased internationally. Some gains have been achieved in populations that delay rather than refuse vaccinations. However, parents who adamantly oppose vaccines regularly circumvent penalties and few gains in uptake are observed in communities that decline vaccination. Both financial penalties and restricting access to childcare can increase the hardship already disadvantaged populations experience, and thereby have the potential to increase equity gaps.

## Conclusions

- Well-designed systems are required to increase vaccine uptake, which have multi-components that take a holistic approach across the health system, encompassing healthcare providers, the vaccines and parents, in order to gain broader community acceptance.
- Well-informed health professionals play a central role in educating pregnant women about vaccination – seen as highly relevant and have a significant influence.
- Positive education about immunisation needs to start during pregnancy.
- Attitudes towards vaccination in pregnancy can influence a parent's decision to immunise their new-born but may not predict the immunisation status of their child by the age of two years – it depends on the mother's experience of her child's early vaccinations, and information and influences gained.
- Reducing pain and stress for the infant during vaccination improves the mother's experience and is therefore likely to also affect experiences of the father, other caregivers and the wider whānau.
- Multi-modal approaches are required to encourage immunisation uptake for all to gain trust, reduce misperceptions and improve access.
- Vaccination advocates with similar backgrounds to the target population can help to increase trust – within health care environments (for healthcare workers) and within demographically identifiable communities (for the public).

# Contents

<b>Contents</b> .....	<b>vi</b>
<b>Abbreviations</b> .....	<b>i</b>
<b>Acknowledgements</b> .....	<b>i</b>
<b>1 Introduction</b> .....	<b>1</b>
1.1 Background to New Zealand immunisation coverage .....	1
1.2 New Zealand immunisation coverage rates .....	2
<b>2 Drivers of immunisation programmes</b> .....	<b>4</b>
2.1 Core drivers for immunisation coverage .....	4
2.2 Disease control and prevention .....	5
2.3 Consequences of low immunisation coverage .....	6
<b>3 Vaccine acceptance and decision-making</b> .....	<b>8</b>
3.1 Community attitudes and confidence .....	8
3.2 Healthcare worker attitudes towards vaccination .....	11
3.3 Role of health professionals in parental decision-making .....	13
3.4 Parental attitudes and experiences .....	14
3.5 Summary – influence of decision-making on immunisation coverage .....	17
<b>4 Access and engagement with health services</b> .....	<b>18</b>
4.1 Social disadvantage rather than parental attitudes affects coverage .....	18
4.2 Removal of barriers to access health services .....	20
4.3 Conclusions – influence of barriers on immunisation coverage .....	24
<b>5 Immunisation incentives</b> .....	<b>24</b>
5.1 Factors affecting immunisation programme outcomes .....	24
5.2 Health service provider incentives .....	25
5.3 Parental incentives .....	26
<b>6 Mandatory vaccination to improve vaccine coverage</b> .....	<b>27</b>
6.1 Mandatory vaccination of health care workers .....	28
6.2 Mandatory immunisation of children .....	29
<b>7 References</b> .....	<b>34</b>

## Abbreviations

ATSI	Aboriginal and Torres Strait Islander
CRC	Convention on the Rights of the Child (1990)
CYP	Children and young people
DHB	District health board
DTaP	Combined diphtheria, tetanus and acellular pertussis vaccine
ED	Emergency department
IPV	Inactivated poliovirus
GP	General practitioner
GUiNZ	Growing up in New Zealand longitudinal study
HCW	Healthcare worker
HepB	Hepatitis B
Hib	Haemophilus influenzae type B
HPV	Human papillomavirus
KPI	Key performance indicators
LHD	Local health department
LMC	Lead maternity carer
MenC	Meningococcal C
MELAA	Middle Eastern, Latin American, African ethnicity
MMR	Combined measles mumps and rubella vaccine
NIR	National immunisation register
NIS	National immunisation schedule
NITAG	National Immunisation Technical Advisory Group
NME	Non-medical exemptions
NSW	New South Wales
NZ	New Zealand
P4P	Pay for performance
PCV	Pneumococcal conjugate vaccine
RR	Relative risk
SES	Social economic status
UK	United Kingdom
UMV	Universal mass vaccination
UN	United Nations
US	United States of America
VCR	Vaccine coverage rate
VPD	Vaccine-preventable disease
WHO	World Health Organization

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# 1 Introduction

The aim of this document is to review published scientific literature that considers approaches to encourage the uptake of vaccines and factors that affect the success and coverage of national immunisation programmes. When uptake of vaccines is insufficient, the level of immunity in the population is inadequate to prevent the spread of vaccine-preventable disease (VPDs). Improvements in immunisation coverage are required globally to protect against VPDs.

In most developed countries, many vaccine-preventable diseases have successfully been controlled in recent decades through national immunisation programmes. Although only a small proportion of the population are reluctant to accept vaccines, other important reasons for lower immunisation coverage are inequities and barriers to access vaccines and health care for more socially deprived populations.

Disease outbreaks are increasingly occurring in countries that had previously stopped the spread of endemic disease. For example, Europe saw escalating numbers of measles cases: 47,000 cases were reported in the first six months of 2018, increasing from 5273 cases in 2016, due to insufficient vaccination coverage. The Ukraine experienced more than half of these cases. (1) Currently, as of October 6, 11 measles outbreaks have occurred during 2018 in the US, despite the Americas being the first World Health Organisation (WHO) region to have officially eliminated endemic measles in 2016 and rubella in 2015.(2, 3)

New Zealand has also experienced outbreaks of measles, although declared to have eliminated endemic disease by the WHO in 2017. An outbreak of mumps began in October 2017 resulting in over 1667 cases in New Zealand.(4, 5)

This review will examine the key drivers for immunisation coverage and discuss options for reducing inequities, reducing barriers and increasing vaccine acceptance and uptake. Literature published between January 2012 and April 2018 is considered. This is not a systematic review and cost analyses are not included.

## 1.1 Background to New Zealand immunisation coverage

The success of immunisation programmes and their likely effectiveness in disease control is assessed by measuring immunisation coverage. Coverage data is used to monitor immunisation strategies and to help identify individuals or geographical regions who may be missing out.(6)

When immunisation coverage was first measured in New Zealand in 1991/1992, immunisation coverage was low and large disparities were seen between ethnic and socioeconomic groups. Overall, only 60% of children were fully immunised at 2 years of age.(6)

Following the implementation of a range of reports, strategies, policies and targets, immunisation coverage at 2 years of age reached 91% in 2012 with significantly reduced equity gaps. The National Immunisation Register (NIR) was introduced in 2005 to record all immunisation events for children born from 2005.

Utilising NIR data, national health targets were set for immunisation coverage in 2007 and revised in 2012 to reflect timeliness of primary immunisations.(6) The immunisation coverage target to have 95% of children fully immunised for age at 6 months, 8 months, 2 years and 5 years has not been achieved nationally.

## **1.2 New Zealand immunisation coverage rates**

Over the year to June 2018, the overall immunisation coverage has been declining in New Zealand. This decline is particularly observed in the timeliness measures and is most marked at 6 months of age. In the 3 months reporting period to 30 June 2018, 91.9% of 2-year-olds were fully immunised for age and only 88.0% (range across ethnicities: 76.6%-90.9%) were fully immunised at the age of 5 years. Delays in vaccination are putting vulnerable infants at risk of VPDs, most notably for Māori, Pacific and Other ethnicities (which includes Middle-Eastern, Latin American and African [MELAA]), as shown in figure 1A. Only 77% of infants are fully immunised for age at 6 months compared with 92% at 2 years of age; more than 20% of infants are potentially vulnerable to VPD due to unnecessary delays in vaccination. Gaps in equity are widening by 8 months of age for Māori children (decline in coverage from 93% in 2015/16 to 88% in 2018) and children living in high deprivation areas (90% coverage compared with 93% for other deprivation levels). Around 5% of parents actively decline vaccination for their children and/or opt out of the NIR.(7)

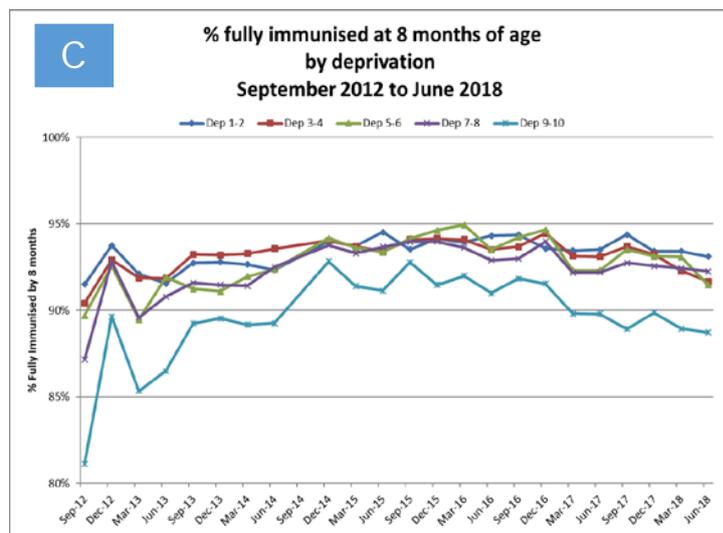
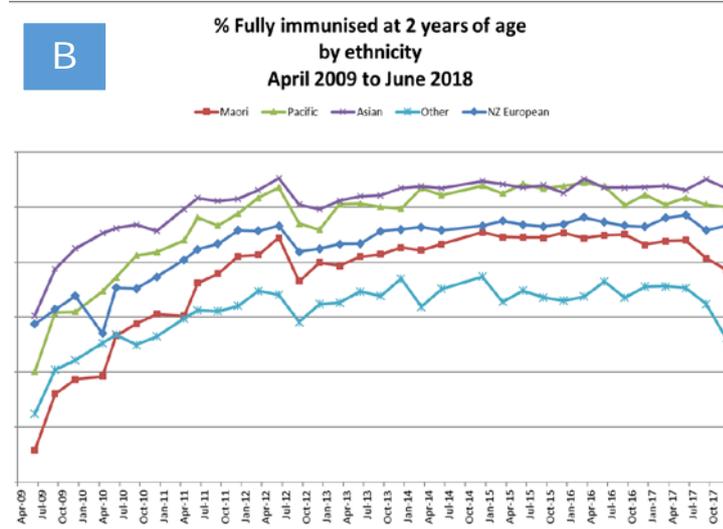
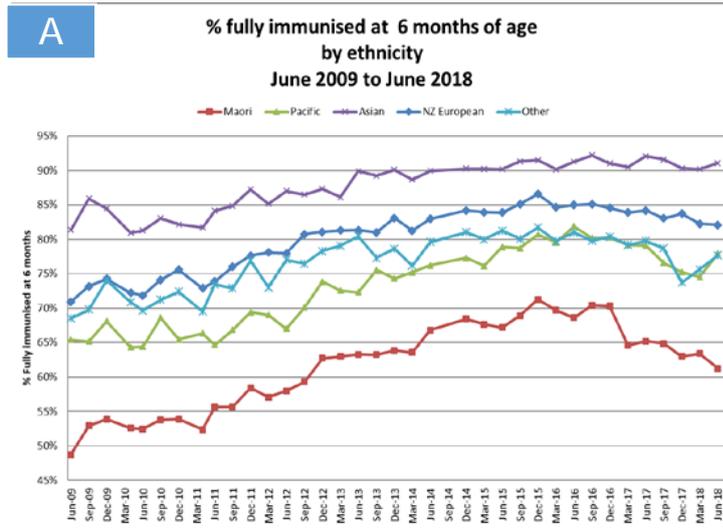
Immunisation coverage to June 2018:

A) at 6 months of age by ethnicity;

B) at 2 years of age by ethnicity;

C) at 8 months of age by deprivation.

(Source: The Immunisation Advisory Centre and Ministry of Health)



## 2 Drivers of immunisation programmes

To enable further discussion about ways the immunisation coverage can be improved, it is worth defining what an immunisation programme is and how it benefits a nation.

Vaccines contribute considerably to public health and disease control. The immunisation schedules of each country, or regions, states and territories within large countries, provide universal immunisation programmes for the population, beginning in infancy. For high income countries targeted programmes are also scheduled for high risk individuals. In New Zealand, vaccines provided as part of the National Immunisation Schedule (NIS) are publicly funded. Policies are put in place, and led by the Ministry of Health, to encourage safe and effective vaccine delivery and equitable uptake.

The New Zealand national immunisation programme, managed by the Ministry of Health:(8)

- Aims to prevent disease through vaccination and to achieved sufficient coverage to prevent outbreaks and epidemics;
- Is accountable for achieving the Immunisation Health Target;
- Monitors disease burden and identifies those at risk;
- Provides guidance and resources to the health sector on immunisation and vaccine cold chain;
- Ensures immunisation providers deliver services that meet the needs of their population;
- Implements the National Immunisation Schedule;
- Delivers trusted and effective vaccine programmes;
- Provides immunisation resources, including the Immunisation Handbook;
- Improves information and data systems; and
- Manages the National Immunisation Register.

Despite clearly defined programmes, immunisation coverage is not always sufficient to achieve high and equitable delivery to adequately control disease across the population and to prevent outbreaks.

### 2.1 Core drivers for immunisation coverage

Based on the reviewed literature, the following list shows the complexities and influences on vaccine uptake and coverage of immunisation. Policy makers, health professionals, parents and their community all play significant roles in influencing the outcomes of immunisation programmes.

- 1) Disease control
- 2) Vaccine acceptance and decision-making
  - a) Community confidence and trust
  - b) Parental trust
  - c) Engagement with knowledgeable health providers
  - d) Education of health providers
  - e) Education of parents
    - i) Early engagement with health services
    - ii) Continued engagement and education

- 3) Access to health services
  - a) Removal of barriers to access health services
    - i) Eliminating ethnic and socioeconomic inequities
  - b) Targeted service delivery
- 4) Incentives to vaccinate
  - a) Health provider incentives
    - i) Immunisation coverage targets
    - ii) Financial incentives
  - b) Parental incentives and liability
  - c) Mandatory vaccinations
    - i) Health professionals
    - ii) For children and school entry

There are also further important influences such as direct vaccine costs, healthcare costs and life-time costs of disease. However, cost-benefit analyses as influencers of immunisation coverage are beyond the scope of this review and will not be examined.

## 2.2 Disease control and prevention

The core driver for immunisation programmes is public health in relation to disease control and prevention, which varies with disease and type of vaccine, and is dependent on vaccine effectiveness and the type of protection achieved. Each country needs to assess its public health requirements based on local epidemiology and risk groups.

For example, tetanus control can only be achieved directly through individual vaccination, whereas diphtheria control is achieved both directly and indirectly through individual as well as community immunity by reducing disease transmission. The incidence of both diseases is now very rare in New Zealand.

The level of immunisation coverage required for control is influenced by the contagiousness of the disease when it is in circulation. For example, measles is highly contagious and requires almost everyone to be immune to prevent its spread. Immunity can be achieved through exposure to the wild-type disease and vaccination – as fewer cases of disease are seen, reliance on sufficient immunisation coverage is increased to maintain immunity.

### 2.2.1 Immunisation benefits

By establishing immunisation programmes, disease prevention benefits are achieved, both medically and financially. Vaccines reduce mortality and morbidity associated with the severest forms of vaccine-preventable diseases. However, where the vaccines do not completely prevent the disease, public and health professional confidence in vaccination is affected.

For many diseases, vaccine effectiveness is strengthened through community immunity and reduced disease circulation, which can only be achieved through high coverage.

The benefits of some vaccines are not immediately observed. For example, HPV and hepatitis B vaccines help to prevent cancers, emerging several years after the initial infection.

Top five reasons to vaccinate (adapted from presentations by Dr Jenny Royale).

Rationale	Disease examples	Comments
To protect against diseases that have no effective treatments	Pertussis, measles, tetanus, poliomyelitis	Only supportive care is available. No treatments are available to stop the disease progression.
Treatment options do not reduce the outcome	Meningococcal disease, invasive pneumococcal disease, Hib	Diagnosis is often too late for antibiotic treatments to prevent serious damage.
Prevention of cancer	Human papillomavirus, hepatitis B	Chronic or persistent infections with these viruses result in pre-cancerous changes to infected cells. Cancer develops later in life.
Reduce the risk of complications	Varicella, rotavirus, influenza, mumps	Vaccination reduces the incidence or severity of these diseases to prevent serious complications, long term damage and death from occurring.
To protect unborn or new-born infants from harm	Influenza, pertussis, rubella, varicella.	Diseases contracted during pregnancy or shortly after birth can seriously harm infants. Maternal immunity helps to protect infants.

## 2.3 Consequences of low immunisation coverage

In recent years, outbreaks of vaccine-preventable diseases have been observed in countries that had previously eliminated the disease or had very low incidence, including measles, mumps, rubella and diphtheria. As well as in countries in which these diseases are endemic, diphtheria, for example, has been reported in parts of Europe and recently in Australia (in Queensland predominantly).(9) Declines in vaccination coverage, due to disruption of immunisation services or due to vaccine-hesitancy, have allowed infections to spread through non-immune populations. The size of vulnerable populations is largest where coverage has been suboptimal (<90-95%), community immunity is not sufficiently protective to prevent disease spread, and natural boosting of immunity from circulating disease is lacking.

Although measles, for example, has been officially eliminated endemically in several countries, including New Zealand, non-immune individuals are at risk of infection if the disease is re-introduced by unvaccinated individuals traveling from countries where it is still prevalent. A resurgence of measles has been observed in Europe, and isolated outbreaks of imported disease to Australia and New Zealand over recent years have spread rapidly when community immunity and vaccination coverage is inadequate.(4, 10-13) A historically low coverage of MMR vaccine and changes to the Schedule have meant that adolescents and young adults are at risk from measles infections, as demonstrated in the 2014 outbreak in Auckland and Waikato.

The resurgence of measles has particularly been seen in the Ukraine (with over 23,000 out of 41,000 cases reported in Europe during January to August 2018), and other poorer countries like Romania and Bosnia.(1) One challenge for these middle-income countries is that they no longer qualify for financial assistance for vaccine costs and experience variability in the political commitment to immunisation programmes. In recent years, large

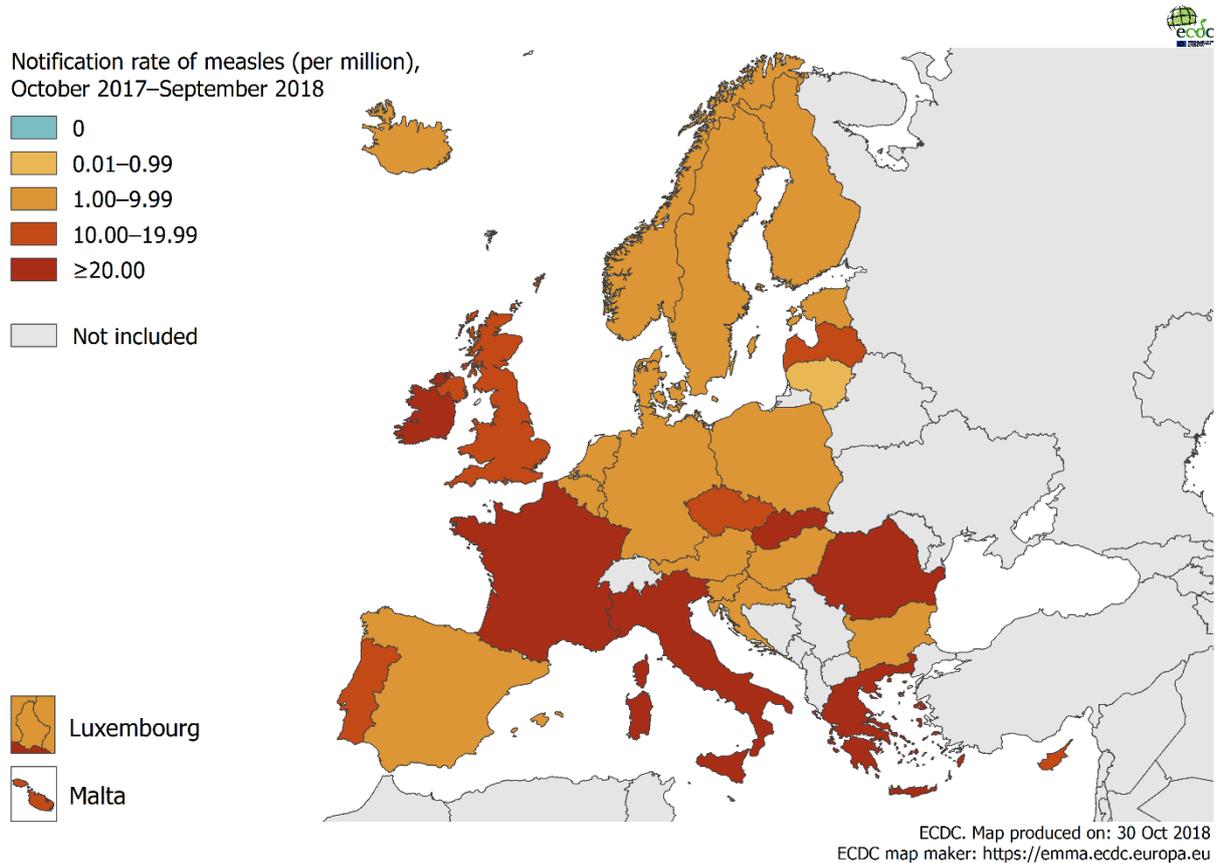


Figure 1 Notification rates of measles in Europe, October 2017 to September 2018 (reproduced from European Centres for Disease Prevention and Control)

numbers of under-immunised migrants have imported vaccine-preventable diseases to countries where those diseases are no longer endemic and have little natural immunity.(14) These outbreaks of imported disease have highlighted deficits in immunisation coverage in other countries. Figure 1 shows the number of measles cases across Europe during October 2018 to September 2018.(15) To put this perspective, the measles incidence rate rose to 2.3 cases /100,000 (0.23/million) in 2016 in New Zealand due to an imported outbreak.(16) In 2017, 15 cases of measles were notified.(17)

### 3 Vaccine acceptance and decision-making

Consent is fundamental to the provision of health care services, including immunisation, and is based on ethical obligations that are supported by legal provisions. It is the ethical duty of the healthcare professional to provide meaningful information to enable a patient or their representative to make an informed choice and enhance the patient's autonomy. To give their consent, the patient (or guardian) must understand that they have a choice, the reason they are being offered the treatment/procedure, what is involved and the probable benefits and risks of treatment or not receiving the treatment (to the individual and community in relation to vaccines), its side-effects, failure rates and alternatives.(8)

The ethics of vaccination is more complicated than for other medical interventions that treat disease. Assessing the risk of inaction is more difficult – considering both the consequences of the disease to an individual as well as the specific likelihood of acquiring the disease. As immunisation programmes succeed, the risk of acquiring the disease reduces, making it more challenging to convey the necessity of vaccines to those giving consent.(18)

#### 3.1 Community attitudes and confidence

It is essential to gain the confidence of the community to achieve acceptance of an immunisation programme or policy. Community clusters of non-vaccinating families are recognised in New Zealand and elsewhere. When their influence and opinions are expressed within that community, they can undermine the informed decision-making process, leaving other members of that community hesitant. Access to social media widens the community through which these influences can spread.

For confidence in immunisation programmes, a better understanding of attitudes towards health and well-being is required.(19)

##### 3.1.1 Role of trust in immunisation programmes

Establishing trust in public health programmes requires that the trust be built and maintained ('continually won'). Public health practitioners and policy makers need to consider what trust is and why it is important when planning services, programmes and interventions.(20)

Sociologists describe two types of trust – institutional and interpersonal. Trust is only needed where there is a deficit of knowledge by the person needing to trust (e.g. the patient). Mistrust often expands from interpersonal to institutional mistrust. Social inclusion is strongly linked to trust and is defined by the extent of appropriate access to services and systems required for daily living. Population groups with higher levels of perceived social inclusion have higher levels of both interpersonal and institutional trust. Generalised levels of distrust have been linked to feelings of social disempowerment.(20)

Maintenance of institutional trust is vital for immunisation programmes. As child immunisation programmes have successfully reduced the incidence of vaccine-preventable disease, public health practitioners are required to engage with and promote the benefits of vaccination to groups who are unlikely to have encountered these diseases. Parents question whether vaccination programmes are working for the best interest of their children or are driven by the pernicious influence of pharmaceutical companies – clear independence

between independent science research, political systems and vaccine manufacturers is therefore required to rebuild trust. Once lost, it is difficult to regain.(20, 21)

Put more eloquently: “*Trust comes on foot and goes away on horseback.*”(22)

Vaccine hesitancy can reflect a problem of trust in the medical and scientific establishment. Coercive vaccination measures are likely to reinforce and broaden mistrust of vaccinations and health professionals in certain population groups, and fuel a perception of state and medical alliance undermining autonomy.(23)

#### 3.1.1.1 Public support

Vaccination policies risk lacking public support if they ignore social and ethnic sensitivities, even when they have a strong evidence base.

In a population-based survey in which participants were presented with theoretical scenarios, public support varied considerably for various vaccination policy options that were equally efficient in disease prevention but differed according to target group (related to equity) or incentives to improve uptake (related to autonomy). Preferences over the use of legal compulsion, financial accountability or offering rewards appeared to be driven by an individual's social orientation (as influenced by individualism or collectivism, and emphasis on equality or hierarchy).(24)

The participants in this study were presented with 15 different option combinations for five target groups – children, healthcare workers, travellers, immigrants, or entire population – selected from theoretical disease threat scenarios and theoretical ways to stimulate vaccine uptake using subsidy, accountability or reward for the target groups. It was noted that the population selected was from a small Flemish region of Belgium and findings may differ in other populations with varying disease experience and vaccination attitudes.(24)

#### 3.1.1.2 Perceptions of risk versus benefit and vaccine safety

The uptake of vaccines is also associated with their perceived safety. As the severity of the VPDs are forgotten when diseases are controlled, public focus turns to milder or rarer vaccine reactions leading to hesitancy and scepticism. Declines in vaccination coverage reduce vaccine effectiveness due to loss of community immunity, and as diseases return confidence in immunisation programmes can be lost.

Europe was shown to be the most sceptical WHO region about vaccine safety, and France was the most sceptical country (41% vs global average of 13%). Vaccine scepticism is only one factor in failure to achieve 95% coverage: complacency about the severity of disease is also an important factor as disease incidence has decreased.(14)

Brown et al conducted a systematic review that investigated the factors affecting MMR uptake (published 2010). The review identified that vaccine-acceptors and vaccine-decliners think differently on a number of factors. It found that parents who declined vaccines believed that the vaccines are unsafe and ineffective, and that the diseases are mild and uncommon. They also distrusted their health professionals, the Government and officially-endorsed vaccine research, but trusted media and non-official information sources. They resented and perceived pressure to risk their own child's safety for public health benefit.(25)

### *3.1.2 Negative influences on vaccine acceptance*

Grzybowski et al (2017) described four contemporary categories for vaccine opponents:(26)

1. Philosophical – based on the concept of the individual's right to self-determination about his/her health, body and life. Consider that medical decisions for children should be left to parents or guardians.
2. Naturalistic – argues the concept that being vaccinated goes against nature and that vaccines cause the body to be insufficiently prepared to combat more severe diseases.
3. Religious – coercive vaccination is considered to be violating the protected freedom of religions. Vaccines are perceived as going against religious teachings and that they contaminate the blood.
4. Medical – most frequently raised, with concerns about side effects and vaccine compositions (e.g. aluminium or mercury) and possible negative outcomes.

However, the opponents do not take into consideration the public health threat caused by increased numbers of unvaccinated individuals and susceptibility of the population to disease outbreaks.(26)

### *3.1.3 Positive influences and community interventions*

Interventions to improve vaccine uptake require multiple components. A systematic review identified the following community-developed interventions that can significantly increase vaccine uptake in toddlers, including: (27)

- Bilingual / language-appropriate promotional material
- Peer health educators
- Outreach / home visiting
- Parental reminders
- Provider support
- Identification of high-risk families
- Signposting to health services

### *3.1.4 Conclusions: influence of community confidence on immunisation coverage*

Gaining public support of immunisation programmes is as important as the use of scientific evidence-based approaches. Generalised levels of distrust have been linked to feelings of social disempowerment, and population groups with lower perception of social empowerment are less trusting. Social inclusion and the extent of access to services is strongly linked to trust.

Trust needs to be continually maintained. Vaccine hesitancy can reflect issues with trust and raise questions as to whether immunisation benefits children's health or if it is driven by company profits.

Coercive vaccination measures are likely to reinforce and broaden mistrust of vaccinations and health professionals in certain population groups, and fuel a perception of autonomy being undermined by state and medical alliances.

Community opinion has an important influence on the decisions of individual families. Negative opinions can undermine decision-making. Engaging with communities to promote vaccine confidence is likely to be 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.

## 3.2 Healthcare worker attitudes towards vaccination

Healthcare workers (HCWs) are at risk of exposure, being infected and transmitting pathogens to and from their patients, and as such are a potential source of nosocomial infections. Vaccination of HCWs reduces the risk of infection and transmission of disease.(28)

To design effective interventions and campaigns to encourage acceptance of vaccination by HCWs, we need to understand the motivations and mechanisms for refusal. As for the public, an individual's decision to be immunised is based on weighing the perceived risks, resulting in a conflict between individual and collective interests. Generally, a lack of confidence, inconvenience, calculation and complacency were identified as barriers to vaccine uptake.(29, 30)

### 3.2.1 Influenza vaccination uptake by healthcare workers

A systematic review conducted by Schmid et al (2017) investigated influenza vaccination hesitancy in HCWs and identified the barriers to intention to vaccinate as:(29)

- Utility of vaccination - benefits (perception of disease risk, social benefit, anticipation of regret) versus risk (vaccine adverse events).
- Risk perception – perception of low risk of disease.
- Social benefit – ethical argument for HCW to be vaccinated – when there is perceived low risk of transmitting disease the vaccine uptake is low.
- Subjective norm – vaccine uptake is higher when social pressure is high.
- Perceived behavioural control – perceived ability to be vaccinated: lacking this control was a barrier to vaccine uptake.
- Attitude – a negative attitude was a major barrier to vaccine uptake, e.g. low vaccine uptake when belief in vaccine effectiveness or trust in authorities is lacking.
- Past behaviour – those who have been vaccinated previously against influenza showed high uptake.
- Experience – past personal and patient experience of influenza. Those with least work experience had a tendency towards lower vaccine uptake.
- Knowledge – a lack of influenza-specific education, such as training or educational materials, was a barrier to influenza vaccine uptake in HCWs.(29)

The attitudes and beliefs towards influenza vaccination were surveyed in 5,141 healthcare workers in hospitals and nursing homes in Belgium. The study found that guidance was needed to promote education, communication and easily accessible vaccination services during seasonal influenza campaigns. The mean vaccination coverage in the participating institutions was 40.4% in hospitals and 45.3% in nursing homes. Although up to 90% of HCWs considered it important not to infect their patients, only 20% of the non-vaccinated staff considered influenza vaccination as part of a duty not to harm their patients.

Misconceptions about the vaccine were significantly negative factors for vaccination; for example, up to 40% of the unvaccinated staff believed that they could get influenza after vaccination and that it could weaken their immune system. Underestimation of the perceived susceptibility of patients or HCWs in contracting influenza were also significantly negative factors ( $p < 0.001$  for most factors). About 20% of unvaccinated staff thought they had a high chance of getting influenza. Positive factors that influenced vaccination coverage were encouragement of supervisors (odds ratio [OR] 7.1 and 7.5 in hospitals and nursing homes, respectively,  $p < 0.001$  for both) and well-organised vaccination campaigns with onsite-vaccination.(31)

### 3.2.2 Reducing vaccine hesitancy in healthcare workers

As discussed by Betsch et al in 2014, strategies are required to correct skewed risk perceptions and activate pro-social motivation of HCWs.(32)

HCWs experience competing motivational forces to be vaccinated and their perceptions of risk - from disease or vaccination - are not necessarily based on reality. HCWs are more motivated for their own benefit, when their health is at risk, and not for their patients or colleagues. Individuals are more likely to protect others if their personal risk and cost is perceived to be small.(32)

*Strategies to activate pro-social behaviour:*

- Mandatory vaccination (discussed in section 5.3.1)
  - a. Offer free vaccination and educational campaigns
  - b. Mask wearing - uncomfortable and stigmatises unvaccinated HCWs for failing to contribute to the public good
- Advocacy: Vaccine Adoption = Access + Acceptance
  - a. Access – facilitate access, low cost in time and money
  - b. Acceptance with education and interventions
  - c. Education – early in HCW training
    - i. Inform about risk of infection and patients together with vaccination to reduce risk
    - ii. Reduce fear of side effects with systematic methods to debunk vaccination myths and misconceptions
    - iii. Strengthen pro-social values
  - d. Interventions
    - i. Communication strategies to activate positive ‘protection of others’ preferences
    - ii. Facilitate access – low cost and time saving
    - iii. Incentives for health care units – paid according to group rather than individual outcome(32)

### 3.2.3 Conclusions – influence of attitudes on health care worker vaccinations

Although HCWs are at higher risk of being infected by vaccine-preventable disease or transmitting disease to vulnerable patients, they experience similar vaccine hesitancy as seen in the population as a whole. Education about the risks and benefits, firstly to themselves and secondly to their patients and colleagues, is likely to be pivotal to changing attitudes and skewed misperceptions.

Multimodal approaches can improve vaccination uptake and vaccination behaviour changes by health professionals, involving personal consequences for non-compliance, accountability and peer-pressure. Advocacy, including education, is required to alter the misperceived risk of vaccination and to promote the benefit to themselves, primarily, then to their patients. Ease of access, through reduced costs, short waiting times and employer-funded vaccines, reduces excuses for non-compliance and encourages pro-social behaviour. Gaining trust in the authorities and providing evidence of effectiveness may also encourage uptake of vaccinations, particularly against influenza.

### 3.3 Role of health professionals in parental decision-making

Emphasising and delivering messages that demonstrate a high degree of consensus among medical scientists reduces concerns about childhood vaccine safety and promotes public support for vaccination.(33)

As discussed further in section 3.4, health providers play a significant role in influencing parental attitudes and confidence in immunisations. The Growing Up in New Zealand longitudinal study observed that the main sources of encouraging immunisation information were from health professionals, whereas, the main sources of discouraging information were from family and friends.(34)

Clear health professional recommendations significantly influenced pregnant women to receive maternal Tdap vaccination when it was first introduced to the Canterbury region of NZ prior to the inclusion of this vaccine to the National Immunisation Schedule.(35)

In Germany, doctors rather than midwives, play a highly relevant role in educating parents (mothers) about vaccination and this education is shown to be most effective when begun during pregnancy.(36) This is likely due to the lead maternity carers (LMCs) being primarily doctors, whereas in NZ midwives predominate as LMCs.

#### 3.3.1 Professional responsibility and ethics

A professional responsibility model of paediatric ethics is described in a commentary by Chervenak (2016), which highlights an ethical obligation to protect and promote the health-related interests of a child who is a patient. In this model, the ethical standard for vaccination is understood as a norm (not as an ideal) – vaccination of children without medical contraindications is an effective treatment to protect the health of children.(37)

It was argued that parental refusal does not have an ethical basis. Therefore, evidence-based counselling of parents about vaccination is essential for informed permission (rather than consent) to empower the decision maker. However, parents ought not to be empowered by the physician to refuse early childhood vaccination.(37)

Likewise, physicians are argued to have a professional responsibility never to make public statements on health matters that lack evidence or promote junk science and reflect professional incompetence (including admitting to not vaccinating their own children). Policy makers are bound ethically to the best interests of the child as norm standard. This professional responsibility model requires early childhood vaccination policy to allow only exemptions based on medical contraindications.(37)

To advocate for vaccinations, health professionals need to be seen to be accepting vaccinations themselves. The attitudes of health professionals are discussed in detail in section 3.2.

### *3.3.2 Conclusions – influence of health professionals in decision-making*

The most influential source of education about immunisation has been shown to be health professionals through engagement with health services. Early engagement with parents during pregnancy provides opportunities to explain the benefits and dispel concerns around the risks before the arrival of the baby. It also encourages engagement with wider health services for better health outcomes.

Since health professionals are pivotal in the decisions made by parents, they have an ethical responsibility not to provide false or unproven information and are accountable for their influences on parents.

The provision of funding and time to allow staff development and education is an important component of immunisation programmes. 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.

## **3.4 Parental attitudes and experiences**

A qualitative literature review examined parental vaccination decisions in the UK. It identified two types of decision-making:(38)

- Non-deliberative decisions were made when parents felt they had no choice, or were happy to comply and relied on social norms;
- Deliberative decisions were made by parents who weighed up the risk and benefit, and considered other's advice or experiences and social judgements.

Trust in information and vaccine stakeholders was integral to both types of decision-making.(38)

As described in section 3.1.1, generalised levels of distrust have been linked to feelings of social disempowerment and exclusion, as may be seen in populations with higher levels of deprivation.(20)

### *3.4.1 Engagement with health services - antenatal and pregnancy*

Most studies investigate attitudes and engagement of mothers in pregnancy and early infancy. Few studies have examined the role of both partners.

First-time mothers are more hesitant and undecided about childhood vaccination than those who already have children. The degree of vaccine hesitancy and two attitudinal factors (belief that vaccines are safe for their child and being prepared to give any new vaccine that was available) were correlated with vaccine uptake post-delivery. Only 66% of the mothers recruited in an Australian study reported having received enough information during pregnancy on childhood immunisations. No association was identified between maternal vaccine uptake or socioeconomic status (SES) and childhood vaccine uptake. However, there was correlation between those who received recommendation for vaccination in

pregnancy compared with those who did not (88% vs 64%; OR 3.5 [95% CI 1.6-7.8],  $p = 0.002$ ). Just over half of the mothers reported having discussed or accessed information on childhood vaccination during pregnancy, predominantly with midwives. This study highlighted the importance of education and communication on childhood and maternal vaccines during pregnancy.(39)

A study in New Zealand identified that highest immunisation coverage was achieved when an early relationship between general practice and families was established and immunisation was promoted antenatally.(40) This study was conducted during 2005-2006 prior to the introduction of maternal Tdap vaccinations.

As part of the Growing Up in New Zealand (GUINZ) longitudinal study, the antenatal immunisation intentions of both expectant parents were explored during antenatal interviews for infants born between April 2009 and March 2010. By late pregnancy, 87% of mothers and 73% of partners had decided whether to immunise their infant. Partners were more undecided (22%) about immunisation than the mother (13%). However, both parents were independently associated with timeliness of their infant's immunisations. Independent of the partner's intentions, infants of pregnant women who decided to fully immunise were more likely to be immunised on time (OR = 7.65; 95% CI 4.87-12.18) and independent of the mother's intentions, infants of partners who decided upon full immunisation were more likely to be immunised on time (OR 3.33, 2.29-4.84). Immunisation timeliness (within 30 days of due date of vaccination by 6 months of age) occurred in 70% of infants of 6,172 mothers and 4,152 partners interviewed. This timeliness was similar to the national average coverage at that time, which was estimated to be 71% at 6 months of age. Between mothers and partners, agreement was moderate (Kappa = 0.43 [0.40-0.46]). Timeliness was more likely if both parents agreed on full immunisation, as compared with partial or no immunisation, and independent of demographics (OR 8.58, 8.58-11.24).(41) Further analyses are ongoing to investigate the sources of information about immunisation for both parents (manuscript in preparation).

Antenatal interventions such as the provision of detailed, scientific, evidence-based information to base decisions upon were strongly suggested to help parents to decide to immunise their infant and to address the influence of omission bias (in which action is judged to be more harmful than inaction). Individuals reach their decision by weighing the perceived pros and cons that they see as relevant, and are influenced by emotional factors.(42) An antenatal decision-making aid was tested and found to be associated with significant decreases in maternal perceptions of risks and harmfulness of vaccines, reduced anxiety around immunisation, increased perceptions of risk of disease and increased satisfaction with the decision.(43)

The role of midwives and other LMCs is greater during pregnancy in New Zealand than in many other countries where obstetricians or primary care physicians predominate. Midwives are likely to have a more influential role during the antenatal and postnatal periods in New Zealand than in Germany, for example. However, the influences of different sources of information during pregnancy are important to consider.

A qualitative prospective cohort study conducted in Germany found that although concerns about diseases were associated with positive changes in attitude, changes in risk perception during after birth altered attitudes towards vaccination. Increasing concern about vaccine adverse events led to negative attitudes – driven by misinformation. Knowledge was an

important predictor of risk perception and physicians were the most influential source of knowledge. The implications of this study for policy makers and vaccination advocates are that education about vaccination should start as early as pregnancy, but attitudes can change with negative experience or knowledge acquired following the infant's first vaccinations.(36)

### *3.4.2 Engagement with health services - first vaccinations*

Attitudes during pregnancy do not predict vaccination behaviour when the child is older, but vaccination experiences and information acquired during the child's first year of life are crucial in determining vaccination status of the child at 14 months of age.(36)

The prospective cohort study in Germany, mentioned above, found that mothers formed attitudes towards vaccination during the first year of their child's life based on the first vaccination experiences with their child. Examples of negative experiences included crying of baby due to pain, feeling that baby was hurt and feeling overwhelmed by the situation. Attitudes became significantly more negative after their child was born and positive attitudes during pregnancy were not correlated with the child's vaccination status at 14 months.(36)

These changes were shown by mixed-effect models to be significantly related to increased perceptions of risk and vaccination concerns. Gaining more vaccine-related knowledge positively influenced attitude formation with time. Therefore, to prevent vaccine hesitancy from developing, it was concluded that strategies are required to improve mothers' experiences when their new-borns are vaccinated and to continually educate mothers about vaccinations before and after birth.(36)

Studies conducted in Canada have examined the role of parent-led pain mitigation in infants. Parent-directed education given either prenatally or in outpatient settings about pain management interventions, such as breast feeding, sugar water, infant holding and topical analgesia, was shown to be effective in improving pain experienced by infants during vaccinations.(44, 45) Clinical guidelines have been established and presented in a WHO position paper.(46, 47)

A New Zealand-based study investigating the coding of 'decliner' by health providers, found that continual re-engagement with parents who initially decline vaccinations can encourage vaccine uptake. A systematic approach is required that does not close down the decision-making process once a declination has been documented. Parental attitudes, influenced by family and community belief systems and misinformation leading to anxiety around vaccines, can change with time. Ongoing engagement with knowledgeable health providers and positive community confidence can influence positive outcomes for vaccination acceptance.(48)

### *3.4.3 Engagement with health services - toddler and preschool vaccinations*

Discussions about natural versus artificial immunity and anticipated regret as a consequence of not vaccinating can be incorporated beneficially during consultations with health professionals to promote parental acceptance of MMR vaccinations.(25)

A qualitative focus-group-based study conducted in England concluded that it is important to identify whether parents want to make empowered decisions - in this case, about MMR vaccination. For health professionals to adapt their communication about immunisation, it is

important to identify what information or autonomy needs the parents may have. This helps to promote parents' perceptions of making informed, autonomous decisions.(49)

#### *3.4.4 Timeliness*

In Zhejiang province in China, a study identified that the risk factors for delayed immunisation were associated with low educational and SES of mother, having a job, having a home delivery, with an increasing number of children per household and low income. Whereas the most frequent reason for non-vaccination was fear of adverse events.(50)

As part of the Growing Up in New Zealand study, it was shown that receiving discouraging information during pregnancy increased the odds of delayed infant immunisation (OR 0.49 [0.38-0.694]; 57% immunized on time), even if parents also received encouraging information (0.51 [0.42-0.63]; 61% on time). However, encouraging information was not associated with timeliness (OR 1.00 [0.87-1.15]; 73% on time). Of the women reported having received no information during pregnancy, 71% immunised on time.(34)

#### *3.4.5 Conclusions: influence of parental attitudes on immunisation coverage*

The experience and attitudes of parents has a profound effect on uptake and timeliness of vaccinations. Parental decisions around vaccinations are influenced by their experiences and appropriate education.

Early engagement with families and continual education presented by knowledgeable and confident health providers gives parents accurate information on which to base their decisions. Parents rely on the opinions of those around them to help to decide upon vaccine uptake. These influences begin in pregnancy and continue to change attitudes as their children grow up. Two decision processes affect how parents act – non-deliberative decisions are made by parents happy to comply to social norms or who feel that they have no choice, and deliberative decisions are made by weighing up perceived risks and benefits, taking the advice of others into consideration.

As part of the education of both parents and health providers, pain mitigating interventions are required to maintain positive experiences with vaccination to reduce the perception of risk.

### **3.5 Summary – influence of decision-making on immunisation coverage**

Trusted professionals can help to inform parents about making positive decisions. The influence of positive and informative advocates outweighs negative influences.

Public support and community acceptance have important influences on the decisions of individual families. Engagement between health education providers and the community is best achieved by members of the same community, with similar linguistic, ethnic or cultural backgrounds.

Acceptance of antenatal vaccination and early discussions about vaccination can reduce delays in immunisation of infants by providing the information required to make decisions beforehand.

The way initial vaccination events of their infants are experienced can have a lasting effect on parental attitudes to immunisation.

Continued engagement with and education of parents and their community can reinforce positive decisions, overcome negative influences and encourage vaccine uptake even for those who may have initially declined consent.

Healthcare workers also require education and trust to be gained, to overcome misperceptions about vaccines and to decide to be vaccinated. Personal risk outweighs any responsibility they may feel towards their parent clients. Easily accessible vaccine is most accepted. Coercion risks increasing distrust, although there is some evidence that multimodal approaches involving personal consequences for non-compliance, accountability and peer pressure, can change vaccination behaviour and improve vaccine uptake among HCWs.

A summary of the influences is given below:

1. Positive education about vaccination needs to start during pregnancy for both expectant parents.
2. Well-informed health professionals play a central role in educating pregnant women about vaccination – seen as highly relevant and have a significant influence.
3. Attitudes expressed in pregnancy do not necessarily predict the immunisation status of a child – it depends on the mother's experience of her child's vaccination and information gained.
4. Reducing pain and stress for infant during vaccination improves mother's experience.
5. Maintaining engagement with well-informed health professionals maintains positive attitudes towards immunisation.

## **4 Access and engagement with health services**

Immunisation coverage is dependent on access to vaccines and engagement with health services. As discussed, parental attitudes are significantly influenced by engagement with knowledgeable health providers and decisions around vaccination are made during pregnancy and continue to evolve during childhood. Only a small proportion (around 2%) of parents actively refuse to accept vaccinations. However, barriers to health and vaccination services have a significant influence on the immunisation status of disadvantaged populations. This impacts on and leads to inequities in immunisation coverage for certain population groups, particularly those experiencing poverty or living in more remote or socially isolated communities.

### **4.1 Social disadvantage rather than parental attitudes affects coverage**

#### *4.1.1 Disparities in New Zealand*

Low immunisation coverage in New Zealand is associated with household poverty, younger age of primary caregiver, delayed start to immunisations, later birth order in family, primary caregiver being Māori or Pacific ethnicity, and high rate of housing mobility of family.(6, 51) Gaps in immunisation coverage and social disadvantage have also been identified for refugee and some migrant children.(52)

Significant gains have been made in reducing these inequities. During 2007 to 2012, the inequity gap in immunisation coverage at age 2 years between Māori and non-Māori

reduced from 11% (59% coverage) to 1% (92% coverage) at a national level and was eliminated within some district health boards (DHBs).(53) However, gaps remain and social disadvantage continues to be an issue.

#### *4.1.2 Disparities in Australia*

Delayed immunisation was also significantly associated with social disadvantage indicators in an Australian study, especially with large family size (39.5% of delayed vaccinations). Parental disagreement with immunisation accounted for only a small proportion of delayed vaccinations (2.1%). The nationally representative cohort study quantified the relative impact of parental attitudes compared with socio-demographic factors associated with delayed immunisation. Participants for this study were selected in 2004 from the Longitudinal Study of Australian Children and compared with their vaccination history on the Australian Childhood Immunisation Register, from which the children were categorised as either fully immunised at 6 months of age, delayed or totally non-immunised.(54)

Most incompletely immunised infants in 2004 did not have mothers who disagreed with immunisation, according to a similar study using the Longitudinal Study data. Barriers to immunisation in Australia were found to be heterogeneous and required tailored interventions.(55)

A qualitative study conducted in Maitland NSW, Australia, investigated the reasons for incomplete immunisation of children from disadvantaged populations, for which a persistently high proportion of children were not fully immunised. As identified through interviews with parents and immunisation providers, factors impeding immunisation included:(56)

1. Limited engagement with health services unless urgent
2. Multi-dimensional barriers to access immunisation services, including:
  - a. Transience, large families – fall behind on immunisation as low priority
  - b. Disadvantaged backgrounds, including socioeconomic hardship, mental health and drug/alcohol dependence, family violence, homelessness – immunisation low priority and/or struggle to access a GP.
  - c. Fear and distrust of health and government services
  - d. Service providers seen as not accommodating needs of parents

It was noted that parents of children in this study did not mention specific vaccines as reasons for incomplete immunisations. Also, since the parents interviewed had eventually sought immunisation services, this study did not capture the views of parents who do not engage at all with health services. In the Maitland area, the number and rate of 1 year-olds not fully immunised remains virtually unchanged following the introduction of the No Jab, No Pay policy in Australia (described further in section 5.4.4).(56)

#### *4.1.3 Disparities in England*

An ecological study conducted in England over four years found that lower immunisation coverage for DTaP-IPV booster and the second dose of MMR was associated with greater area-level socioeconomic deprivation among nearly 9.5 million children aged 5 years. Although coverage increased from 79% (standard deviation [SD] 12%) in 2007/8 to 84% (SD 6%) in 2010/11, there was a weak negative correlation between the average Index of

Multiple Deprivation score within a Primary Care Trust and DTaP-IPV coverage. Over the study period this correlation reduced but remained significant ( $r = -0.298$ ,  $p < 0.001$  in 2007/8 and  $r = -0.179$ ,  $p = 0.028$  in 2010/11). Similarly, MMR coverage in 2007/8 was correlated to deprivation (coverage 75% [SD 10%];  $r = -0.225$   $p = 0.008$ ). No significant correlation was seen by 2010/11 ( $r = -0.0078$ ;  $p = 3.43$ ) at which time second MMR dose coverage was 64.8%. The improvement in coverage was attributed to improvements in reporting and contractual performance targets as an incentive to reduce health inequalities.(57)

Inequalities were identified in the timeliness of childhood immunisations in London. From the vaccine histories of 315,381 children born between 2001 and 2010 with diverse ethnicities, a cohort study found that the majority of children received their primary series on time (91.2% fully vaccinated on time by age 1 year). Differences in timeliness were identified to occur at different ages among various ethnic groups when compared with White-British children adjusted for deprivation and area. Only 2.3% of children who were completely unvaccinated at age 1 year were fully vaccinated by the age of 5 years. Higher proportions of children partially vaccinated at 1 year were fully vaccinated by age 5 years. For some ethnic groups, starting but not completing the vaccine course was an issue. Differences in timeliness existed by deprivation and health area, but were smaller than the ethnicity differences. The study concluded that tailored approaches may be required to improve vaccine uptake within specific groups.(58)

## 4.2 Removal of barriers to access health services

### 4.2.1 Multi-component interventions to reduce inequities

Differences in vaccine uptake in high income countries can be related to socioeconomic status, gender, ethnic group and geographical location, and in some countries, religious belief.

### EQUALITY VERSUS EQUITY



In the first image, it is assumed that everyone will benefit from the same supports. They are being treated equally.



In the second image, individuals are given different supports to make it possible for them to have equal access to the game. They are being treated equitably.



In the third image, all three can see the game without any supports or accommodations because the cause of the inequity was addressed. The systemic barrier has been removed.

A systematic review of 41 studies was conducted by Crocker-Buque et al (2017) in which interventions to decrease vaccine uptake inequalities in OECD countries were categorised according to age group: routine childhood vaccines (birth to 11 years), adolescent vaccines (11-19 years), and seasonal influenza vaccine for children and young people up to 19 years of age. These interventions included multicomponent complex interventions, patient-focussed reminder/recall systems, outreach programmes, prompts from HCWs and computer-based interventions.(27)

The review found that multicomponent, locally designed interventions demonstrated the best evidence for reduced inequities in children and adolescents in the short-term. For example, multicomponent community-developed interventions that significantly increased uptake for children aged 19-35 months included:

- Bilingual / language appropriate promotional material
- Peer health educators
- Outreach / home visiting
- Parental reminders
- Provider support
- Identification of high-risk families
- Signposting to health services

Three studies found that escalating intervention intensity was particularly effective.(27)

Other reviewed interventions to improve access and vaccine uptake for disadvantaged populations included community catch-up clinics in addition to general practice for adolescents no longer in school, reminder/recall systems by telephone and post, immunisation champions, standing orders and modifications to health records. However, no studies provided good evidence of sustained uptake long-term.

The review recommended: (27)

- Locally designed, multicomponent interventions, particularly in urban, ethnically diverse, low income or deprived populations
- Text messaging and other reminder/recall systems be considered, particularly for adolescents
- Increasing intensity of interventions for non-responders, which was more cost-effective than universal home visiting

An intervention study conducted in New Zealand supported the notion that one strategy will not improve childhood immunisation coverage rates by itself. A toolkit of strategies is required to reduce equity gaps in coverage. Positive aspects of service delivery included immunisation being of high priority and being provided by pro-immunisation and knowledgeable staff within general practices. Challenges experienced were inaccurate family contact information and referral discrepancies between healthcare and child welfare providers. Building rapport with families and vaccine hesitance were also challenges. Common themes relating to improved childhood immunisation coverage included importance being given to adequate practice processes, such as precall and recall interventions for hard-to-reach families, creating a team approach to immunisation, and a commitment to engaging with parents.(59)

A cohort component of the Longitudinal Study of Australian Children found that delayed immunisation was associated with social disadvantage. The study also concluded that

improvement in timeliness might be achieved through multi-component, family-focussed strategies, including reminders to parents and removal of barriers for busy families.(54)

#### *4.2.2 Tailoring service delivery for disadvantaged populations*

To address the low immunisation rates of underserved children in North Carolina, US, a qualitative exploratory study compared immunisation delivery factors in 10 local health departments (LHDs). It found that to meet a population's needs around service delivery LHDs should study the population they serve. The abilities of higher performing LHDs to immunise underserved children were influenced by the hours of operation (immunisation available during lunch hour noon-1pm), appointment systems (for immunisation as well as walk-in), the use and type of tracking systems (including a designated full-time employee to perform tracking on a daily basis) and waiting times (average wait times of 15 minutes compared with 30 minutes for lower performing LHDs).(60) Immunisation coverage rates were not reported for this study.

The qualitative study conducted in Maitland, Australia identified the following to improve access and uptake of vaccines, and to overcome inequities in disadvantaged populations: (56)

1. Flexible family-centred approach likely to be effective
  - a. Targeted and opportunistic approaches
  - b. Home visiting
  - c. Flexible hours
2. Use data more effectively to inform service providers about trends and individual children
  - a. Timely sharing of relevant information
  - b. Data quality and recording issues

As mentioned, social disempowerment within population groups with higher levels of perceived social inclusion have higher levels of both interpersonal and institutional trust.(20) Community-developed interventions can significantly increase vaccine uptake by targeting engagement with the community and enhancing trust.(27)

#### *4.2.3 Reducing missed opportunities*

A systematic review was conducted by Jaca et al (2018) to assess strategies to reduce missed opportunities for vaccination. Strategies, for which there was moderate certainty of evidence, that improved vaccination rates and reduced missed opportunities included patient education (relative risk [RR] 1.92), patient tracking (RR 1.18), outreach sessions and provider prompts (RR 1.24). There was also low certainty evidence that concurrent interventions targeting health facilities - including education, prompts, audit and feedback, and phone calls to family settings - may also increase vaccination coverage (RR 1.25).(61)

In a 2018 Cochrane systematic review of 75 studies, Jacobson Vann et al concluded that patient reminder and recall interventions, including telephone and autodialer calls, letters and postcards, text messages or combinations with outreach, improved immunisation rates in primary care settings. Evidence was high that reminders improved the receipt of childhood (8% risk difference, RR 1.22 [1.15-1.28]) and adolescents (7% risk difference, RR 1.29

[1.17-1.42]) vaccinations. There was also moderate evidence that influenza vaccination of children and adults and also adult immunisation could be improved using reminders.(62)

#### 4.2.4 Targeting indigenous peoples

The health of indigenous people is a human rights concern. The Convention on the Rights of the Child (1990) (CRC) offers a guide to the United Nations Member States on their obligations towards children and their health, including indigenous children. Article 24 of the CRC includes the obligations of the Member State parties to take appropriate measures to: (a) diminish infant and child mortality; (b) ensure the provision of necessary medical assistance and health care to all children, with the emphasis on primary healthcare; and (c) combat disease and malnutrition. Other global and regional normative frameworks exist, including the 2007 UN General Assembly Declaration on the Rights of Indigenous Peoples. Although it has policy references at a global and country level, it is not binding and does not serve as a mandate.(63)

##### 4.2.4.1 The Treaty of Waitangi and He Korowai Oranga

As indigenous people and Treaty partners, Māori have a right to health and equal health outcomes in New Zealand. The Treaty of Waitangi (*Te Tiriti o Waitangi*) outlined the Māori rights to *kāwanatanga* (good governance), *tino rangatiratanga* (sovereignty) and *oritetanga* (equity) and the New Zealand Government is responsible for ensuring that these rights are met.(64)

Within the New Zealand health system, *He Korowai Oranga* (Māori Health Strategy) was established as an over-arching framework to guide the Ministry of Health and DHBs towards the best health outcomes for Māori people across the whole health and disability sector and extending to other sectors.(65) The principles of the Treaty of Waitangi of partnership, participation and protection, underpin the relationship between the Government and Māori. These principles aim to ensure that Māori have at least the same level of health and quality of life as non-Māori, safeguard Māori culture and values, require Māori to be involved at all levels of decision-making, planning, development and delivery of health services, and to work in partnership with Māori communities, encompassing iwi, hapū and whānau.(65)

In some communities, particularly in more remote rural communities, meeting these principles is challenging. Inequities remain and are associated with poor health outcomes, which are likely to be due to a feeling of social exclusion associated with low SES, and in some areas, mistrust of the health and welfare systems.

##### 4.2.4.2 Addressing immunisation issues in Brazil

In order to address the issues of immunisation of indigenous children in Brazil, the following risk criteria were used to identify priority areas for vaccination:(63)

1. Areas of difficult geographic access
2. Low vaccination coverage
3. Quality problems in the immunization information system
4. Occurrence of vaccine-preventable diseases
5. Less than three vaccination stages in the last year

A specific calendar month was designated as ‘Vaccination of Indigenous Peoples month’, to focus attention on the specific health standards to certain population groups facing health challenges. It includes the principle of acceptability with respect to services being configured

in culturally and socially acceptable ways. This strategy contributed to a 30-40% annual increase in immunisation coverage.(63) Recognising Brazil has a different socio-ecological environment to NZ, these strategies may not necessarily be generalizable. For example, strategies such as these could have the potential to be seen as either privileging Māori compared to other ethnic groups with high needs, or in reverse, of unfairly targeting Māori.

### **4.3 Conclusions – influence of barriers on immunisation coverage**

Vaccine uptake and timeliness of immunisations can be increased by removing barriers to access vaccines for disadvantaged populations and facilitating engagement with health services.

Cultural and socially acceptable practices are required, with multimodal approaches 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 the needs, and to maintain the rights of Māori under the Treaty of Waitangi and to achieve equity.

Locally designed and implemented multi-component interventions are most effective in increasing vaccine uptake and immunisation timeliness, at least in the short-term. Recall and reminder systems and strategies to avoid missed opportunities can improve vaccine uptake in all age groups.

## **5 Immunisation incentives**

Incentives can be used to motivate acceptance and improve uptake of immunisations for parents and health service providers.

### **5.1 Factors affecting immunisation programme outcomes**

Multiple factors affect how immunisation coverage influences the running and outcomes of immunisation programmes. As part of a study in Europe for example, variability in approaches and outcomes were identified when health system attributes, vaccination strategy and vaccination coverage rates were compared in relation to the universal mass vaccination (UMV) outcomes.(66)

Typically, countries had a vaccine-specific key performance indicator (KPI), e.g. a target vaccine coverage rate (VCR). However, these data were not always publicly available each year and there was variability between age groups or vaccines for which the data were collected. KPI targets were only widely applied to influenza and the combined measles-mumps-rubella (MMR) vaccine due to considerable variation between country schedules. The study concluded that fundamental issues need to be addressed to improve country UMV performances, e.g. by increasing VCR and better defining VCR goals in target populations.(66)

## 5.2 Health service provider incentives

### 5.2.1 Performance-based health care incentives

In New Zealand, the primary care National Health Target of increased immunisation at 8 months of age is financially incentivised through the primary health organisation (PHO) services agreement (2016/17).(67)

Performance-based payment incentives for family doctors were shown to encourage higher levels of childhood immunisations in Estonia. Childhood immunisation coverage was an indicator for a pay-for-performance quality system. In comparison with family doctors who did not join the quality system, those that did met the 90% vaccination coverage criterion more frequently for all vaccinations listed in the Estonian State Immunisation Schedule.(68)

A study in Manitoba, US, found that a pay-for-performance programme (called the Physicians Integrated Network) had limited impact on immunisation rates. Also, it did not address health inequities in lower socioeconomic cohorts (income quintiles). At the end of the study, inequity in SES-related vaccination completion had worsened in non-participating clinics, but remained constant in the programme-funded clinics.(69)

### 5.2.2 Immunisation coverage targets

A qualitative study conducted in New Zealand investigated the implementation consequences of health targets on immunisation and emergency department treatment. Through interviews of clinical and management staff, the implementation of targets was compared for the immunisation coverage target at 2 years of age and time to treatment, discharge or admission in emergency departments. Although these targets had identical achievement levels, mixed positive and negative implementation consequences were revealed.(70)

Actions four DHBs took to improve coverage within their regions, particularly for Māori, were examined in a case-study. It found that the establishment of immunisation coverage health targets and documentation of immunisations on the NIR improved accountability for immunisation coverage nationally and locally.(53) A hierarchy of immunisation champions was established across the health service, and funding and resources were targeted towards improved immunisation service. These enabled changes at local levels and greater cooperation between immunisation service delivery providers to work collaboratively to address the health target within their region. League tables created an element of collegial competition. However, falls in coverage have been associated with target fatigue and the sustained effort required to maintain high levels of coverage. It is recommended that health targets be used over a set period of time and once they have ended, be replaced with ongoing monitoring.(53)

These immunisation coverage targets encouraged general practices to think imaginatively and employ creative solutions to encourage vaccination uptake and to achieve national, regional and local targets.(59) It is argued that targets may focus attention and resources at the detriment of other health services that are not subject to set targets. For example, some felt that the immunisation target at 2 years of age detracted away from ensuring vaccination was given in a timely manner. However, on the positive side, immunisation targets encouraged collegial collaboration and wider benefits to the health of children through

greater engagement with primary healthcare services enabling other health issues to be addressed.(59) A case-study of health target implementation found that it was important to consider the inter-organisational and inter-professional environment of health target implementation and it concluded that policymakers need to consider the broader implementation context and effects on related services.(70)

Improvements in coverage for socioeconomically deprived children age 5 years in England were attributed specifically to immunisation performance incentives. As an incentive to reduce health inequalities, improvements in reporting and policies included contractual targets with primary care to achieve specified immunisation performance levels. The ecological study concluded that an integrated approach to immunisation delivery may support reduction of inequalities where the approach incorporates a systematic improvement of data management, and comprehensive and adaptable service delivery.(57)

### *5.2.3 Conclusions – influence of service incentives on immunisation coverage*

Due to the public funding of the primary health care system in the New Zealand setting, pay-for-performance incentives may impact differently on immunisation coverage than seen elsewhere. Targets which compare performance between providers and district health boards have been shown to be beneficial, particularly through improved engagement of children with primary care services. Common goals also encourage collegial collaborations. The establishment of a hierarchy of immunisation target champions from the Ministry of Health to DHBs, primary healthcare organisations (PHOs) and individual practices improved communication and accountability nationally and locally.

Positive gains can be achieved by incentivising healthcare providers financially to increase immunisation uptake. Pay-for-performance incentives are unlikely to directly address health inequities within the target community but can incentivise providers to work harder at increasing vaccine uptake for their enrolled population and improve health outcomes, thereby indirectly reducing inequities.

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 taken into consideration. Also, sustained efforts to meet targets can result in fatigue and therefore are best implemented in the short term. Community-based immunisation champions who can engage their local community most effectively can also reduce the strain on health care providers.

Currently in New Zealand, the immunisation coverage target is 95% at milestone ages of 6 months, 8 months, 12 months, 2 years and 5 years of age). As directed by the Government, a new set of performance measures are currently under development.

## **5.3 Parental incentives**

### *5.3.1 Financial incentives*

As examined by Adams et al (2016), parental financial incentives were not believed to be appropriate motivation for vaccinating children, according to qualitative studies, and were not deemed to be the best use of resources for promoting preschool vaccinations in the UK. There is some concern that targeting those most at need with financial incentives was seen

as coercive due to financial pressures, although an earlier systematic review found that there was an absence of evidence as to whether effectiveness varies by socioeconomic status. Preference for financial rewards were persistently towards universal incentives, as compared with targeted incentives, and related to equity (e.g. rewarding bad behaviour when parents who had delayed vaccinations were eligible for reward). It was likely that these perceptions were particular to the UK context where healthcare services are universally available, and as such would also apply in New Zealand.(71)

A Cochrane systematic review reported that, in low-to-middle income countries, household monetary incentives appeared to have little effect on coverage alone. There was low-quality evidence that regular outreach plus monetary incentives improved coverage. Home visits to identify and refer unvaccinated children to health clinics may have improved polio vaccine uptake. However, most of the evidence from the reviewed studies was of low certainty.(72)

### *5.3.2 Financial liability*

Grzybowski et al (2017) proposed that parents be financially liable for the consequences of refusing vaccinations. Unvaccinated individuals or parents refusing to vaccinate their child would be required to sign a legally binding contract to cover the costs of hospitalisation and treatment in the case of infection. This approach was considered to maintain a balance between coercion and autonomy, and vaccine opponents are faced with the consequences if an infection occurs.(26)

However, hypothetically, in the situation where a mild case of a vaccine-preventable disease was treated at home without the involvement of a health provider, it would be difficult to measure the costs for that individual if a community outbreak results from the child not being vaccinated.

### *5.3.3 Conclusions – influence of parental incentives on coverage*

Financial incentives for parents are better received when universally available, not just for targeted groups, and equality is perceived.

Financial consequences rather than incentives could be appropriate for parents who actively refuse vaccines. However, for those who delay for reasons associated with financial hardship, the financial consequences would have an accumulative and negative effect on the families' wellbeing and increase hardship and social exclusion.

## **6 Mandatory vaccination to improve vaccine coverage**

Vaccination mandates can vary between hard-line penalties for non-compliance such as legal action or loss of financial benefits, to softer penalties such as exclusion from mass gatherings or sports events, and compulsory decision-making. More recently, since outbreaks of vaccine-preventable diseases like measles have been seen in the US and Europe, further legislation has been imposed to increase the penalties of non-vaccination.

Mandatory vaccination policies have been argued to be appropriate for certain environments, such as for school children and health care workers, where the risk of infection is greatest. However, opponents of mandatory vaccination believe that full disclosure of the risks should be made mandatory rather than the vaccination.(73)

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

1. Failure to motivate vaccine uptake with less coercive methods (e.g. school entry)
2. Outbreak of one or more VPD that has increased harm and concern about low coverage (e.g. measles in the US)
3. To achieve a global disease elimination goal (e.g. polio)(74)

However, the implementation of mandatory programmes is practically and operationally challenging.(74)

Public health interventions that are described as being mandatory can be defined as requiring an active opt-out and some form of penalty for refusing to comply.(75)

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 records of the immunisation status of children aged 15 months or older are requested upon enrolment; caregivers must comply with such requests to supply immunisation certificates for their children. The rights of children to attend or enrol are not affected if these requests are not met.(76)

## **6.1 Mandatory vaccination of health care workers**

As discussed, parental decisions to immunise their children often rely on trust in their health professionals. It is therefore fundamental that vaccination is seen to be accepted by healthcare providers. It is also suggested to be ethically unacceptable for health professionals to express their own opinions against vaccination while influencing parents making health decisions for their children.(37)

In a commentary from an American Medical Association perspective, Wynia (2007) stated that enforced mandatory influenza vaccination of HCWs ought to require a signed waiver, and patients (especially those at high risk from influenza) should be informed when they received care from unvaccinated practitioners.(75)

A mixed methods study and survey investigated the attitudes among HCWs and managers responsible for implementing influenza vaccination campaigns in England toward three mandatory policies. It found that mandatory vaccination and facemask wearing for those unvaccinated were not well supported, whereas declination forms used for constructive intelligence-gathering were better received if HCWs were not stigmatised. There was resistance to being compelled to accept a medical intervention and it was perceived as unethical.(77)

### *6.1.1 Effectiveness of mandates for health care workers*

Mandates with non-compliance consequences, e.g. wearing masks, education, unpaid leave, restriction of duties or termination of employment, were associated with larger increases in hospital HCW influenza vaccination rates in the US than in the hospitals with mandates, but no such consequences.(78)

A multimodal vaccination campaign conducted in a community-based healthcare system in the US significantly increased vaccination rates of HCWs from 57-72% to 92% in the first year and 93% in years 2-4 ( $p < 0.001$ ). There was a decline in the proportion of HCW

declaring medical/religious exemptions (from 1.2% to 0.5%,  $p < 0.01$ ) or declining vaccination (from 4.4% to 3.8%,  $p = 0.01$ ). Campaign approaches consisted of a mandatory declination policy, mask-wearing for those not vaccinated, 'I'm vaccinated' badges for those that were, improved vaccination tracing, weekly compliance reports to managers, disciplinary measures, vaccination stations at faculty entrances, and including a target employee vaccination rate ( $>75\%$ ) in the employees' annual bonus programme.(79)

### *6.1.2 Improving coverage without mandates*

One barrier for uptake of vaccines in medical students was inconvenience.(30) To overcome an aspect of inconvenience and time constraints, the UK no longer recommends waiting following vaccination. The rationale is that most adverse events, including anaphylaxis, occur immediately after injection or several hours later, and there is no evidence to support the practice of longer observation time following vaccination.(80, 81)

### *6.1.3 Conclusions – influence of mandates on healthcare worker vaccination*

Mandates in which there are consequences for non-compliance can help to increase vaccination uptake of HCWs. Peer-pressure can influence vaccination uptake; however as discussed previously, coercion can increase mistrust. Multi-modal approaches that advocate 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.

## **6.2 Mandatory immunisation of children**

### *6.2.1 Compulsory vaccines – full and partial mandates*

Vaccines for which penalties are enforced for non-receipt are described as compulsory vaccines. Penalties range from financial implications, to exclusion from state education or group gatherings, or imprisonment. In some countries, partial mandates are in place for selected vaccines on the national immunisation schedule, and in other countries, full mandates exist for all the scheduled vaccines.

### *6.2.2 Implementation of mandates internationally*

Due to the epidemiological risks resulting from low immunisation coverage, and outbreaks of disease that had previously been controlled, obligations to vaccinate have been enforced through legal solutions in the US and Europe.(26)

Across Europe, there is no overall vaccination requirement and most European countries maintain their own immunisation policies and publicly funded programmes. The implementation of mandates and the vaccines assigned to mandates vary: 15 European countries do not have mandatory vaccinations and some only have mandates on selected vaccines, such as polio, diphtheria and tetanus or hepatitis B. (26)

The Croatian constitutional tribunal upheld the obligation to vaccinate children based on the recognition that the child's right to health means more than the right of parents to make decisions.(26)

A range of mandatory vaccination programmes have been introduced. For example:(73, 82, 83)

- In the US, some states have compulsory vaccination for school entry, some permit religious and philosophical non-medical exemptions (NME), whereas other states only permit medical exemptions validated by a physician.
- In Canada, three provinces have introduced legislation for school entry vaccination requirements which include exemption clauses based on medical, religious or conscience grounds. Unvaccinated children are excluded from school in the event of a disease outbreak.
- Latvia requires healthcare providers to obtain signatures from those who decline vaccination.
- Slovenia has mandatory vaccination for nine designated diseases and does not permit non-medical exemptions. Failure to comply results in a fine.

Other countries, for example Australia, France and Italy have introduced or tightened immunisation mandates with financial or legal penalties.(74)

### *6.2.3 Politics of mandates*

Structural public health interventions which eliminate or reduce choice could be considered politically and publicly appropriate for vaccinations due to the immediate public health consequences of infectious diseases.(71)

Three integrated studies, including a systematic review, conducted by Adams et al (published in 2016) found that quasi-mandatory interventions, such as exclusion from childcare or school with exemptions, and parent incentives to immunisation could be effective in increasing the uptake of preschool vaccinations in the UK, particularly for more disadvantaged population groups. However, universal incentives were preferred to targeted ones. More flexibility in the timing and location of vaccinations with less waiting time was seen by health professionals and parents as an alternative strategy to improve uptake.(71)

Supporting the use of state powers to protect public health and safety, from the perspective of polio eradication in Israel, Gostin (2018) observed that governments have a duty and the power to achieve population-wide vaccine coverage in order to stem the spread of infectious diseases, including in geographical areas with high numbers of individuals claiming religious or conscientious exemptions to vaccinations. He reported that, to safeguard public health and achieve a public health objective, governments are obliged to use the least restrictive/invasive measures, but not to use less effective measures simply because they are voluntary or less invasive. To find the most effective, least invasive intervention is fact-specific. He concluded that, from a legal and 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, least restrictive alternatives in good faith(84)

In August 2018, despite positive gains in immunisation coverage, the Italian Senate voted for an amendment to suspend a law requiring parents to provide proof that their child has been vaccinated when they enrol in nursery due to concerns of the new Italian government about the need for mandatory immunisation requirements.(85) Previously, in July 2017, Italy

increased mandatory vaccination from four to ten vaccinations, all children under 6 years were required to be fully vaccinated to enrol at preschool facilities, with a catch-up for all children aged up to 16 years, and non-vaccinating parents faced heavy fines. In one year, an increase in vaccine uptake was observed, including a 4.4% increase in MMR vaccinations, and almost a third of unimmunised children born 2011-2015 have now been fully immunised. The bill is not expected to be restored until 2019 and there are concerns that the resulting confusion will be detrimental to the immunisation programme.(85, 86)

#### *6.2.4 Policy in Australia*

A 'No Jab No Pay' policy was introduced by the Australian federal government in January 2016 as an extension of pre-existing policy. Family Assistance benefit payments are withheld for unvaccinated children up to the age of 20 years with strict medical exemptions. Additionally, a 'No Jab No Play' policy has also been implemented in Queensland, Victoria and New South Wales to exclude unvaccinated children without medical exemptions from preschools and schools. Non-medical grounds are not accepted as valid exemption from immunisations.

From 1 July 2018, the Australian Department of Social Services imposed further penalties on parents who do not vaccinate their children by reducing fortnightly Family Tax Benefit payments (around AU\$28 per fortnight) for each child who does not meet immunisation requirements.(87)

##### *6.2.4.1 Gains in Australia*

Despite controversy, positive gains in the Australian immunisation coverage rates have been seen following the implementation of the No Jab No Pay policy alongside other strategies to promote immunisation. The greatest increases were seen in indigenous populations. Coverage rose 1.64% for all five-year-old children from 92.6% to 94.2%, from 93.9% to 96.5% for Aboriginal and Torres Strait Islander (ATSI) children and increased by 1.77% for all 12-year-olds. There was a large increase in the number of adolescents aged 10-20 years who had catch-up vaccinations, and more than 80,000 adolescents have received a second dose of MMR as of June 2018.(88)

As of March 2018, however, coverage for two-year-olds was not as high at 90.5% for all children and 88.4% for ATSI children. This was attributed to the addition of extra antigens, varicella and meningococcal C, to the schedule at 18 months of age.

For partially vaccinated children, there was not a blanket refusal to vaccines rather objections to certain vaccines. Conscientious objectors to vaccination are required to complete four steps to ensure that choosing non-vaccination is a deliberate and considered choice by parents that has been discussed with a health provider. This stepwise process can be seen as positive in that it often allows parents in this group the opportunity to express concerns and to be persuaded to vaccinate, at least with some vaccines.(23)

##### *6.2.4.2 Challenges in Australia*

Many of the children with incomplete immunisations were identified as coming from low-income backgrounds, and as such, these families may have been encountering structural barriers to vaccination. Therefore, it has been argued that withdrawal of welfare benefits and preventing enrolment of unvaccinated children to childcare is likely to exacerbate the disadvantage, resulting in both health and social inequities.(23)

An undesirable effect of compulsory vaccination for early childhood attendance, which has been reported in the media and by interviewed parents, is the establishment of unregulated centres or informal care specifically for unvaccinated children. Within these centres, in which there would be no herd immunity, clustering of unvaccinated children increases the likelihood of disease outbreaks into a community also likely to be under-vaccinated.(89) To overcome the loss of non-medical exemptions, some parents opposed to vaccination have sought fraudulent medical exemptions, which marginalises their families away from mainstream medical practice and puts pressure on doctors to commit fraud.(23)

Within an area of Australia known for low vaccination rates (Byron Shire, NSW), non-vaccinating parents were interviewed about the impact of the No Jab No Pay policy. They reported a greater commitment to their decision not to vaccinate, including a willingness to be involved in protest action, to maintain control over health choices for their children. Reduced income was offset by removing children from early childhood education, reducing work commitments, reducing living costs by moving residence, and accessing informal childcare arrangements. In some cases, registered vaccine objectors were better resourced and less likely to be dependent on welfare payments.(89)

#### 6.2.4.3 Summary of Australian mandate

Implementation of the Australian No Jab No Pay policy, alongside other strategies to improve vaccine uptake, helped to increase the immunisation coverage - especially for ATSI children by the age of 5 years - and improved the uptake of the MMR notably in adolescents.

However, those from lower socioeconomic groups already experiencing challenges to accessing health providers were further affected by loss of income through loss of benefits or access to childcare (in states that introduced No Jab No Play). Communities known for choosing not to vaccinate are being further marginalised, and the mandates have reinforced their beliefs and resolve, creating more polarised views.

#### 6.2.5 Partial mandates

Some mandatory vaccination policies can be described as partial mandates. A partial mandate is implemented when there is some degree of choice around immunisation decisions. For example, when some but not all the vaccines on a national immunisation schedule are selected to be compulsory and others are recommended but voluntary. Allowing non-medical exemptions based on conscientious objection or religious reasons, may also be considered a partial mandate.

In a study using an online game simulation, participants were randomised for two sequential vaccine decisions to either a compulsory or voluntary vaccination intervention and then a voluntary intervention. Compared with when the first vaccination was voluntary, a compulsory first vaccination led to increased anger with negative vaccination attitudes among individuals and a 39% decrease in vaccination uptake for the second voluntary vaccination. It was especially observed for vaccine hesitant participants. The study concluded that only making some vaccinations compulsory can have detrimental effects on the whole vaccination programme by reducing uptake of the voluntary vaccinations.(90)

This effect was observed in Slovenia, where mandatory vaccination for nine designated diseases led to uptake of more than 95%, whereas coverage for non-mandatory vaccines, such as HPV vaccine, was less than 50%.(73)

### *6.2.6 Preschool and school entry requirements*

As well as measles, there have also been resurgences of diphtheria, pertussis and rubella in Europe, predominantly in countries with poor immunisation coverage. In response to measles outbreaks, some countries in Europe have introduced compulsory immunisation of children, unless children have proven medical contraindications.

In Italy, vaccinations were made compulsory from birth to 16 years of age, and during the 2017-2018 academic year, children unvaccinated against 12 VPD ( diphtheria, tetanus, pertussis, polio, Hep B, Hib, Men B and C, MMR, varicella) were denied entry to nurseries and school, and parents could be fined from €500 up to €7500 for non-compliance. In Germany, parents of non-vaccinated children without proof that they have sought medical advice on vaccinating their children are reported to authorities.(14) In France, 11 vaccinations (DTaP, IPV, Hib, HepB, MMR, MenC and PCV) are mandatory and unvaccinated children can be refused entry to nurseries, schools and camps.(91)

However, the director of the European Centre for Disease Prevention and Control was reported to say, 'There is no obvious association between mandatory vaccination, without other measures, and increased vaccination uptake in any given country.'(14)

#### *6.2.6.1 Non-medical exemptions from school entry*

Some states in the US, Canada and Australia have removed non-medical exemptions (NMEs) for vaccinations prior to school entry. Other states allow exemptions for medical, religious and philosophical reasons. One role for mandatory vaccination in the US is to vaccinate the few that have delayed vaccine doses, i.e. the 10% of 'stragglers'.(82)

In their review, Opel et al discussed that there are three outcomes to be considered before removing non-medical exemptions – enforcement, vaccine confidence and policy precedent – to ensure the success of such policies in maintaining broad consensus supporting childhood vaccination. They argued that it is easier to enforce vaccination during an outbreak than when no imminent threat is perceived. A lack of decision-making control influences greater perception of risk from vaccines and requires greater confidence in HCW recommendations. A precedent for NME policy needs to be set in terms of other public health contexts to justify restricting liberty. They consider a deliberative and precautionary approach is required through a neutral forum.(92)

### *6.2.7 Conclusions – influence of childhood immunisation mandates on coverage*

The implementation of mandates is resource-intensive, with little gains in improvements in vaccination coverage. Parents who are adamantly opposed to vaccines will find ways to circumvent the penalties.

Some gain may be achieved in populations that are slow, but not reluctant to vaccinate. Positive short-lived gains in immunisation coverage have been reported through catch-up vaccinations of adolescents and for children with delayed vaccinations. However, financial penalties or preventing access to childcare and education can impose additional hardship on already disadvantaged populations.

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.

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