



2017
2018



**Infectious Disease Epidemiology,
Prevention and Control**
BIENNIAL REPORT

MINNESOTA DEPARTMENT OF HEALTH

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ACRONYMS USED IN THIS REPORT

MDH: Minnesota Department of Health

IDEPC: Infectious Disease Epidemiology, Prevention and Control Division

CDC: Centers for Disease Control and Prevention

PHOTO CREDITS

Front cover: Emergency Hospital at Brookline, MA to care for influenza cases. (National Archives American Unofficial Collection of World War I Photographs)

Front cover & inside cover: Funeral procession for the Student Army Training Corps students at St. Olaf College who died in the influenza epidemic. (Northfield History Collaborative)

Front cover & page 1: Nurse wearing a mask as protection against influenza. September 13, 1918. Nurses were scarce, as their proximity to and interaction with the disease increased the risk of death. (National Archives at College Park, MD)

Page 1: Special hospital for Influenza Epidemic. Emery Hill, Lawrence MA. (National Archives American Unofficial Collection of World War I Photographs); Letter carrier in New York wearing mask for protection against influenza. New York City, October 16, 1918. Letter carriers, mass transit workers, and others who came in contact with the public, were especially vulnerable to disease. (National Archives at College Park, MD); Refugees from the 1918 fire seek assistance in the Duluth Armory. 1918, with the fire, the flu and the mounting toll of casualties from World War I, it is considered one of the worst years in Duluth's history. (Kathryn A. Martin Library Archives and Special Collections at the University of Minnesota, Duluth)



INFECTIOUS DISEASE EPIDEMIOLOGY, PREVENTION AND CONTROL

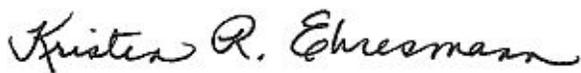
LETTER FROM THE IDEPC DIRECTOR

On behalf of the Infectious Disease Epidemiology Prevention and Control (IDEP) Division of the Minnesota Department of Health (MDH), I am pleased to present the 2017-2018 edition of the IDEPC Biennial report (our 4th report). This report provides a snapshot of the significant and diverse work we do as part of our agency mission to protect, maintain and improve the health of all Minnesotans.

The 100th anniversary of 1918 pandemic (highlighted in photos) is a testament to how far we have come in understanding infectious diseases. We now have the ability to test for and treat influenza. The article on influenza describes how we monitor for this disease in Minnesota.

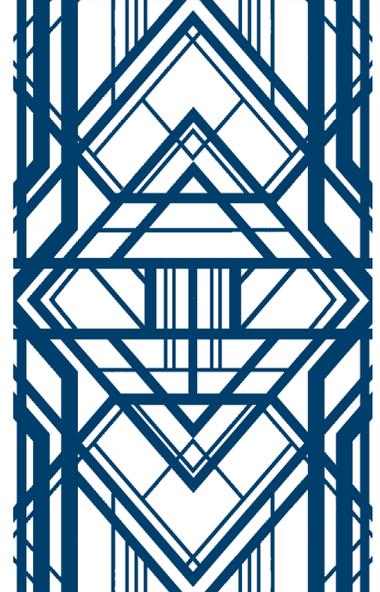
Our work is often in the news; some of the articles describe outbreaks you may have read about, such as the 2017 measles outbreak, which was the largest in the United States and the largest in Minnesota in nearly 30 years. However, there is much important work done in the division that does not make the evening news. This report provides a window on that work as well. Check out the article on our planning for Super Bowl 52 and the Safer F.A.C.E.s agritourism education project.

I encourage you to read more to learn about the exceptional (and interesting) work of the infectious disease staff and how they contribute to keeping all Minnesotans healthy!



Kristen R. Ehresmann, RN, MPH
Director

Infectious Disease Epidemiology, Prevention and Control Division



KEEPING THE PUBLIC SAFE DURING THE 2018 SUPER BOWL

On Feb. 4, 2018, Minneapolis hosted the National Football League Super Bowl LII, bringing to Minnesota thousands of visitors to watch the game and enjoy the associated festivities both before and after the main event. It also brought with it the possibility of increased disease transmission and biological terrorism attacks.

MDH worked extensively to support local public health planning efforts, especially the Minneapolis Health Department. Staff and leadership from IDEPC and the Center for Emergency Preparedness and Response spent many months preparing in collaboration with the Super Bowl LII planning committees.

Increased surveillance for infectious diseases, including possible biological attacks and preparations for high volume medical care needs (i.e., medical surge) were the primary focus of IDEPC's involvement in the preparations.



“It was a goal to be more than ready for any eventuality,” said Epidemiologist Tory Whitten, who helped plan MDH’s surveillance response. “With an event the size of the Super Bowl, the number of people who could be affected by a bioterrorism incident is enormous. We had to be prepared.”

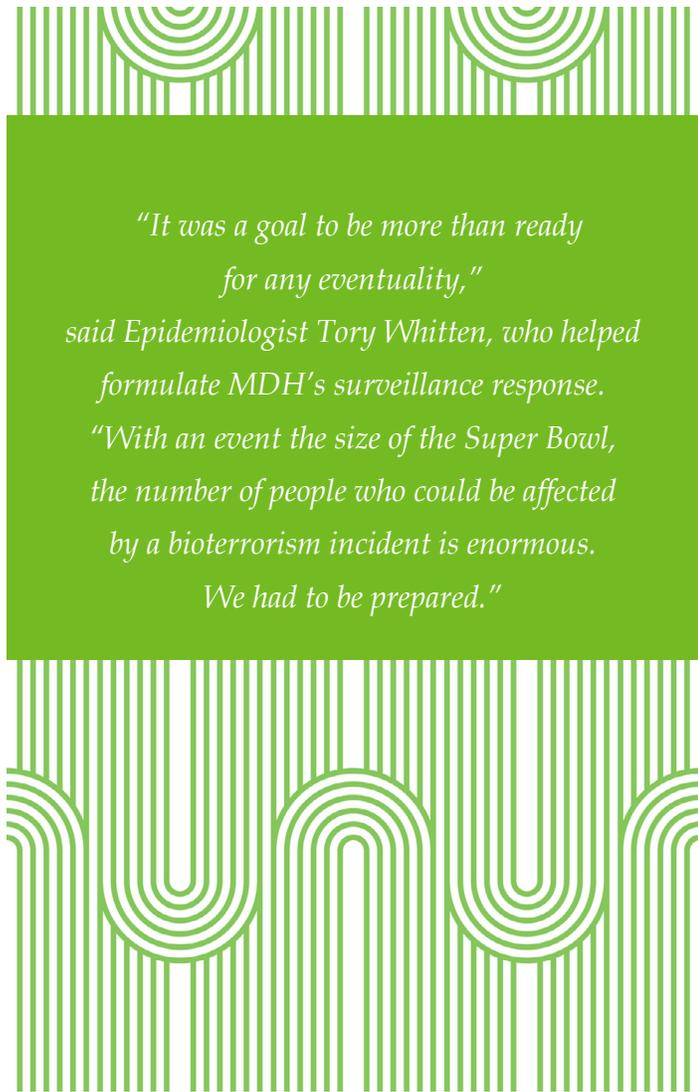
Higher than normal levels of illness were expected due to greater numbers of people congregating. “People spending time together indoors during flu season also had us concerned for possible upticks in influenza cases,” said Whitten.

Raj Mody, IDEPC medical director, worked with other state and local medical surge experts to plan for the possibility of needing to treat large numbers of patients in the event a bioterrorism attack, such as anthrax. Deputy State Epidemiologist Richard Danila took a leadership role in the ramp up of local bioterrorism surveillance.

Using an airborne pathogen detection system known as BioWatch, surveillance was expanded by adding more BioWatch units inside and around downtown Minneapolis Super Bowl venues.

“The BioWatch units collect and filter air, and our Public Health Laboratory tests the filters for evidence of a bioterrorism agent,” said Whitten. “The units were tested every day and didn’t detect any concerns.”

Through the great teamwork and planning of partners at all levels of government – with added public health surveillance, emergency preparedness and infectious disease prevention and control expertise from MDH - the event came and went without major medical or public health incident.



“It was a goal to be more than ready for any eventuality,” said Epidemiologist Tory Whitten, who helped formulate MDH’s surveillance response. “With an event the size of the Super Bowl, the number of people who could be affected by a bioterrorism incident is enormous. We had to be prepared.”

ANNUAL EPIDEMIC: MONITORING FLU ACTIVITY IN MINNESOTA

Every year, there is an epidemic of influenza (flu). It's what we know as "flu season." Each season is unique and unpredictable.

As the 2017-18 flu season unfolded, it became apparent that it was a very severe season. Over 6,000 flu-related hospitalizations were reported to MDH during the season—the most since MDH has been tracking these data. Additionally, Minnesota saw over 690 outbreaks of influenza-like illness in schools and over 200 flu outbreaks in long-term care facilities.

You would think that two full-time epidemiologists and a handful of student workers primarily assigned to flu surveillance would be overwhelmed during such a severe season—but they weren't.

"Our system was able to handle it," said Karen Martin, senior flu epidemiologist. "We didn't have to change things because we have a really flexible system that is built to handle a severe season or a mild season."

Part of that successful surveillance system includes close working relationships with the MDH Public Health Laboratory, clinics, hospitals, local public health, and other partners. These entities play an important role in reporting outbreaks or cases and processing a high volume of laboratory specimens. All of these data help the flu surveillance staff paint a picture of flu activity in Minnesota.

"Flu is an ever-changing virus, so we have to have really good surveillance to stay on top of flu activity and better equip ourselves with knowledge and data to protect the health of Minnesotans," Martin noted.

From the beginning of October through May, we publish a weekly flu and respiratory disease report on the MDH flu website (www.mdhflu.com). These reports have garnered a large audience. Health care providers and public health professionals have anecdotally shared that they rely on the reports to stay updated on what the flu season is looking like. The reports often generate media inquiries and have even prompted phone calls from the public with questions about how to protect themselves from flu.

"Our data contribute to the national picture of what's going on with flu. We regularly send certain data to CDC," said Melissa McMahon, flu epidemiologist. "CDC also sends information to the World Health Organization which contributes to flu strain selection for the upcoming season, so we're looking locally but contributing globally."

"Our system was able to handle it," said Karen Martin, senior flu epidemiologist. "We didn't have to change things because we have a really flexible program that is built to handle a severe season or a mild season."



As flu changes, so does the technology used to gather data. We have been able to utilize electronic reporting and databases to streamline processes and keep them nimble to deal with the rare or unknown things that may pop up.

Due to the sheer number of flu cases that occur each season, we are not able to collect data on every case. Many people who are sick with flu don't go to the doctor. In the 2017-18 flu season, MDH participated in a national pilot project to enhance an internet-based disease surveillance platform called "Confirmed Flu Near You." This system allows both health departments and the public to see where and how much influenza-like illness is being reported. Nearly 100 Minnesotans volunteered to use an app to submit weekly reports of symptoms and even submitted lab specimens for testing.

"This is a new and ambitious project with the overarching goal of being able to identify an outbreak or pandemic earlier," said Jeff Sanders, flu and pertussis epidemiologist. "This can help supplement the other data we collect and tell us more about how flu affects people."

All of these data help inform public health staff about the burden flu has on the population and underlines the importance of prevention measures, such as flu vaccination, to help keep people healthy.

IT TAKES A VILLAGE: RESPONDING TO THE 2017 MINNESOTA MEASLES OUTBREAK

Tuesday, April 11, 2017, started out like a normal day. Emily Banerjee, the measles epidemiologist, was busy at work when an email arrived from the MDH Public Health Laboratory. Test results for a child suspected of having measles were in: it was positive. By the end of the day, there was a second confirmed case.

“I very clearly remember that morning and the panic and dread that I felt,” said Banerjee. “I just knew this was going to be big.”

These weren’t the first measles cases Banerjee and her colleagues had responded to—Minnesota typically sees one or two imported measles cases each year. High vaccination rates in the state and a swift response usually keep the disease contained. But this time they did not know how the children got measles and the children were part of the Somali Minnesotan community, which had low MMR (measles, mumps, rubella) vaccination rates. That meant an outbreak was already underway in a vulnerable population.

MMR vaccination rates had been declining in the Somali Minnesotan community since about 2004 due to a perceived increase in autism rates in the Somali-American community and the mistaken belief that autism was related to MMR vaccine. Studies have consistently documented that there is no relationship between vaccines and autism, but this misinformation continued to spread causing parents to fear autism more than measles.

MDH staff had been providing education on immunizations and autism in the Somali Minnesotan community for the last several years to try and reverse this downward trend. They were seeing some change, but this was a long-term effort. A decline in vaccination rates meant a large number of children were still vulnerable to one of the most infectious diseases on the planet.

Hinda Omar, a Somali outreach worker, was out doing education in the community when she heard about the first cases.



*“One hand cannot clap –
it is vital to have partners
in doing this work,”
said Omar.*

“I was very worried that we would end up with a lot of cases,” said Omar. “Our community has a lot of places where we come together, so I knew we needed to get information to people fast because young people didn’t know how bad measles could be.”

The disease did spread fast. At the end of the first week, there were eight confirmed cases and it was several weeks before things would slow down.

“We immediately recognized that this was a crisis and jumped into action,” said Kristen Ehresmann. “Staff from across MDH dropped everything to respond to this outbreak.”

The first order of business with each case was figuring out who else was potentially exposed and not immune to measles, meaning they had not been vaccinated and had never had measles. MDH relied heavily on partners in local public health and health care facilities to help identify people.

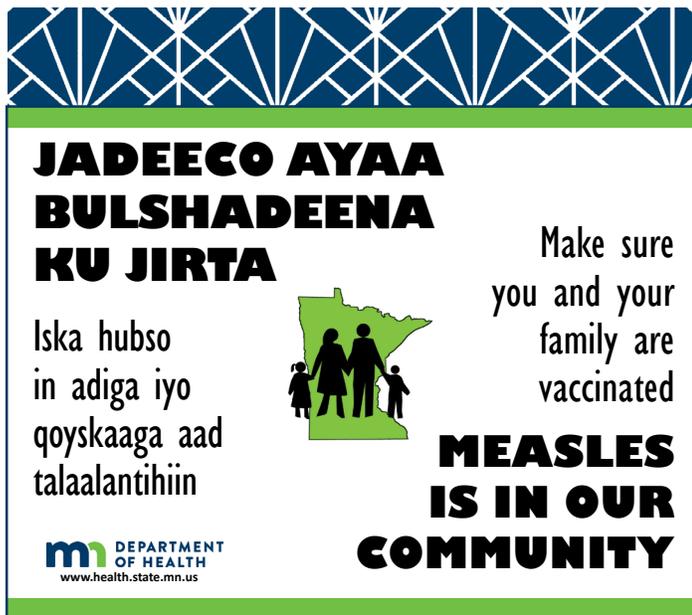
The Minnesota Immunization Information Connection (MIIC) was vital in this effort. MIIC is a system that stores electronic immunization records. Staff could use MIIC to see whether a person exposed to measles had been vaccinated. It was also used to track MMR vaccines given during the outbreak.

“Being able to use MIIC during this outbreak was a game changer,” said Ehresmann. “We were able to quickly assess immune status and work with partners to make recommendations for treatment, vaccination, and more.”

Children 10 years and younger were the primary group affected during the outbreak. Many of the children attended child care centers, sometimes more than one, and these centers became the most common site where the disease spread.

Child care centers in Minnesota are required to keep records on the immunization status of all the children in their care. Jennifer Heath, supervisor, led a team who worked with the centers to get this information so they could determine who had not been vaccinated.

“For some of the centers, this process took longer than you would think. They did not have the records readily available and maybe didn’t understand why we needed the lists so quickly,” said Heath. “We had to do a lot of education.”



Once staff determined who had not been vaccinated, they would make phone calls to the families and the child care centers letting them know that those children were excluded, meaning they could not go to the child care center (or other high risk settings such as school) for 21 days. This was the amount of time it was possible for the child to show symptoms of measles. The requirement to stay away from high risk settings for 21 days is a public health practice called exclusion.

“Many families did not understand that exclusion was a possibility when they refused to vaccinate,” said Kathryn Como-Sabetti, supervisor. “It’s very difficult for families to not have child care for 21 days. We had to explain why it was so important for stopping the spread of measles.”

Staff worked with more than 500 families with calls averaging 20-30 minutes. This incredibly time and staff intensive effort paid off in the end.

“Vaccination was important, but we clearly saw that when we started exclusion early it really had an impact on reducing the number of subsequent cases,” said Como-Sabetti.

Talking to families of children who were exposed to measles was only part of the education and outreach efforts. Communications staff used the media, social media, websites, and print materials to educate Minnesotans about the threat of measles and promote vaccination.

Messages disseminated about measles and how to protect yourself certainly had an impact. More than 51,000 MMR vaccine doses were given during the outbreak above what would normally be expected.

While some of this information was reaching the Somali Minnesotan community, staff knew that dedicated outreach was needed to make sure messages were tailored for the community. This involved things like translating messages as well as strategically working with external partners like Somali media outlets, child care owners, health care providers, and religious leaders. Staff had learned that some of the community’s faith practices aligned with health practices, so imams were a vital partner in helping to reinforce the messages from MDH and the mosques helped provide a venue for sharing information.

“We were so glad we had Somali outreach workers at MDH and that we had been building a foundation of relationships with these partners prior to the outbreak,” said Lynn Bahta, immunization clinical consultant.

Work conducted during the outbreak strengthened these relationships and has led to ongoing educational efforts pairing imams with physicians to talk about immunizations and autism in the community.

“One hand cannot clap—it is vital to have partners in doing this work,” said Omar.

On Aug. 25, 2017, the outbreak was declared over. At the end of those five months, there were 75 cases. Of those, 21 had to be hospitalized and 68 of the cases were not vaccinated.

Evaluation projects are still underway to assess what practices or resources may need to be improved for future responses, but overall staff agreed that the surveillance, exclusion, vaccination, and outreach efforts employed were what kept this outbreak from being even worse.

“The fact that we had 75 cases when over 8,000 people were exposed to measles shows that our public health interventions worked,” said Banerjee.

The outbreak may have ended, but the threat remains.

“As long as there is measles somewhere in the world, the chance of measles coming to Minnesota remains,” said Ehresmann. “Our staff are dedicated to protecting the health of Minnesotans. We will continue to nurture relationships with partners, educate Minnesotans about the benefits of vaccination, and build systems that allow for an efficient response to infectious diseases.”

So staff forge ahead—ready to respond at a moment’s notice.



WAVE STUDY AIMS TO FIND LINK BETWEEN VIRUSES IN DRINKING WATER AND ILLNESS



When Minnesotans turn on their kitchen tap, they expect the water flowing out is safe to drink. Using funding from the state's Clean Water Fund, staff from the Waterborne Diseases Unit conducted the Minnesota Water and Virus Evaluation (WAVE) Study to find out if there is an association between the presence of viruses in groundwater drinking water sources and acute gastrointestinal illness (AGI) in a community. To do this, we worked with six Minnesota water utilities to test their drinking water source for viruses weekly for one year. We also asked people in these communities to complete weekly surveys about any illness they may have had the week before.

Overall, only 9 of 305 (2.9%) water samples collected tested positive for a virus that could cause AGI in people, and very low levels of viruses were found in the few drinking water samples that tested positive.

"Finding these low levels of viruses does not necessarily mean that people drinking the water would become ill," said supervisor Trisha Robinson, "but it does indicate that a potential pathway for drinking water contamination may exist."

During the weeks viruses were detected in the drinking water source, higher rates of reported AGI were found. However, a firm conclusion cannot draw firm because this finding was not statistically significant, meaning the finding could have been due to chance or that the study was too small to show that the association is real. Viruses can spread through water, but they are also spread through food, person-to-person contact, or other ways.

"In order for viruses to get into drinking water, they first have to be circulating in the community," Robinson said. "This makes it hard to say if viruses found in the water are the cause of illness or the result of illness."

One key finding that all Minnesotans can take away from the study is the finding of higher rates of illness among people who had a water filter or softener at home. It is important to remember that if these devices are not properly maintained (such as regularly replacing the filter), they will be less effective and may harbor contaminants. You should always follow the manufacturer's recommendations for installing, cleaning, and maintaining a treatment unit.

THE MALARIA PREVENTION PROJECT

Malaria in Minnesota? You might be surprised to know that Minnesota had 67 cases of malaria in 2017. However, all of these infections were acquired abroad. The good news is that a little prevention before and while traveling can reduce the chances of getting malaria, but first we need to understand the barriers.

Staff in the Refugee and International Health Unit and Vectorbone Unit are currently in the midst of the five-year, CDC-funded, Malaria Project, in collaboration with the University of Minnesota, Hennepin County Medical Center (now Hennepin Health), HealthPartners and two partners in New York and Maryland. In recent years, the number of individuals who are diagnosed with malaria in the United States has increased. Since malaria is not endemic in the United States, travelers who visit friends and relatives (VFRs) who may travel to malaria-endemic regions have been the most susceptible. This project aims to determine if United States residents traveling to these regions are taking preventative measures before leaving and if not, why? How can we help these travelers stay healthy when abroad?

The Malaria Prevention Project strives to reduce this disease burden by identifying the populations most at risk and finding out more about the barriers these populations face. To do this, Community Advisory Boards (CABs) were created in Minnesota and New York City to help guide the research team.

Minnesota's CAB consists of eight highly accomplished community leaders who were born in West Africa and have a variety of backgrounds. They have been lending their expertise to assist project staff in trying to reduce the number of malaria cases seen among community members visiting friends and relatives back in West Africa. The CAB's purpose is to provide guidance on the project, from study design all the way to analysis and interpretation of the findings. The CAB is also helping to create solutions, interventions, and messaging to implement in community, health care, and travel settings.



Through focus groups held with West African communities here and in New York City, the project has been able to hear about barriers, assets, and knowledge about malaria from the communities most impacted. The focus groups aimed to answer the following questions:

- What are people worried about when traveling?
- What do people do to stay safe when traveling?
- Do people visit a medical professional before traveling?
What barriers prevent/discourage individuals from visiting a doctor?
- Do individuals take anti-malarial medications? Where do they purchase these medications? What are the barriers to taking anti-malarial medications?
- What are individuals doing to prevent malaria abroad?
- What barriers exist in preventing malaria while abroad?
- Are there areas of confusion?
- Where do people seek health information in Minnesota?
- Suggested solutions for preventing malaria?

Key findings:

- Assumptions: The key over-arching finding is that we were able to confirm only some of the anecdotal assumptions that travel doctors make (and often repeat) about VFR travelers such as the cost of medications, misinformation, and underestimating risk.
- Cost: Many view cost as a major barrier to accessing malaria medications. The out of pocket expense is too high, even for those with Medicare/Medicaid. This was the most common barrier identified in the focus groups, and the attendees of our community forum strongly agreed that this was an issue.
- Inconvenience: Travelers did not want to inconvenience their hosts with special requests such as bed nets or staying indoors at dusk, when many are outside to socialize.
- Perceptions: While many participants saw the need to protect themselves from malaria the need to respect their hosts and avoid being perceived as “too American” can be more important.

The Malaria Prevention Project has now entered its fourth year of the five-year project. The final two years will be focused on developing resources and interventions, sharing information with community members, and informing travelers health and primary care providers on how best to serve their patients that travel to malaria-endemic countries.

UNDETECTABLE = UNTRANSMITTABLE (U=U)

When taken as prescribed, HIV medications decrease the amount of HIV in blood so that it is too low to measure. This is called being undetectable and allows people living with HIV to live long and healthy lives. We now have evidence that being undetectable prevents sexual HIV transmission.

Several large studies showed zero HIV transmissions among couples from a person with undetectable HIV to their HIV-negative sex partner. These results led to the creation of an international campaign in 2016 called Undetectable = Untransmittable (U=U) to convey the consensus that people living with HIV who get and stay undetectable have effectively no risk of sexually transmitting HIV.

“U=U is life changing for people living with HIV and their loved ones,” said Communications Specialist Mariah Wilberg
“It reduces HIV stigma and motivates people to consistently take their medications.”



MDH joined the U=U campaign in October 2017, making Minnesota the third state to do so. MDH quickly launched an educational campaign that debuted on social media on World AIDS Day in December 2017 and on Metro Transit buses in January 2018. The bus ads received over six million views as of June 2018.

“U=U is life changing for people living with HIV and their loved ones,” said Communications Specialist Mariah Wilberg, who is leading MDH’s U=U campaign. “It reduces HIV stigma and motivates people to consistently take their medications.”

MDH’s leadership in the U=U campaign has gained national attention. In 2018, MDH staff presented about Minnesota’s U=U campaign at the National Health Outreach Conference; the Iowa HIV, STD, and Hepatitis Conference; the HIV is Not a Crime III National Training Academy; the United States Conference on AIDS; as well as many local conferences.

MDH will continue to promote U=U throughout 2019 with plans for online advertising, social media outreach, another Metro Transit campaign, translated educational materials, and more.

“We want to make sure every person living with HIV in Minnesota knows that Undetectable = Untransmittable,” said Wilberg.

Undetectable
EQUALS
Untransmittable

U=U
health.mn.gov/uu

m
DEPARTMENT
OF HEALTH

“ HIV doesn’t stop me. My daily medication keeps me healthy and protects my partner. I still have the life and the love I want. ”



USING VIDEO TO REACH DIVERSE AUDIENCES



“There’s a lot of stigma around hepatitis B and part of that is a lack of knowledge about how the disease spreads,” said Grilli.

“The video allowed us to feature a person from their community who could explain what hepatitis B is, the importance of pregnant women getting tested, and how their health care provider can help keep them and their baby healthy.”

Health and wellbeing are talked about differently in each culture. Finding ways to talk about diseases so that the audience understands and relates to the message can be difficult, especially if English is not their first language.

Reaching pregnant women from Minnesota’s refugee and immigrant populations is a priority for the Perinatal Hepatitis B Prevention Program. One way of doing this is by providing translated materials on the MDH website. However, when really looking at the needs of the families this program serves, it became clear that video would be a more effective medium.

“We specifically wrote this project into our grant (Immunization Cooperative Agreement) because we were committed to providing this resource,” said Genny Grilli, Perinatal Hepatitis B Prevention Program Coordinator. “We also knew that we didn’t want to just put subtitles on a video with someone speaking English—we wanted to show women of childbearing age who were native speakers to make sure the message was impactful.”

Program data showed that English, Somali, Karen, and Hmong would be priority languages to focus on. The

program utilized internal video resources to keep the costs low and collaborated with Ramsey County Public Health to film in one of their clinic exam rooms.

“There’s a lot of stigma around hepatitis B and part of that is a lack of knowledge about how the disease spreads,” said Grilli. “The video allowed us to feature a person from their community who could explain what hepatitis B is, the importance of pregnant women getting tested, and how their health care provider can help keep them and their baby healthy.”

So far, the program has completed the English, Somali, and Karen videos with the Hmong video in the works. The videos have been posted on the MDH website at [Hepatitis B Video for Pregnant Women \(www.health.state.mn.us/hepbvideo\)](http://www.health.state.mn.us/hepbvideo). They have been shared with local public health agencies and CDC has promoted them on their website. The videos will also be promoted to health care providers so they can share them with patients.

“We were really impressed with the final product, and the response we’ve received has mirrored that,” said Grilli. “We are very lucky to have a strong program and great internal resources to take on this special project and reach key communities to fill an education gap.”

GOATS, CALVES, AND CHICKS, OH MY! MAKING PETTING ZOOS AND COUNTY FAIRS SAFER ACROSS THE STATE

“Keeping visitors safe is a primary concern for the agritourism operators we talk to,” said zoonotic diseases epidemiologist and veterinarian Malia Ireland.

“We want to give them the resources to do this using best practice guidelines.”



When a family visits a petting zoo, the last thing on their mind is catching an illness from a calf, chick, or goat. These illnesses, called zoonoses, occur annually in Minnesota and can be very serious. The prevention of these illnesses is the focus of a new training developed by staff from the Zoonotic Diseases Unit.

“When people and animals come together, there’s a chance for germs to be shared from one to the other,” said Malia Ireland, zoonotic diseases epidemiologist and veterinarian. “The Safer Farm Animal Contact Exhibits or Safer FACES training can help agritourism venues like petting zoos and county fairs keep their visitors and animals safe.”

Safer FACES was designed for the owners, operators and staff of fairs, petting zoos, and other venues where the public can interact with animals. The online training consists of six modules focusing on health risks from animals, facility design, animal care and management, staff training, visitor education and signage, and handwashing. Scattered throughout the program are knowledge checks and cautionary tales of Minnesota outbreaks, followed by a quiz at the end.

“The Safer FACES training course was created with the busy small business owner in mind,” said Ireland. “This online program lets people fit learning into their schedule and work at their own pace.”

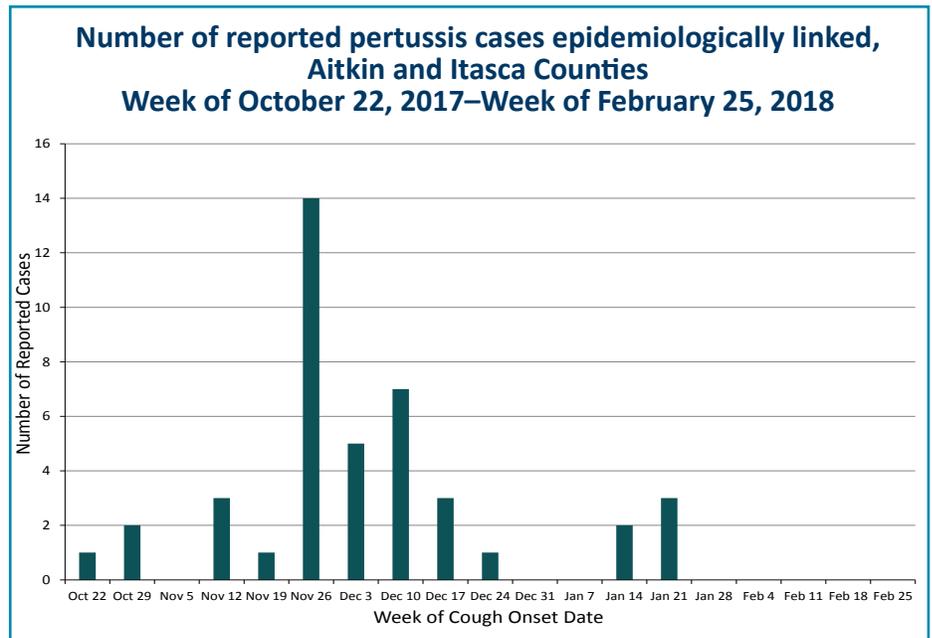
When users complete the program, MDH provides certification that the organization has learned best practices for visitor-animal interactions. This includes signage to post at their venue, which helps to increase the public trust in the education animal-contact venue owners have received.

“Keeping visitors safe is a primary concern for the agritourism operators we talk to,” said Ireland. “We want to give them the resources to do this using best practice guidelines.”

The Safer FACES training program was created with funding from the Upper Midwest Agricultural Safety and Health Center (UMASH).

WORKING TOGETHER: THE VALUE OF PARTNERSHIPS

In mid-December 2017, MDH was first notified of a probable case of pertussis in an elementary school teacher at the Hill City School in Aitkin County. The following week, two confirmed cases in students at the Hill City School were reported and an outbreak investigation began. Ultimately, 48 cases of confirmed, probable, and suspected pertussis were reported from both Aitkin and Itasca Counties. The outbreak response was a collaborative effort among MDH, Aitkin County Public Health and Itasca County Public Health and Human Service Departments, Independent School District #002 (Hill City), Independent School District #318 (Grand Rapids-area), Riverwood Health System, and Grand Itasca Hospital and Clinics.



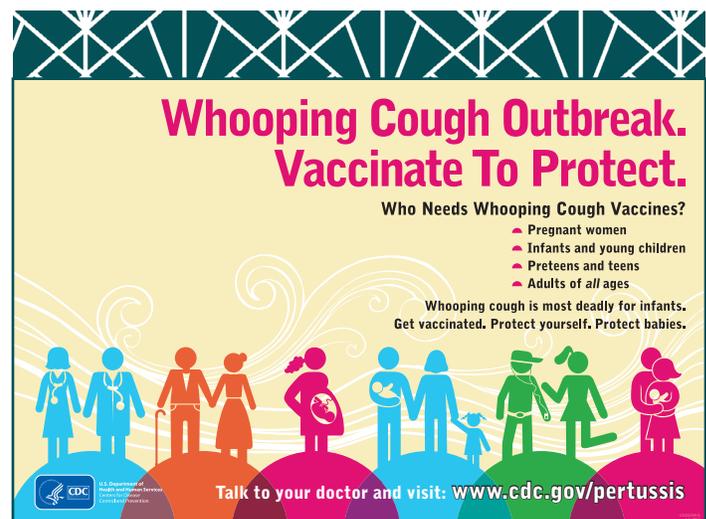
Hill City School is located in Hill City, a small town in northwestern Aitkin County. The school serves over 250 students preschool through grade 12. Students come to the school from the immediate surrounding area. However, some staff commute in from Itasca County, and residents of Hill City routinely travel to and from Grand Rapids (18 miles, Itasca County). Consequently, the outbreak quickly spread to the Grand Rapids area, too.

Pertussis, a bacterial infection caused by *Bordetella pertussis*, is a respiratory disease, which can be severe. Pertussis often starts with mild cold-like symptoms and, as the disease progresses, causes violent coughing fits that can be followed by vomiting. Symptoms are similar to other respiratory illnesses, which makes identifying and diagnosing cases difficult. During 2012–2016, no cases were reported from Aitkin County; however, during that same time period an average of 12 cases a year, totaling 60 cases in all, were reported from Itasca County. Thus, pertussis was clearly spreading in the area.

The first outbreak-related cases reported coughs starting in late October. Most cases reported coughs starting between Thanksgiving and mid-December. Unfortunately, the timing of this outbreak coincided with sharp increases in seasonal influenza activity, which may have added to a delayed identification due to a misdiagnosis.

Furthermore, this outbreak likely spawned two additional clusters of cases in the Grand Rapids community.

The outbreak response significantly benefited from partnership and collaboration with local public health agencies and health systems. Aitkin County held a vaccination clinic on site at the school, and Itasca County was able to leverage their well-established connections to local health clinics and school nurses. Throughout the outbreak, MDH also worked closely with the local health systems to ensure the proper testing and diagnosis of all cases in the community. Local clinicians and public health staff brought local information to the response that improved outreach and surveillance activities.



KEEPING AN EYE ON INVASIVE BACTERIAL INFECTIONS

Many bacteria live on our bodies without causing an infection but when bacteria get into certain body sites they can cause serious disease and are called invasive infections. Invasive infections are those where the bacteria finds its way into a normally sterile body site such as blood, bone, or cerebrospinal fluid and others. These infections are often serious and require hospitalization, some patients with these infections die.

Since 1995, MDH has conducted Active Bacterial Core surveillance (ABCs) as part of CDC's Emerging Infections Program (EIP). We are one of 10 sites in the United States that conducts surveillance for certain bacterial infections.

ABCs cases are Minnesota residents who have an invasive infection due to:

- Group A *Streptococcus* (GAS)
- Group B *Streptococcus* (GBS)
- *Haemophilus influenzae* (HI)
- *Neisseria meningitidis*
- *Streptococcus pneumoniae*

Also included in ABCs are cases of neonatal sepsis. These cases are newborns less than seven days old who have a blood stream infection. These invasive infections are serious and often require patients to be hospitalized.

Each ABCs site uses the same methods for collecting information on cases, which allows CDC to combine data and provide a national picture. In Minnesota, the bacteria is sent to the MDH Public Health Laboratory for characterization and then sent to CDC. The data are used to monitor trends in antibiotic resistance and emergence of specific bacterial serotypes or serogroups (a specific type or strain of bacteria).

“The information gathered from Minnesota and other ABCs sites are used to understand the burden of these severe infections,” said Kathryn Como-Sabetti, supervisor. “This helps inform vaccine research and other public health policies so we can find ways to prevent these horrible infections.”



For example, data were used to develop public health guidelines on universal screening before delivery of all pregnant women to prevent early-onset GBS infections, [Prevention of Perinatal Group B Streptococcal Disease: Revised Guidelines from CDC, 2010](https://www.cdc.gov/mmwr/preview/mmwrhtml/rr5910a1.htm) (www.cdc.gov/mmwr/preview/mmwrhtml/rr5910a1.htm).

ABCs also conducts public health research such as studies on vaccine effectiveness. We recently participated in studies of vaccine effectiveness for two pneumococcal vaccines, PCV7 and PCV13. These vaccines protect against certain types of *Streptococcus pneumoniae*. ABCs found a dramatic decrease of invasive *Streptococcus pneumoniae* cases nationwide from 100 cases per 100,000 population in 1998 (before vaccine) to 9 cases per 100,000 population in 2015, due to the licensure of these vaccines. Similar declines were also found in Minnesota (Figure 1).

Beginning in 2000, increases in *Haemophilus influenzae* type a (Hia) cases were noted in northern Canada and Alaska. We analyzed Minnesota data and also saw an increase in Hia cases from 2006 to 2017 (Figure 2). We were able to use our data to determine that Hia cases were more likely to be American Indian/Alaska Native, younger than 5 years old, and reside in greater Minnesota. In partnership with CDC and other ABCs sites, we are participating in a study to better describe Hia cases, their clinical features and potential long-term effects.

As an ABCs site, we also monitor for invasive GAS infections. Minnesota and other ABCs sites have recently seen a dramatic increase in invasive GAS. In 2017, there were 6.3 invasive infections per 100,000 population in Minnesota compared to 2.9 cases per 100,000 population in 2004 (Figure 3).

“We do not fully understand the reasons for the increase in GAS cases,” said Como-Sabetti. “But we are working with CDC and other ABCs sites to better understand and potential reasons for the increase and determine prevention measures.”

Another success story that emphasizes the importance of this program is a decrease in *Neisseria meningitidis* (meningococcal disease) cases. We have seen cases of *Neisseria meningitidis* go from an average of 20 cases per year from 2005 through 2009 to 0 in 2018 (Figure 4).

In 2018, CDC developed an interactive tool, called Bact Facts, for health care providers, laboratories, and the general public to provide a picture of ABCs data. Bact Facts Interactive allows users to look at ABCs data by bacteria, cases, deaths, syndrome, and antibiotic resistance and serotype or serogroup. [Bact Facts Interactive](https://www.cdc.gov/abcs/bact-facts-interactive.html) (<https://www.cdc.gov/abcs/bact-facts-interactive.html>).

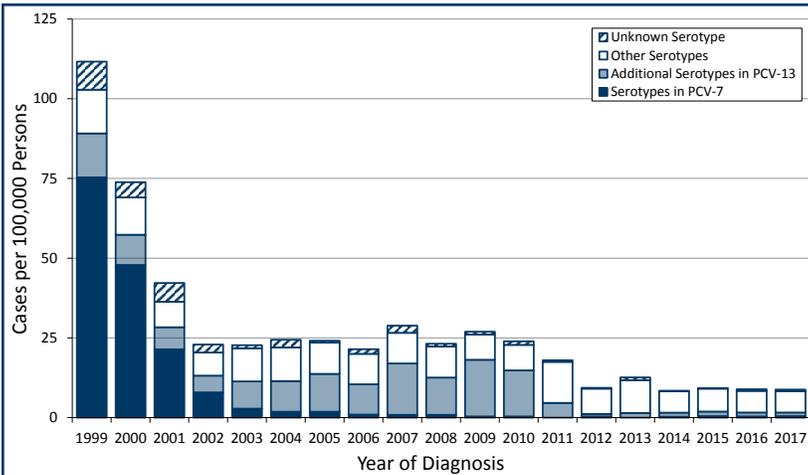


Figure 1:
**Incidence of Invasive *Streptococcus pneumoniae*,
 United States, 1999-2017**

PCV-13 contains the 7 serotypes in PCV-7 (4,6B,9V,14,18C,19F, and 23F) plus 6 additional serotypes (1,3,5,6A,7F, and 19A).

Figure 2:
Invasive *Haemophilus influenzae* Serotype A Incidence Rate by Race, Minnesota, 2006-2017

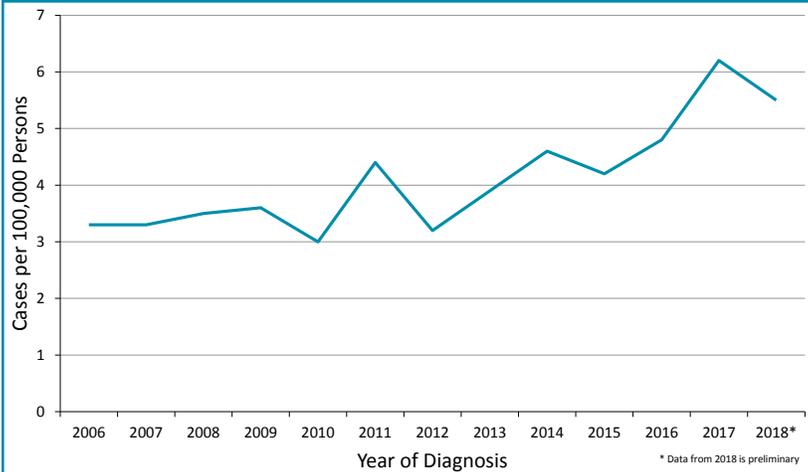
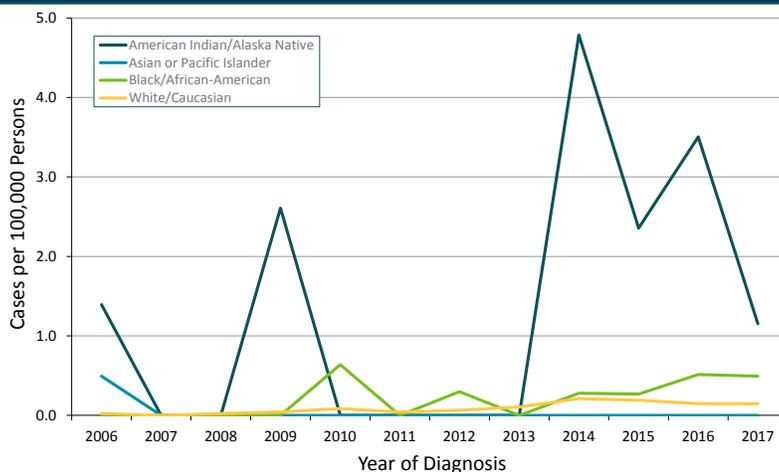


Figure 3:
Incidence of Invasive Group A Streptococcal Disease, Minnesota, 2006-2018*

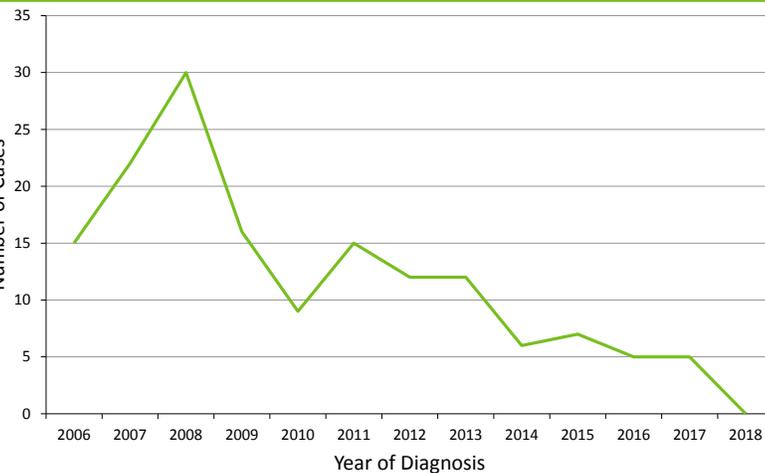


Figure 4:
Incidence of Invasive *Neisseria meningitidis* Disease, Minnesota, 2006-2018

2017 DISEASES BY THE NUMBERS: A YEAR IN REVIEW

Cases of Selected Communicable Diseases
Reported to the Minnesota Department of Health

Disease	Metro (3,012,117)	Northwest (158,477)	Northeast (325,803)	Central (743,891)	West Central (239,173)	South Central (290,032)	Southeast (501,850)	Southwest (218,251)	Unknown Residence	Total (5,489,594)
Anaplasmosis	116	94	105	201	63	11	44	4	0	638
Babesiosis	10	13	6	11	8	2	9	0	0	59
Blastomycosis	8	7	13	11	0	3	2	0	0	44
Campylobacteriosis	465	27	31	153	46	90	132	105	0	1,049
Cryptosporidiosis	99	25	19	60	37	37	91	113	0	481
<i>Escherichia coli</i> O157 infection	36	2	0	13	10	7	13	15	0	96
Hemolytic uremic syndrome	1	0	0	4	0	2	1	1	0	9
Giardiasis	286	20	51	104	25	28	54	75	0	643
<i>Haemophilus influenzae</i> disease	62	5	12	17	5	6	14	4	0	125
HIV (non-AIDS)	176	3	4	11	2	4	13	4	0	217
AIDS (diagnosed in 2016)	116	2	2	7	6	2	7	2	0	144
Legionnaires' disease	64	1	7	11	3	3	7	2	0	98
Listeriosis	7	0	2	4	0	1	0	0	0	14
Lyme disease	672	69	143	306	80	27	94	17	0	1,408
Measles (rubeola)	69	0	0	4	0	2	0	0	0	75
Meningococcal disease	2	0	1	1	0	0	1	0	0	5
Mumps	56	12	1	1	0	1	1	0	0	72
Pertussis	381	13	57	177	8	22	67	6	0	731
Salmonellosis	482	64	37	110	37	47	72	67	0	916
Sexually transmitted diseases	21,473	478	1,435	2,488	819	1,001	2,084	641	562	30,981
<i>Chlamydia trachomatis</i> (genital)	15,647	357	1,179	2,076	659	887	1,695	548	480	23,528
Gonorrhea	5,102	103	235	321	145	97	350	84	82	6,519
Syphilis, total	724	18	21	91	15	17	39	9	0	934
Shigellosis	68	0	2	6	1	0	3	6	0	86
Streptococcal invasive disease - Group A	204	11	23	31	13	15	42	20	0	359
Streptococcal invasive disease - Group B	286	10	50	85	27	42	46	30	0	576
<i>Streptococcus pneumoniae</i> disease	221	11	42	79	27	31	53	18	0	482
Tuberculosis	130	2	1	15	1	12	14	3	0	178
Varicella	297	2	10	52	14	18	24	15	0	432
West Nile virus	10	1	0	4	3	1	1	10	0	30
Zika virus	8	0	0	2	0	0	1	0	0	11

County Distribution within Districts

- Metro - Anoka, Carver, Dakota, Hennepin, Ramsey, Scott, Washington
- Northwest - Beltrami, Clearwater, Hubbard, Kittson, Lake of the Woods, Marshall, Pennington, Polk, Red Lake, Roseau
- Northeast - Aitkin, Carlton, Cook, Itasca, Koochiching, Lake, St. Louis
- Central - Benton, Cass, Chisago, Crow Wing, Isanti, Kanabec, Mille Lacs, Morrison, Pine, Sherburne, Stearns, Todd, Wadena, Wright
- West Central - Becker, Clay, Douglas, Grant, Mahnomen, Norman, Otter Tail, Pope, Stevens, Traverse, Wilkin
- South Central - Blue Earth, Brown, Faribault, LeSueur, McLeod, Martin, Meeke, Nicollet, Sibley, Waseca, Watonwan
- Southeast - Dodge, Fillmore, Freeborn, Goodhue, Houston, Mower, Olmsted, Rice, Steele, Wabasha, Winona
- Southwest - Big Stone, Chippewa, Cottonwood, Jackson, Kandiyohi, Lac Qui Parle, Lincoln, Lyon, Murray, Nobles, Pipestone, Redwood, Renville, Rock, Swift, Yellow Medicine

For more 2017 disease statistics, visit the [Disease Control Newsletter 2017 Annual Summary \(www.health.state.mn.us/diseases/reportable/dcn/\)](http://www.health.state.mn.us/diseases/reportable/dcn/)



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