

Equity in Vaccination: A Comprehensive Analysis of Federal Policies- Immunization Information Systems and Child Care Vaccination Laws-Impacting Immunization Uptake across Age Groups

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Abstract

Vaccination is an essential health service that is needed across all age groups. Children, however, form the population that most needs and are mostly considered in national vaccination programs. Despite the incalculable benefit of vaccination, inequities exist in its implementation. Immunization inequity causes negative healthcare outcomes for both individuals and whole populations. Childhood vaccinations are one of the earliest portals of health care. Inequalities in childhood vaccination programs lead to inequities in vaccine uptake in adulthood. Policies have been spearheaded by the federal government to bridge the gaps in vaccination rates nationally. Two such strongly supported policies are the Immunization Information Systems (IIS) and child care vaccination laws. This report examines these policies in light of the available supporting evidence. The evidence shows that the implantation of these policies varies across different states with attendant effects on vaccination rates. The shortfall of policy implementation was laid bare by the COVID-19 pandemic. Federal policy, with robust support, predicts higher vaccination rates. The immunization infrastructure modernization act aims to strengthen IIS, ensuring equitable upgrades.

Keywords: Vaccination; Health care; Immunization; Modernization

Introduction

Vaccination is an essential health service that is needed across all age groups. Children, however, form the population that most needs and are mostly considered in national vaccination programs [1]. The current COVID-19 pandemic has driven home the need for vaccination and systems already in place were leveraged and strengthened to improve vaccination

interventions for COVID. Pediatric vaccination on average saves 42,000 lives, prevents 20 million disease cases and saves the community and government \$70 billion per cohort year [1]. A fifth of childhood deaths in the US before the widespread adoption of vaccines was due to measles, diphtheria, smallpox and pertussis. Now, almost all mortality from vaccine-preventable diseases has been eliminated in the United States.

Despite the incalculable benefit of vaccination, inequities exist in its implementation. Immunization inequity causes negative healthcare outcomes for both individuals and whole populations. Vaccination is a gateway to healthcare processes because it forms one of the first activities most individuals have with the health system. If equity can be achieved, then a lot of disadvantaged populations will be attracted to using the health system. The inequity in immunization was harshly exposed in the wake of the current COVID-19 pandemic. Existing vaccination structures were improved to meet the public health need but despite the upgrades, individuals who are from indigenous populations, the homeless, incarcerated, disadvantaged and marginalized populations have higher morbidity and mortality from COVID-19. These disadvantaged populations include blacks, Hispanics, Asians, rural adolescents, the uninsured, people with disabilities and the LGBT.

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Vaccination policies are selected for implementation nationally by the Advisory Committee on Immunization Practices (ACIP) which is convened by the Centers for Disease Control and prevention (CDC) [2-5]. These recommendations are based on strong evidence which are shared by the two national policies that would be analyzed in this report.

Literature Review

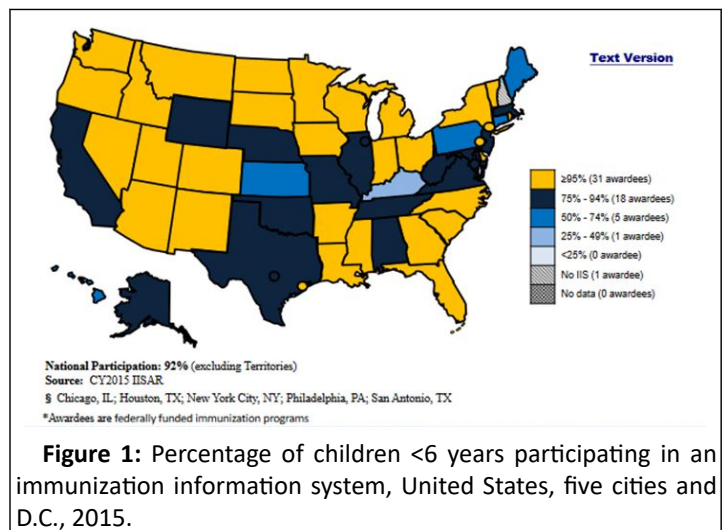
Review of policies and impact on communities

Immunization Information Systems (IIS) are databases that are aimed at collecting information on the vaccination status of the population and storing this information confidentially and electronically. The IIS is meant to improve vaccination coverage, adherence, administration and management. Once vaccination data is digitalized and available for analysis, areas of weak coverage would be easily noted, ineffective vaccine doses noted, effective client support structures to remind and collect client feedback, guide response to vaccine-preventable disease and help in vaccine management [4]. Overall evidence of IIS effectiveness is unclear in the US as a US national study did not show a significant increase in vaccination uptake, however, a national study in Australia showed effectiveness though this was likely confounded by the increased incentives offered to families and providers. Isolated studies have shown a mild uptick in vaccination rates (5%-14%) with recall systems [4]. Other studies have also shown usefulness in responding to public health issues like recalling unvaccinated individuals, vaccine management, vaccine safety, monitoring vaccine uptake and utilization. IIS has also been evaluated and shown to provide cost-benefit when compared with the current vaccine management system [4]. Benefits range from gains of 1.59-8 dollars for every dollar invested in the program, however, these studies were done in the pediatric population. These studies, however, aside from being mainly based on the pediatric population also are based on models at the state or national level [4]. Overall, 214 studies (209 conducted in the US) met the inclusion criteria for the systematic review assessing the effectiveness and usefulness of the IIS, with the majority reporting positive results. These results, however, need to be weighed with the restriction in sharing clinical data and the degree of manpower and technology needed to input data into the IIS system. Currently, the IIS in the US works under a patchwork of policies, adoption levels and technological data in 63 jurisdictions in the US (50 states, the district of Columbia, four localities, five territories and three freely associated states) [5].

Discussion

The implementation of IIS in the US will be analyzed in this paper. Bearing in mind that individual IIS policy and implementation differ across the 63 IIS jurisdictions in the US despite attempts of the federal government to regularize the implementation of IIS. 47 of 50 states plus Washington DC are lifespan IISs (provide IIS coverage for an individual's lifespan) while 42 of 50 states plus Washington DC are opt-out IISs for adults. IIS interstate data sharing however remains a challenge [5]. The federal government provides grants to the 63 jurisdictions contingent on the requirement that the jurisdiction uses the funds to meet federal IIS requirements. As of 2015, 31 awardees have $\geq 95\%$ of children under 6 years enrolled in IIS, 18 awardees had 75%-94%, while only 1 awardee (New Hampshire) had no form of IIS at all [6]. The distribution of states with different levels of IIS coverage cannot be fully explained by the

poverty distribution and political affiliations of the different states (Figure 1) [6].



Due to the fact that personally identifiable information is required, the IIS is influenced by the Health Insurance Portability and Accountability Act of 1996 (HIPAA) [1]. At the point of care, IIS improves vaccine administration and monitoring, as an individual's vaccination history is available to the provider. The information is also used at the population level. Vaccination information currently is largely decentralized [1].

Another vaccination program with strong evidence is the child care vaccination laws which are implemented with differing strictness across the US. These laws dictate whether a child can be enrolled in school (daycare, head, start, pre-kindergarten, preschools and other early childhood programs) based on receiving the required vaccines. Although all 50 states and Washington, D.C. require children to be vaccinated, there is a range of implementation mechanics and enforcement [1].

The legal right for each jurisdiction to form its own laws for child enrollment vaccination requirements was first upheld in 1905 in a landmark supreme court case, *Jacobson v. Massachusetts*. This ruling has been expanded to be used in cases involving weighing individual rights against the common good. This authority was cemented in 1922 in another supreme court case *Zucht v. King*. This vaccination requirement affects a lot of children because almost 13 million children aged 0-5 years have weekly non-parental care as of 2019 [1].

Generally, 4 stances have been adopted by states regarding child care vaccination laws. 43 states and Washington, D.C. clearly identified in law what vaccines are required for child care; two states (Delaware and Pennsylvania) required all CDC-recommended vaccines without listing them; two states (Florida and South Carolina) assigned the responsibility of publishing vaccination requirements to the department of health; and three states (Indiana, Massachusetts, and Montana) have a mixed system where some vaccines are required and others would be published by the department of health [1].

As of 2020, vaccines recommended by ACIP included "annual influenza; diphtheria, tetanus and acellular pertussis (DTaP); *Haemophilus influenzae* type b; hepatitis A; hepatitis B;

inactivated poliovirus; Measles, Mumps, Rubella (MMR); pneumococcal conjugate; rotavirus; and varicella" [1]. Only 4 states (Ohio, Rhode island, Delaware and Pennsylvania) required all 10 vaccines outlined by ACIP for childcare entry. All jurisdictions, however, require MMR, inactivated polio vaccine and DTaP. 50 jurisdictions require the Varicella vaccine. Most jurisdictions (34 states and Washington, D.C.) require 6-8 vaccines; and only 3 states (Minnesota, South Dakota and West Virginia) required 5 or fewer vaccines for child entry. Rota virus vaccine and annual influenza vaccine are the least required by states (about 15%) [1,7].

However, despite the requirements for childcare enrolment, exemptions may be made based on non-medical reasons. In the 50 states and Washington, D.C., 5 tiers are identified based on the strictness of allowing exemptions based on non-medical reasons (mostly political and religious beliefs). "Five states were categorized under tier 1, nonmedical exemption not permitted (10 percent) (appendix exhibit A5); 18 eight states fell under tier 2, most stringent (16 percent); seventeen states were categorized as tier 3, more stringent (35 percent); ten states and Washington, D.C., were considered to belong to tier 4, less stringent (22 percent); and ten states belonged to tier 5, least stringent (20 percent)". Washington state does not allow non-medical exemption to the MMR vaccine (Figure 2) [1,7].

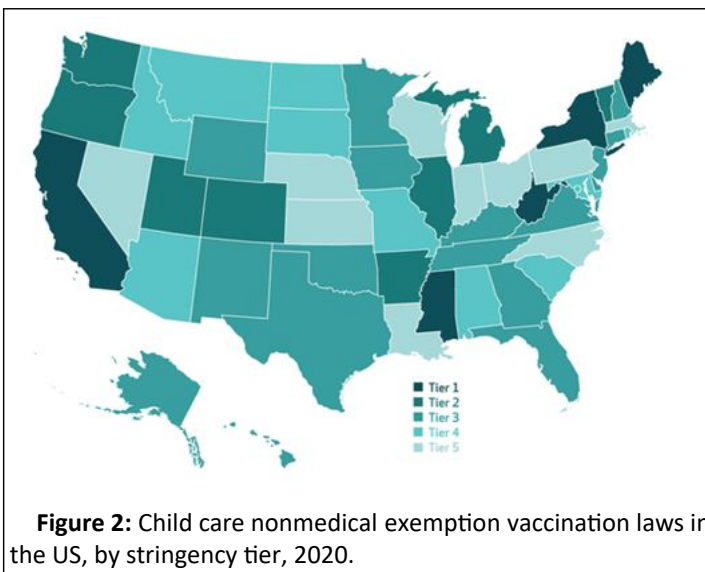


Figure 2: Child care nonmedical exemption vaccination laws in the US, by stringency tier, 2020.

These two programs if implemented nationwide would help bridge gaps in vaccine distribution. A primary care provider is the most common access point for vaccinations, however, about a fifth of Americans (47% of Hispanics, 23% of whites and 31% of blacks) do not have access to a primary care provider (National Vaccine Advisory Committee). Vaccination programs, as previously mentioned, serve as a gateway to healthcare facilities. People who live in states who do not fully enforce federal IIS and school care policies are deprived off this gateway causing worse health outcomes (National Vaccine Advisory Committee).

Conclusion

With the expansion of the IIS program, since personal data is collected, individuals who show up on the IIS system as not

being fully vaccinated or do not show up at all (as they may not have had any vaccinations) could be personally traced and the reasons for their poor uptake known. The IIS could also show if a subset of people or a geographical area has a lower-than-average vaccine uptake. The fact however remains that disadvantaged populations in any state have inequitable access to vaccination.

Recommendation

The two policies-IIS and the child care vaccination laws are laws that has shown strong evidence in improving vaccination uptake. But the implementation and interpretation of these laws vary widely in different states and jurisdictions.

The federal policy have strong evidence supporting their implementation (National Vaccine Advisory Committee). States that partially implement these policies or do not implement it at all will likely have lower vaccination rates. From the evidence, the IIS has a wider scope than the child care vaccination laws. Important to consider also is that great strides have been made in the child care vaccination laws. The usefulness of the IIS has also been demonstrated in its use in the response to the COVID-19 pandemic.

The IIS when it works as intended is able to pinpoint lapses in vaccine coverage even in preschool children (who although make up an essential population in need of vaccination, are not the only population in need). The Federal government provides grants for the implementation of IIS at a standard level. The CDC also provides operational and technical standards for the IIS. Far strides would be made if there is a political will to make laws that will attempt to unify implementation of the CDC minimum requirements and regularization of the IIS framework. A recent law was passed in 2021, the Immunization Infrastructure Modernization Act, which is meant to shore up the patchwork of policies currently supporting the IIS, instead of the singular policy intended at its inception. This policy will award grants to IIS jurisdictions with more stringent restrictions, improve available technology, provide technical assistance and designate data and technology standards. Uniform enforcement of this law will be a step in the right direction. Truthfully, a lot of finances and manpower would be needed to perform these upgrades, however, the benefits would far outweigh the initial costs.

To promote equity, more attention needs to be paid to ensure that disadvantaged populations are represented in IIS upgrades. Bearing in mind these populations do not have access to healthcare facilities.

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