



**IMPROVING VACCINATION COMPLIANCE AND COMBATING ANTI-  
VACCINATION SENTIMENT IN THE UNITED STATES**

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ABSTRACT

In recent years, the United States has seen the rise of controversy surrounding the right to refuse vaccinations. An increase in vaccination refusal presents a number of challenges in the field of public health and public policy. The goal of this policy proposal is to analyze various strategies to improve rates of childhood vaccination in the United States. While the United States population, as a whole, is affected by this issue, certain demographic groups may be disproportionately impacted by ineffective vaccination policy. A combination of approaches will likely be necessary to increase vaccination rates throughout the country. Strategies such as incentivization, education campaigns, and improved accessibility will be examined in the context of health theory, specifically the Health Belief Model.

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## INTRODUCTION

Many health behaviors become problematic when seen at a large scale. For example, due to vaccination refusal, the United States has seen a reemergence of several vaccine-preventable infectious diseases, such as measles and pertussis, that had previously been contained or eliminated (Phadke et al., 2016). A poignant example of large-scale effects of vaccine refusal is the measles virus. In 1978, the Centers for Disease Control and Prevention declared its goal to stop all measles outbreaks in the United States (CDC, 2018). With the development and widespread use of the MMR vaccine, providing protection against measles, mumps, and rubella, the CDC was successful in eliminating the measles virus from the United States in 2000 (CDC, 2018). The celebration, however, was short lived. Rumors of a link between vaccines and the development of autism began to circulate, and doubt of the effectiveness and safety of vaccines grew (White, 2014, p. 270). Measles had been eliminated, so many perceived it as a vaccine that was safe to skip.

The return of the virus was slow, but in 2014, the number of measles cases spiked, with the largest outbreak resulting in 383 people infected, mostly “among unvaccinated Amish communities in Ohio” (CDC, April 2019). It is likely that the increase in cases was due to a gradual increase in vaccination refusal. This explanation also applies to the 42 measles cases in the 2015 Disneyland outbreak, as the California Department of Public Health reported that at least 28 of the people infected had not been vaccinated (Berman, 2015). While rates of vaccination against measles appear to be remaining steady in the last decade or so, studies have shown that those who refuse vaccines are often located in geographic clusters (Lieu et al., 2015, p. 280), which creates potential for more intense outbreaks in these locations.

The increasing number of vaccine-preventable infectious disease outbreaks, like the measles, indicates that the current United States vaccination policy needs to be reevaluated. With

a rise in anti-vaccination sentiment and increasing incidence of vaccine-preventable infectious diseases comes a sense of urgency to find solutions.

### **Population of Interest**

Although a decrease in the rates of childhood vaccination will impact the United States as a whole, there are several populations of interest for this proposal. Vaccination rates vary due to a number of factors. Social determinants of health, such as parental education and socioeconomic status, can impact the rates of vaccination, as well as demographics like race and ethnicity. Due to the variety of factors at play, it is unlikely that a singular strategy will be entirely effective; a combination of approaches is predicted to be more successful.

Education and income are important social determinants of health that “correlate most strongly with life expectancy and most health status measures” (McGill, 2016). This suggests that education and income impact health behaviors, including childhood vaccination. Understanding the effects of education and income on vaccination rates may allow for more comprehensive and effective policy.

A study exploring parental attitudes about childhood vaccinations in Canada indicated that negative knowledge, attitudes, and beliefs about vaccination have been “found among parents with post-secondary (non-university graduate) education levels and (mostly) lower-to-upper middle-class incomes” (Carpiano et al., 2019, p. 286). This study also determined that education level is a significant predictor of vaccination rates, with “lower education (i.e., less than a university degree) being associated with higher odds of not receiving the minimum age-specific dosage” (Carpiano et al., 2019, p. 286). This suggests that focusing on income as a factor in improving vaccination rates may not be the most effective strategy. Although this research was not completed in the United States, it is likely that similar trends exist. Canada’s

vaccination policy is similar to that of the United States, with requirements of vaccination before starting school and opportunities for exemptions (Walkinshaw, 2011a, p. 1165). Vaccination refusal is not isolated to individuals of a lower socioeconomic status; it is a widespread issue that will require strategic solutions and policy. This research suggests changing beliefs about vaccinations may be more complex than providing financial incentives. For this proposal, the population of interest will be individuals with lower levels of education, rather than lower income.

Other crucial factors to consider when developing effective vaccination policy is race and ethnicity. These factors may highlight systemic disparities that require more than a one-size-fits-all policy. One study analyzing racial and ethnic disparities in preschool immunizations in the United States found several notable differences in the vaccination rates among different populations. This study concluded that the “gap between White and Black children widened by an average of 1.1% each year, and the gap between White and Hispanic children widened by an average of 0.5% each year” (Chu et al., 2004, p. 974). This difference between racial and ethnic groups indicates a systemic issue that may require several solutions to improve vaccination rates. For example, studies have shown that African Americans are less likely than White Americans to participate in medical research trials, donate blood, receive vaccinations, or seek medical intervention (Bates & Harris, 2004). This difference indicates a need for large-scale changes that may not be possible via changes to vaccination policy. It is important, however, to be aware of these trends when developing policy in order to effectively target the different needs of different populations.

## BACKGROUND

### **History of Controversy**

In the late 1990's and early 2000's, reports emerged in the United States that claimed a causal link between childhood vaccinations and the development of autism (White, 2014, p. 270). Soon after, counterclaims were released, arguing the falsehood of the link between vaccines and autism. The Institute of Medicine Immunization Safety Review Committee released one such report in 2004. The committee reviewed "more than 200 epidemiological and biological studies" in order to determine whether or not a causal relationship exists (White, 2014, p. 270). The report stated that "in the absence of experimental or human evidence that vaccination (either the MMR vaccine or the preservative thimerosal) affects... mechanisms that are causally related to the development of autism, the committee concludes that the hypotheses generated to date are theoretical only" (Institutes of Medicine, 2004b, p. 16). This report attempted to quell parents' fears about vaccinating their young children, as well as explaining the importance of widespread vaccinations in eradicating diseases. Additionally, evidence surfaced to discredit "the work of Dr. Mark Geier, author of the only published work purporting to establish a causal connection between vaccines and autism," revealing faulty research practices (Moreno, 2006, p. 414). Despite many health organizations and researchers rejecting the theory that vaccines lead to autism, many Americans remained unconvinced.

Despite other researchers rejecting the causal relationship, Geier's reports and interpretations of further publications sparked controversy in the United States. Some argued that the media spurred on this process by "publishing erroneous evidence, indulging in celebrity testimony, and balancing credible science with fear-based anecdotes" (White, 2014, p. 270). With a large amount of conflicting information available, especially as the use of the internet became more widespread, the legitimacy of both pro-vaccination and anti-vaccination claims has often been questioned.

## **Promoting Behavioral Changes**

In order to increase rates of vaccination in the United States, a variety of factors should be considered. The Health Belief Model, developed by scientists with the United States Public Health Service, outlines reasons that individuals engage in health behaviors—such as opting out of public health programs designed to prevent or detect disease (Glanz & Rimer, 2005, p. 13). The six main constructs of this model are useful in better understanding why individuals may choose not to vaccinate their children. These constructs are perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy (Glanz & Rimer, 2005, p. 13). All six are relevant in developing effective public health policy, but this analysis will focus primarily on the perceived susceptibility, severity, benefits, and barriers. The application of these constructs may allow for better understanding of vaccination refusal behaviors, and policy development to improve vaccination rates.

### ***Perceived Susceptibility***

Perceived susceptibility is described by the Health Belief Model as the “beliefs about the chances of getting a condition” (Glanz & Rimer, 2005, p. 14). Due to the success of vaccinations in the United States, it is likely that many individuals opting to delay or refuse vaccinations for their children perceive the risk of infection to be low. A study in the *New England Journal of Medicine* estimated that vaccination programs are responsible for the prevention of over 100 million cases of infectious disease in the United States since 1924, including diphtheria, measles, polio, and pertussis (Panhuis et al., 2013). The development of an effective vaccine is especially linked with the drastic decline in the incidence rates of diphtheria and measles (Panhuis et al., 2013). While this indicates the importance and efficacy of vaccinations, it also suggests that the risk of several infectious diseases is significantly lower than in previous decades. Studies have

indicated that the perceived susceptibility of infectious disease is directly associated with parental intent to vaccinate (He et al., 2015, p. 336). The success of vaccination programs has resulted in a low incidence rate for many infectious diseases, which in turn creates the perception that these diseases are uncommon and relatively low risk (Panhuis et al., 2013). Education campaigns may be an effective strategy in combating this perception and changing behavior.

### ***Perceived Severity***

Perceived severity is defined by the Health Belief Model as “beliefs about the seriousness of a condition and its consequences” (Glanz & Rimer, 2005, p. 14). In terms of vaccinations, this construct describes an individual’s beliefs about an infectious disease and its symptoms. Elimination of polio was achieved in the United States in 1979 via widespread use of both the inactivated Salk vaccine and the Sabin live oral vaccine (Panhuis et al., 2013). Prior to the vaccine, polio caused paralysis in over 35,000 Americans each year in the late 1940’s (CDC, Oct 2019). Low perceived severity of polio may result from several factors. The decades between the outbreaks in the 1940’s and the present, as well as the generation of Americans growing up in a nation without polio, make public memory of the symptoms faint. Dismissal of an infectious disease is more likely when symptoms are unknown or perceived as less severe than when the public regularly sees the disease.

### ***Perceived Benefits***

The Health Belief Model suggests that individuals will be prepared to act if they believe that a behavior will be effective in reducing the risk or severity of a health condition (Glanz & Rimer, 2005, p. 14). In the case of vaccination policy, there are several aspects of this construct to consider. The perceived benefits of vaccination can be examined in terms of large-scale,

societal benefit and small-scale, personal benefit. Research has shown the effectiveness of vaccination programs in drastically reducing the incidence rates of previously widespread pathogens (Panhuis et al., 2013). As such, the societal benefits are fairly visible, preventing Americans from numerous infectious diseases that once had high incidence rates. Unfortunately, the personal benefit may appear minimal in comparison. The goal and benefit of successful vaccinations is the absence of disease, or the prevention and mitigation of negative outcomes. While this benefit may be incredibly important in terms of public health and disease prevention, it may be overshadowed by the perceived barriers or risks.

### ***Perceived Barriers***

The Health Belief Model describes perceived barriers as “beliefs about the material and psychological costs of taking action” (Glanz & Rimer, 2005, p. 14). In the vaccination issue, this construct includes aspects such as concern about the side effects of vaccines, distrust in the healthcare system, and belief in anecdotal evidence. The history of research indicating a causal relationship between vaccines and autism makes this construct incredibly important. Despite research indicating the safety of vaccinations, many Americans are concerned about various adverse side effects. Research by psychologists Kahneman and Tversky has indicated that people typically have more extreme responses to possible negative outcomes than possible positive outcomes when faced with uncertainty (Bond & Nolan, 2011). This suggests that when parents decide whether or not to vaccinate their children, the potential side effects or perceived barriers/risks are weighted more heavily than the potential benefits, namely prevention of disease. As mentioned, the perceived personal benefits may be difficult to visualize because they are the absence of negative outcomes rather than the presence of positive outcomes.

Another aspect of this construct to consider when developing vaccination policy is distrust in the health care system by various groups in the United States. For example, studies have indicated that approximately one third of African Americans have experienced discrimination in a health care setting, and one in five African Americans avoids medical care due to concerns of discrimination (Stein, 2017). One study indicated that “Hispanics either reported consistently higher mean levels of distrust [in the health care system] relative to Whites, or a mixed relationship [depending on socioeconomic status]” (Armstrong et al., 2007, p. 1288). It is presumptive to suggest that minorities will always have greater distrust in the health care system than white individuals. When developing vaccination policy, however, it is important to be aware that it may be the case for some individuals. This distrust acts as a barrier to positive health behaviors like vaccination and must be addressed to create effective and equitable policy.

## CURRENT POLICY

With the rise in prevalence of vaccine-preventable infectious disease outbreaks, like the measles virus, comes a sense of urgency to develop new solutions. Current United States vaccination policy may no longer be sufficient in preventing infectious disease, but creating effective policy requires an understanding of current strategies and the strengths and weaknesses of these policies.

The United States largely employs one strategy to encourage childhood vaccination coverage: compulsory vaccinations prior to enrollment in day care facilities or elementary schools, as is seen in all 50 states (Digitale, 2017). Despite this policy, parents can seek exemptions for their children in a variety of circumstances. Every state allows for medical exemptions, all but three states allow for religious exemptions, and 18 states allow for personal belief exemptions (Digitale, 2017). These exemptions, while allowing for more personal choice

for parents on behalf of their children, create a problem for public health. Estimates of childhood vaccination exemptions show that 1% to 3% of children are unvaccinated due to the exemptions, with some communities seeing up to 20% of children exempt and unvaccinated (Ventola, 2016, p. 431). With more parents seeking exemptions for their children comes an increase in the risk of infectious diseases. Studies have even indicated that the ease at which parents can seek and receive exemptions for their children is linked with disease prevalence rates for the vaccine-preventable illnesses (Walkinshaw, 2011b, p. 1167). Following the large Disneyland outbreak of measles in 2015, where a significant number of those affected were unvaccinated (Berman, 2015), California decided to remove the option of religious and personal-belief exemptions from its vaccination policy (Digitale, 2017), in an attempt to prevent future outbreaks.

In addition to the problems seen with vaccination exemptions, the requirements to vaccinate before starting school are not applicable to all children, with parents of homeschooled children able to refuse vaccines, often with very little pushback due to the lack of proof of vaccination required for homeschooling (Khalili & Caplan, 2007, p. 471). Many children can fall through the cracks when it comes to mandating childhood vaccinations, making it difficult to assess the effectiveness of vaccine policy in the United States.

Beyond specific vaccination requirements, it is important to consider the cost of vaccinations and programs developed to cover this cost. The vaccines recommended by the Advisory Committee on Immunization Practices have been estimated to have a public-sector cost for “one person as recommended through adulthood (not including annual influenza vaccines) is roughly \$1,450 for males and \$1,800 for females” (Kim, 2011, p. 1761). This cost illustrates one instance in which meeting public health recommendations may be out of reach for many populations in the United States. The cost of vaccines has risen drastically in recent decades, especially with the development of newer, more effective vaccines (Institute of Medicine, 2004a,

p. 32). The rates of compliance for several vaccinations are the same across socioeconomic groups due to coverage by the Vaccines for Children program (Ventola, 2016, p. 433). This federal program provides coverage to “children who are Medicaid-eligible, uninsured or underinsured, or American Indians or Alaska natives up to the age of 18,” (Kim, 2011, p. 1760) to mitigate discrepancies in coverage for disadvantaged communities. The Vaccines for Children program has, “in the cases of older vaccines ([DTaP] and MMR), [established] federal price caps” (Institute of Medicine, 2004a, p.23) as well, contributing to greater accessibility of vaccinations. Almost 50% of American children are eligible for coverage by this program, and the Affordable Care Act has worked to alleviate the financial burden of vaccination costs (Kim, 2011, p. 1760).

Unfortunately, programs to address the cost of vaccinations have not been entirely effective in reducing disparities in coverage and compliance. It has been suggested that socioeconomic status explains the low vaccination rate for several vaccines, not covered by the Vaccines for Children program, among Black children when compared to white children (Ventola, 2016, p. 433). Discrepancies in coverage among different populations indicates the need for a more comprehensive and equitable policy. The complexity of this issue means that the implementation of a combination of approaches may be required. Developing an effective policy calls for the analysis of the potential impacts of strategies, both individually and in conjunction with one another.

## ALTERNATIVE POLICY STRATEGIES

### **Mandates**

One strategy to improve vaccination rates that has been implemented successfully in many countries is mandatory vaccination. In Bulgaria, Croatia, France, Italy, and several other

European countries, vaccinations against nine infectious disease are mandatory (Bozzola et al., 2018, p. 3). In many other European countries, these vaccinations are recommended instead (Bozzola et al., 2018, p. 3). The heated nature of the vaccination issue in the United States makes mandatory compliance a delicate subject. It can be difficult to enforce mandatory health behaviors while maintaining personal freedoms. Many Americans argue that policies should allow for personal choice (Maddox et al., 2019, p. 1670), which creates problems for a public health issue like infectious disease prevention. Preventing infectious disease is based largely on the concept of herd immunity, which specifies that having a sufficient portion of the population vaccinated against the disease can protect those who are not vaccinated by substantially reducing the transmission rate (Anderson & May, 1985, p. 323). For individuals with medical exemptions, this is a crucial concept. Improving compliance rates via mandatory vaccination creates herd immunity, but potentially sacrifices personal freedoms. This debate makes mandatory vaccination policy a precarious solution, but there may be ways to implement parts of mandatory policies, as seen in other nations.

Additionally, it is important to utilize mandatory policies with care, as research has shown that the perception of coercion is associated with reduced perception of the effectiveness of mandatory health treatments (Swartz et al., 2004, p. 783). As such, it is crucial to educate the public on the benefits or necessity of the treatment, rather than just mandate that everyone comply.

Mandatory vaccination policies have been shown to be successful in certain cases. In Slovenia, children are immunized against nine diseases, with exemptions only available for medical reasons and noncompliance resulting in a fine (Walkinshaw, 2011b, p. 1168). Compliance rates are over 95%, and any individuals suffering from vaccination injuries are compensated (Walkinshaw, 2011b, p. 1168). Although this policy leaves less room for personal

choice than many national vaccination policies, the high compliance rates allow for nationwide disease prevention that may not be possible in the United States with current policies.

A possible alternative to a rigid, mandatory vaccination policy is one with specific protocols for exemptions, as is utilized by several countries worldwide. The childhood vaccination schedule and several other immunizations are mandatory in Latvia (Perevoščikovs, 2015), but if an individual seeks an exemption, a healthcare provider must explain the possible consequences of refusal and the patient must sign a written refusal (Walkinshaw, 2011b, p. 1168). The requirement to discuss with a healthcare provider may offer a disincentive for parents to opt out of vaccination, as this offers a chance for education and discussion about the vaccine-preventable illnesses. This policy is similar to a proposed law in Arkansas to provide parents seeking nonmedical exemptions with counseling to discuss the risks (Omer et al., 2009, p. 1986). While mandatory vaccinations may not be effective in the United States, based on the desire for personal choice, requiring discussion and written understanding of risk may improve compliance rates. These protocols may allow for a healthcare provider to better highlight the perceived severity, susceptibility, and benefits.

Mandatory vaccination policies can be successful in discouraging noncompliance with vaccine recommendations; in other words, these policies increase the perceived benefits of vaccination by making opting out of vaccinations less attractive. Although highlighting benefits of a health behavior is a recommended strategy in the Health Belief Model for promoting action (Glanz & Rimer, 2005, p. 13), it is important to consider the potential unintended consequences of mandatory policies. For example, mandatory smallpox vaccinations in the United States that disproportionately impacted poor Americans saw the formation of the Anti-Vaccination Society of America in 1879 (Schwartz, 2012). This organized opposition to a health behavior like vaccination can have long-term impacts and potentially decrease vaccination rates further. As

such, an alternative strategy to mandatory vaccinations to increase perceived benefits is likely to be more effective in the United States.

### **Incentivization**

Many public health policies, such as automobile safety with seatbelts and smoking prevention, focus on the mitigation of negative health behaviors with legal or financial consequences. Rather than taking a punitive approach to discourage vaccination refusal, however, an incentives-based approach may be more effective in encouraging parents to comply with recommended vaccinations for their children. Incentivization is a strategy that is primarily focused on highlighting the existing perceived benefits of vaccination and creating new benefits. It has been shown that financial incentives are an effective strategy, compared to minimal intervention, for encouraging health-promoting behaviors, such as vaccination and disease-screening (Giles et al., 2014, p. 13). As such, it is likely that this approach would be successful in the United States vaccination policy if implemented effectively and strategically.

One example of the success of vaccination incentives is Australia. Rather than mandate vaccinations, Australia has devised a system of rewards for families that comply with vaccinations recommended by the Australian Childhood Immunization Register (National Centre for Immunisation Research and Surveillance [NCIRS], 2018, p. 3). The “No Jab, No Pay” policy requires parents to follow guidelines in order to “receive the Child Care Benefit, the Child Care Rebate, and the Family Tax Benefit Part A supplement” (NCIRS, 2018, p. 5). These programs are “parent incentive payments that are paid where a child is up-to-date with his/her immunisations or the parent has obtained an appropriate medical or philosophical exemption” (Walkinshaw, 2011b, p. 1167). Under “No Jab, No Pay” families will receive reductions from the payment for each child that has not been vaccinated (NCIRS, 2018, p. 6). Additionally, while

children are not required to be vaccinated before attending school, given possible exemptions, in the event of an outbreak, those that refuse vaccines will not be allowed at school (Walkinshaw, 2011b, p. 1167). This can have serious implications for working parents when children are forced to stay home, creating a disincentive to refuse vaccinations. This policy of incentivization has shown to be effective in Australia's immunization coverage of over 91 percent of one, two, and five-year old children (Australian Government Department of Health, 2020). It is likely that a similar approach of incentivization could improve compliance rates in the United States.

Research indicates the potential for positive public health outcomes with the right incentives. For example, an analysis of influenza vaccination behavior using game theory indicated that incentives are particularly effective on young individuals, despite the limited personal gain by this population as compared to more elderly participants (Chapman et al., 2012, p. 1014). The researchers noted that young participants were more inclined to vaccinate when a financial incentive reflected the average point total of the group, rather than individual point totals (Chapman et al., 2012, p. 1012). This suggests that incentivization is effective as a tool to highlight the perceived benefits of a health behavior, as mentioned in the Health Belief Model. The trend of young participants opting towards vaccinating for the benefit of the group, rather than the benefit of the individual, is promising when developing new policies, as large-scale changes will require support from younger and future generations to be sustainable.

Based on the success of an incentivization policy in Australia, as well as the study indicating the success of group-oriented incentives for younger participants, a combination of approaches is likely to be most effective. Baseline incentives, based on those in Australia, can be utilized to improve vaccination compliance rates in the United States, as a whole. Citywide, statewide, and nationwide compliance rates can be tracked and rewarded with additional payments for parents meeting specified requirements, as supported by Chapman et al (2012).

These incentives would likely improve compliance by highlighting the perceived benefits of vaccination. The Health Belief Model notes that when individuals feel that the perceived benefits outweigh potential costs, they will be ready to act (Glanz & Rimer, 2005, p. 13), indicating the likelihood of improving compliance rates.

### **Accessibility and Administration**

There are several logistical issues to consider when it comes to improving childhood vaccination compliance. The scheduling and administration of vaccines has raised concerns for many parents, so policy changes may be necessary to improve vaccination rates. Accessibility may also be a factor in the low rates of vaccination in the United States, with accessibility being impacted by issues such as cost (e.g., insurance, co-pays), availability of healthcare providers (e.g., limited numbers of primary care providers in remote/rural areas), scheduling (e.g., the ability to schedule an appointment at the recommended age/time) and transportation (e.g., limited ability to travel to a clinic), among other barriers to accessibility.

One approach to minimizing these barriers might be to reduce the number of vaccine time-points by administering multiple vaccines on the same day, thus requiring fewer visits overall to a healthcare provider. According to the American Academy of Pediatrics, a common question and concern raised by parents is whether the number of recommended vaccinations overwhelms a child's immune system (AAP, 2018). Especially for an infant, multiple vaccines may seem like a risk to an immature immune system. One survey of parents with infants noted that the majority of parents "preferred their children to receive no more than two immunizations in one visit" (Ventola, 2016, p. 432). Despite the widespread concern, research has shown that delaying the receipt of vaccines does not have a statistically significant benefit over on-time receipt (Smith & Woods, 2010). Furthermore, on-time receipt of vaccines was shown not to have

adverse effects on the infant's neurological development, even 7 to 10 years later (Smith & Woods, 2010). Due to the research supporting the current vaccination scheduling, changes shouldn't be made to the schedule, but rather to the communication of the research supporting the schedule. Prior to an appointment with a health care provider to receive vaccinations, it could be beneficial for parents to have the opportunity and be encouraged to explore research on the safety of the current schedule. One research database that might be encouraged is that created by the American Academy of Pediatrics, which provides journal articles, as well as summaries, regarding the safety of various aspects of vaccination (AAP, 2018).

Although the concern about vaccination scheduling may convince some parents to opt out of vaccinating their children, changing the schedule to limit the number of vaccinations at each appointment may do more harm than good for the United States vaccination rates. Disadvantaged groups may be unable to attend more appointments to spread out the vaccinations, potentially decreasing compliance rates further; therefore, some flexibility may be needed to allow for a trade-off between following a rigid schedule, versus combining vaccine visits, where needed, to ensure that all are completed. Limited transportation options and conflicts with parental work hours may make vaccination difficult to access for some families (Ventola, 2016, p. 433). Additionally, vaccination rates for children below the poverty line is lower for the vaccines that require multiple doses (Ventola, 2016, p. 433), indicating that a policy requiring more appointments for vaccinations may exacerbate disparities in vaccination completion. Rather, combinations of vaccinations might be more effective, streamlining the process and improving rates (Ventola, 2016). More research may be required to determine the most effective and safe combinations of vaccines.

Another important consideration when it comes to decreasing the perceived barriers of vaccination to promote action pertains to the financial cost of vaccines. This burden falls most

heavily on individuals of lower socioeconomic status, specifically those without health insurance. Unfortunately, families recently struggling with unemployment and lack of health insurance may be unaware that they qualify for Medicaid (Ventola, 2016, p. 433), meaning that some families may fall through the cracks in vaccination access. Because rates of health care un-insurance or under-insurance are greater among Hispanic and African American adults than non-Hispanic whites (Sohn, 2016), this is likely a key cause of the aforementioned differences in vaccination coverage across different racial and ethnic groups. One strategy to improve access and overall vaccination rates is making vaccine coverage independent from health insurance status. Education about the options available for Medicaid coverage may also be effective, particularly for recently unemployed individuals who have lost other forms of healthcare insurance. Various other solutions have been proposed to improve accessibility to vaccinations. One such strategy is allowing patients to receive vaccinations at walk-in appointments or on a same-day basis (Ventola, 2016, p. 435). This approach does, however, seem to necessitate consideration for the financial cost incurred by families; a combination of approaches that minimize multiple barriers (i.e., financial, logistical, transportation, scheduling) would likely be most effective in improving access in an equitable manner.

## **Research**

In addressing low rates of compliance for childhood vaccinations, it is important to explore the nuances of vaccination refusal. The Health Belief Model offers several explanations for an individual's readiness to act, one of which is perceived barriers, or the costs of acting (Glanz & Rimer, 2005, p. 14). The perceived barriers, whether minor side effects or serious complications, can make it difficult to encourage people to comply with vaccination recommendations and develop effective policies.

Convincing Americans to follow vaccination recommendations, simply because public health and governmental organizations say so, may prove difficult due fairly widespread distrust in governmental health organizations. The Tuskegee Study is a prime example of the difficulty to build trust with individuals when it comes to medical advice, “as some of those who know that [the Tuskegee Study of Untreated Syphilis] was about syphilis believe that the government deliberately infected the participants” (Bates & Harris, 2004, 1053). In addition to broader philosophical or political beliefs about the role and scope of government, as well as the beliefs that personal freedoms have greater importance than various prosocial behaviors, many are reluctant to follow vaccine recommendations due to an overly close relationship between vaccine manufacturers and the CDC. Various anti-vaccine groups, such as the Children’s Health Defense warn parents not to vaccinate their children due to conflicts of interest in the vaccine industry (Children’s Health Defense, 2020). When it comes to advising the public on vaccine safety, CDC has often sought the opinions of medical experts, without disclosing their conflicts of interest (Harris, 2009). And while there have been efforts to separate federal public health agencies from those working in the industry, and those serving to financially gain from the industry, such perceptions about conflicts of interest can certainly increase suspicion and decrease trust in government agencies. This suggests that some separation from the United States government may be necessary to improve vaccination compliance rates. This may be the case particularly for individuals who have experienced systemic racism and unethical treatment in a health care setting, such as people of color or those in economically disadvantaged communities. It is, unfortunately, a fairly common fear that “that the medical community really will harm people of African descent on purpose—just for profit or just to help someone from another race” (Stein, 2017). The distrust in the government makes it extremely difficult to convince the public to follow medical recommendations. With childhood vaccinations, this issue is perhaps even more

elevated because many parents likely will not take the risk of trusting the government if their child could be the one who suffers. To address these concerns, this policy proposal recommends that safety research be completed by an independent research lab or organization, unaffiliated with the U.S. government. Creating distance between the government, while being upfront and transparent about research, might aid in efforts to convince parents to follow public health recommendations and vaccinate their children.

It may not be possible to ease all fears of the perceived barriers to childhood vaccination, but more extensive safety research could alleviate some parents' concerns. Vaccine licensing is overseen by the U.S. Food and Drug Administration, with safety research being evaluated and manufacturing being continuously monitored for each approved vaccine (FDA, 2011). Despite the guidelines for clinical trial phases and safety monitoring (FDA, 2011), it can be argued that this process is not objective enough. Legislation protects vaccine manufacturers in the United States from lawsuits, meaning that parents cannot sue if their child reacts poorly to a vaccine (DeLong, 2012). While this provides protection for manufacturers to continue production of vaccines, which are an important public health tool, it can also be argued that it isolates and disincentivizes safety protocols (DeLong, 2012). Creating serious consequences for failed inspections from the United States government might allow for more transparency regarding vaccine production and trust with the public.

### **Education Campaign**

As mentioned, the Health Belief Model notes that perceived susceptibility and perceived severity are two key factors in whether an individual will act; if an individual perceives the disease as severe and possible to be contracted, they will be more likely to vaccinate (Glanz & Rimer, 2005, p. 14). The success of vaccinations worldwide has allowed many people to live

without many infectious diseases that severely impacted previous generations. In Scotland, researchers found that teenagers have “limited knowledge and experience of the [vaccine-preventable] diseases, excluding chickenpox” in terms of prevalence and severity (Hilton et al., 2013). The low incidence rates due to widespread vaccination was a key factor in limited knowledge among the study participants (Hilton et al., 2013). The success of vaccination programs that has led to this low incidence is a successful outcome, but a consequence is that it creates a public perception that the diseases are uncommon and individuals have a low risk of contracting them (Panhuis et al., 2013). This has serious implications for the vaccination rates in the United States, as studies have shown that parental intent to vaccinate is directly associated with how susceptible to an infectious disease an individual perceives their children to be (He et al., 2015, p. 336). By informing the public of the severity of the vaccine-preventable diseases, as well as an individual’s susceptibility if they opt out of vaccinations, an education campaign could improve vaccination rates in the United States.

Creating an education campaign promoting vaccinations is difficult without venturing into the realm of fearmongering. Although causing panic and fear is not the goal of a public health promotion campaign, fear has been utilized as a motivator for various successful campaigns. For example, research has shown that anti-smoking campaigns using fear tactics are effective in motivating individuals with “low readiness to quit” when paired with messages to promote self-efficacy (Wong & Cappella, 2009). This same strategy might be adopted for a vaccination promotion campaign. Due to the low public perception of the severity of vaccine-preventable diseases, education about the symptoms might sway public opinion. Information regarding the rates of infection in unvaccinated communities may also be effective to change perceived susceptibility. Research has shown that vaccination refusal and underimmunization occur in geographic clusters (Lieu et al., 2015), creating greater risk of outbreaks if exposed to

the vaccine-preventable infectious disease. Given the pockets of outbreaks seen in the United States like the Disneyland measles outbreak (Berman, 2015), education about susceptibility could have significant impact on vaccination rates.

Studies have shown that using fear in an education campaign must be strategic; the level of fear aroused should be alleviated by the action being promoted (Soames Job, 1988). Thus, the presentation of vaccine-preventable symptoms will need to be tested with focus groups in order to establish an effective campaign. Additionally, such campaigns must include information about the impact of vaccines in reducing or preventing symptoms, information about geographic trends in susceptibility, and a clear path to action, such as resources for accessing vaccinations.

#### EVALUATION OF SUCCESS

While the success of vaccination policy could be measured by the rates of vaccination or the rates of vaccine-preventable infectious disease, this policy will evaluate outcomes on several levels. At a macro level, vaccination rates nationwide are a key metric for monitoring the success of the proposed changes to current vaccination policy. In addition, monitoring by local health departments would allow for a more granular picture of the impact of this proposed policy within specific states or cities/regions.

As mentioned, one challenge in implementing effective vaccine policy, as well as similar medical recommendations, is building trust with the public. Relying on the public's blind trust in governmental health recommendations is not realistic for achieving the goals of policy implementation—that is, to change people's health behaviors. Involving those impacted by the policy changes, namely parents of young children, through surveys or interviews by healthcare providers may be more effective in helping to shape policy strategies that are ethical, equitable, and effective. This proposed policy would be accompanied by a requirement to assess public

opinion through patient feedback. Any new concerns voiced by patients could be addressed and future policy adapted, if need be.

## POLICY RECOMMENDATION

With the increase in vaccine refusal and reemergence of various vaccine-preventable infectious diseases comes the need for the United States' vaccination policy to be reevaluated. Current policy approaches focus on the enforcement of recommended childhood vaccinations through school requirements (Digitale, 2017). While this creates reasonable compliance with recommendations, exemptions and homeschooled children may fall through the cracks in coverage. To increase public adherence with vaccination policy, other methods should be employed to encourage and promote the public. School-based requirements focus solely on the enforcement aspect of vaccination policy; large-scale change and improved compliance will rely on a shift towards promotion policy.

Unfortunately, the reasons parents may choose not to vaccinate their children vary. As a result, the strategies must be tailored to fit a specific reason for noncompliance, or a model of health behavior can be utilized to promote a health behavior like vaccination. The Health Belief Model offers several constructs to explain an individual's likelihood of taking action. This model does not, however, offer a simple solution to issues in vaccination policy. Each construct may have a different level of importance in pushing individuals toward noncompliance with vaccination recommendations; perceived barriers may have a greater impact on individuals of a lower socioeconomic status, whereas low perceived susceptibility may have a greater impact on individuals of a higher socioeconomic status, for example. In order to reach the greatest number of people, vaccination policy must utilize a combination of approaches to increase the perceived susceptibility, severity, and benefits, and decrease the perceived barriers.

To address the perceived susceptibility and severity of vaccination, an education campaign will be developed to better inform the public of the symptoms of the relevant vaccine-preventable diseases. This will be tested with focus groups to determine the most effective health marketing strategy. Overall, this education campaign will serve to remind Americans of the importance of vaccines in preventing various diseases with which younger generations may be unfamiliar. A media campaign may be used to reach the widest audience, as well as a campaign in the health care setting.

An incentivization program will be developed to promote compliance with recommendations and address the perceived benefits of vaccinations. On an individual basis, families will receive a predetermined payment amount or tax credit for all children that are up-to-date on vaccinations at various age checkpoints. Communities will receive additional financial incentives if a set percentage of families are up-to-date on vaccinations. This will encourage vaccination for the financial benefit of the community, as younger individuals have been shown to be motivated by group-oriented benefits (Chapman et al., 2012, p. 1012).

Addressing the perceived barriers of vaccination is perhaps the most complex, given the variability of barriers for different groups of people or individuals. This policy recommendation deals primarily with the barriers to access, but other barriers should be considered in long-term policy-making decisions. For example, public distrust in governmental health agencies and vaccine manufacturers calls for reevaluation of the involvement of the federal government and individuals with conflicts of interest in the safety testing of vaccines.

Lack of access leads to disproportionate under-vaccination or un-vaccination of disadvantaged communities, so it is important to address barriers to access. To make vaccinations more accessible for individuals dealing with scheduling conflicts, such as those due to inconvenient work schedules and limited health care clinic appointment availability, it is

recommended that vaccines be made available for walk-in appointments or at other pre-scheduled appointments, such as child wellness visits. Extended hours or a specified vaccination time at clinics might also be adopted to decrease scheduling conflicts and aid in shortening wait-times in clinics for vaccinations.

As a whole, vaccination policy will require reevaluation as time passes and new attitudes or issues become prevalent. The current vaccination policy or this policy recommendation are not permanent solutions, but aspects that prove successful may continue to be utilized to improve vaccination rates in the United States.

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