IMMUNIZATION RATES IN NORTH DAKOTA SCHOOLS:

AN IN-DEPTH ANALYSIS INTO IMMUNIZATION POLICIES, PRACTICES, AND BELIEFS IN NORTH DAKOTA SCHOOLS

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Executive Summary

Over the last decade, North Dakota has experienced fluctuating school reported immunization rates. During the 2014-2015 school year, kindergarten immunization rates in North Dakota were some of the worst in the nation. Stricter enforcement of immunization requirements for school entry by key stakeholders helped to increase rates in the following years. Specifically, measles, mumps, and rubella (MMR) kindergarten immunization rates increased from 89.78% during the 2014-2015 school year to 93.83% during the 2016-2017 school year.

Immunization rates remained relatively stable for the next four years, but recent data indicate kindergarten immunization rates dropped a full percentage point for all school-required vaccinations between the 2020-2021 and 2021-2022 school year. The rates are the lowest seen in over five years in North Dakota, and the decline amounts to approximately 100 additional kindergartners entering the 2021-2022 school year without documented immunity to vaccine-preventable diseases. Immunization rates for all school-required immunizations declined among kindergartners during the 2021-2022 school year. Specifically, only 94.17% were up-to-date with Hepatitis B vaccine in the 2021-2022 school year compared with 95.66% in the 2019-2020 school year. All other required immunizations for school entry were at or below 92% for the 2021-2022 season compared with rates of 94% or higher in the 2019-2020 school year. The current national goal set by Healthy People 2030 is 95% immunization coverage with MMR in this age group.

The concerns from a decreasing trend in overall vaccination coverage have been compounded by increasing exemption rates across the state. Currently, there are three types of vaccine exemptions in North Dakota: medical, religious, and personal belief (philosophic/moral). While exemptions filed for personal belief and religious reasons in the 2021-2022 school year are the highest recorded in the past decade in the state, 3.34% and 1.27% respectively, exemptions filed for medical reasons are the lowest recorded in the same time span at 0.19%. Medical exemptions remain the only type of exemption that requires a physician's signature. Exemptions for personal belief and religious reasons require only a parent or guardian's signature.

Overall exemptions filed in North Dakota for school-required kindergarten immunizations have steadily climbed from 1.74% during the 2011-2012 school year to 4.80% during the 2021-2022 school year. Additionally, exemptions for personal belief and religious reasons in non-public schools (6.09% and 2.39%, respectively) are approximately double the rate seen in public schools (3.07% and 1.15%). In contrast, public and non-public schools have similar medical exemption rates, 0.19%, and 0.22% respectively.

The state of North Dakota requires parents or guardians to provide either proof of school-required, age-appropriate immunizations for children or to have an exemption filed before entry into childcare, school, or home-based instruction. Children who have not received the required immunizations by October 1st must be given an exclusion letter and excluded from school according to state law.

The COVID-19 pandemic led to major shutdowns of non-essential business and clinic operations in early 2020 and considerably disrupted the uptake of routine childhood immunizations. Limited movement of individuals, as a result of stay at home orders and fear of exposing children to COVID-19, reduced visits to health care providers for routine care, resulting in many children missing routine immunizations. Further, the creation of new vaccines to fight against COVID-19 and the corresponding spread of misinformation regarding their development and safety may have increased vaccine hesitancy among parents/guardians for school-required vaccines. Disparities in vaccination rates and differing attitudes towards vaccination have been noted between western and eastern North Dakota and were illuminated by the COVID-19 pandemic. Eastern North Dakota often has considerably higher vaccination rates and lower exemption rates than western North Dakota. Vaccine hesitancy fueled by circulating misinformation and mistrust in government has further polarized the state.

To gain a better understanding of North Dakota's decreasing immunization rates and increasing exemption rates, the North Dakota Department of Health (NDDoH) engaged the North Dakota State University (NDSU) Center for Immunization Research and Education (CIRE) to study current immunization trends and exemption practices in the state. CIRE was tasked with surveying key immunization stakeholders about their beliefs regarding immunization requirements, exemption policies, and current immunization trends. Project objectives included the following:

1. Gain insight into current immunization and exemption policies, practices, knowledge, attitudes, trends, and beliefs in North Dakota.
2. Facilitate in-depth discussion around school immunization and exemption policies and practices and the effect of current trends on immunization and exemption rates in North Dakota schools.
3. Make suggestions for potential policy, process, or rule changes in relation to immunization and exemption policies and practices in North Dakota.

To accomplish these objectives, CIRE invited stakeholders across the state to participate in virtual and in-person focus groups, one-on-one interviews, and electronic surveys. The participating stakeholders included individuals who work directly with the documentation, enforcement, and administration of school immunizations in the state. These included healthcare providers, public health employees, and school administrators. CIRE also reviewed and analyzed the 2021-2022 school year immunization survey data collected by the NDDoH.

The majority of stakeholders stated that they believed the process of obtaining an immunization exemption in North Dakota was too easy and should be strengthened. The most common suggestion was to implement compulsory vaccine education from a healthcare provider for parents who are requesting either a religious or personal belief exemption. The primary goals of an education requirement would be to limit the misuse of exemption forms and further educate individuals about the benefits of vaccination and consequences of under-immunization and claiming an exemption.

Stakeholders also highlighted the importance of upholding North Dakota laws regarding required immunizations for school or childcare entry and excluding non-compliant children. Many schools around the state do not exclude children who are non-compliant with school-required immunization after the October 1st deadline. The majority of school staff whose schools do not enforce the exclusion requirement said this behavior was a reflection of their local superintendent's beliefs, while others felt conflicted about their duties as educators. School administrators also indicated that since the emergence of COVID-19 vaccines in December 2020, the practice of excluding non-compliant children has become more difficult.

Stakeholders feel the dynamic has changed since the rollout of COVID-19 vaccines. Vaccine hesitancy and mistrust in the government make enforcement of school-required vaccinations challenging. Many stakeholders feel overwhelmed with the extreme pace and amount of misinformation surrounding vaccine safety circulating on social media and throughout communities. Attempting to combat misinformation has become increasingly hard as they feel their status as the immunization authority has also been compromised. Many stakeholders feel parents and guardians do not take letters regarding immunization requirements for school entry seriously. Fortunately, the majority of stakeholders feel the decrease in kindergarten immunization rates seen during the 2021-2022 school year in North Dakota was due to decreased prioritization of routine immunization rather than vaccine hesitancy or refusal.

When discussing barriers to increasing immunization rates to school-required vaccinations in their region, stakeholders consistently discussed lack of resources as a significant barrier. Many stakeholders feel they lack the knowledge and skills to create advertising materials, especially for social media campaigns. Additionally, there was almost universal agreement that vaccination clinics held in schools increase immunization rates, although many stakeholders expressed confusion over how to implement and coordinate these types of events. Finally, one stakeholder expressed frustration over lack of availability of multilingual vaccine resources.

To improve immunization rates and follow recommendations provided by immunization stakeholders in North Dakota, CIRE recommends the following changes to policies, rules, and practice/processes.

Policy Changes

- No immediate policy changes are recommended at this time, as parents currently have the option to vaccinate their child or file an exemption. However, in the future, if exemptions continue to increase and the exemption form is routinely misused to achieve compliance, the NDDoH should consider requiring an educational component (with a healthcare provider or local public health unit staff or other designated medical provider) for parents seeking exemptions. This would limit those filing for exemptions out of convenience and it would ensure that parents are making an educated decision with a trusted medical provider.

Practice/Process Changes

- All schools should proactively work on immunization compliance prior to the start of the school year. Additionally, schools need to enforce school immunization requirements and exclude children who are not compliant after October 1st.
- The NDDoH should create a "school located vaccination clinic" toolkit to be used as a resource for schools and vaccinators with best practices in the coordination of school immunization events.
- The NDDoH should develop a "social media" toolkit for immunization stakeholders to promote vaccines and vaccine-related events (e.g. Back-to-School clinics, influenza vaccine blitzes, etc.)
- The NDDoH should develop a process to validate school immunization survey results to improve the accuracy of the data collected.
- Multilingual immunization resources for school-required vaccinations should be easily accessible and available on the NDDoH website.
- Templates for communication with parents/guardians regarding an individual child's school immunization records should be offered on NDDoH letterhead.

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Introduction

Immunization is considered one of the ten greatest public health achievements of the 20th century.[1,2] Vaccines have saved countless lives and significantly reduced the overall burden of disease across the globe. A recent analysis illustrated that in a single birth cohort in the United States, vaccination prevented an estimated 20 million cases of disease and over 40,000 deaths, averting approximately $76 billion in total societal costs.[3] Today, vaccines are administered to individuals of all ages in the United States for 17 infectious diseases, with the majority of vaccines administered before the age of 18.[4]

Despite vaccine's incredible accomplishments in preventing the transmission and eradicating diseases, opposition to vaccination has been around as long as vaccination itself.[2] Throughout history, a flurry of misinformation and vocal opponents have followed the introduction of each new vaccine. Eradication and reductions in the incidences of vaccine-preventable disease means people have less personal experience with many diseases and may not fully understand the risks they pose to society.

Additionally, online communication has allowed for an unprecedented spread of misinformation at a faster pace and greater volume than ever before.[5] Unfortunately, the more a person is exposed to misinformation, the more a person is susceptible to the negative consequences of the misinformation, including decreased acceptance of vaccination recommendations.[5] Growing concern among public health experts around vaccine hesitancy led the World Health Organization (WHO) to list vaccine hesitancy as one of the top ten threats to global health in 2019.[6]

Brief History of Vaccine Hesitancy

During the early 1800s in England, Edward Jenner's cowpox experiments showed children could be protected from smallpox if they were infected with lymph from a cowpox blister.[2,7] This led to widespread smallpox vaccination which was met with immediate public criticism. The major rationales for this criticism varied from sanitation and scientific concerns to religious and political objections.[2] In 1853, the Vaccination Act ordered compulsory vaccination of infants up to three months old in the United Kingdom. In 1867, the Vaccine Act was extended to include mandatory smallpox vaccination of any child up to 14 years old with penalties for vaccine refusals. Increasing opposition to the expansion of mandatory vaccination led to the formation of the Anti-Vaccination League and resulted in the creation of multiple anti-vaccination journals.[2] By the end of the 19th century, smallpox outbreaks in the United States led to both pro- and anti-vaccine campaigns, but the virus was ultimately eradicated thanks to the smallpox vaccine.[2,8]

More recently, considerable vaccine hesitancy was observed in the 1980s with the release of the pertussis vaccine. Pertussis, also known as whooping cough, can cause severe respiratory

disease in infants and children but also can occur in teenagers and adults.[9] Pertussis is highly contagious and was estimated to have a 10% mortality rate in children in the 20th century. The introduction of pertussis vaccines led to a major decline in the incidence of the disease, but it was met with false claims that it caused dangerous neurological side effects. By the time this was disproven, the damage to the reputation of the vaccine was already done.[9] Several anti-vaccine theories began to emerge that inaccurately linked pertussis vaccines to intellectual and physical disabilities, leading to the formation of the group Dissatisfied Parents Together (DPT), which eventually became the National Vaccine Information Center. The group claims to be the oldest institution for information regarding vaccine safety, and today it serves as a major source of vaccine misinformation in the United States.[9]

Anti-vaccination sentiments continue to be fueled by prominent societal figures. American actress Jenny McCarthy claims her son's autism began right after he received the MMR vaccine.[10] She argues that the number of childhood vaccines has increased in parallel with rates of autism. She fails to acknowledge the increase is likely due to new diagnostic criteria, which have expanded the number of individuals classified as autistic.[10] The idea that vaccines give rise to autism didn't originate with McCarthy. It gained prominence through the now discredited and former British doctor, Andrew Wakefield, who claimed to have discovered the link between the MMR vaccine and autism in 1998.[2,7] His research was published in one of the most respected medical journals in the world, *The Lancet*. The article was retracted more than a decade later, and Wakefield's medical license was ultimately revoked after it was shown he had falsified the data. An investigation revealed he had received hundreds of thousands of dollars from lawyers hoping to sue the vaccine manufacturing company. Wakefield continues to spread vaccine misinformation that erodes public trust. After he met with Somali American community groups in Minnesota between 2010 and 2011, Somali American MMR immunization rates dropped from 92% in 2009 to 42% in 2017. Following the drop in immunization rates, Minnesota experienced one of the largest measles outbreaks in 30 years, which disproportionately affected Somali American communities.[11]

In the wake of the COVID-19 pandemic, misinformation around vaccines exploded and so too did vaccine hesitancy. Various socioeconomic and societal factors contributed to COVID-19 vaccine hesitancy and were confounded by the use of social media. [12,13] Anti-vaccine tropes seen in other vaccine rollouts resurfaced such as the false claim that vaccines cause infertility or the belief that mandatory vaccines are an attack on personal freedom. From April 2020 to December 2020, self-reported likelihood of getting a COVID-19 vaccine in the US declined from 74% to 56% despite press releases showing high vaccine efficacy for two vaccines in phase 3 trials.[14,15] Even nurses and other healthcare workers expressed concern over vaccine safety and efficacy despite the large body of evidence showing the COVID-19 vaccine is safe and effective.[14,16,17] Currently, just over 65% of people who are eligible for the vaccine (anyone ≥ 5 years of age) in the United States are considered fully vaccinated, meaning they completed either a single-dose or two-dose series, and less than 50% of the US population has received the recommended booster dose.[18]

Experts now fear that people's distrust of the COVID-19 vaccine may bleed into recommended childhood vaccines. Already, several state politicians have threatened to revisit mandatory vaccination. Georgia and Wisconsin introduced bills that, if they had passed, would have inhibited a school's ability to require proof of vaccination to be enrolled.[13,19] Many states, including North Dakota, have also seen a rise in non-medical exemptions, and some lawmakers have attempted to increase access to non-medical exemptions in their states.[20] If trends continue, it could slowly unravel one of public health's greatest accomplishments—the reduction and elimination of disease through vaccination and herd immunity.

Vaccine Exemptions and Outbreaks of Preventable Diseases

Despite the obstacles that mass immunization has faced throughout history, immunization rates for school-required vaccines have remained relatively high in the United States. This is largely because parents are required to show proof of vaccination for their children to attend school or file for a vaccine exemption. Mandatory vaccination for school attendance in the United States dates back to 1827, when Boston became the first city to require smallpox vaccination. After it became a state mandate in 1855, other states followed suit. State laws requiring immunization to attend school were highly criticized and even challenged in the US Supreme Court, but they have withstood until present day.[4]

Incorporated into school immunization laws is the option to file a vaccine exemption, but the type and number of exemptions vary by state. There are three types of vaccine exemptions: medical, religious, and personal belief (philosophic/moral). All states allow medical exemptions and most allow non-medical exemptions—religious, personal belief, or both. California, Connecticut, Maine, Mississippi, New York, and West Virginia are the only states that do not allow religious or personal belief exemptions.[21] Vaccination rates tend to be highest in states where only medical exemptions are permitted; in these states, medical exemptions are reserved for those who cannot or should not be vaccinated, and they require a doctor's signature. Doctors who have signed off on medical exemptions without legitimate cause have been subject to disciplinary action.[22]

Vaccine refusal has resulted in an increasing number of vaccine-preventable disease outbreaks.[23,24] Among a measles outbreak in 2018-2019 in Rockland County, New York and other nearby counties, there was only 77% MMR vaccination coverage in the communities affected, well below the 95% coverage required for herd immunity.[23] The outbreak was just one of 22 measles outbreaks that occurred between January and September 2019 in the United States. At the end of 2019, there had been a total of 1,249 measles cases reported that spanned across 31 states. It was the second highest number of outbreaks since the United States eliminated measles in 2000 and the highest number of individual cases of measles reported in a single year since 1992.[25] Among the cases of measles reported in 2019, 89% either did not have proof of vaccination or had an unknown vaccination status. Most cases were in individuals under the age of 18, with 27% occurring in school-aged children 5-17 years of age.[25]

There has also been a resurgence of pertussis. This is partially due to waning vaccine-induced immunity, but it is exacerbated by vaccine refusal. Phadke et al showed that states permitting personal belief exemptions or that had policies making exemptions easy to obtain had a higher incidence of pertussis.[26] Another study showed the risk of pertussis is 13 times higher among unvaccinated children compared with unvaccinated children.[27] In 2014, California declared a pertussis epidemic after disease incidence rose to more than five times higher than baseline.[26,28] Two years later, following a measles outbreak linked to Disneyland, California tightened their vaccine exemption laws so that only medical exemptions were accepted for school attendance. After the law went into effect, vaccination rates for measles and pertussis increased nearly 5% between the 2014-2015 and the 2016-2017 school years.[29]

North Dakota Immunization Policies and Practices

In North Dakota, school required immunizations were first implemented at the start of the 1975-1976 school year. Initially, required vaccines included diphtheria, tetanus, pertussis, polio, measles, mumps, and rubella. In 2000-2001, vaccine requirements were expanded to include hepatitis B, along with the addition of religious and personal belief exemptions. Then, in 2004-2005, a varicella vaccination requirement and a corresponding history of disease exemption were added. In 2008, booster vaccines for tetanus, diphtheria, and acellular pertussis, along with meningococcal vaccine, were made requirements for entry into middle school.[4] Currently one dose of TdaP given on or after the student's 11th birthday and one dose of meningococcal conjugate vaccine (MCV4) given on or after a student's 10th birthday are required for entry into 7th grade. Additionally, a second dose of MCV4 must be given on or after a student's 16th birthday for entry into 11th grade.[30]

North Dakota Century Code (NDCC) states that "A child may not be admitted to any public, private, parochial school, daycare center, childcare facility, head start program, or nursery school operating in this state or be supervised through home-based instruction unless the child's parent or guardian presents to the institution authorities a certification from a licensed physician or authorized representative of the state department of health that the child has received age-appropriate immunization…"[31] NDCC does provide provisional admission into school or early childhood facilities to students in the process of receiving the age-appropriate required immunizations set forth by the state department of health.

North Dakota laws allow parents/guardians to file for three types of immunization exemptions: medical, religious, and personal belief (philosophical/moral). An exemption allows a child to be exempt from any or all immunization requirements. A physician's signature is required when filing for a medical exemption. A physician may also grant history of disease exemption for children with a reliable history of chickenpox, hepatitis B, measles, mumps, or rubella.[32] For personal belief and religious exemptions, a parent or guardian must sign the exemption form which states there is a sincerely held philosophical, moral, or religious belief that is opposed to such immunization. All exemption forms must be provided to the child's school, early childhood

facility, head start program, or preschool educational facility as part of the child's immunization records.[32]

NDCC also requires schools to designate an "institutional authority" to enforce state immunization requirements for school and childcare entry. School and childcare facilities are required to determine if children are compliant with current school immunization requirements, inform parents/guardians of children who are not compliant, and exclude children who do not meet the immunization requirements.[32] Students are considered compliant with state immunization requirements if they are 1) fully immunized, 2) file an immunization exemption or 3) a licensed physician or NDDoH representative provides written proof the child has begun receiving immunizations or a parent provides written consent for the local health department to administer missing immunizations. Children are considered non-compliant if they are 1) not up to date on school-required immunization, 2) do not provide immunization records to school or childcare facility, 3) are unimmunized, and/or 4) do not have an exemption on file at the school.[4] Any child that is unable to provide a certificate of immunization or file an exemption before the October 1st deadline, or within the thirty calendar days of enrollment, must be excluded from school or childcare.[32] As stated in NDCC, consequences for not enforcing school-required immunizations may include withdrawal of federal and state funding.[33]

Each school must also complete an annual immunization summary report, referred to as the school immunization survey, and submit it to the NDDoH by November 1 of each year or another date designated by the NDDoH.[32] The survey data from each school includes the number of 1) students enrolled by grade, 2) students who are immunized to each vaccination, 3) students with an exemption, and 4) students with no immunization record on file. NDDoH sends the school survey data to the Centers for Disease Control and Prevention (CDC) where it is used to compare state immunization rates.

Immunization data in North Dakota is reported to and stored in the North Dakota Immunization Information System (NDIIS). The NDIIS database aggregates vaccination data from multiple healthcare providers from across the state.[34] Schools often have one or more staff members with access to NDIIS to check immunization records for students.

Current Trends in US Childhood Immunization Rates

Disruption of routine immunization delivery is one of the silent consequences of the COVID-19 pandemic that has been felt across the United States.[35] As a result of the disruption, North Dakota's childhood immunization rates for routine immunizations have declined for all vaccine types.[36] A similar trend is emerging throughout the United States, resulting in large deficits in immunization rates.[35]

Most states have an immunization registry or centralized database to track the vaccination status of residents. Each state also has vaccination requirements for childcare and school entry

which are monitored through annual immunization surveys in accordance with state laws. The survey covers information related to the type of vaccines required and the number of recommended doses. Most states, including North Dakota, follow the recommendations of the Advisory Committee of Immunization Practices (ACIP) for age-appropriate immunizations. Some states have additional vaccination requirements.[4]

Using data obtained through states' immunization registries and centralized databases, it is apparent that immunization rates were immediately impacted by the pandemic. An estimated 80% fewer doses of measles vaccines were administered across the United States to those aged >24 months from mid-March to mid-April 2020 as compared to January and February 2020.[37] Further analyses of immunization records from 10 states estimated at least a 60% decline in both MMR and HPV vaccines administered, in children aged 2 to 8 years and 9 to 12 years old, respectively, from March to May 2020 as compared with March to May 2019.[23] States such as Alabama experienced some of the steepest decreases, reporting a 50% drop in immunization rates for all individuals less than 18 years of age in May 2020.[37]

After most states eased the stay-at-home orders in June-September 2020, there was an initial increase in routine pediatric vaccination doses being administered in some regions, with rates of vaccination approaching or even surpassing baseline pre-pandemic levels. However, vaccination rates were not sustained at the levels necessary to catch up children and adolescents who missed routine immunizations.[23] Several factors could lead to delays in catch-up for routine vaccination, such as fear of contracting COVID-19 preventing visits to healthcare facilities, differing duration and enforcement of stay-at-home orders, or prevalence of COVID-19 in communities. Additionally, the rapid transition to virtual learning may have resulted in the lack of enforcement for school-required immunizations.[23] The CDC has recommended co-administration of COVID-19 vaccine with other routine immunizations as one solution to the growing number of unvaccinated children. A consolidated and coordinated effort between schools and healthcare providers is necessary to recover from the decline in immunization rates seen among children during the pandemic.[23]

The negative impact of the COVID-19 pandemic on immunization rates across the United States has persisted. Immunization rates for children entering kindergarten in the United States were reduced by 1% in the 2020-2021 school year as compared with 2019-2020 school year, amounting to an estimated 35,000 additional children with unknown vaccination history entering kindergarten in the United States.[38] Vaccine exemptions may not be entirely to blame for the decrease. Rates vary by state, but national exemption rates among kindergartners appear to be stable at 2.2% in 2021-2022 compared with 2.5% in 2019-2020 school year.[24] However, an additional 3.9% of kindergartners across the nation during the 2020-2021 school year did not have an exemption and were not up to date for MMR, suggesting that disruptions in access to and prioritization of routine immunizations may have led to the decreases seen in kindergarten vaccinations, rather than parents refusing vaccines and filing exemption. Promisingly, if all non-exempt kindergartners were vaccinated, all but two states could achieve 95% vaccination coverage. This further highlights the importance of enforcing immunization

requirements and a collaborative effort to make sure children are up-to-date with recommended immunizations going forward.[24]

Project Background

A decade ago, North Dakota struggled with low kindergarten immunization rates. Between 2011 and 2016, North Dakota's kindergarten immunization rates consistently ranked in the bottom ten among all states in the United States for both DTaP and MMR.[29] During the 2014-2015 school year, only 89% of kindergartners in the state were fully vaccinated for DTaP, MMR, and varicella. Rates slowly improved during the 2015-2016 school year with approximately 91% of all kindergartners in North Dakota receiving all recommended vaccinations. Kindergarten immunization rates reached 93% in 2016-2017 and remained stable for the following four years, hovering around 93-94%. For all vaccines, with the exception of HepB, rates have hovered just slightly under 95%, falling short of the United States Healthy People 2030 prevention initiative for achieving 95% MMR vaccination coverage. However, school reported immunization rates for the 2021-2022 school year dropped to 92%, the lowest rates seen in over 5 years, and amounting to approximately 100 additional children in North Dakota entering the 2021-2022 school year without documented immunity to vaccine-preventable diseases.[36] (Figure 1) Similar trends were observed across the United States the previous school year, as overall kindergarten rates dropped 1%.[24] (Figure 2) National rates for the 2021-2022 school year are not currently available.

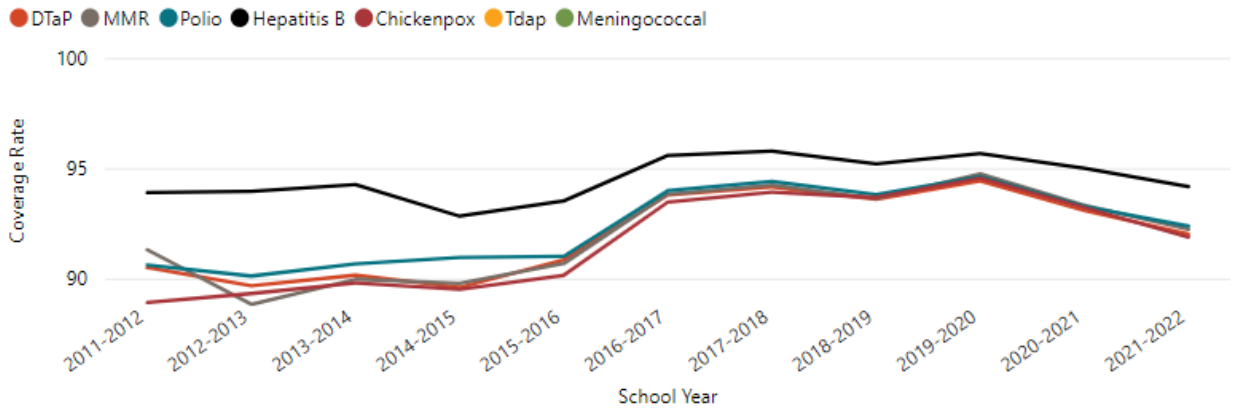

Figure 1. North Dakota kindergarten immunization rates by school year and vaccine type
Source: North Dakota Department of Health

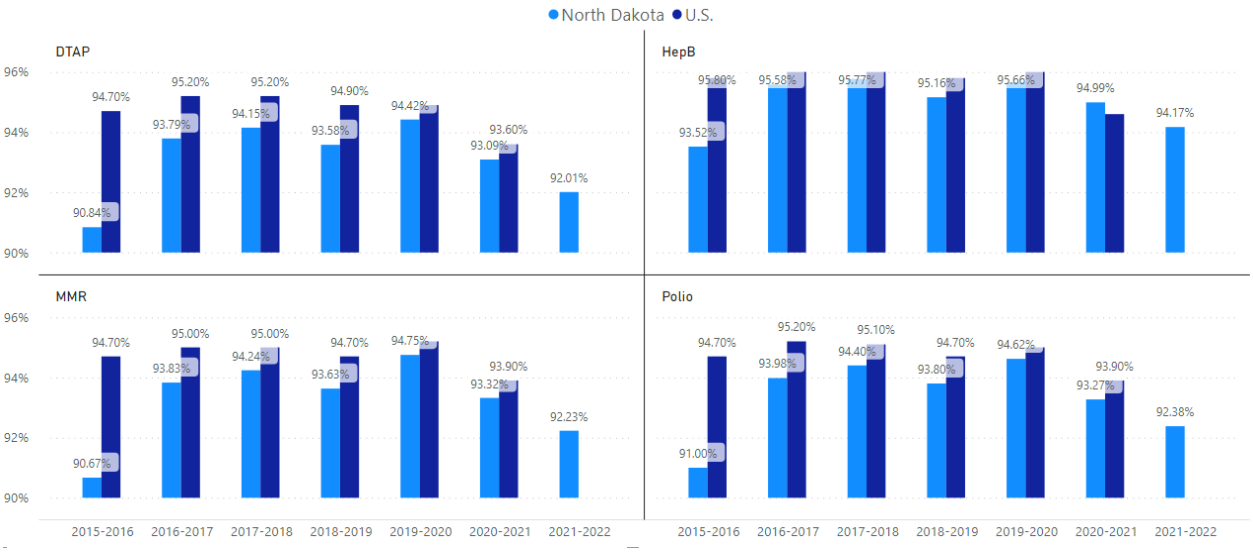

Figure 2. Kindergarten immunization rates in North Dakota and the U.S. by school year
Source: North Dakota Department of Health and CDC's SchoolVaxView
**National data for the 2021-2022 school year not yet publicly available*

The increase in North Dakota's school reported immunization rates during the 2016-2017 school year followed the publication of the CIRE report, "Immunization and Exemption Policies and Practices", by Hall et al. This report was part of a project that examined individual school policies on immunization requirements for school entry and the procedures behind filing for an exemption to a required vaccination. Following a statewide push for school enforcement of immunization requirements, many schools began enforcing school immunization requirements more strictly. This resulted in many children receiving overdue vaccines and schools receiving immunization records for children that had not been previously received by the school.

Over the last decade, total exemptions to school required immunizations have also increased in North Dakota from 1.74% during the 2011-2012 school year to 4.8% during the 2021-2022 school year. Personal belief exemptions have historically represented the majority of exemptions filed in North Dakota. Personal belief exemptions have nearly tripled in the past 10 years, increasing from 1.20% in 2011-2012 to 3.34% in the 2021-2022 school year. Religious exemptions have also increased, jumping from 0.22% to 1.27% over the same time period. Medical exemptions for school-required immunizations represent a small proportion of all exemptions filed in North Dakota and have remained stable or slightly decreased over the past decade (.32% to .19%).[36] (Figure 3) Overall, North Dakota exemption rates are higher than the national average and, during the 2020-2021 school year, North Dakota had nearly double (4.16%) the rate of exemptions compared with the national average (2.20%).[29,36] (Figure 4) Currently, national exemption rates for routine immunizations appear stable while North Dakota exemption rates are on the rise.[24]

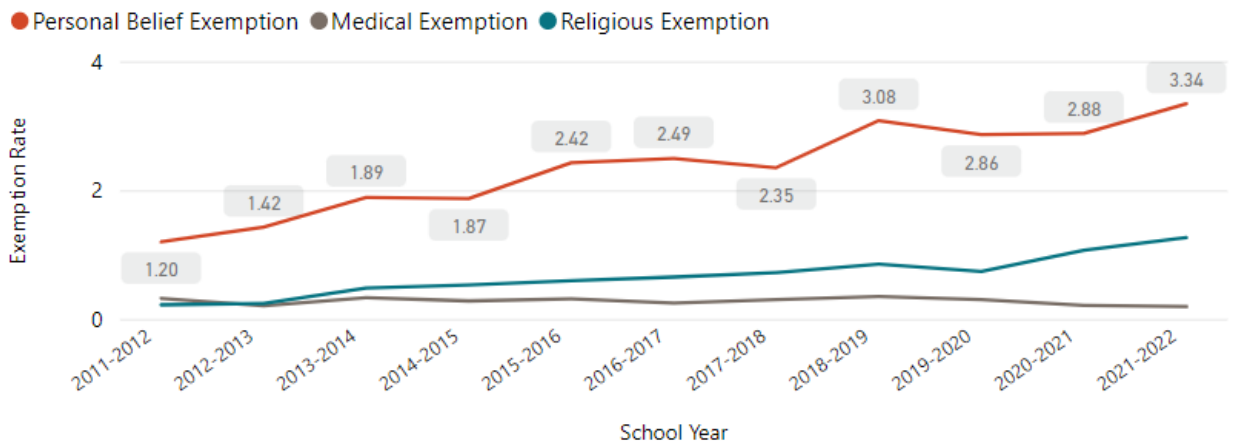

Figure 3. Exemption rates in North Dakota kindergartners by school year
Source: North Dakota Department of Health

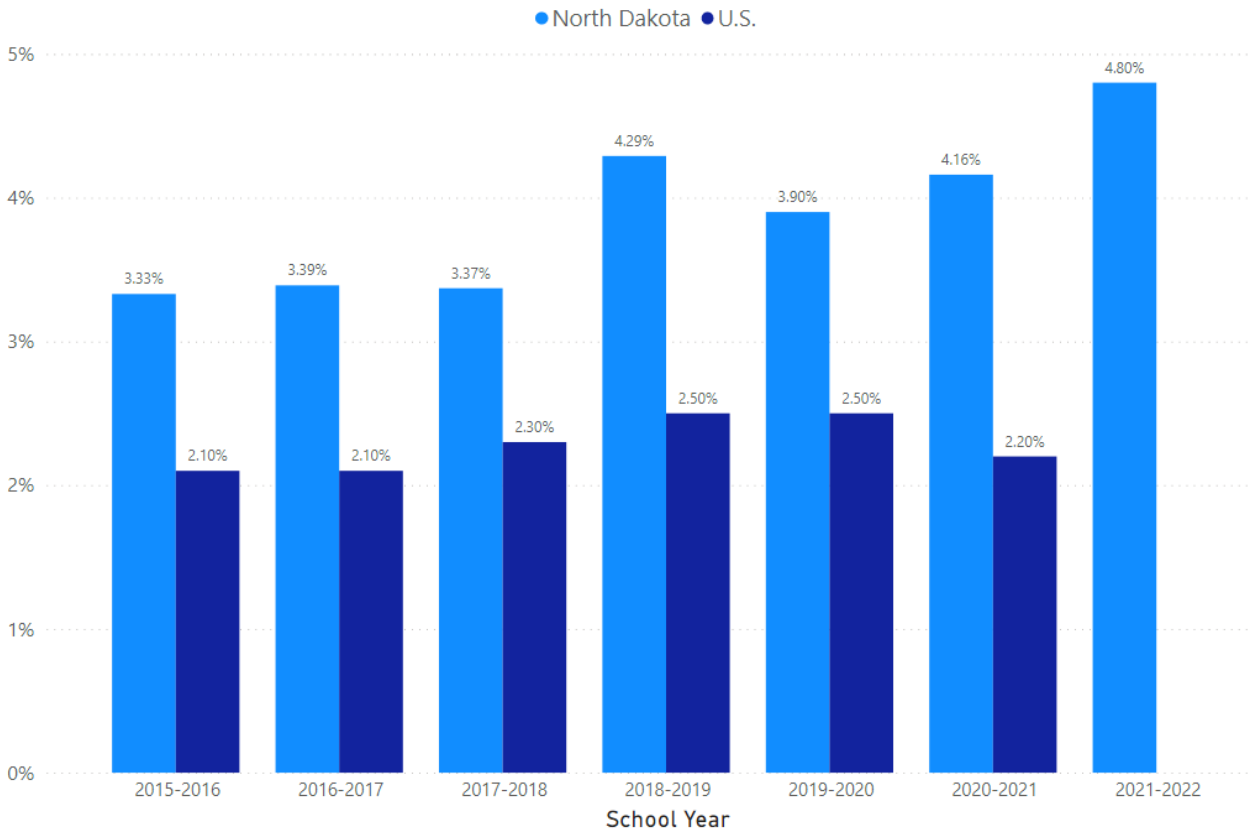

Figure 4. Kindergarten exemption rates in North Dakotan and the United States by school year
Source: North Dakota Department of Health and CDC's School Vax View

Immunization disparities between eastern and western North Dakota have previously been explored by assessing HPV series completion and influenza vaccine acceptance.[39] HPV lifetime series completion rates and influenza vaccination rates by season are higher in eastern North Dakota. More recently, stark differences in uptake of the COVID-19 vaccine between eastern and western North Dakota have come to light.[40] (Figure 5) Multiple factors likely contribute to

the geographic disparities. The western part of the state is more rural, which presents more barriers to health care, and it has seen rapid changes in population due to an oil boom, which may have led to a shortage in healthcare resources.[39] Additionally, rural communities may feel they are less at risk for outbreaks due to a more dispersed population.[41]

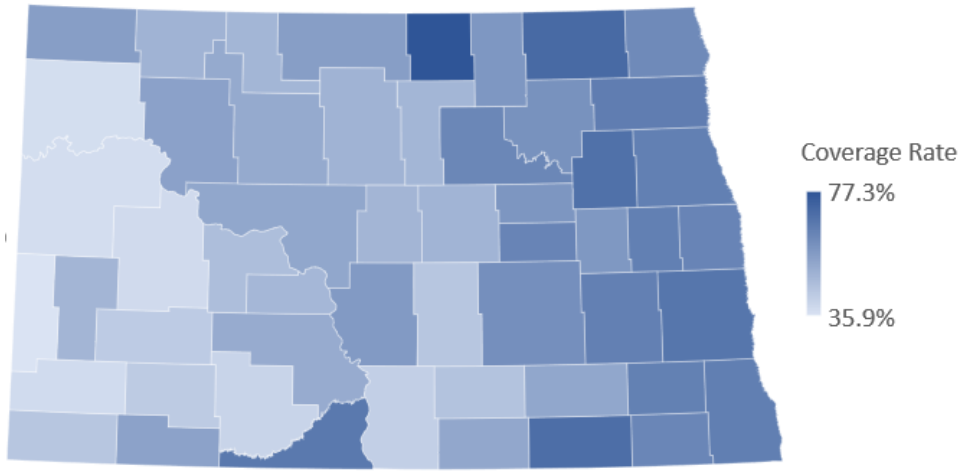

Figure 5. Coverage rates of at least one dose of COVID-19 vaccine by county in North Dakota
Source: North Dakota Department of Health COVID-19 Vaccine Dashboard

Due to declining immunization rates for school reported vaccinations in North Dakota and an increase in overall exemptions being filed, the NDDoH engaged the North Dakota State University (NDSU) Center for Immunization Research and Education (CIRE) to study current immunization trends and exemption practices. CIRE was tasked with surveying key immunization stakeholders about their beliefs regarding immunization requirements, exemption policies, and current immunization trends.

Project objectives included the following:

1. Gain insight into current immunization and exemption policies, practices, knowledge, attitudes, trends, and beliefs in North Dakota.
2. Facilitate in-depth discussion around school immunization and exemption policies and practices and the effect of current trends on immunization and exemption rates in North Dakota schools.
3. Make suggestions for potential policy, process, or rule changes in relation to immunization and exemption policies and practices in North Dakota.

Methodology

Data Collection

The NDDoH provided immunization data and school survey results from the 2014-2015 school year through 2021-2022 school year. All analysis was performed and visualizations were created using Microsoft Power BI. The clinician survey was conducted using Qualtrics XM.

For some analyses, immunization rates are presented by eastern/western part of the state. For the purpose of the regional analysis, counties were designated as “eastern” or “western” in order to highlight any regional disparities. The regional breakdown is available below. (Figure 6)

Throughout the rest of the report, MMR immunization rates among kindergartners will be used as a proxy for overall vaccination rates due to the type of school immunization data provided and because changes in reported vaccination rates year to year do not appear to be specific to individual vaccines; rather, changes in one vaccination rate typically accompany similar changes in other required immunizations. Finally, using school survey data, it was not possible to distinguish between students who were exempt from either individual vaccines or all required vaccines.

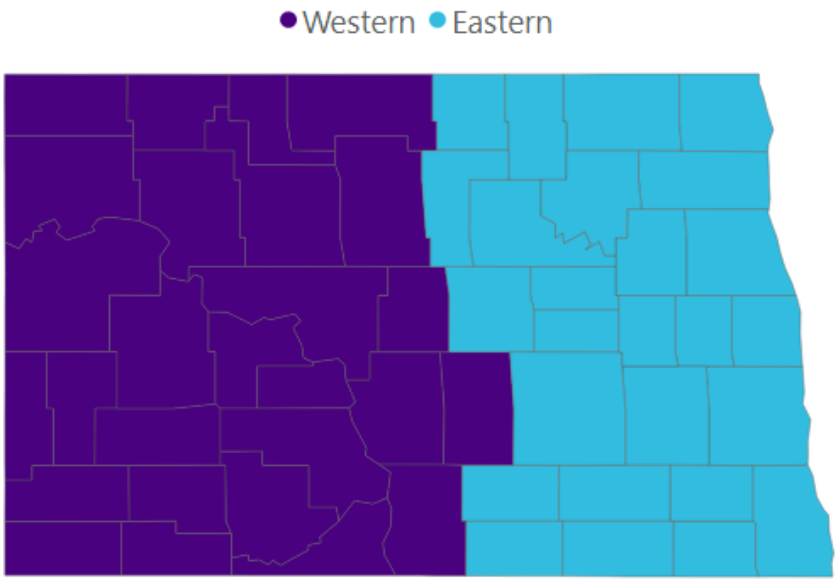

Figure 6. North Dakota counties designated as “eastern” or “western” for analysis

Stakeholder Engagement

Focus Group and One-on-One Interviews

Stakeholders involved in the immunization process in North Dakota schools were recruited through an email invitation for a focus group or one-on-one interview. Stakeholders included employees at schools (school nurses, administrators, administrative assistants, and principals) and local public health unit (health nurses and administrative staff).

Those individuals self-identifying themselves as the immunization contact at their respective school(s) on the NDDoH school immunization survey were invited to participate. These stakeholders often held positions in schools working directly with immunization records and exemptions to school-required vaccinations. The CIRE project manager contacted each stakeholder by email with details explaining the nature and goals of the project and time required for participation. Interested participants attended a focus group using the virtual platform Zoom. One focus group was held in person.

Participants were asked to complete an online pre-survey prior to their scheduled focus group. Data collected included basic information regarding their experience in North Dakota immunizations and school exemption policies and practices, demographic information including the counties and schools they serve, and thoughts and opinions on current North Dakota immunization exemption policies and practices.

At the beginning of each virtual focus group, participants were shown a brief PowerPoint presentation which included an overview of the importance of immunizations, a history of recent outbreaks of vaccine-preventable diseases, current immunization and exemption policies in North Dakota, local and national immunization and exemption rates, and information on resources for completing the North Dakota school immunization survey.

Following the PowerPoint presentation, focus group participants were asked a series of questions regarding their thoughts and opinions on school immunization and exemption policies, current trends in immunization and exemption rates, changes in practices since the emergence of the COVID-19 vaccine, and any suggestions that they felt could reduce immunization exemptions and increase immunization rates. Stakeholders were also asked for their opinions on the potential need for immunization policy changes in the state. Focus group questions were created and selected in conjunction with the NDDoH and with the project objectives in mind. Participants were reminded their responses were completely anonymous and encouraged to share their true thoughts and opinions.

At the end of each virtual focus group, participants were asked to complete a brief online post-survey. The post-survey asked how helpful the focus group was for either increasing their knowledge of vaccination or networking with other immunization stakeholders. Stakeholders were also asked their thoughts regarding current immunization policies, suggestions for changes to immunization policy, opinions on the virtual format of the focus group, and interest in future educational immunization training.

Clinician Survey

To better understand recent trends in immunization and exemption rates, CIRE surveyed clinicians at the forefront of childhood and adolescent immunization in North Dakota. The primary target audience was family physicians, nurse practitioners, physician assistants, nurses and other clinical staff.

CIRE worked with the NDDoH to obtain contact information for clinicians who serve as Vaccines for Children (VFC) providers in the state. The VFC program provides vaccines to eligible children 18 years and younger at little to no cost. The CIRE project manager emailed facility contacts at VFC clinics and provided a survey link to interested participants. The online survey included project details and goals as well as sector-specific questions regarding immunization trends and attitudes since the emergence of COVID-19 vaccines. Clinicians were asked about their beliefs, observations, and practices regarding vaccination of school-aged children, and local immunization requirements and exemption policies.

Results

North Dakota School Immunization Survey Analysis

School reported immunization data is gathered in North Dakota through an electronic survey sent by the NDDoH in the fall of each school year to school immunization representatives. The school survey contains a matrix with columns by vaccine type to report the number of students 1) up-to-date, 2) with a medical exemption, 3) with a religious exemption, 4) with a personal belief exemption, and 5) with a history of disease exemption. (Figure 7) The survey also adds the results of those columns into a total column and instructs the user that the “total should not be greater than the number of enrolled students”. School immunization survey data was used for result analysis.

Please answer the following questions for **Kindergarten** students:

Total should not be greater than the number of enrolled students.

	How many students are up-to-date?	How many students have a medical exemption?	How many students have a religious exemption?	How many students have a personal belief exemption?	How many students have a history of disease exemption?	Total
DTaP (Diphtheria, Tetanus, and Pertussis)	0	0	0	0	0	0
Polio (IPV)	0	0	0	0	0	0
Hepatitis B (Hep B)	0	0	0	0	0	0
MMR (Measles, Mumps, Rubella)	0	0	0	0	0	0
Chickenpox (varicella)	0	0	0	0	0	0

Figure 7. North Dakota school immunization survey for kindergarten, 2021-2022

Kindergarten immunization rates vary among counties in North Dakota. (Figure 8) An individual school immunization rate may be high even though the immunization rate in the county the school resides in is low (depicted as red) and, conversely, an individual school may have a low immunization rate even though the county it resides in has a high immunization rate (depicted as green).

Counties in western North Dakota tend to have lower immunization rates compared to counties in eastern North Dakota. During the 2021-2022 school year, eastern counties had an MMR vaccination rate of 93.94%, while western counties only had 89.94% of children up-to-date. (Figure 9) Immunization rates in both eastern and western North Dakota fall below the Health People 2030 goal of 95% MMR immunization coverage.

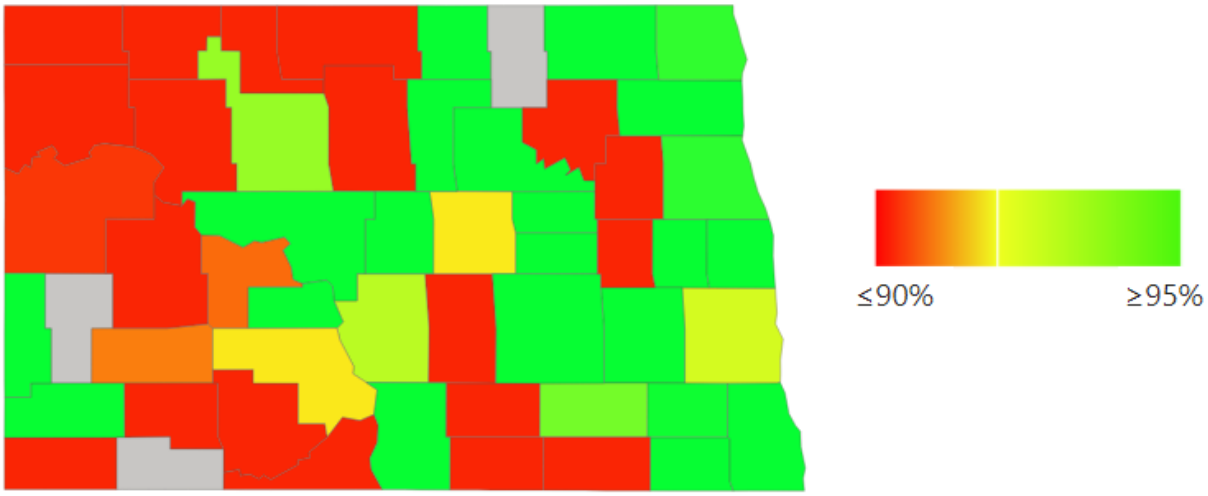

Figure 8. MMR kindergarten immunization rates by county, 2021-2022
Source: North Dakota Department of Health

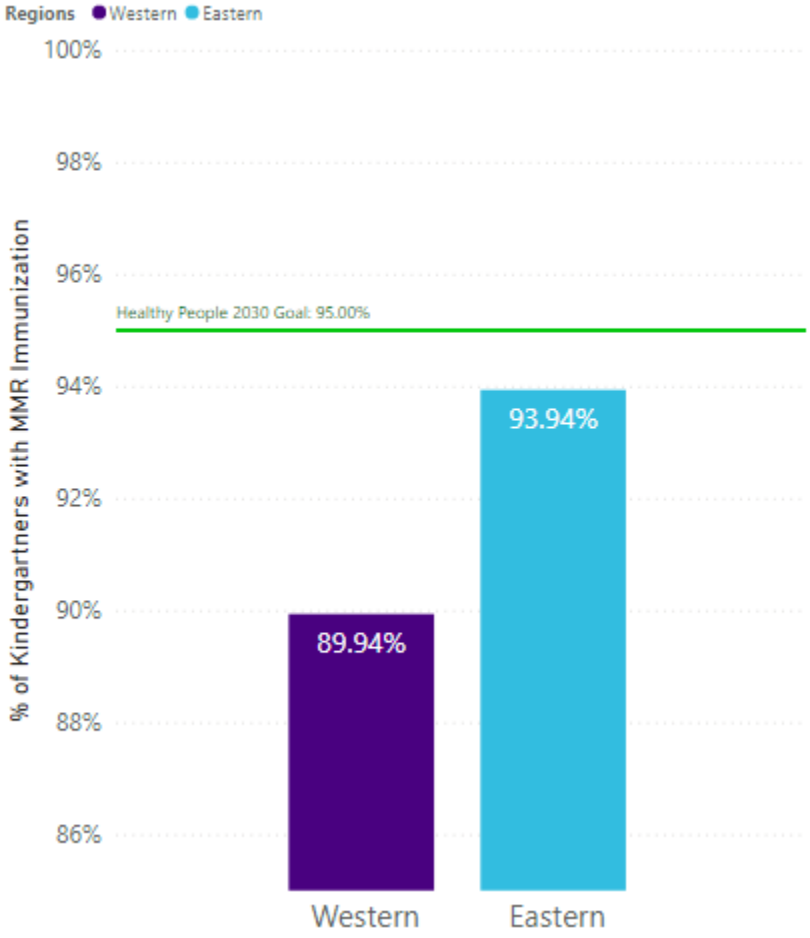

Figure 9. MMR kindergarten immunization rates by region, 2021-2022
Source: North Dakota Department of Health

Kindergarten exemption rates in western counties (6.34%) were approximately double the rate of exemptions filed in eastern counties (3.31%). (Figure 10) Additionally, the number of kindergartners reported as having no immunization record on file in western counties (2.72%) was over double the rate compared with eastern counties (1.33%). (Figure 11)

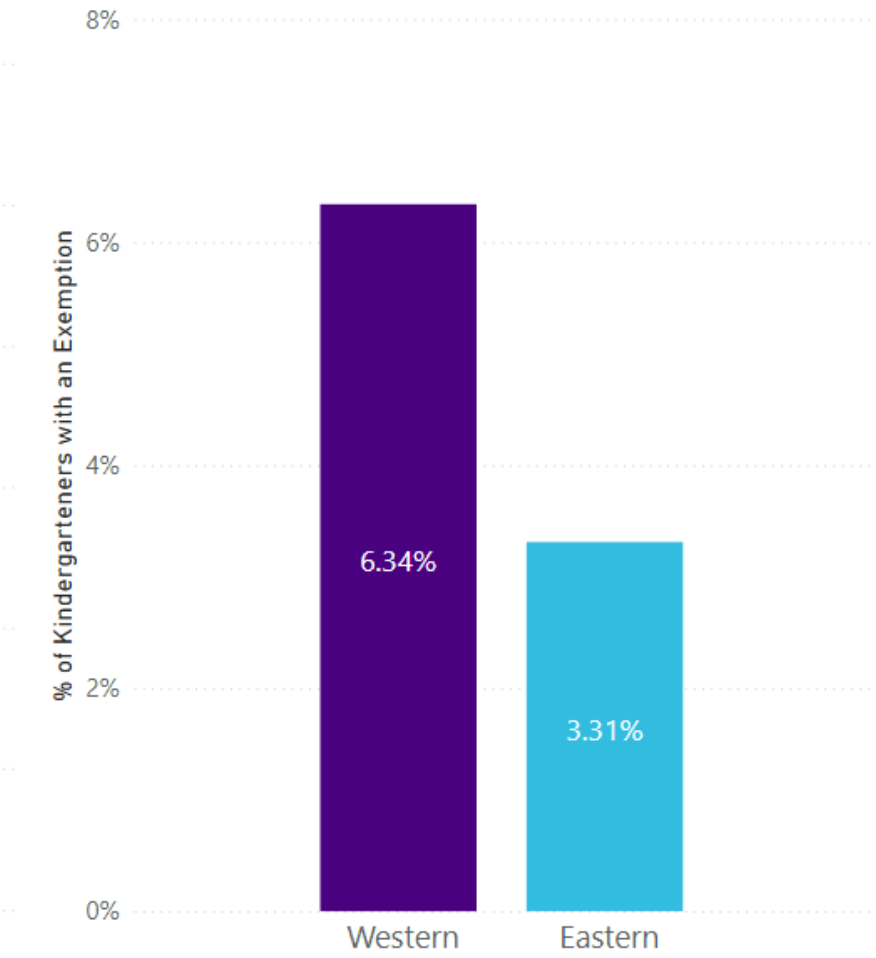

Figure 10. Kindergarten exemption rates by region, 2021-2022
Source: North Dakota Department of Health

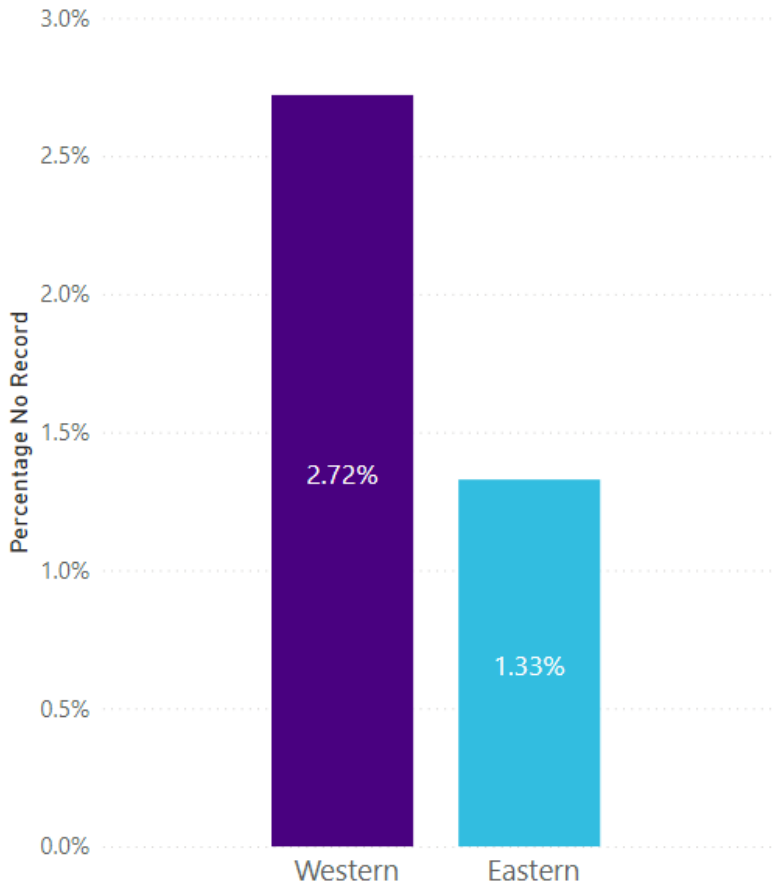

Figure 11. Rates of kindergartners with no immunization record by region, 2021-2022
Source: North Dakota Department of Health

Exemption rates prior to and two years into the COVID-19 pandemic were compared using data from the 2019-2020 (pre-pandemic) and 2021-2022 (2 years into pandemic) school years. Exemption rates increased for personal belief, religious, and total exemptions for both western and eastern counties in North Dakota from 2019-2020 to 2021-2022. Rates for religious exemptions in western counties show the most substantial increase almost doubling from 1.10% pre-pandemic to 1.9% two years into the pandemic. (Figure 12)

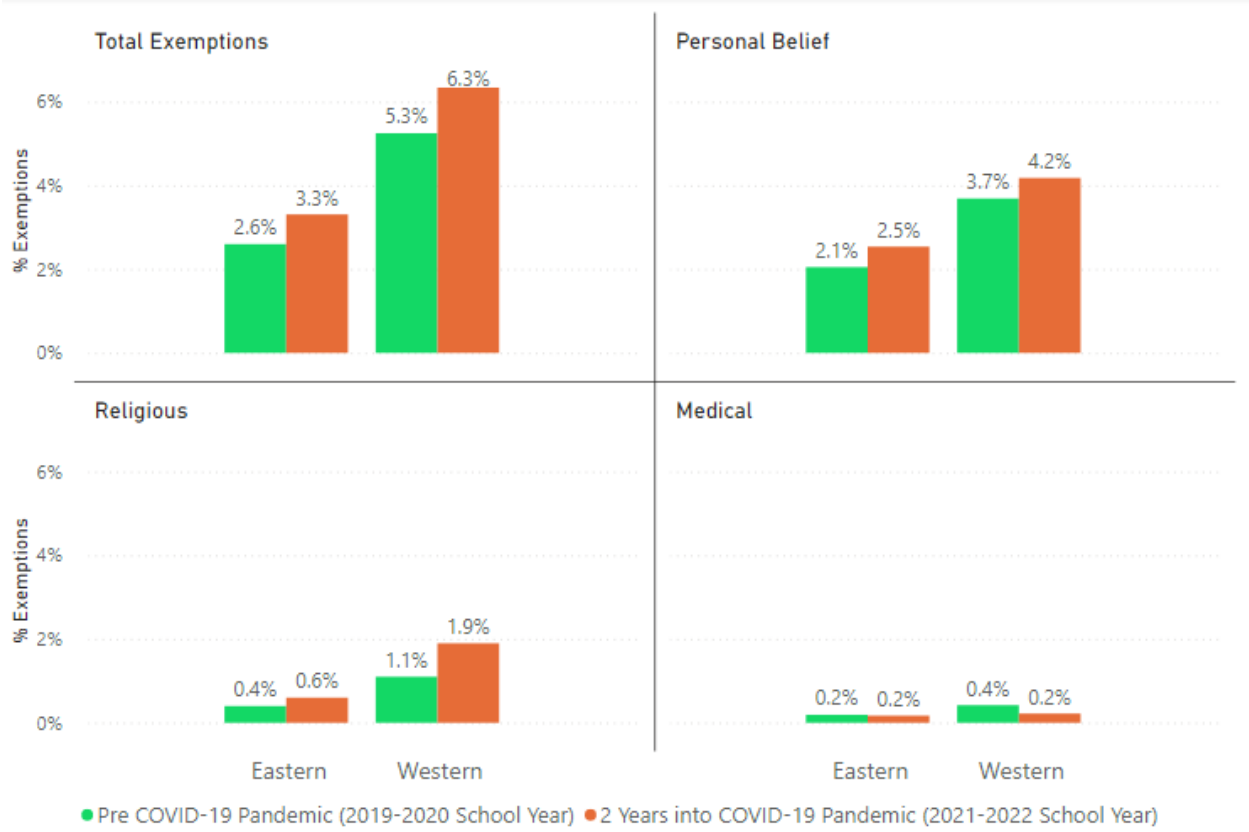

Figure 12. Exemption rates prior to (2019-2020 school year) and two years into (2021-2022 school year) the COVID-19 Pandemic
Source: North Dakota Department of Health

Non-public schools in North Dakota have historically had higher exemption rates than public schools. Recently, this gap has widened, resulting in exemption rates in non-public schools (8.70%) that are nearly double the rates of public schools (4.41%) in the 2021-2022 school year. (Figure 13) Personal belief exemption rates for non-public schools (6.09%) were almost double the rates in public schools (3.07%). Similarly, religious exemption rates in non-public schools (2.39%) were over double the rates seen in public schools (1.15%). Conversely, medical exemption rates are similar in public and non-public schools, .19% and .22% respectively.

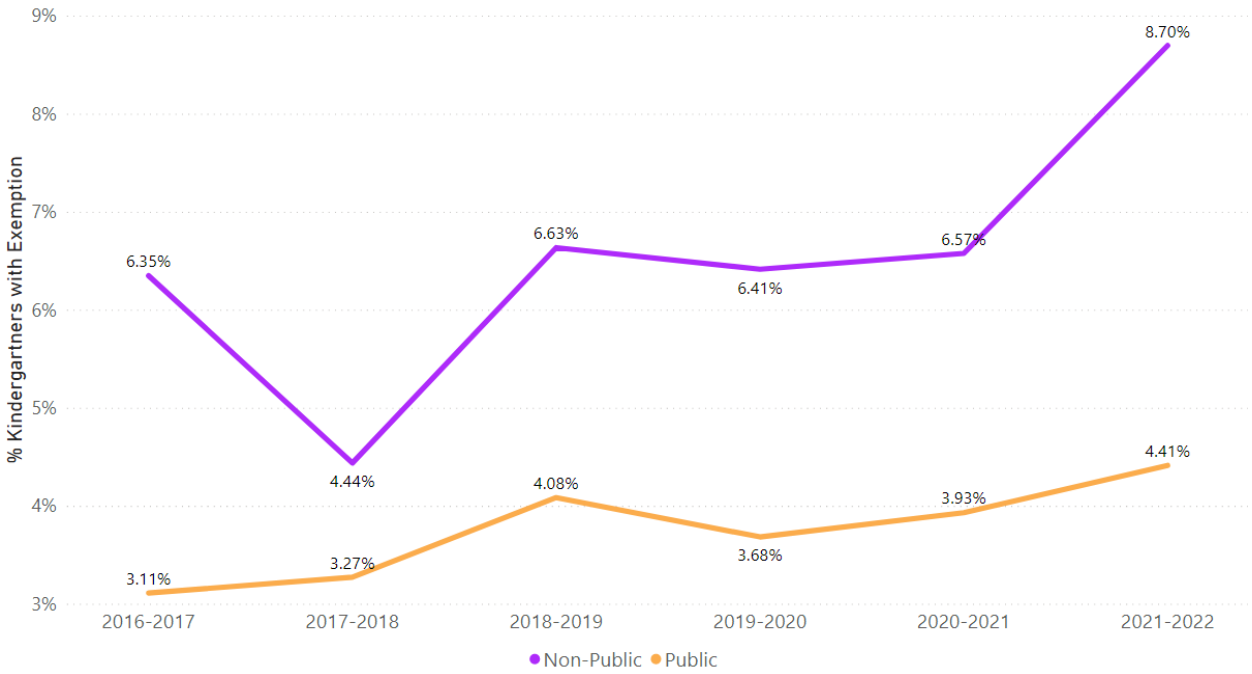

Figure 13. Historical kindergarten exemption rates for non-public and public schools in North Dakota
Source: North Dakota Department of Health

Similarly, non-public schools have historically lower immunization rates when compared with public schools. Although MMR immunization rates for the 2021-2022 school year among kindergartners in North Dakota decreased overall, rates were disproportionately lower in non-public schools (85.43%) when compared to public schools (92.89%). (Figure 14)

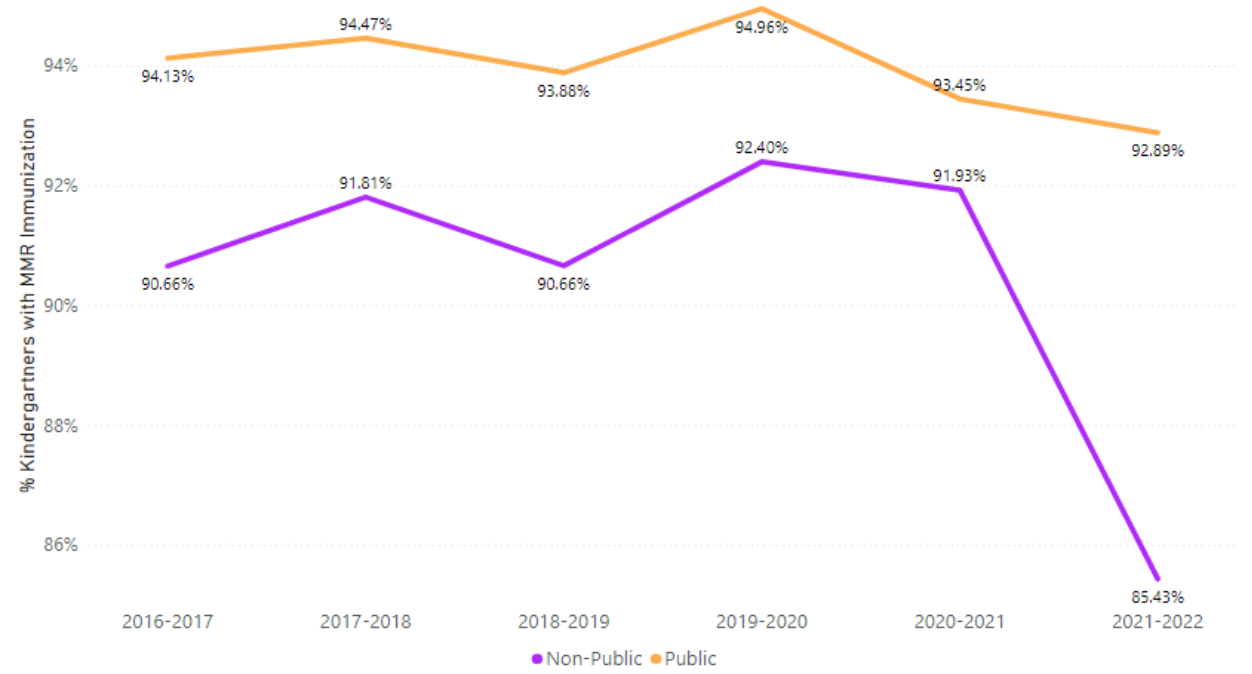

Figure 14. Historical kindergarten MMR immunization rates for non-public and public Schools in North Dakota
Source: North Dakota Department of Health

Focus Groups and One-on-One Interviews

A total of 12 focus groups and one one-on-one interview were conducted with 54 immunization stakeholders representing 29 counties across the state. (Figure 15) Most of this work was conducted virtually with only one focus group conducted in person. Of the focus groups, nine were school groups comprised of school employees such as principals, nurses, and administrative staff. Three additional focus groups were conducted among public health groups consisting entirely of local public health unit employees.

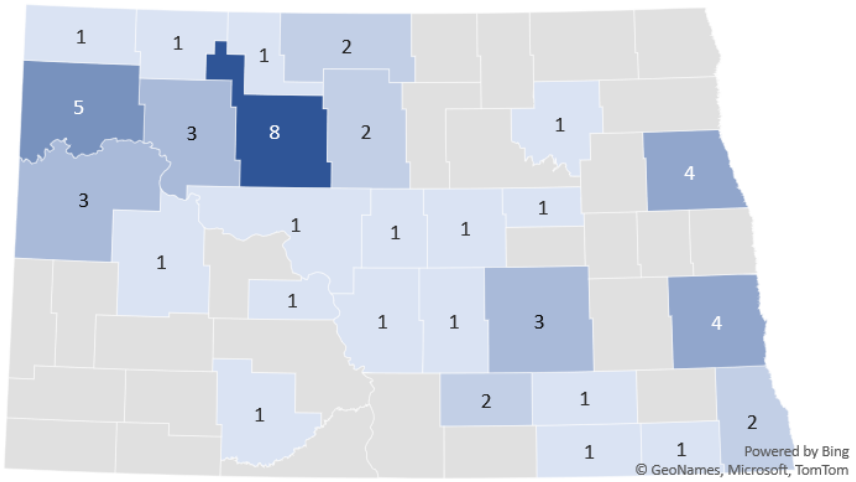

Figure 15. Number of individuals who participated in either a focus group or one-on-one interview by county

Schools

In discussions with school representatives, almost all participants felt the current immunization requirements for school entry in North Dakota are adequate. A few stakeholders suggested that the human papillomavirus HPV vaccine be made a requirement for 7th grade entry. Additionally, all stakeholders recognized the importance of childhood vaccination for maintaining herd immunity and prevention of disease outbreaks in schools.

Most stakeholders reported they had noticed a decline in immunization rates and an increase in exemptions most noticeably in the years since the start of the COVID-19 pandemic. Many stakeholders attributed the decrease in immunizations to lack of prioritization of routine immunization rather than vaccine hesitancy. Early in the pandemic, stay at home orders and decreased movement forced parents to delay routine healthcare, including immunizations. The backlog of children with overdue healthcare appointments combined with an already stressed healthcare system complicated the process of routine childhood immunization. School representatives felt the majority of new non-medical exemptions filed since the COVID-19 pandemic were out of convenience and to avoid exclusion from school, rather than a true personal or religious belief preventing parents or guardians from vaccinating their children.

Although convenience and reduced access to immunizations was stated as the most likely cause for increased exemption rates, many stakeholders agreed that the emergence of the COVID-19

vaccine has changed parents' perceptions towards routine vaccination. Many stakeholders felt that parents who once trusted them as the local authority are now skeptical and question vaccination schedules and requirements. One common theme shared was a trend in families who have older, vaccinated children that unexpectedly filed exemptions for their younger children, suggesting new hesitancy towards or refusal of routine immunizations. Parents are explicit with school stakeholders about not wanting to feel pressured to vaccinate their children. Some school stakeholders felt that exemptions would continue to rise as the full effect of COVID-19 is realized.

Some of the trends discussed by stakeholders have been noted previously. For example, as noted in the CIRE report titled "Immunization and Exemption Policies and Practices in North Dakota: A Comprehensive Review and Recommendations for Improvement", many stakeholders continue to see chiropractors spreading anti-vaccine sentiments in their region which negatively affects vaccine confidence and ultimately leads to a decrease in vaccine uptake.[4] Additionally, stakeholders feel children from families of low socioeconomic backgrounds seem to have lower immunization rates. This mimics data released by the CDC showing that, in 2017, only 89% of children aged 19-35 months living below the poverty line had gotten at least one dose of MMR, compared to 93% living at or above the poverty level. [42]

Many stakeholders commented on how easy it is to obtain an exemption for personal belief or religious reasons in North Dakota. Stakeholders agreed that exemptions were a "last resort" option for students, but many acknowledged that they had offered school immunization exemption forms to parents. For students who are non-compliant with immunization requirements, the ease of obtaining an exemption provided a way for schools to meet the October 1st deadline and to avoid excluding students from school.

Opinions on exclusion from school when children do not meet immunization requirements were mixed. The majority of school representatives stated they do not enforce exemption policies, which was both a reflection of the philosophies of their local superintendents and a product of conflicting personal views on enforcement. One stakeholder commented, "It is my role to educate students, not turn them away." Many explained how school serves as a safe haven to students, especially for disadvantaged students who face socioeconomic challenges. The few participating schools that enforced exclusion policies were mostly non-public schools, with one school stating it was easier to maintain, monitor, and enforce immunizations due to smaller enrollment and having a closer relationship with parents. Most schools allow students to stay in school as long as an appointment has been scheduled, even if it is after the October 1st deadline. Most stakeholders felt the pandemic made the already difficult task of enforcing immunization requirements even more challenging. They explained that quarantine requirements and mask mandates have resulted in heightened mistrust in government and defiance towards rules and regulations. Many parents have responded to school officials who attempt to enforce required immunization with statements such as, "The government will not tell me what to do with my children."

Challenges

When asked about challenges associated with enforcing school immunization requirements, school representatives stressed that it is difficult to maintain authority and trust. Many felt that letters from their school regarding students' immunization records are not being taken seriously and felt letters from higher authorities, such as the NDDoH, might be better received.

Providing immunizations at school was consistently discussed as an effective way of increasing immunization rates, especially in rural areas. Several participants were interested in offering immunizations at school, but they were unfamiliar with the protocol for how to collaborate with the local public health unit. They also expressed concerns relating to insurance, portability of vaccines, and obtaining parental consent. Many felt that although providing immunizations within schools could improve their immunization rates, they lacked the information, time, and resources to consider implementing a program at their schools. Additionally, many stakeholders worried that it would cause friction between school staff and parents. One stakeholder said parents are hesitant to have their children vaccinated at school because they are "afraid we are going to sneak in the COVID-19 vaccine." In contrast, another stakeholder felt that the emergence of COVID-19 vaccine had resulted in increased awareness and uptake of routine vaccination.

Stakeholders also expressed that lack of parental knowledge of vaccine requirements is a barrier. This is especially noticeable with the meningococcal conjugate vaccine (MCV4) for students entering grade 11. Many stakeholders felt there is an educational component missing for this age group and explained that when parents were made aware of a missing MCV4 vaccination, the majority were compliant, stating they didn't know their child was overdue for the immunization.

Additionally, some school administrators have noticed a large influx of students from immigrant families who often are missing proof of vaccination for their children. Language barriers make translation and understanding of immunization requirements difficult. One stakeholder specifically discussed have trouble finding immunization documents for parents from Pakistan, which would significantly assist in communication with the students and caregivers in her region.

Time constraints and understaffing were commonly mentioned as challenges to maintaining compliance with immunization requirements. Transient student populations make the process of obtaining and maintaining vaccination records difficult. The majority of stakeholders felt the October 1st deadline is too early in the school year and does not provide adequate time for collection of immunization records. They speculated that the early deadline increases the temptation for schools to offer an exemption to a parent/guardian as a way to meet the deadline.

Many of the larger school districts utilize PowerSchool for maintaining immunization records. However, there is no link between NDIIS and PowerSchool. A linkage in these systems could reduce the amount of time necessary to maintain immunization records and complete the school surveys, and it could improve the accuracy of the data collected.

Recommendations

Most stakeholders believe that exemptions are too easy to obtain in North Dakota. Most suggestions for change include that an educational component prior to obtaining an exemption be required. Delivery methods for this education ranged from online PowerPoints or videos, local public health unit classes, or education with a healthcare provider.

Misinformation and distrust in immunizations appears to be emerging as a common theme for stakeholders within the school system. Many stakeholders reported they struggle to maintain their role as an authority figure. Stakeholders suggested communication regarding student's immunization records be provided on NDDoH letterhead as a solution. The letter would be similar to the current templates provided in the school immunization survey toolkit and include information regarding the requirements for school entry in North Dakota, education regarding the importance of vaccinations, and the student's individual immunization record including upcoming and overdue immunizations.

Stakeholders often cited lack of resources as challenges to increasing immunization rates in their region. Many requested that the NDDoH consider networking with local health units and school districts to answer questions and establish relationships between regional stakeholders with the ultimate goal of providing immunizations within schools. Rural school providers often expressed a lack of knowledge for how to implement new immunization processes within their schools. Further, some stakeholders felt their school administration would be interested in resources on laws regarding exclusion of non-compliant students. Many stakeholders cited the increasingly volatile dynamic of the conversation surrounding vaccination requirements and would be receptive to resources on how to handle such conversations in more effective ways. Additionally, school administrators believe they could use more resources regarding vaccine education. Many shared that caregivers often look at the school's website or Facebook pages for timely and factual vaccine information. They would be interested in learning more about how to educate parents on vaccination requirements using social media.

Most stakeholders feel the October 1st deadline is too early. Many requested a more feasible deadline be implemented with the consideration of the time required to obtain immunization records each school year, including accessing NDIIS, contacting out-of-state facilities, communicating with parents/guardians, providing education, and scheduling immunization appointments.

Finally, stakeholders suggested improvements to the way immunization data is stored and shared. Many school administrations expressed they would like to see PowerSchool link with NDIIS to improve the efficiency and accuracy of immunization records. In all focus groups, the creation of a national immunization registry was reported frequently as the most helpful tool that could be provided to stakeholders to better manage and enforce immunization requirements in school.

Local Public Health Units

Public health nurses and employees stated they have observed both a decline in immunization rates and an increase in exemptions to school-required immunizations since the COVID-19 vaccines were authorized for emergency use in December 2020. Similar to schools, public health stakeholders agreed the majority of exemptions were due to a decreased prioritization of vaccination rather than vaccine hesitancy or vaccine refusal. Some public health employees suggested that immunization rates may improve as COVID-19 protocols are relaxed and routine care becomes more accessible and easier to prioritize.

Although public health stakeholders did not think it was the primary cause of the decline in immunization rates, they noted that vaccine hesitancy had substantially increased. Many expressed concerns over the spread of misinformation that was brought to their attention at patient encounters. Further, the majority of public health employees voiced frustration over the increasing level of patient mistrust in health information. One nurse stated, “We used to be their primary contact of trust (for health information), but that is not there anymore.”

Stakeholders pointed out that the majority of schools that they served in North Dakota do not enforce immunization requirements or exclude non-compliant students. Additionally, stakeholders felt exemption forms are too easy to obtain, and that some schools hand exemption forms out too quickly to parents without proper education and resources. They believed this sends the wrong message when we should be more concerned about maintaining immunization rates in schools. One nurse shared a story of a parent who asked the school about where to obtain the required meningitis vaccination for her child. A school employee gave the parent an exemption letter as a means to meet the immunization requirement for school and did not provide information about the vaccine or where it was offered. Public health nurses acknowledged that many school administrators are not trained health professionals. Many nurses felt exemption forms should only be available to those that are trained in vaccine education.

Public health employees stated they appreciate NDIIS for providing updated immunization information but felt frustrated with the disconnect between NDIIS and PowerSchool. Many explained that having to enter information into two systems was not only time-consuming but also made their records more vulnerable to data entry errors. This issue is exacerbated when school administrators scan immunization information into PowerSchool without entering the information into NDIIS, resulting in large gaps in documentation. Overall, stakeholders feel when they do experience glitches while working with NDIIS, they are able to contact the support team via email and these issues are usually resolved quickly.

Challenges

A considerable challenge noticed by local public health stakeholders was the ease of access to exemption forms by both the schools and parents. One nurse expressed she felt like a school in her region hands out exemption forms “like candy” as a quick and easy fix in order to meet the

October 1st deadline. Many nurses are concerned that allowing access to immunization exemption forms might be encouraging parents/guardians to delay immunizations.

Most stakeholders agreed that immunization rates generally increase when immunizations are provided in schools. However, most stakeholders stated there are many challenges to coordinating these types of events. The greatest challenges to providing in-school immunization clinics were 1) advertising upcoming immunization clinics and 2) obtaining consent. Many health units stated that schools are concerned about the backlash from parents if they advertise immunizations on their online platforms. Additionally, health units expressed frustration in the ability to obtain consent from parents, stating that paper consent forms often get lost in backpacks and are not returned. Due to low visibility and issues with consent, there seemed to be a consensus that immunization clinics within schools have a low turnout and are not worth the effort.

The addition of PrepMod by the NDDoH as a tool for organizing immunization events seemed to have mixed reviews. While one LPHU employee praised PrepMod for its ease of obtaining electronic consent, many others felt frustration with PrepMod's inability to bill for vaccination or link with the LPHU's current billing system.

Recommendations

The majority of public health employees agreed that the accessibility to exemption forms in North Dakota is a major concern. Many suggested exemption forms only be obtained from a healthcare provider after an educational component has been completed to make sure there is clear and factual understanding of vaccinations and the potential consequences of being unvaccinated.

Public health employees strongly suggested the need for consequences or incentives related to immunization enforcement in schools. Recommendations for consequences included loss of funding for non-compliant schools or inability for schools to participate in state-sanctioned sporting activities and events.

Public health employees have noticed an increase in misinformation circulating regarding vaccine safety and efficacy online. To combat this misinformation, they suggested an increase in educational outreach regarding vaccinations on social media with an emphasis on vaccine safety and importance of vaccination for disease prevention.

Clinician Survey

Of the 93 healthcare staff who were sent links to the clinician survey, 24 individuals representing 15 counties across North Dakota responded. (Figure 16) Nineteen identified themselves as working in family practice while the other five identified themselves as pediatric providers. (Figure 17) Individuals completing the survey included nurses, physicians, physicians, and other clinic staff. (Figure 18)

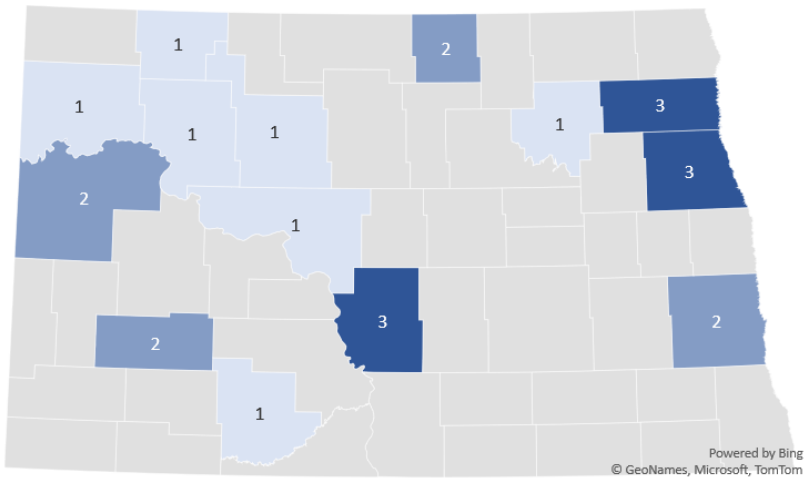

Figure 16. Number of individuals who participated in clinician survey by county

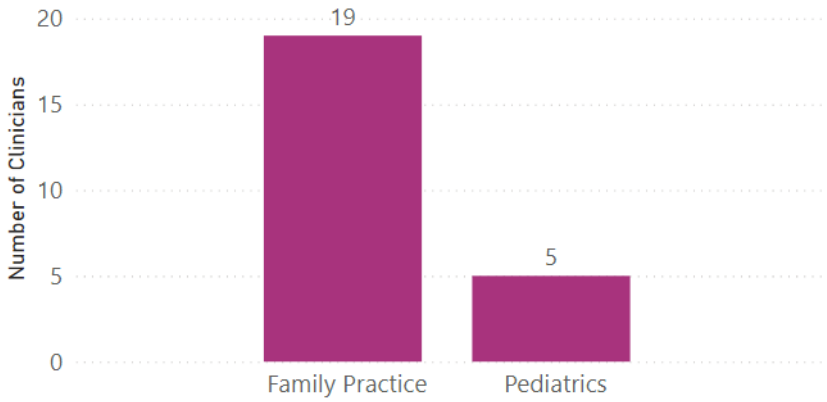

Figure 17. Primary specialty distribution in clinician survey results

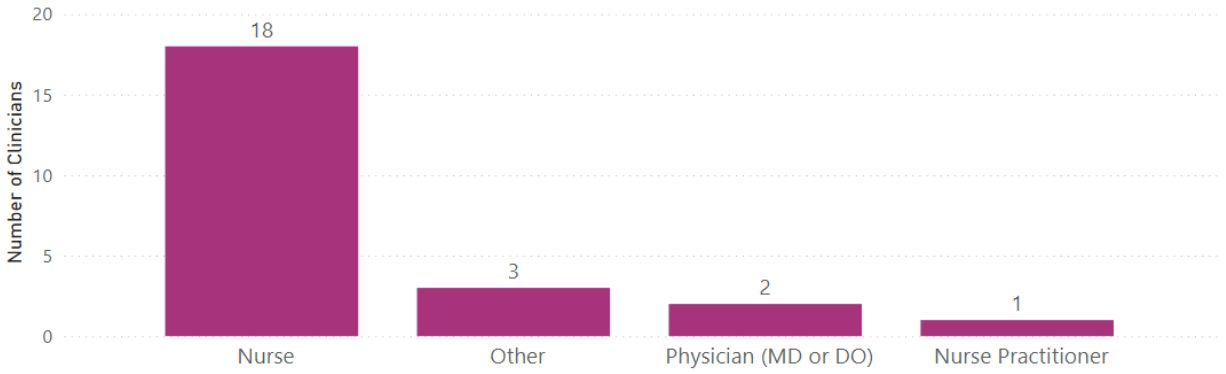

Figure 18. Primary job title distribution in clinician survey results

Most clinicians surveyed noted that they treat patient encounters with non-vaccinating families the same or very similar to vaccinating families, with only half of respondents reporting that they continue to bring up vaccination at subsequent visits. Approximately one third of clinicians require the parent/guardian to sign a patient declination form. Only two clinicians reported that non-vaccinating patients are dismissed from the practice, while one clinician reported scheduling appointments for non-vaccinating families at a particular time of the day. (Figure 19)

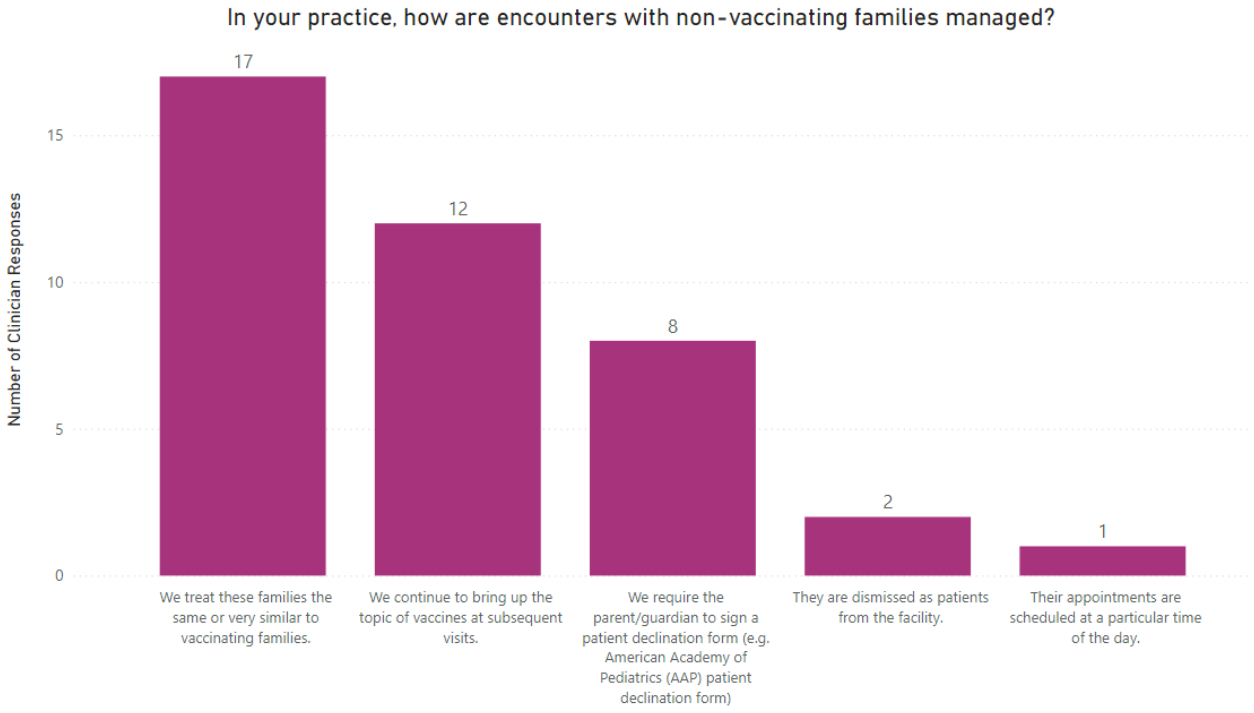

Figure 19. Clinician policies regarding non-vaccinating families

When asked about their general approach to a vaccine-hesitant parent, the majority of respondents reported they provide education on the vaccination, including the benefits, risks, and disease(s) they prevent. Approximately two-thirds of respondents reported trying to

understand the parent's views and respect the patient's choice not to vaccinate. Three respondents reported that they usually do not have enough time to educate patients on vaccination even though they would like to. (Figure 20)

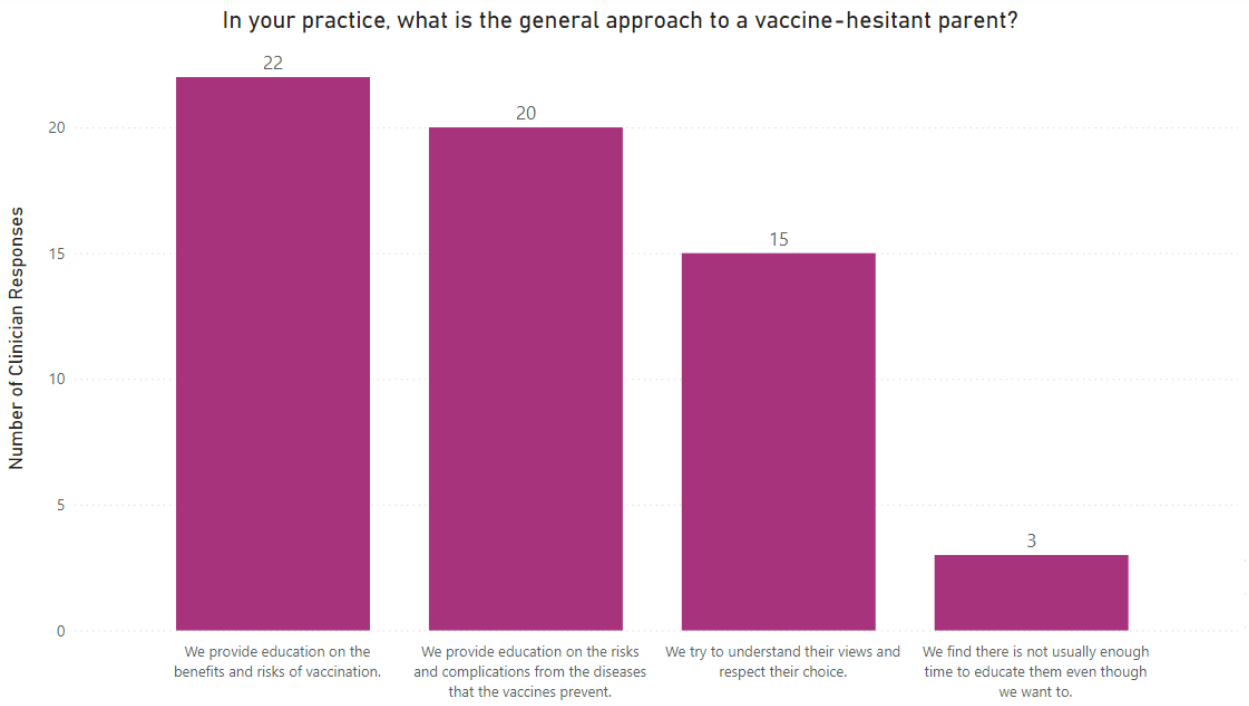

Figure 20. Clinician approaches to vaccine-hesitant parents

The majority of the survey respondents believed that exemptions for personal belief or religious reasons are too easy to obtain in North Dakota. (Figure 21) However, when asked If there should be changes to these policies, the responses varied. Most clinicians were unsure if there should be changes, while others were split equally between changing and not changing the exemption policy. (Figure 22) All clinicians surveyed reported granting medical exemptions if there is a risk of harm to the patient, and most will grant a medical exemption if there is patient history of adverse reaction to vaccines. One-third of participants reported that a verbal request for a medical exemption from a parent/guardian was sufficient for the provider to issue a medical exemption, and even less said they would grant a medical exemption if there was a family history of adverse reaction to vaccines. (Figure 23)

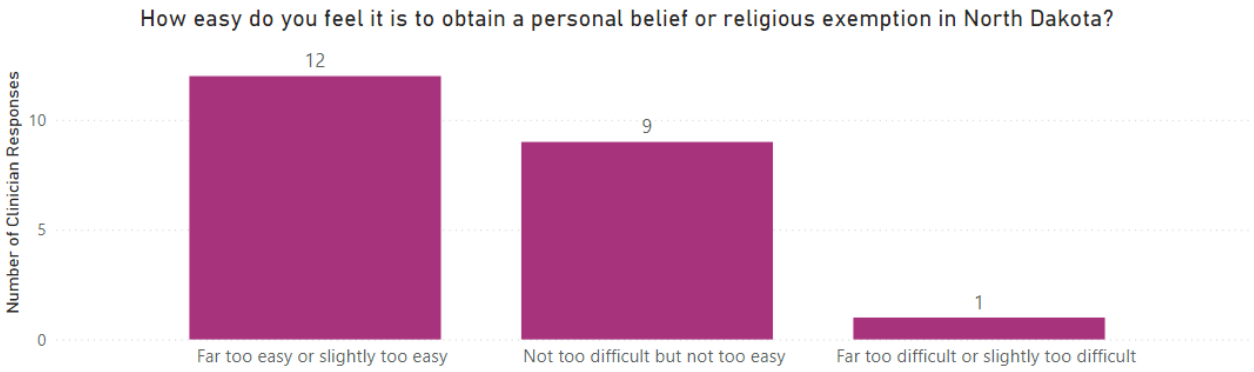

Figure 21. Clinician opinions regarding rules for obtaining personal belief and religious exemptions in North Dakota

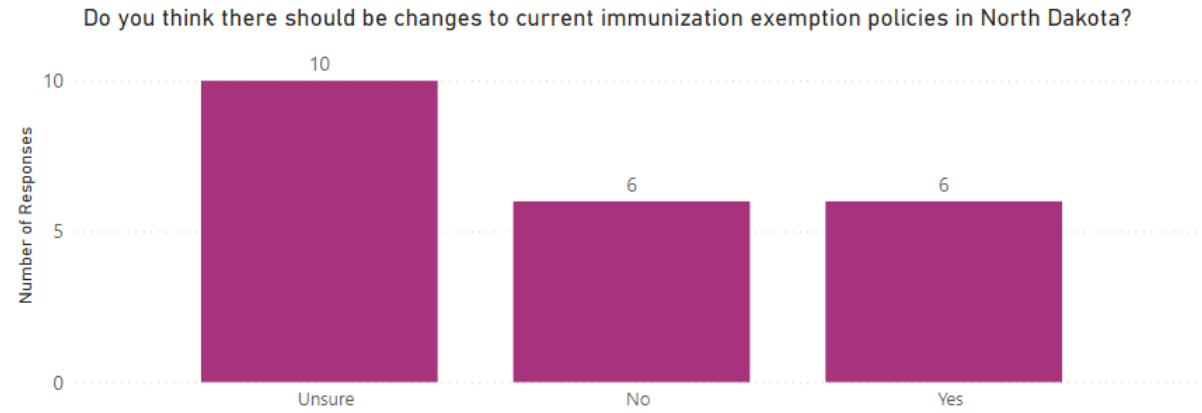

Figure 22. Clinician opinions regarding whether changes should be made to current exemption policies in North Dakota

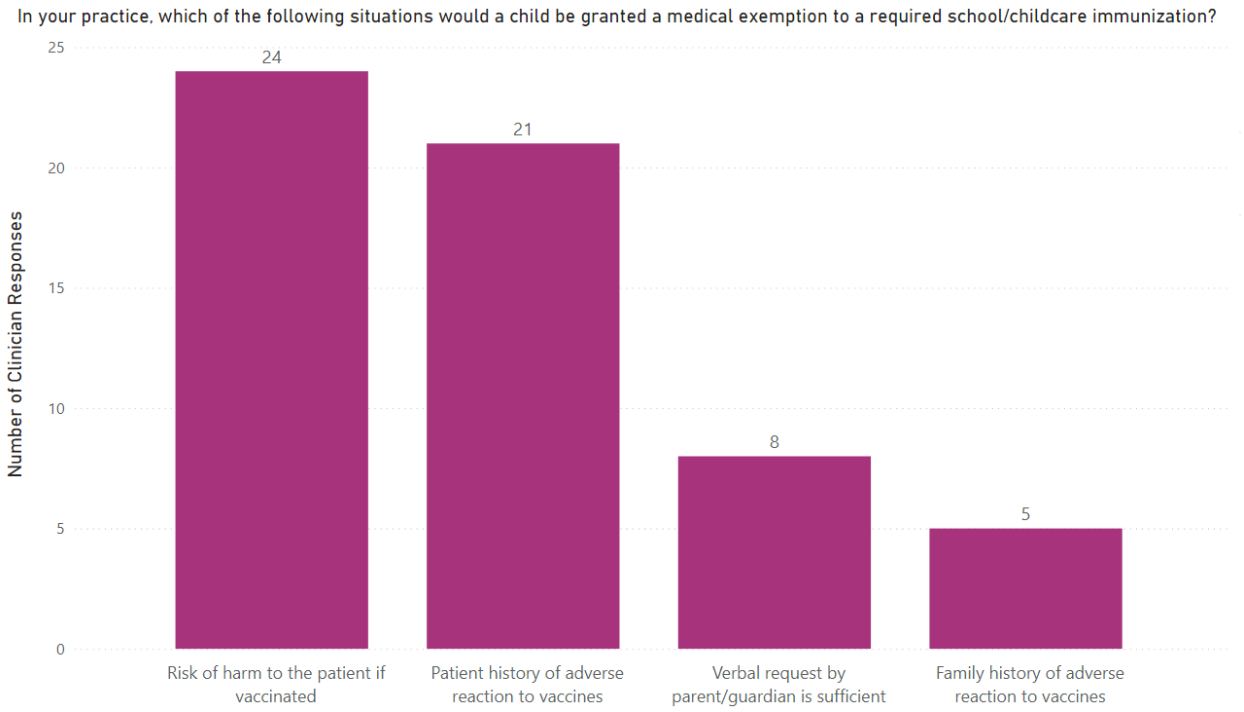

Figure 23. Clinician criteria for granting a medical exemption

Recommendations

A few participants shared their thoughts on ways to increase vaccination rates in North Dakota. Some felt North Dakota should impose stricter rules for obtaining an exemption to school required immunizations. One respondent said exemptions are "too easy to obtain, and often parents/patients are not making rational, sound decisions based on medical and scientific fact… It is undermining our profession." Another clinician said parents need to be educated on the consequences of their actions when choosing not to vaccinate their children, and they suggested increasing educational outreach on vaccine safety and the consequences of not vaccinating children. Finally, one respondent felt that most of the recent emphasis has been on the COVID-19 vaccine and that "now seems to be a good time to get back to discussing the option for all children to be vaccinated against everything."

Discussion

NDDoH School Survey Analysis

Recommendations

The collection and reporting of school immunization data is not an easy task. Data is validated by the NDDoH by evaluating a sample of de-identified, individual records, but while this might improve accuracy, this is unlikely to significantly change reported immunization rates. After

analysis of the school survey data for the 2021-2022 school year, in most cases the numbers do not match, but in many cases, it is clear there were either data entry errors or misunderstanding in how to accurately report immunization data.

There are a few suggestions that could improve the accuracy of the data collected in the school survey. First, there is no designated column within the matrix for those students with no record or for those students provisionally enrolled that are in progress of becoming up-to-date with required vaccinations. Keeping in mind the disruption of the COVID-19 pandemic and the increased likelihood that more students may have delayed vaccinations, the need for a column for those students in-progress is critical for accurate data collection. Secondly, many of the individuals completing the survey are not trained in immunizations and therefore may lack the knowledge necessary to accurately complete the survey. To avoid confusion, it is important to ensure the format and language used in the school survey matches immunization databases used to complete the survey (NDIIS, PowerSchool, etc.). Finally, when the user fills out the survey, there do not appear to be any internal validation steps to ensure accuracy of the data being collected. A simple solution could be to include a validation step within the survey so if the total column does not match the number of reported students surveyed, the survey cannot be submitted. Ideally, when the numbers do not match, an error message would be triggered that asks the person submitting to double check the accuracy of their numbers. The error message could also include contact information for the NDDoH immunization group to reach out to for any questions about more complex situations or how to accurately report the data. This would not only improve the accuracy of the data collected but also strengthen the relationship between NDDoH and immunization stakeholders.

School immunization survey analysis for the 2021-2022 school year showed that disparities continue to exist between eastern and western portions of the state. Similarly, exemption rates and the percentage of children with no immunization record on file are higher in western counties. Western counties face different challenges than eastern counties in North Dakota. Specifically, western counties have experienced a large influx in population due to the Bakken oil boom. The increased population created obstacles in obtaining accurate immunization records, especially from out-of-state providers. Understaffing further exacerbated the issue resulting in difficulties enforcing immunization requirements. Decreased access to care could also be a contributor to decreased immunization rates in more rural regions in western North Dakota. Additionally, although exemption rates for both religious and personal belief reasons increased in both western and eastern North Dakota over the past few years, it appears religious exemptions disproportionately increased in the western part of the state over past two years compared with pre-COVID-19 levels. CIRE feels that the NDDoH should work to better understand geographic disparities in North Dakota, including exploration into why religious exemptions specifically increased in western North Dakota after the COVID-19 pandemic.

Immunization rates in non-public schools in North Dakota are lower and exemption rates are higher in comparison to public schools in recent years. Specifically, for the 2021-2022 school year, only 85.43% of kindergartners at non-public schools were vaccinated against measles, mumps, and rubella compared with 92.89% of kindergartners at public schools. Low

immunization rates coupled with an exemption rate over 8% are extremely concerning for the health of the children in those schools. Nationally, a similar trend is seen with non-public schools having nearly 2-fold higher rates of overall exemptions when compared to public schools.[43] Concerns about vaccine safety, religious objections, or more lenient policies for granting an exemption in a non-public school are possible reasons for the disparity.[43] Public health initiatives should target non-public schools and address the challenges specific to those types of schools.

Focus Group and One-on-One Interviews

Limiting access to immunization exemption forms was a common theme between local public health units and school staff. Recent research indicates that states with simpler immunization exemption procedures have more than double the exemption rates when compared with states with more-complex processes.[44] To address this issue in North Dakota where it is relatively easy to obtain an exemption, stakeholders recommended adding an educational component to the process of obtaining an exemption. Other states have successfully decreased vaccine exemption rates following the implementation of rules requiring parents to attend immunization education when seeking an exemption to a mandatory vaccination.[45] In Michigan, the nonmedical exemption rate decreased by 35% statewide in the year after the new requirements were implemented.[45,46] Additional analysis showed that the amount of burden imposed on the parent (how much time or effort was required) had little to do with the degree to which exemption rates were reduced. The authors stressed that it did not matter how the implementation of any educational component was imposed, but that an educational requirement imposed in any way was associated with decreased non-medical exemption rates.[46] However, in light of the obstacles to vaccination the COVID-19 pandemic has created, it might be wise to wait to implement any additional burdensome processes at the current time. Limiting access to exemption forms could spark backlash and increase opposition to routine immunizations. In the future, an educational component provided to parents seeking a vaccine exemption should be strongly considered.

There was almost universal agreement between all immunization stakeholders that if vaccinations could be provided within schools, immunization rates would increase. However, stakeholders in local public health and schools feel there are a lack of resources in how to coordinate such events. Additionally, in-school vaccination clinics require a large amount of time and staff to advertise and organize to ensure the event is successful and worth the effort. The creation of a school-located vaccination clinic toolkit could provide schools and local public health units with the knowledge and tools to implement new programs. Similar toolkits have been created by immunization organizations and implemented in other states.[47,48] The toolkit could include planning and event timelines, clinic layouts, partnering information, emergency plans, sample template letters, and proper vaccine storage and handling. One suggestion is to include PrepMod specific training and education on how this system could help streamline the process of in-school immunization clinics making them simpler, more efficient, and ensure high turnout at events.

With the enormous amount of information circulating on the internet and with the increased number of people using the internet as a trusted source for health information, stakeholders expressed the need to be equipped with the resources to help increase their social media presence. The development of a social media toolkit tailored to North Dakota citizens and the issues faced in more rural communities could be a practical and helpful tool. Examples of social media toolkits for vaccine education and increasing immunization rates could be used as guidance for the creation of a more custom guide to social media campaigns specific for North Dakota stakeholders.[49,50]

There are resources available on the NDDoH website in English and Spanish regarding vaccination requirements for school entry in North Dakota. However, these resources do not appear to be available in any other languages. Increasing the availability of the multilingual school-required immunization resources available on the NDDoH website could greatly aid in some stakeholders' ability to effectively communicate immunization information and enforce immunization requirements.

Although vaccine hesitancy continues to be an issue, a considerable amount of the decrease in school-required immunization rates in North Dakota is due to children who are simply behind on their vaccinations. Public health initiatives should target the importance of routine immunization on the health and safety of the community. Also, it is critical stakeholders ensure wide availability to immunizations and ease of access to appointments for routine immunizations through non-traditional means such as evening and weekend appointments or non-traditional venues (sporting events, grocery stores, etc.). It is critical that schools are enforcing immunization requirements by the October 1st deadline. Collecting immunization records from students is a time-consuming and complex task. In order to meet the deadline, schools should work on gathering immunization documents and sending reminders well in advance to a child's first day of school. Beginning these processes early can go a long a way in helping make sure kids are up to date.

Clinician Survey

Clinician sentiments appear to echo those of the focus group participants. The majority felt that exemptions are too easy to obtain and some feel there should be changes, though many are unsure of the changes that need to be made. Additionally, one clinician stressed the need for increased public outreach and education surrounding vaccines.

Overall Recommendations

To improve immunization rates and follow recommendations provided by immunization stakeholders in North Dakota, CIRE recommends the following changes to policies, rules, and practice/processes.

Policy Changes

- No immediate policy changes are recommended at this time, as parents currently have the option to vaccinate their child or file an exemption. However, in the future, if exemptions continue to increase and the exemption form is routinely misused to achieve compliance, the NDDoH should consider requiring an educational component (with a healthcare provider or local public health unit staff or other designated medical provider) for parents seeking exemptions. This would limit those filing for exemptions out of convenience and it would ensure that parents are making an educated decision with a trusted medical provider.

Practice/Process Changes

- All schools should proactively work on immunization compliance prior to the start of the school year. Additionally, schools need to enforce school immunization requirements and exclude children who are not compliant after October 1st.
- The NDDoH should create a "school located vaccination clinic" toolkit to be used as a resource for schools and vaccinators with best practices in the coordination of school immunization events.
- The NDDoH should develop a "social media" toolkit for immunization stakeholders to promote vaccines and vaccine-related events (e.g. Back-to-School clinics, influenza vaccine blitzes, etc.)
- The NDDoH should develop a process to validate school immunization survey results to improve the accuracy of the data collected.
- Multilingual immunization resources for school-required vaccinations should be easily accessible and available on the NDDoH website.
- Templates for communication with parents/guardians regarding an individual child's school immunization records should be offered on NDDoH letterhead.

Limitations

The results of this project are subject to many limitations. First, the majority of focus group discussions were conducted virtually. In light of the ongoing COVID-19 pandemic and corresponding guidelines and restrictions in place during when this project was conducted, CIRE felt it was safest and most effective to utilize a virtual platform for focus group participation. This may have prevented some stakeholders from participating if they had limited access to internet or those who may not be as familiar with the technology. However, we found the ability to conduct focus groups online likely allowed many stakeholders, especially rural, the option to participate. Many stakeholders expressed their approval of the virtual focus group often stating they may not have been able to participate if it was in-person and in a larger community due to time or travel constraints.

Overall participation compared to the total number of local public health unit employees, school staff, and clinicians was low so the data presented may not represent the actual viewpoints of stakeholders.

The data collected from focus group discussions were primarily qualitative. More specifically, data were collected regarding opinions, attitudes, beliefs, and practices surrounding immunizations. Analyzing these type of data may be at greater risk for informational bias than quantitative data.

Further, there is a potential for selection bias in the study population since participants were not randomly selected. Because participants volunteered to participate, stakeholders with strong opinions on either side of the topic may be overrepresented. Additionally, although participants were reminded that any information collected during the focus group would be kept confidential, because focus groups involve more than one individual, participants may not have felt comfortable stating their opinions when they were different from others.

Certain key stakeholders were not included in focus groups such as parents/guardians, childcare providers, and clinicians. Due to limited time, resources, and other factors, CIRE could not invite everyone to share their opinions. Although online surveys helped to capture clinician perspective, survey invitations were only sent only to VFC providers, which does not represent the entire population of immunization providers in the state of North Dakota.

Because of time, resources, and other factors, this project did not have participation from a representative sample of immunization stakeholders from tribal groups in North Dakota.

Lastly, the primary mission of CIRE is to improve immunization rates in North Dakota, and as such the organization should not be viewed as an uninterested and independent third-party facilitator.

Conclusion

Compliance with state requirements for school immunizations is necessary to achieve high vaccination rates and prevent incidences of vaccine-preventable diseases. Recent trends in decreased immunization rates across the United States following the COVID-19 pandemic have further complicated an already difficult task. Clinicians and schools are faced with new challenges, including the vast spread of misinformation coupled with a heightened mistrust in government and science. At the height of the pandemic, schools and clinics struggled to deal with constantly changing protocols and guidance while still attempting to maintain confident and effective communication. Additionally, stay at home orders significantly disrupted routine care which was further exacerbated by extensions of grace periods for immunization records creating an excess of children needing care when restrictions were lifted. The ease in which North Dakotans can obtain a vaccine exemption has intensified the issue by creating an avenue for the misuse of exemptions out of convenience and a reduced prioritization of routine immunization.

The data collected in this report highlights the need for a deeper understanding of the long-term impacts of the COVID-19 pandemic on childhood immunizations. Additional studies should examine the potential for misuse of current immunization exemption forms and the effects of

lenient exemption policy on immunization rates in North Dakota. Geographic disparities highlight the need for more targeted research and interventions into the challenges faced by different demographics and regions in the state.

There are a multitude of factors contributing to decreased childhood immunization in North Dakota and thus the solution to improving rates must be multi-faceted. Schools and local public health units must work together to combat misinformation, educate the public on the importance of childhood immunization rates, and coordinate vaccination events. The NDDoH should work to create toolkits to aid in increasing social media presence and best practices for in-school immunization events. Improved accessibility to multi-lingual education materials regarding vaccination requirements will help ensure all communities are properly educated. Validation of school reported immunization results should be monitored and it is necessary to follow-up with schools when inaccuracies arise. In conclusion, the key to improving immunization rates lies in both policy changes and a personalized grassroots approach with collaboration between schools, local public health units, state health department, and clinicians.

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