

Childhood Vaccination Mandates: Scope, Sanctions, Severity, Selectivity, and Salience

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Introduction

Political communities across the world are responding to parental refusal of routine childhood vaccines. This is a centrally important issue, since outbreaks of previously eliminated diseases recur where high vaccine coverage rates are not maintained. Societies need uniform high coverage rates of up to 95% to prevent outbreaks, and this uniformity is particularly difficult to maintain when vaccine refusers tend to cluster geographically.¹ Moreover, because some people cannot be vaccinated for medical reasons—and a separate cohort of (disadvantaged) children remain unvaccinated due to poor system reach²—governments can accept only very low levels of vaccine refusal if they are to maintain community protection. Recent outbreaks of measles in North America and Europe have made it more urgent for governments to reconsider how they engage with parental decision making about vaccination.³

Abundant scholarship has focused on vaccine hesitancy and refusal in high income countries, and we have ample evidence about the beliefs and attitudes of parents who hesitate or refuse to vaccinate. The research literature illuminates the processes of individual and communal reasoning which contribute to

vaccine rejection, and the societal forces that empower parents to dismiss expert advice.⁴⁻⁷ Governments would do well to draw on this research in their efforts to convince parents to vaccinate their children. However, when attempts to reason with parents are ineffective—or when such attempts are too costly or too risky—governments may have good reasons to embrace more forceful measures to promote vaccination, as many societies have already done. These are ‘vaccine mandates’ or ‘mandatory vaccination’.

‘Mandatory vaccination’ is commonly invoked but poorly defined. Recent scholarship illuminates the diverse policies to which this term is applied,³ and some scholars have used this term in ways that fail to distinguish significant differences between those diverse policies.^{8,9} We can clarify our thinking about vaccine mandates by imposing a taxonomy on both real-world and possible vaccine mandate policies and asking how, and upon whom, they operate. Recent research by us and others has engaged primarily in the identification and classification of existing vaccine mandate policies, which admit of significant diversity.^{3,10} Accordingly, there is already sufficient evidence to conclude that judgments about vaccine mandates—whether they will be effective, ethical, trust-eroding, etc.¹¹—cannot be well-informed (or, therefore, well-justified) if they do not respond to particular components of vaccine mandate policies. The current literature often glosses over these differences. It fails to adequately attend to diverse ways in which mandates can be ‘mandatory’, the different (magnitude of) negative consequences for noncompliance, and the scope of the targeted population. More systematic and methodologically rigorous approaches are needed for informed thinking about vaccination governance, in the light of both current policy diversity and the expanse of possible policies. In this article, we build upon previous empirical work to more broadly and systematically conceptualize mandatory childhood vaccination policies.

In what follows, we introduce three primary axes along which to conceive of differences between mandatory childhood vaccination policies. These are *scope* (which vaccines are mandated), *sanctions* and their *severity* (what happens when you don't vaccinate) and *selectivity* (the management of enforcement and exemptions). As we explore each of these policy components, we engage with the important question of whether and how so-called mandatory vaccination systems target the vaccination status of the cohorts that can be under vaccinated in a population: those who are under vaccinated due to *access* reasons (poor system reach) and those who have ready access to vaccines but may choose not to vaccinate on based on the belief that not receiving the vaccine is a better option.² We can further split this latter group into two sub-groups – those who are considering refusing vaccines but might be swayed by mandatory policies, and committed refusers – and we consider the capacity of the policy components to work on these sub-groups too.

Throughout our analysis, we also consider how specific policy components impact the timeliness of vaccination. In our penultimate section, we narrow our focus to consider how *scope*, *sanctions* and their *severity* and *selectivity* interact at the level of individual action, which is the specific problem for which policymakers are invoking and reorganizing contemporary mandatory regimes. From this perspective, the centrally important question is whether and to what degree a vaccine mandate motivates someone to vaccinate, if they were otherwise disposed not to have done so. We call this the *salience* of a vaccine mandate. Whether a particular vaccine mandate leads someone to vaccinate is only one of the questions of relevance to policymakers. Accordingly, we also briefly consider other considerations relevant to the 'success' of a vaccine mandate. These include financial and political expediency constraints, and larger policy goals. In our final section, we employ three case studies to demonstrate how our taxonomy

provides a framework for conducting empirical work that classifies and compares different vaccine mandate regimes (between societies and over time), considering their *salience* for the vaccine hesitant, vaccine refusers and the general population.

It may be helpful to note some limitations of this article. We do not focus on distinctions between the levels of state or sub-state government at which power can be exerted to incline people to vaccinate, nor do we address the different tools available to different levels of government. Also, we do not attend to the differences between the various means by which government may generate vaccine mandates, e.g. legislation, regulation, decrees, policies and practices.³ Furthermore, we focus on how mandates operate, rather than on their origins and bureaucratic formats. Additionally, this article is not *for* or *against* vaccine mandates, both because the fundamental thesis of this article is that vaccine mandates are not homogenous, and because assessments of particular vaccine mandate policies would require empirical information that is often not available. Accordingly, we suggest that this paper's framework can be employed to design policy research into the operation of mandatory vaccination policies, to include detailed document analysis and qualitative interviews with key informants who can answer detailed and specific questions about policies' operation and likely outcomes.

Scope: which vaccines?

Debates about mandatory childhood vaccination policies often seem to presume that governments either mandate or take a neutral stance towards all vaccines. In practice, though, governments make distinct and fine-grained decisions about whether or how to promote individual vaccines. First, a government must determine whether to *license* a particular vaccine, to allow it to be sold and administered within the jurisdiction.¹² Second, a government must decide which of the licensed vaccines it will *recommend*, which may include adding them to a technical schedule that identifies which vaccines should be

administered at which ages. Third, a government must determine how and whether to *fund* (or facilitate the funding of) of individual vaccines, to make them easy to access; this process usually follows elaborate vaccine-specific cost-benefit analyses.¹³ Finally, governments must decide whether to *mandate* individual vaccines, through one or more of the means we explore in the next section. Importantly, states do not recommend (for all people) all the vaccines that they license, they do not provide equal funding for all of the vaccines they license or recommend, and they do not mandate all of the vaccines that they license, fund, or recommend.

Let us consider the distinction between recommending and mandating vaccines. Italy's recent reforms made mandatory a set of vaccines against the following long list of diseases: polio, pertussis, diphtheria, tetanus, hepatitis B, hib, meningococcal B, meningococcal C, measles, rubella, mumps, and varicella.¹⁴

In contrast, other countries mandate fewer vaccines, such as Belgium, which requires only polio.⁸

Indeed, most states recommend far more vaccines than they require. For example, the USA's Advisory Committee on Immunization Practices (ACIP) currently recommends children receive (in addition to seasonal influenza vaccine) at least 32 doses of 12 vaccines that protect against 15 diseases (Centers for Disease Control and Prevention 2018), but no US state mandates all of these vaccines and doses.¹⁵

Australia mandates almost all its recommended vaccines but not Meningococcal B, which it does not even fund.¹⁶ France is an outlier; it has recently decided to mandate all of its recommended vaccines.¹⁷

Diverse considerations could inform a state's decision to mandate some, all or no vaccines. The health of the vaccinated child is one consideration, the prevention of unvaccinated children from infecting others is another, and the related maintenance of community protection is a third. High immunization rates also promote a set of social and political values including fairness, education, public trust, and

fiscal prudence (since vaccines prevent illnesses and outbreaks are costly for individuals and governments). On this basis, societal benefits for wide-scope mandatory vaccination could be even more broadly construed. However, mandates negatively impact parental liberty, and can contribute to political polarization and the erosion of political legitimacy. These features thus provide caution against mandates. Elsewhere, we lay out the various ethical considerations for policymakers when deciding to make one, some or all vaccines mandatory, and our arguments draw on relevant facts about individual diseases (e.g. threat, contagion) and the corresponding vaccines (whom it benefits and how) (Navin, M. and Attwell K. “Vaccine Mandates, Value Pluralism, and Policy Diversity,” manuscript under submission).

The relevant point for this current paper is that ethical considerations often do not appear to drive a country’s decisions about which vaccines to make mandatory. Instead, historical legacies and pragmatic considerations seem to exert a dominant influence¹⁰. With regard to historical legacies, it is common for vaccines that are made mandatory to remain mandatory, even if the society tends to only *recommend* additional vaccines in future years. For example, this trend toward inertial mandates seems prevalent in the histories of immunization policy in Italy and France.¹⁰ Pragmatic considerations seem even more consequential for immunization policy. For example, when France recently mandated all recommended vaccines, the decision was driven by questions about what to do when a required vaccine was available only in combination with a merely recommended vaccine.¹⁷ The divide between required and merely recommended vaccines created practical problems (as in the case of combination vaccines), but it also generated a troubling rhetorical implication: that ‘merely recommended’ vaccines were not important. However, if societies respond to this problem by mandating all recommended vaccines, such a policy may have the opposite of its intended effect: people may come to believe that all vaccines are only as valuable as the least valuable vaccine. Nevertheless, France chose this policy option after the

government investigated what would happen if they made all vaccines recommended (optional); studies showed coverage rates would drop amongst the most vulnerable.¹⁰ In this way, a value like health outcomes equity can play a significant role in determining which vaccines states mandate.

Sanctions and their Severity

Above, we explored how governments either construct or inherit frameworks that determine which vaccines are mandatory. A further consideration is *how* political societies will make vaccines mandatory. While some discussions of mandatory vaccination seem to take for granted that there is one means by which to ‘make people get vaccinated,’ a critical review of the possible sanctions that could govern vaccine acceptance reveals a diversity of possible interventions. Not all of these are currently operative in political communities, but all have historical precedents or contemporary advocates. In previous research, we developed a framework for analyzing vaccine mandates along a liberty-oriented spectrum, with complete voluntarism on one side and criminalization on the other.¹⁰ In this paper, we further complicate that framework, both by adding additional *types* of sanctions to the spectrum, and also by considering the role of the *magnitude* of each type of sanctions. As we will demonstrate, the most severe types of sanctions (e.g. criminalization) may not be so severe in application, if the magnitude of the consequence is low (e.g. a trivial fine). Accordingly, accurate assessments of the relative severity of different possible vaccine mandates will require attention to the interplay between particular types and magnitudes of possible sanctions.

Forcible vaccination

States have the capacity to compulsorily vaccinate children against their parents’ wishes and without their consent. This is the most extreme type of sanction because it forcibly brings about the desired result (the vaccination of the child) through a direct assault on the bodily integrity of the child, and

through an explicit violation of parental liberty. Forcible vaccination narrowly targets (potential) vaccine refusers, since parents willing to vaccinate their children will not have to be forced to do so. Whether one's society will even tolerate this kind of state intervention in family life will depend on their society's conception of the rights of parents, the rights or interests of children, and the relationship between the two. For example, the US protects an especially wide sphere for parental sovereignty; it is the only country not to ratify the UN's Convention on the Rights of the Child.¹⁸ Other countries often recognize that the state should play a bigger role in protecting children's rights and interests, but overriding parental authority rarely extends beyond cases in which children are at significant risk of serious harms, or one-off interventions regarding life-saving medical treatment.¹⁹ However, forcible vaccination is a live option for the state. We do not know conclusively of any cases where it is currently employed, but Mongolian law states that compulsory catch-up regimes can be imposed by relevant authorities.²⁰ What 'compulsory' means in this circumstance is unclear, which is further evidence that forensic policy analysis is required to understand the operation of any given jurisdiction's mandatory policy. However, some states and substate units have previously employed forcible vaccination during outbreaks, though in some cases this seems not to have been sanctioned by the relevant statutes. For example, public health officials in 1890s Brooklyn, NY, and in 1900s Boston, MA, sent teams of physicians and police officers on 'vaccination raids' of immigrant neighborhoods. Residents often attempted to flee or fight to protect themselves or their children from being vaccinated.^{21,22} Furthermore, the governments of many societies will order the vaccination of children in their custody or supervision (e.g. orphans or children in foster care), or of children whose parents are legally separated or divorced and who disagree about whether to vaccinate.^{23,24} However, in the latter case the vaccination is only 'forcible' from the perspective of the parent withholding consent (which is provided by the other parent).

Criminalizing non-vaccination

The next most severe sanction is for states to make it a crime not to vaccinate one's children. According to this kind of mandatory vaccination policy, those who do not vaccinate are rendered criminals, since they fail to perform an unescapable legal obligation. Criminalization divides the political community: people who vaccinate can be members in good standing, but people who do not vaccinate cannot.

Criminalization targets those who are unvaccinated for access or complacency reasons as well as those who refuse vaccines. However, in practice, the threat of a criminal sanction is most likely to motivate those who are unvaccinated because they lack easy access to vaccines, are complacent about vaccination, or are only mildly hesitant. It is likely that this kind of policy will make only committed vaccine refusers into criminals. This type of sanction seems less severe than forcible vaccination, since it does not directly violate the bodily integrity or parental liberty of vaccine refusers; it does not force vaccination. However, criminalization nonetheless has the potential to be an especially severe sanction.

The severity of criminalizing vaccine refusal depends on the magnitude of the criminal sanctions. While a \$10 one-time fine for noncompliance makes vaccine refusal a crime, sanctions of this magnitude likely serve a primarily symbolic function, and likely to influence only people who are mildly hesitant about vaccination or especially reluctant to violate legal rules. In contrast, a \$10,000 fine applied annually to all children who are not up to date would make vaccination necessary for all but the most committed (or wealthiest) vaccine refusers. Clearly, if criminal sanctions involved imprisonment, then criminalization would be a severe penalty, and even fines can result in imprisonment if they are not paid. However, if criminal sanctions for noncompliance consist only of minor one-time financial penalties, then criminalization can be relatively toothless. Such penalties can even transform vaccine refusal into purchasable commodity: pay the fine and you can be restored to good standing. In this way,

criminalization is qualitatively different from forcible vaccination. While the severity of criminalization varies dramatically depending on the magnitude of the criminal sanction, the severity of forcible vaccination does not vary much at all: either the state forcibly vaccinates someone or it does not.

According to a database assembled by the Sabin Vaccine Institute, several countries fine parents who are non-compliant with childhood vaccination requirements.²⁰ These include Belize, Bulgaria, Jamaica, Kosovo and Mongolia. The fines vary in magnitude and there is no indication whether the fines are repeated if parents continue to fail to comply. Fines are also part of the new Italian vaccine mandate regime¹⁰, but again forensic policy analysis will be required to determine whether these fines are applied more than once, regarding the same children, if their parents continue to refuse vaccines. Imprisonment for vaccination noncompliance seems uncommon, but the Sabin database states that Ugandan vaccine refusers can be jailed for six months.²⁰

There can be a strong expressive or symbolic connotation to the criminalization of certain behaviors^{25,26}, but they can lose their motivational force if the consequences are minor or easily avoidable. Even ‘minor’ criminal sanctions can either reinforce existing social norms or generate new ones over time, and may therefore be useful policy tools. Furthermore, merely expressive or symbolic criminal sanctions for vaccine refusal can have significant longer-term social consequences, e.g. for political polarization on contested policy issues, including immunization policy. For example, in 19th century England, refusers who objected to minor fines for noncompliance with vaccine mandates sometimes had their property seized and auctioned. This practice led to mass riots and, eventually, to the development of conscientious objector protections from vaccination laws.²⁷

Denial of access to public spaces

A further sanction that vaccine mandate policies can impose is to exclude the unvaccinated from institutions or spaces to which they would otherwise have access. As well as explicitly protecting the public by keeping the unvaccinated away from those to whom they might transmit disease, this type of exclusion can performatively express an effort to protect public goods, and to ensure fair contributions to their upkeep. The concept of a public good refers to a shared resource that all members of a particular community can access without necessarily contributing to its upkeep. Economists and political scientists use this concept to inform our thinking about how to mitigate against cases in which the self-interested acts of a set of individuals can create an outcome that no one wants. The current state of affairs with regard to global CO₂ emissions is a case in point.²⁸ Indeed, the bad consequences of free-riding on public goods is a canonical instance of ‘market failure’ for which state intervention can be justified.

Many scholars regard the community protection that results from mass vaccination to be a public good.^{29,30} Community protection is a valuable resource available to all who need it, whether they are a newborn baby, a person for whom vaccines are not effective, someone who can’t be vaccinated, or someone permanently or temporarily immune-compromised. (We favor ‘community protection’³¹ over the more familiar but inaccurate ‘herd immunity’: High immunization rates allow a *community* of persons (not a *herd* of animals) to be *protected*, but the community does not become *immune* in any literal sense.) Community protection is also available to those who do not vaccinate, but live in places where almost all other people do. Since those in this latter category are free-riding on the public good, and actually diminishing it by doing so, they may be committing an offence against solidarity. This is not a criminal offence against state laws, as per the criminal sanction described above. Rather, vaccine

refusers have objected to full participation in the community's common life. Of course, the state could choose to sanction people who free-ride on community protection through fines or imprisonment. But excluding vaccine refusers from spaces in which the community 'does things together'—like publically-funded schools or daycare—is a way to recognize that a vaccine refuser has already placed themselves outside of the community. The most well-known example of this kind of sanction are school-entry requirements present in all US states. Most of them have exemptions, which we deal with in the next section, but the public solidarity logic still underlies this type of sanction. Guyana, Moldova and Jamaica are among the other countries to also employ this type of 'public solidarity' sanction.²⁰

As noted above, the forms of exclusion that 'public solidarity' sanctions impose may also be justified by public health considerations specific to the spaces from which they are excluded. For example, the clustering of children at daycare and school makes these likely locations for outbreaks, and the operators of these institutions (whether state, not-for-profit or private) have a duty of care to those attending them. Therefore, this kind of sanction may be no more liberty-restricting than other neutrally-justified restrictions on who may enter various social spaces. For example, children must commonly be potty-trained before being admitted to school.

Sanctions that respond to the complementarity between public solidarity, public space, and public protection target those who are unvaccinated due to disadvantage or complacency by motivating them to get their children's vaccines up to date in order to access the good. This leaves only parents who do not wish to vaccinate on the wrong side of the sanction, and therefore excluded from participation in some aspects of public life.

Financial levers

Vaccine mandate sanctions can also include financial levers. Of course, fines (discussed above) are a financial lever, but they are instances of criminalization. Here, we focus on ways in which the state (or non-state actors) can withhold payments to the unvaccinated as a means of excluding them from social goods to which they would otherwise be entitled.

One kind of financial sanction involves the suspension of incentive payments that are delivered to parents who agree to vaccinate their children. This model was in place in Australia between 1998 and 2012, through a “Maternity Immunisation Allowance” paid through the Federal Government’s social security system. It was not means-tested.³² Some developing countries have also employed this approach, awarding incentives at the actual moment of vaccination. For example, people in Nicaragua and India who agreed to be vaccinated have been able to receive small cash payments, but people who refuse vaccines have not received those payments.^{33,34} Although one might question whether such policies or approaches should be categorized as sanctions, we classify them as such in this paper, because we wish to be comprehensive about the levers that states can employ, and because denying access to incentives can function as a sanction (i.e. a loss, burden or punishment), especially for people who are socio-economically disadvantaged.³⁵ Incentive payments function on those under-vaccinated for access reasons by prompting them to get vaccinated in order to access an entitlement. Those who do not wish to accept the vaccine potentially fall foul of the sanction.

Governments need not always use specially-designed payments as financial incentives. Instead, they can incorporate vaccination requirements into the conditional receipt of other financial benefits. ‘Public

solidarity’ reasoning, as outlined above, also tells in favor of this type of sanction. Public monies comprise a resource to be spent for the benefit of the nation, as determined by the ideological commitments and pragmatic reasoning of the government. Public funding of community goods is ‘something we do together’. Governments can attach vaccination requirements to various kinds of financial entitlements, such that the unvaccinated are denied financial support to which they may otherwise be entitled. Some might argue that this is an incentive, rather than a sanction, but we classify it as the latter, because this is a case of the state treating the unvaccinated differently—and negatively—thus imposing punitive consequences in the hope of driving uptake. The policy logic is the same as the case, above, of specially designated payments. Those who might otherwise remain unvaccinated due to poor system reach, complacency or minor hesitancy will vaccinate their children in order to access the entitlement. Only refusers will be left on the wrong side of the sanction. The Australian Government took this particular approach between 2012 and 2015, abolishing the Maternity Immunisation Allowance and instead linking an annual means-tested Family Tax Benefit Supplement to the child’s vaccination status.³⁶ This payment operates as a form of middle class welfare, targeting everyone below a certain income threshold. Following some other significant adjustments to vaccination policy (outlined below), current Australian policy now aligns children’s vaccination status to means-tested entitlements paid fortnightly. The Australian Government also makes cash payments in the form of childcare subsidies conditional upon children being fully vaccinated.³⁷

We will revisit Australia’s vaccination policies in the next section when we describe enforcement and exemptions. However, for now we note that the bundling of vaccination status and financial entitlement can have different effects on potential vaccine refusers depending upon background social practices. The linkage (and potential removal) of an existing entitlement may trigger a loss aversion heuristic that

would be more powerful than the desire to attain a new, purpose-built incentive^{38,39}. We also note that while ‘public money reasoning’ applies to this kind of sanction, this kind of sanction could also be justified in terms of the financial costs to the state that result from non-vaccination, such as contact tracing and healthcare treatments in the event of outbreaks of disease.

Legal responsibility for harms caused by non-vaccination

The final type of sanction conceives of vaccination noncompliance as a possible instance of criminal or tortious negligence.^{40,41} In this scenario, vaccination is not itself a legal obligation, but is rather a legally recognized duty of care. So, the unvaccinated remain members in good standing of the political community, subject neither to criminal punishment nor to denial of access to public goods. However, if other people are harmed because of a person’s failure to fulfill their duty to vaccinate, then they may be subject to criminal or civil liability. Rather than using *ex ante* compulsion, the threat of criminal or civil liability holds the unvaccinated responsible for the harms they cause. This kind of vaccine mandate is *prima facie* less restrictive of liberty than are vaccine mandates that criminalize vaccine refusal, notwithstanding the scale of criminal sanctions (as discussed above and below). It also has different expressive/symbolic content, since it places vaccine refusal alongside other everyday activities—driving a car, operating a business—that are permitted by society, but for whose negative consequences one can be held responsible.

While legal scholars have debated the viability of this model^{40,41}, we do not know of any countries that have sought to impose it. It is possible that one day an individual will be able to trace the source of their or their child’s infection to an unvaccinated person. They may then seek to recover their damages

through a lawsuit, or the state may decide to pursue a parallel criminal investigation and indictment. In some political communities these kinds of lawsuits and prosecutions may be able to succeed even in the absence of new legislation—since common law may already provide sufficient precedents—but the state can also take various measures to facilitate these kinds of liability ascriptions. These include creating laws that alter the existing burden of proof, or delineating appropriate amounts for compensation. The state and / or courts may also need to clarify the scope of a duty to care in the context of vaccination decisions. For example, persons who cannot be vaccinated for medical reasons cannot have a duty to vaccinate, so they should not be subject to criminal or civil liability for infecting others, if they otherwise took reasonable means to protect themselves from becoming vectors of disease. States would also have to determine whether and how increased criminal or civil liability for infecting others should differ between persons who are unvaccinated for various reasons, e.g. limited access, complacency, vaccine refusal.

Further considerations for all sanction instruments.

In Table 1, below, we summarize and elaborate on the many kinds of sanctions policymakers may impose on parents who do not vaccinate. There are two additional key considerations that apply to all the sanction instruments we explore above, which allow us to further differentiate between them. The first consideration relates to the *timeliness* of the sanction and its relationship to the timeliness of vaccination. The second consideration relates to which *categories of person* the sanction does – and does not – aim to impact.

Governments have an interest not just in children being vaccinated, but in them being vaccinated ‘on time’, e.g. according to the age milestones recommended by technical committees. Particular sanction instruments may be more or less effective in achieving timeliness. Forcible vaccination, criminalization and financial incentives can apply to the parents of even very young children, whereas exclusions from institutions of public solidarity (daycare or school) will apply at later ages, and will therefore be less timely for young children.⁹ Legal obligations to avoid infecting others can operate as a threat at any age, but parents may also be less worried about infants spreading disease than toddlers or schoolchildren. For all of these reasons, the choice of sanction instrument may affect the *timeliness* of vaccination.

The categories of person touched by a sanction is potentially an even more important consideration. Forcible vaccination, criminalization and legal obligations to avoid infecting others could theoretically apply to all parents, but the latter two sanctions would have a differential impact for families with different amounts of financial assets. Exclusions from institutions of public solidarity will only affect those who would intend to use them; on this basis there is a distinction between schools (which are generally compulsory, apart from home-schooling) and daycare, which is only used by some families. Moreover, families that do not use daycare may do so for a variety of reasons, including financial resources (able to live on a single income, or hire a nanny), social capital (family members or friends providing care), and lifestyle commitments (the choice to have a stay-at-home parent).^{42,43} A parent’s economic class and social group identities will therefore have significant impact on whether particular kinds of sanctions will impact their immunization behaviors.

The differential operation of these kinds of exclusion can also play out with financial levers, depending on how they are designed. Non-means-tested special incentive payments theoretically treat everybody

equally; in practice they have differential impact depending on the household's relative wealth and the difference the incentive would make to the family's financial well-being. Meanwhile, conditional entitlement to other forms of means-tested welfare based on vaccination status involves governments making an explicit decision: they are not going to concern themselves with the vaccination status of children whose parents earn too much money to be eligible for, or reliant upon, state payments. In this way, an entire social class goes 'ungoverned' because of the choice of sanction. It seems clear that any sanction that involves money—coming in or going out— will have less impact on the wealthy. For this reason, we have heard suggestions that Australia, where cash and entitlement-based mandates have a disproportionate impact on those in lower income brackets, should impose a taxation surcharge on high income earners whose children are not vaccinated. Such a system, currently in operation for high income earners who do not take out private health insurance, would put a lever in place to govern the vaccination behavior of this economically privileged cohort.

Selectivity: enforcement and exemption

The previous section explored the design of mandatory vaccination policies regarding the choice of sanction. Another important component of mandatory vaccination policies is their method of enforcement and exemption.

One option is for policymakers to adopt a rule-based form of selective enforcement that identifies general and objective conditions for excusing people from the sanctions otherwise associated with vaccine refusal. Another option is to grant officials tasked with enforcing vaccine mandates the discretion to determine whether some noncompliant persons should be exempt from sanctions. In this

second kind of selective enforcement, agents of the state are empowered to weigh the benefits and costs of sanctions in individual cases. A third category of selective enforcement includes mandatory policies which appear to have been designed to make it easy for parents to avoid the consequences of mandates, or which outsource enforcement decisions to third parties who are neither motivated nor required to enact them. Mandates in this third category—which we call ‘mirage mandates’—appear to have been designed not to be mandates at all, but this is usually not made explicit.

Exemptions based on legal rules excuse some people who meet particular conditions from vaccine mandate policies’ sanctions. Individuals who live in societies whose vaccine mandate policies include rule-based exemption procedures can know in advance whether they will qualify for an exemption, since the criteria for receiving an exemption are objective and general, and they are publically announced. The most common example of this kind of exemption is for people for whom vaccination is medically contra-indicated; these are ‘medical exemptions’. It is also common to offer exemptions to people who object to vaccination for reasons of religious conviction or personal belief. These are ‘nonmedical exemptions’ (NMEs).

In theory, determinations about medical and nonmedical exemptions could both be made based on whether people requesting exemptions meet the relevant objective criteria. This is common in the case of medical exemptions, which are often subjected to scrutiny. For example, political communities that allow medical exemptions usually require physicians or other health care professionals to attest that immunization is contraindicated. These communities often police the physicians and other health care professionals who make such attestations, and they sometimes punish fraud, or encourage the relevant professional societies to do so.⁴⁴

In contrast, people who request nonmedical exemptions are often not directly interrogated about their putative reasons for refusing vaccines. This is for many reasons, including the epistemic difficulties involved in assessing the sincerity of a person's claims, the financial costs involved in conducting such an assessment, and the violations of personal information privacy and religious liberty that such an intervention might entail.^{45,46,47,48} Therefore, in practice, nonmedical exemption policies usually limit the distribution of exemptions not according to whether people provide the right kinds of *reasons*, but whether they are willing to withstand the required bureaucratic *procedures*. For example, parents in Germany who seek nonmedical exemptions must demonstrate that they have received medical counselling. Australia also employed this exemption model until 2016. The process is similar for parents in some US states, who must complete an education program in order to access exemptions, while parents in other US states need only to submit an official state form on which they attest to their objection.⁴⁹

Exemptions application processes that rely on the burdensomeness of exemptions application procedures to limit the number of exemptions do not directly enforce vaccination. Instead, such policies function as nudges, since they alter the choice architecture in ways that parents can avoid with minimal effort.⁵⁰ This does not mean that the burdensome aspects of an exemption program are valuable *only* because they deter people from applying for exemption, since education requirements may change some parents' minds about immunization. Consider that Michigan's nonmedical exemption rate declined by 35% between 2014 and 2015. While most of that decline is likely due to fewer people applying for exemptions, some people who applied for nonmedical exemptions subsequently allowed their children to receive vaccines they refused at the beginning of education sessions. For example, in one of

Michigan's largest counties, 16.4% of children whose parents attended an education session received (within eighteen months) at least one vaccine that their parents had previously rejected (although many of these parents were following alternative schedules and may have decided to vaccinate even in the absence of education sessions).⁵¹ However, even when an education session does not lead to increased immunization compliance, it can contribute to a parent's informed refusal of childhood vaccines, which is an important moral good.^{11,52}

Vaccine mandates with permissive nonmedical exemptions criteria encourage uptake amongst the complacent or socially disadvantaged. These kinds of mandates are 'low stakes' because the categories of people who they incline to vaccinate are not firmly committed to refusing vaccines, unlike 'high stakes' vaccine mandates, which involve direct conflict with committed vaccine refusers. Thus, while mandatory systems with permissive non-medical exemptions criteria still address the behavior of vaccine refusers, by imposing administrative burdens, they do not sanction the decision to refuse itself. We will consider the implications of this kind of selectivity in the final section.

States can decide not to identify in advance the classes of exempt individuals, as described above, but can instead construct formal mechanisms by which representatives of the state can decide whether and when to grant exemptions. When Australia abolished financial entitlements to refusers ('Conscientious Objectors'), the new law designated that the Secretary of the Department of Human Services could determine whether individuals can be regarded as meeting immunization requirements even though they are not vaccinated.³⁶ Limited criteria apply, but the determination is made by an individual from the state.

States can also adopt informal mechanisms that allow state officials to make decisions about whether and when sanctions will apply. This informal selective enforcement operates in cases where state officials are aware that individuals are not complying, or are likely not complying, with requirements, but choose not to investigate or to impose penalties or sanctions. This was the status quo in France and Italy until their recent policy changes.¹⁰

Finally, states can construct mandatory policies whose sanctions are effectively non-enforceable. These ‘mirage mandates’ may appear to include sanctions, but close examination reveals a policy that has been designed so that they barely apply or are easily avoidable. For example, a potential ‘mirage mandate’ exists in the Australian state of Queensland. Like many Australian states, Queensland has a ‘No Jab, No Play’ policy, which ostensibly prevents access of the under-vaccinated to childcare facilities. (State-based ‘No Jab, No Play’ policies complement the Federal ‘No Jab, No Pay’ policy, which withdraws financial entitlements from the under-vaccinated.) The Queensland policy seems to require parents to vaccinate their children or have their children excluded from childcare, but the law actually only *enables* childcare providers to exclude these children. However, childcare providers may have a compelling financial interest not to exclude children from their businesses. Accordingly, Queensland’s form of proxy enforcement of its sanctions for vaccination noncompliance likely makes its policy a ‘mirage mandate.’

How should we make sense of different enforcement and exemption options and the diverse effects that they can have on the operation of mandatory policies? (See Table 2 for a summary). Mandates that can be avoided through exemptions, selective enforcement or indeed their prior construction as ‘mirage mandates’ could be defended on the grounds that they protect conscience, and that they provide a ‘relief

valve' for citizens who would otherwise 'make trouble' for the government, particularly in ways that could put broader vaccination coverage at risk. When the state excuses from legal obligations a small group of people who would otherwise passionately resist, that can make legal obligations more stable and popular, or at least less likely to be the target of mobilized political movements. Whether such exemptions or selective enforcement is ultimately justified depends on background political and epidemiological conditions.

A well-run exemptions program may have ancillary benefits beyond the incentive it provides for lukewarm vaccine refusers to become vaccinated, e.g. mandating the receipt of education about immunization, protecting the principle of informed consent to vaccination and vaccine refusal.⁵³ For example, when Australia abolished conscientious objections to vaccination, Leask and Danchin noted that the previous requirement that parents sign conscientious objection forms provided a (now lost) opportunity for medical professionals to discuss parents' vaccination decisions.¹¹ Also, this form had allowed the government to collect data about who was (and was not) vaccinated, and the reasons why people refused vaccines. Such data could help governments address vaccine coverage using alternative, non-mandatory strategies. 'Mirage mandates' cannot deliver these kinds of benefits, since they generally allow refusers to avoid consequences of all kinds, both sanctions and the bureaucratic burdens of exemptions applications policies.

Selective enforcement, exemptions and even mirage mandates will be easier to justify when they excuse few enough vaccine refusers from sanctions that vaccination rates remain high. However, if too many people have reasons (or claim to have reasons) to reject vaccines, then exemption systems may inhibit the successful operation of vaccination policies in achieving community protection. Having tight

enforcement and limited exemptions will squeeze parents, some of whom will object vociferously and / or find alternative ways to avoid vaccinating their children. For example, recent research describes how Australian medical exemptions doubled following the abolition of conscientious objections, such that the eligibility for them was subsequently tightened.³ A similar result ensued in California after its elimination of NMEs.¹⁰

Vaccine mandates are in the news presently because of specific changes to enforcement and exemption rather than because entirely new mandatory policies have been developed. California and Australia removed formal selective enforcement (exemption) processes from the mandatory systems already in place. France and Italy went from lax enforcement to revised regimes of requirements and consequences.¹⁰ Selectivity —exemption and enforcement— is a key component of vaccine mandates, because it has such a strong influence on compliance, regardless of the kind of sanction that is chosen. We continue discussion of this theme, below.

For now, we conclude this section with an additional consideration that cuts across all types of selectivity: the population(s) targeted by selective enforcement policies. We identify three normatively and pragmatically distinct categories of persons who could be targeted:

- 1) the under-vaccinated, due to complacency or poor system reach;
 - 2) persons pre-disposed to refuse some or all vaccines who could be convinced to vaccinate by mandates; and
 - 3) the committed vaccine refusers, who will not vaccinate even if threatened with significant sanctions.
- A vaccine mandate policy's form of enforcement selectivity determines, in part, which groups the policy will incline towards vaccinating. For example, mandates with generous exemption regimes (however

constructed) will predominantly affect the vaccination behaviors of those in group 1. Mandates with more restrictive exemption regimes may also nudge members of group 2 towards vaccination—by increasing the costs of vaccine refusal—but these regimes will avoid direct political conflict with the members of group 3. Mandates with limited selectivity—whose sanctions are very difficult for vaccine refusers to escape—will have the best potential to govern the vaccination behaviors of all three groups. But, as we note below, the success of a mandate with such limited selectivity will depend, also, on the other components of that policy, including its scope, and the type and magnitude of its sanctions.

Saliency: putting scope, sanctions, severity and selectivity to work

Policymakers who are considering implementing or revising vaccine mandates usually do so with the goal of increasing vaccination coverage among those who would otherwise refuse vaccines (although some jurisdictions have also experimented with permitting greater freedom of choice, even at a cost to vaccination coverage).⁵⁴ Therefore, from the point of view of recent and ongoing debates about vaccine mandates, a centrally important question is the degree to which a particular mandatory vaccination policy impacts vaccination coverage compared to other possible (mandatory or non-mandatory) policies. We want to know whether one policy is more likely than another policy to ‘make’ people get vaccinated. This is a question about (what we call) the *saliency* of a vaccine mandate.

In the previous three sections, this paper focused on differences in the form and substance of vaccine mandates along three axes: *scope*, *sanctions & severity*, and *selectivity*. This section identifies how viewing these three aspects of vaccine mandates in tandem can help answer questions about whether vaccine mandates accomplish one of their most important goals: getting people to vaccinate. Therefore, *saliency* is not an additional free-standing axis of analysis, since we learn about a vaccine mandate’s

salience only by reflecting on *other* features of a mandate policy. Furthermore, our treatment of *salience* does not identify a definitive aggregation that collapses all policy features to a single scale. Rather, the purpose of our *salience* analysis is to inform comparative judgments between past, present or proposed versions of a single jurisdiction's mandatory vaccination policy ("Australia's recent policy shifts have made its vaccination mandates more *salient* than they used to be") or between two jurisdictions ("California's mandates are more *salient* than Washington's). A more complete assessment of the salience of particular vaccine mandates will require attention to historical, bureaucratic, political and cultural factors that are beyond the scope of this kind of theoretical article.

A mandatory vaccination policy's scope, sanctions, and selectivity will each influence a vaccine mandate's salience to an individual making a decision about vaccinating their child. We must consider these components in tandem and interactively. For example, from the point of view of a mandate policy's *scope*, a policy that requires only one vaccine may be more likely to generate compliance than a policy that requires eleven vaccines. Also, from the point of view of a policy's *sanctions*, excluding children from school or daycare is more likely to generate compliance than a policy that imposes a trivial one-time fine. But what about the difference between a policy that requires one vaccine and excludes the non-compliant from school, versus a policy that requires eleven vaccines but imposes only a trivial one-time fine? While we suspect that the former policy will generate greater compliance, we need context-specific information—and better empirical evidence—before confident predictions are possible.

Questions about *selectivity* are central to determinations of *salience*. In particular, rule-based non-medical exemptions regimes can often be so permissive as to make irrelevant—from the point of view of

salience—policy differences of all other kinds. For example, it almost certainly makes little difference to vaccination behavior whether sanctions include imprisonment, fines, exclusion from public goods, or the withdrawal of benefits, if there exists a permissive rule-based exemptions program. In such cases, the sanctions need not apply to anyone at all, and parents can know as much in advance. Those who wish to refuse vaccines will apply for exemptions, while parents who are content to receive vaccines will comply. If such a policy motivates anyone at all, it inclines towards vaccination only those parents whose children may have otherwise remained under-vaccinated due to reasons of imperfect access, complacency, or mild hesitancy. In contrast, *scope* questions will remain relevant even when permissive rule-based exemptions policies exist, since it matters which vaccines a mandate policy inclines mildly hesitant parents to accept.

A related salience question involves balancing the burdensomeness of sanctions with the burdensomeness of being exempted from sanctions. As we just mentioned, sanctions provide little incentive to vaccinate, regardless of their magnitude, when rule-based exemptions are easy to acquire, or when it is widely known that state administrative or legal officials are permissive in granting exemptions. In contrast, when rule-based exemptions are very burdensome to access, or when the decisions of state officials are uncertain, then the resulting mandate would be more salient, prompting people to vaccinate, rather than routinely request exemptions.^{45,55}

This section has so far focused on how vaccine mandates can succeed at inclining individuals to vaccinate. But there are two further ways in which attending to the goals of vaccine mandates can inform research and deliberations about vaccine mandates. First, there are other policy levers that can influence people to vaccinate. Inasmuch as salience focuses our attention on the *goals* of immunization

policy, it can direct us to consider alternative or complementary policies that can assist in pursuing those goals, e.g. finely-calibrated communications campaigns and addressing access barriers. Options and choices in these alternative modes of governance— scope, sanctions and their severity, and selectivity— might then inform decisions about the salience of vaccine mandates. For example, if a government employed a communications campaign as a complement to its vaccine mandate, it might be able to scale down the severity of the sanction (and hence the salience) of the mandate, while maintaining high immunization rates, if the communications campaign can increase vaccine uptake.

Second, the central goal of vaccine mandates— influencing individuals to vaccinate— is usually only an intermediate goal, i.e. a goal that is in service to more important ends. When we focus attention on salience, we invite reflection about the further purposes served by getting more people vaccinated, e.g. to minimize loss of life in our community, to globally eradicate a particular disease, to cultivate social norms surrounding immunization, to promote solidarity about public health. And these reflections can inform decisions about how to structure vaccine mandates. For example, if a particular vaccine mandate aims ultimately at saving lives, then that may be a reason to limit its *scope* towards only those diseases for which there is an epidemiological risk of outbreak. Or, for another example, if policymakers want to focus ultimately on cultivating social norms in support of vaccination, then they might want to prioritize *sanctions* that have public and performative aspects, e.g. the ‘public’ nature of exclusion from schools, or the use of merely symbolic criminal or civil penalties. Such considerations can and should ultimately inform the salience level of specific vaccine mandate policies.

Regardless of the particular goals governments pursue with vaccine mandates, economic realities may place significant practical or moral restrictions on the *salience* of such policies. First, governments

making decisions about the constituent elements of vaccine mandates need to consider how the burdens of sanctions or exemptions processes will be distributed among the population. For example, financial sanctions will be more burdensome for the poor. Exclusion from daycare or school exclusion is likely to have a similar class-based impact, but its differential impact will directly distinguish between parents who can and cannot care for or teach their children at home. Additional equity issues arise when considering the salience of various kinds of selectivity. If accessing a nonmedical exemption requires attending an education session or completing an online module, then people with less free time, or who lack internet access, will face a disproportionate burden. Again, this is a burden likely to be borne disproportionately by the economically and socially disadvantaged. Thus decisions about the ultimate design of a vaccine mandate should be informed by the question: “For *whom* will this mandate be salient, and who else gets to dodge its consequences?”

Funding considerations may also place limits on the constituent features and hence *salience* of a society’s vaccine mandates, since all of the features we have discussed can place financial burdens on the state: from reporting procedures, to exemptions processes, to methods of enforcement. For example, it may be much more expensive for a state to provide mandatory one-on-one immunization education, as a condition of applying for a nonmedical exemption, than not to allow NMEs at all. Conversely, when vaccine mandates exclude more children from publicly funded schools, or when they withhold childcare payments to parents, these policies can save the state substantial sums, at least in the short term.⁵⁶

Finally, it may be unethical, illegal, or otherwise destructive for societies to implement the most *salient* kinds of vaccine mandates, even if these are the most efficient means for promoting immunization. In particular, societies should first try to make it easier for people to choose vaccination for themselves, in

light of the ethical imperative to treat coercion as a last resort in public health. Unfortunately, some societies have chosen not to prioritize access-promoting efforts, but have resorted instead to mandates as a ‘quick fix.’^{3,10} We therefore join previous researchers who have argued that vaccine mandates, particularly those that are more *salient*, are likely to be unjustified in contexts in which vaccines are not available, access to vaccines is not publically funded or otherwise free, or when vaccines are difficult for populations to access, e.g. due to time or travel.³ Moreover, governments with mandatory schemes that do not also have no fault compensation schemes for those injured in the course of routine vaccinations are also reneging on their end of the bargain in the ‘things we do together.’¹¹

Conclusion

Mandatory vaccination is not a unitary concept. Instead, vaccine mandates are distinguished by their use of different sanctions to influence diverse populations. These policies focus on a different number of vaccines and they involve various mechanisms of enforcement and exemption. The conceptual framework we have outlined in this paper can illustrate the wide variety of real-world and potential vaccine mandates. This framework can also be helpful for a set of additional reasons: First, it helps us to understand the ‘salience’ of a particular mandatory vaccination policy, since a mandate policy’s impact on the target population’s vaccination behavior is centrally important in policy debates. Second, it helps us to consider how particular policy levers work, and where they fall short. For example, school access mandates reach a broad population, but do not directly target on-time infant and toddler vaccination. Additional childcare access mandates only partly address this because not all families utilize out-of-home care. Third, the framework helps us to consider the ways in which diverse mandatory vaccination policies have different impact on people who are under-vaccinated for access reasons versus people who are more or less hesitant about vaccination. Ideally, all of these considerations should inform debates

about vaccine mandates. Finally, as we noted in our introduction, it will not be sufficient to draw conclusions about any mandatory policy's operation based merely on an analysis of the text of a statute or policy document. Instead, we need to pursue empirical work and, in particular, qualitative research aimed at context-specific populations of citizens and policymakers. The framework we introduce in this paper can structure and guide such research.

Table 1: Vaccination Sanction Instruments

SANCTION	ELABORATION	GRADATION	EXAMPLE	POLICY LOGIC	TIMELINESS	TOUCHES *	KEY RISKS	ADVANTAGES
Forcible vaccinat ^o .	State forcibly vaccinates child.	No – binary policy	Unknown	State seizes child responsibility.	Can govern.	Everybody.	Trauma, overreach, public trust.	Protects children (only in cases of serious risk).
Criminalisation.	Fines, imprisonment for parents.	Variable severity of fines / sentence.	France, Kosovo	Vaccination is a legal requirement.	Can govern.	Everybody.	Commodify punishment.	Creates social norm.
Exclusion from public spaces.	No access to school, childcare, for unvax ^e d.	Could apply to few or many institutions; be age limited	School entry requirements (eg California).	Contribute to public solidarity in order to access products of public solidarity.	May not govern pre-school timeliness.	Only those who use institution.	Disadvantage for children excluded.	Upholds reciprocity. Limits spread of disease.
Financial levers (purpose built or conditional)	No vax, no financial entitlement.	Could apply to large or small amounts of money.	Australia pre-2016.	As above. Also extracts potential costs of disease to state.	Can govern	Depends on means-testing.	Disadvantage for children denied.	Solidarity, as above.
Legal responsibility for harms.	State makes it easier to sue parents whose children spread disease.	Yes – variable policy settings	Unknown.	You are responsible for harms you cause.	May depend on unvaccinated child's perceived ability to infect others.	Everybody; greater burden on poor.	Currently no causality provable.	Creates social norm; reduces state's fiscal responsibility for care of victims.

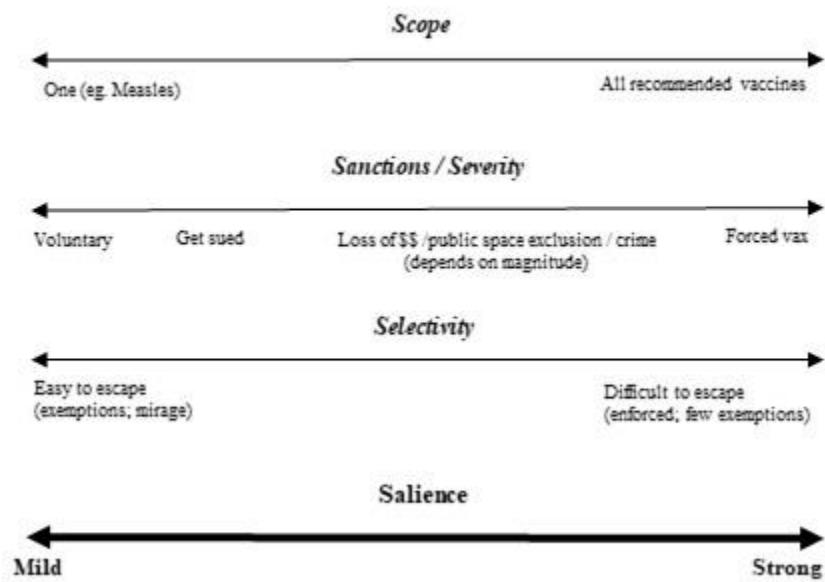
*subject to exemption categories and burdensomeness

Table 2: Vaccination Selectivity (enforcement and exemption)

MODE	ELABORATION	EXAMPLE	POLICY LOGIC
Broad and clear exemption regimes.	You can get out of vaccinating if you follow set procedures.	Michigan (US): exemption after attending education session.	Govern the complacent, don't squeeze refusers.
Engineered selectivity (individuals approve cases)	Limited decisions to allow exemptions are enacted by senior functionaries.	Australia: Federal Departmental Secretary grants limited exemptions.	Some (minimal) flexibility to be responsive case-by-case.
Informal non-enforcement.	Non-compliance with stated laws or policies not investigated / punished.	Italian children not excluded from school 1999-2017	Avoid publicity of removing mandate (may damage uptake)
Mirage mandates	Policy design facilitates non-compliance.	Queensland (Australia): childcare providers decide whether to exclude non-vaxed.	Appear to be taking tough action while facilitating non-compliance.

Figure 1: Determining the salience of mandatory vaccination systems

Figure 1: Determining the salience of mandatory vaccination systems



CASE STUDY: AUSTRALIA

Background: Since 1998, Australia has used financial incentives under federal legislation to prompt parents to keep their children up to date with vaccinations. These were specific periodic payments until 2012, when receipt of other annual payments to eligible families – as well as childcare subsidies – became conditional upon children being up to date with their vaccinations. Since 2018 vaccination status has further been linked to fortnightly payments and repackaged childcare subsidies, both of which are means tested. Eligible parents can receive federal payments for their children until they turn 20 years of age.

Scope: Australia recommends a number of infant and childhood vaccines but not all are listed on the National Immunisation Plan. Only the latter are included in the mandatory vaccination scheme. The twelve vaccines included are Diphtheria, Tetanus, Pertussis, Polio, Measles, Mumps, Rubella, Hepatitis B, Varicella, HIB, Meningococcal ACWY and Pneumococcal.

Sanction and severity: Australia uses financial levers. Parents whose children are not vaccinated and who would otherwise be eligible for Family Tax Benefit A (fortnightly payment) and Child Care Subsidy have payments cut, at a possible annual penalty of up to \$15,000.

Selectivity: In 2016 the Australian Government removed Conscientious Objection, which had enabled Australian families to opt out of vaccination after lodging a form signed by a medical professional who had counselled them. This way the family could still receive financial assistance. Since 2016 only specified and tightly controlled medical exemptions are available for those seeking to receive vaccination-linked payments.

Further considerations: Because Family Tax Benefit A (the fortnightly payment) applies from birth, eligible families are incentivised to vaccinate on time from the very beginning. While Australia's federal payments function as middle-class welfare and hence apply to a large proportion of the population, they do not touch high income earners. Approximately a third of Australian families with dependent children receive Family Tax Benefit. Childcare Subsidy is available to parents on higher incomes (but still means-tested). However, Childcare Subsidy does not prompt parents to vaccinate until their children start attending childcare. Both these mandatory options would appear *salient* to parents to whom they apply, with considerable financial losses for non-compliance (until the child is an adult) and very limited capacity for exemptions. However, the policy reflects a strategic government decision to leave ungoverned the vaccine behaviour of higher income earners. This is only partly addressed by a Federal Government request to the States to introduce policies excluding unvaccinated children from childcare centres, which are their domain. Three States have introduced variants of such a policy.

CASE STUDY: ITALY

Background: Some vaccinations in Italy have been classed as mandatory since their introduction last century (diphtheria, polio, tetanus and hepatitis B), but other vaccines were merely recommended. Italy's historical mandatory system invoked both fines and school exclusion for those who declined the mandatory vaccines, but these were rarely enforced, particularly school exclusion since 1999. Italy's vaccine policy changed in 2016 with a Ministerial Decree classifying an additional six vaccines as mandatory and an alteration to sanctions.

Scope: Italy's mandatory vaccines are Diphtheria, Tetanus, Pertussis, Polio, Measles, Mumps, Rubella, HIB, Hepatitis B, and Varicella.

Sanction and severity: Italy's reworked mandatory system employs two different kinds of sanction. It denies access to public spaces by preventing unvaccinated children from enrolling in daycare and preschool. (While Italy's reworked mandatory system uses enrolment in schools to appraise students' vaccination status, no exclusions apply to those who are not vaccinated.) However, parents of pre-school and school-age children can be fined for not vaccinating their children; fines are set nationally at €100-500.

Selectivity: Italy only permits medical exemptions to vaccine mandates in instances in which a child has a recognised contraindication. There are no other types of exemption available.

Further considerations: Our ongoing empirical research investigates the exact implementation of fines for non-vaccination, including how pro-actively these are applied in early childhood outside of the prompts of school enrolment data collection. This will determine whether the mandates govern timeliness of uptake. Italy's decentralised health system, with different regional data recording practices and no national register, is another complexity.

CASE STUDY: MICHIGAN (USA)

Background: Michigan's Public Health Code (Act 368 of 1978) requires children to be vaccinated prior to enrolling in school or childcare, but it allows for medical and nonmedical exemptions (NMEs). The responsibility for identifying the required vaccines and the method for applying for exemptions is delegated to a committee of the state legislature: the Joint Committee on Administrative Rules (JCAR). Beginning in 2015 JCAR determined that parents or guardians who wished to apply for NMEs had to (1) complete an official state form attesting to the reasons for their refusal, and (2) attend an immunization education session at a local health department.

Scope: For enrolment in Kindergarten, Michigan requires vaccines against nine diseases: Diphtheria, Tetanus, Pertussis, Polio, Measles, Mumps, Rubella, Hepatitis B, and Varicella.

Sanction and Severity: Michigan uses denial of access to public spaces. Children who have not received the required vaccines will not be admitted to childcare, Kindergarten, 7th grade, or upon their transfer into a new school district. If immunization levels in another grade become too low, as determined by the local health department, then the local school board can also require immunization for admission to that grade.

Selectivity: Applications for medical exemptions require a signed statement from a physician (DO, MD) and may be scrutinized by local health departments. Applicants for nonmedical exemptions must complete an official state form attesting to the reasons for their refusal, and attend an immunization education session at a local health department.

Further Considerations: Because the sanctions involved apply only at enrolment in childcare or school, they do not target children at very early ages, especially in families that do not make use of childcare. The school entry requirements apply to both public and private schools, but private schools may have a financial incentive to keep as many students enrolled as possible, and they therefore may be more willing to 'provisionally' admit students who are neither vaccinated nor in possession of an exemption. Private schools may also be more likely to encourage families to acquire exemptions than to become vaccinated, since they are more directly accountable to the preferences of the families they serve. Public health advocates in the state have expressed their desire to eliminate nonmedical exemptions entirely, following the lead of California, but this is not currently politically feasible, since the party that controls the state legislature is committed to preserving nonmedical exemptions.

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