WISCONSIN COMMUNICABLE DISEASES REPORT 2017

BUREAU OF COMMUNICABLE DISEASES
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Wisconsin Department of Health Services | Division of Public Health

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This report represents Wisconsin state communicable disease surveillance: the ongoing collection, analysis, and dissemination of data to prevent and control communicable diseases. We would like to recognize the staff of Wisconsin local health departments, tribal health agencies, and the Wisconsin State Laboratory of Hygiene (WSLH) for their significant contributions to the surveillance, investigation, and prevention of communicable diseases in Wisconsin. We also thank health care providers and clinical labs whose disease reporting constitute the basis for this report.

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1.0 | INTRODUCTION

WHAT IS THE ROLE OF THE BUREAU OF COMMUNICABLE DISEASES?

The Bureau of Communicable Diseases (BCD) in the Division of Public Health (DPH) at the Wisconsin Department of Health Services (DHS), is responsible for the coordination of surveillance activities for more than 80 infectious diseases of public health importance. BCD works with local health departments (LHDs) to control and prevent the spread of these diseases. BCD maintains records of reportable communicable diseases, leads collaborative efforts to prevent healthcare-associated infections, produces data and statistics on selected diseases, and provides information for health care providers and the public.

WHAT IS THE PURPOSE OF THIS REPORT?

This report summarizes the burden of reportable communicable diseases meeting the 2017 national case definitions established by the Centers for Disease Control and Prevention (CDC) and the Council of State and Territorial Epidemiologists (CSTE). Wisconsin-specific case definitions can be found in EpiNet guidance available on the DHS website. Requirements for the timing of reporting, once the disease or condition is recognized or suspected, vary by disease. General reporting requirements are described in Wis. Stat. ch. 252. A complete list of reportable conditions and the specific reporting requirements are described in Wis. Admin. Code ch. DHS 145 Control of Communicable Diseases.

WHAT DISEASES ARE INCLUDED IN THIS REPORT?

Disease cases included in this report occurred during January 1, 2017–December 31, 2017. Cases reported without an onset date are included in Wisconsin Electronic Disease Surveillance System (WEDSS) surveillance data with an episode date reflecting date of specimen collection, test result, or report date, whichever is earliest. Information on conditions not included in this report can be found on the DHS website.

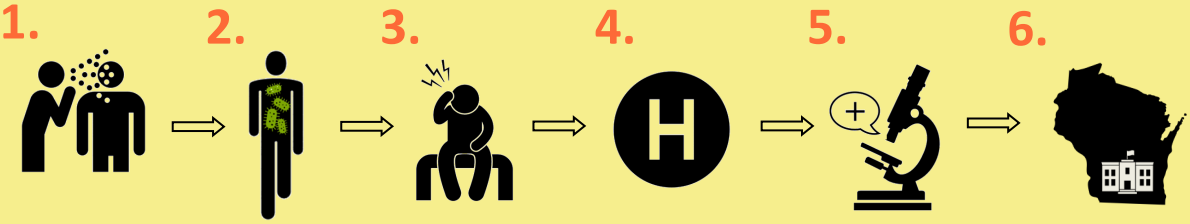
2.0 | DISEASE REPORTING

The majority of data for this report come from WEDSS. These data are collected through routine, passive surveillance. The WEDSS reporting network is made up of institutions that treat patients or test specimens, including physicians, infection preventionists, laboratorians, and other health care providers.

WHAT IS THE PURPOSE OF DISEASE REPORTING FOR SURVEILLANCE?

- Estimate the magnitude and geographical distribution of disease burden, and characterize developing trends or other changes over time.
- Detect outbreaks and epidemics.
- Evaluate control and prevention methods, and facilitate planning.

WHAT IS THE PROCESS OF PASSIVE SURVEILLANCE?



1. Disease exposure occurs.
2. Disease develops in some exposed individuals.
3. Most individuals with disease will develop symptoms.
4. Some symptomatic individuals will seek health care.
5. A lab test may be able to detect and identify the pathogen causing the illness.
6. A positive lab report for a reportable disease must be sent to the local health department.

WHAT ARE THE LIMITATIONS OF PASSIVE SURVEILLANCE?

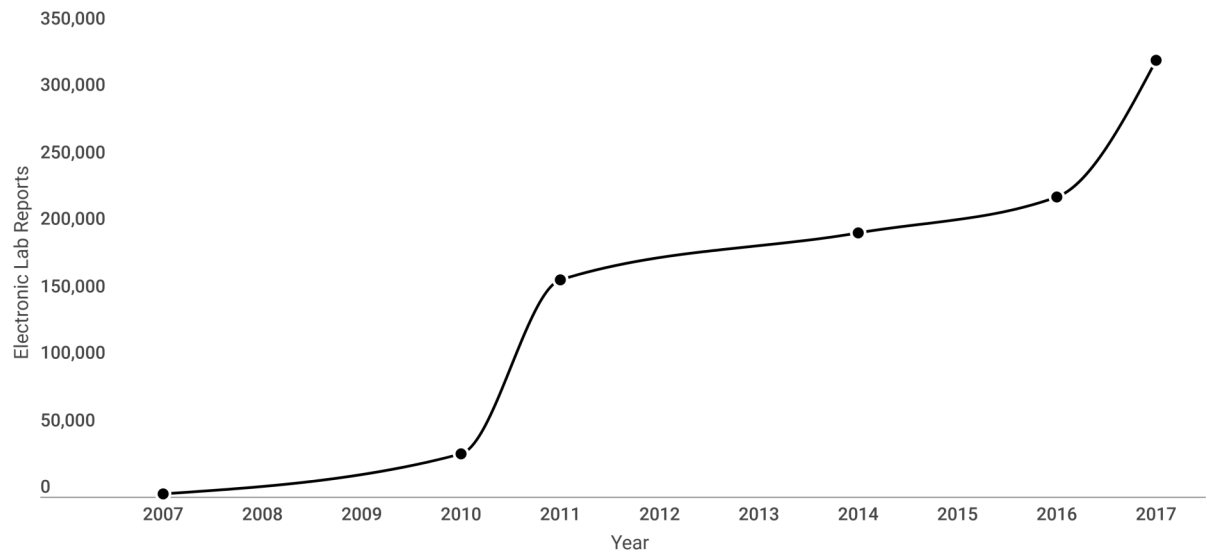
Passive surveillance cannot detect ALL cases of disease, and the chain of events leading up to the report of any given incident introduces opportunity for cases to be missed.

- **Lack of representativeness.** Wisconsin residents without access to health care or without insurance may be unable to visit a physician for a diagnosis, even if symptoms are severe. Populations likely to be underrepresented include, but are not limited to: migrant populations, persons experiencing homelessness or poverty, rural or plain populations, and tribal populations.
- **Underreporting.** People who are sick do not always seek health care. Health care providers do not always recognize reportable conditions. Therefore, there is a subset of reportable diseases occurring that ultimately are not included in surveillance data.

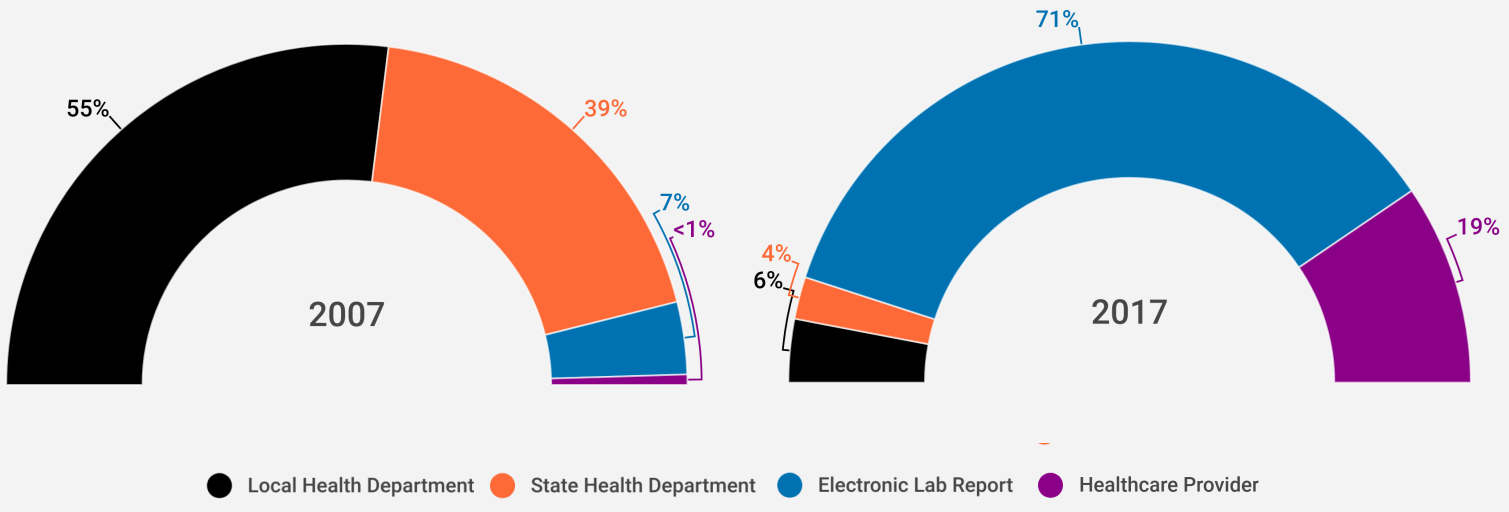
3.0 | WEDSS

The Wisconsin Electronic Disease Surveillance System (WEDSS) is a secure, web-based system that facilitates reporting, investigation, surveillance, and notification of communicable diseases for the state. WEDSS is designed for use by public health staff, infection control practitioners, clinical laboratories, health care providers, and other disease reporters. WEDSS supports disease surveillance and reporting for nationally and locally reportable communicable diseases, and is also utilized for surveillance of select environmental conditions and certain birth defects. WEDSS was introduced in Wisconsin in 2007 and the volume of activity has continually grown over the past 10 years. The growth of electronic lab reporting (ELR) is particularly noteworthy.

The Rise of Electronic Lab Reporting in Wisconsin, 2007-2017



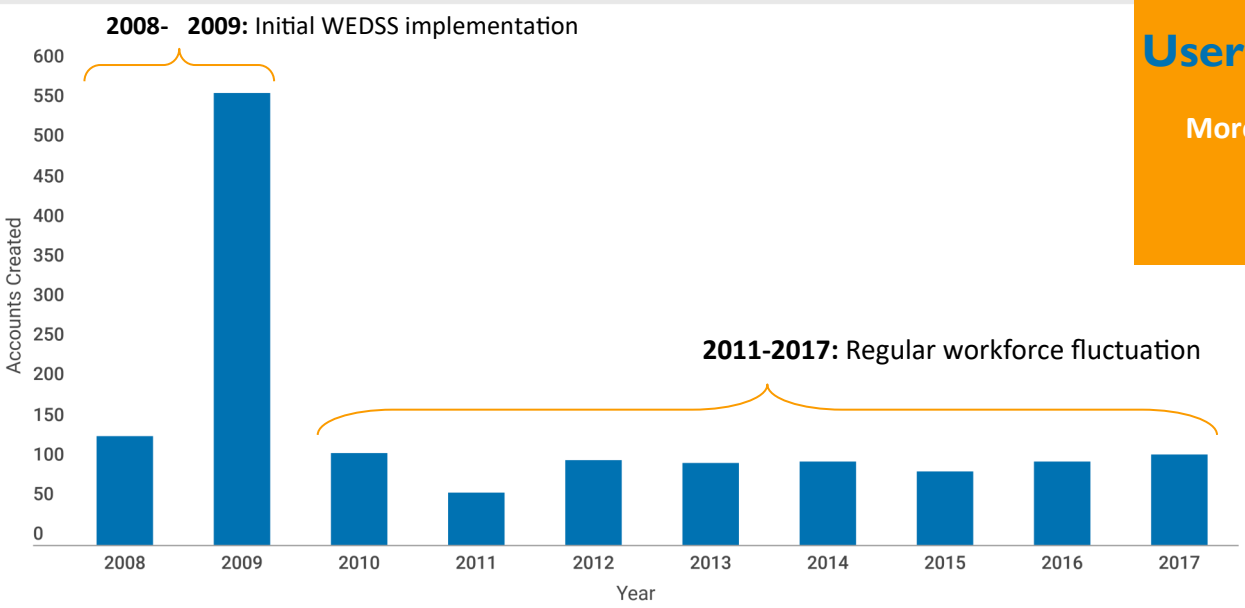
Who is Reporting into WEDSS?



3.0 | WEDSS

Wisconsin LHDs, clinics, and hospitals experience employee turnover each year. This means that new users are always being introduced to WEDSS.

Creation of Local Health Department Accounts in WEDSS, 2007-2017



User accounts

More than 1,500 LHD user accounts have been created since 2007!

BENEFITS OF WEDSS

Improved security
for information sharing and data access.

Time savings
with easier access to the most current disease-specific forms.

Automatic reporting
to the correct health department based on patient address.

Reduced workload
removing duplicative paperwork and data entry.

Improved reporting consistency

Standardization of reporting

More timely reporting

For a basic introduction to WEDSS: A Brief Overview of WEDSS

Questions or requests for new WEDSS user accounts, email: dhswedss@dhs.wisconsin.gov

4.0 | DISEASE SURVEILLANCE CHART

This report contains a selection of reportable conditions with inclusion based on public health significance and frequency of occurrence. Case counts may include any combination of confirmed, probable, and suspect cases to convey the best picture of burden for a specific condition. Incidence was calculated using the 2017 Census Wisconsin population estimates (2017 U.S. Census Bureau, Population Estimates, July 1, 2017 [V2017]. Retrieved from www.census.gov/quickfacts/WI).

Disease	2017 Cases	Incidence per 100,000 Population
Enteric/Gastrointestinal Diseases		
Bacterial		
Campylobacteriosis	1,731	29.95
Enteropathogenic *E. coli (EPEC)*	401	6.94
Enterotoxigenic *E. coli (ETEC)*	60	1.04
Shiga toxin-producing *E. coli (STEC)*	417	7.22
Listeriosis	16	0.28
Salmonellosis	946	16.37
Shigellosis	770	13.32
Typhoid fever	8	0.14
Vibriosis (non-cholera)	11	0.19
Yersiniosis	42	0.73
Parasitic		
Cryptosporidiosis	880	15.23
Cyclosporiasis	5	0.09
Giardiasis	824	14.26
Other		
Hemolytic Uremic Syndrome (HUS)	7	0.12
Invasive Bacterial Diseases		
Group A Streptococcal Disease	207	3.58
Group B Streptococcal Disease	545	9.43
Mycotic/Fungal Diseases		
Blastomycosis	123	2.13
Coccidioidomycosis	15	0.26
Histoplasmosis	16	0.28
Respiratory Diseases		
Influenza-Associated Hospitalizations (2016-2017 Influenza Season)	3,951	68.37
Legionellosis	116	2.01
Tuberculosis (TB)	40	0.69
Sexually Transmitted Infections (STIs)		
Chlamydia	26,432	457.40
Gonorrhea	6,467	111.91
HIV (newly diagnosed cases)	221	3.82
Sexually Transmitted Pelvic Inflammatory Disease (PID)	78	1.35
Syphilis	419	7.25

4.0 | DISEASE SURVEILLANCE CHART

Disease	2017 Cases	Incidence per 100,000 Population
Vaccine Preventable Diseases		
Haemophilus influenzae, invasive disease	127	2.20
Meningococcal disease	6	0.10
Mumps	44	0.76
Pertussis (whooping cough)	943	16.32
Streptococcus pneumoniae, invasive disease	422	7.30
Varicella (chickenpox)	200	3.46
Vector-borne Diseases		
Mosquito-borne		
California serogroup, unspecified	2	0.03
Jamestown Canyon virus infection	7	0.12
La Crosse encephalitis	4	0.07
Malaria[1]	20	0.35
West Nile virus infection	13	0.22
Zika virus infection[1, 2]	63	1.09
Tick-borne		
Babesiosis	52	0.90
Ehrlichiosis/Anaplasmosis	700	12.11
Lyme disease	3,470	60.05
Powassan virus infection	5	0.09
Rocky Mountain Spotted Fever	19	0.33
Viral Hepatitis		
Hepatitis A	7	0.12
Hepatitis B, acute	9	0.16
Hepatitis B, chronic	261	4.52
Hepatitis B, perinatal	1	0.02
Hepatitis C	3,927	67.96
Hepatitis E	3	0.05
Zoonotic Diseases		
Brucellosis	3	0.05
Leptospirosis	1	0.02
Lymphocytic Choriomeningitis Infection	1	0.02
Q fever, acute	6	0.10
Q fever, chronic	1	0.02
Toxoplasmosis	2	0.03
Tularemia	1	0.02
Other Diseases		
Kawasaki disease	10	0.17
Transmissible spongiform encephalopathy (human)	10	0.17

[1] Denotes diseases where all cases in Wisconsin residents are travel-associated. No local transmission occurs.

[2] Due to enhanced surveillance, asymptomatic confirmed cases are included.

5.0 | NOTABLE OUTBREAKS

BCD staff routinely investigate outbreaks of communicable diseases in coordination with local health department partners. This section highlights four large outbreak investigations that required enhanced response activities in 2017. These outbreaks were: increase in Jamestown Canyon virus cases, *Salmonella* Thompson in shelled peas, Seoul hantavirus in rats, and toxoplasmosis in venison.

Jamestown Canyon Virus

Salmonella Thompson

Seoul Hantavirus

Toxoplasmosis

5.1 | JAMESTOWN CANYON VIRUS

Pathogen: Jamestown Canyon virus (JCV) can be transmitted to humans by the bite of an infected mosquito. JCV was initially isolated from mosquitoes in 1961 in Jamestown Canyon, Colorado, and was first recognized as causing human illness in 1980. The specific vector(s) of JCV in Wisconsin are unknown, but the virus has been detected in various *Aedes*, *Coquillettidia*, *Culex*, and *Culiseta* species mosquitoes in other parts of the U.S., some of which are present in Wisconsin. The main animal that carries JCV in nature and spreads it to mosquitos is white-tailed deer. Infection with JCV can cause mild febrile illness (fever) or, more rarely, central nervous system disease such as encephalitis or meningitis. The elderly or people with immunocompromising conditions are at a higher risk of developing neuroinvasive JCV disease (infection of the nervous system). There is no treatment available for JCV disease, only supportive care for symptoms.

Situation: Since JCV disease is rare and commercial laboratory diagnostics are not available, Wisconsin conducts enhanced JCV surveillance, and has done so since 2011. During 2012 to 2016 a median of five cases of JCV disease (range 1 – 11) were reported annually among Wisconsin residents. During 2017, however, we detected 43 (41 confirmed, 2 probable) cases of JCV disease, a greater than 700% increase in cases compared to the average number of cases over the previous five years. Some of this increase can be explained by a 300% increase in testing for JCV at the Wisconsin State Laboratory of Hygiene (WSLH), however, what remains is still a significant outbreak of JCV cases that can presumably be attributed to higher risk of JCV infection in 2017.

Among the 43 JCV cases in 2017, the median age was 60 years (range 19 – 81) and 56% were male. The most common symptoms reported were fever, fatigue, headache, chills, disorientation, and muscle aches. Approximately 80% of cases developed neuroinvasive disease, and 60% of patients were hospitalized. One death was reported, though we were not able to confirm that JCV disease contributed to the patient's death. Cases occurred throughout the spring and summer, in 24 counties across all regions of the state.

Outcome: It is still unclear why the incidence of JCV disease increased so drastically in 2017 and whether it will be sustained. DHS is working with University of Wisconsin partners to test mosquitoes for JCV to learn more about the specific vector or vectors of JCV in the state. Health care providers should consider JCV infection whenever there is a suspicion of West Nile virus infection, and can request JCV testing through WSLH. Like all mosquito-borne diseases, JCV can be prevented by taking precautions against mosquito bites and removing mosquito breeding sites around your home.

5.2 | SALMONELLOSIS IN SHELLED PEAS

Pathogen: *Salmonella* causes approximately 1.2 million illnesses and 450 deaths in the U.S. every year. Approximately 1,000 *Salmonella* infections are reported each year in Wisconsin. Foodborne transmission accounts for the majority of these illnesses. Public health investigations are critical for interrupting transmission, determining how or why the outbreak occurred, and implementing prevention measures.

Situation: During August 2017, the Wisconsin Division of Public Health (DPH), Wisconsin State Laboratory of Hygiene (WSLH), multiple local health departments (LHD), and Department of Agriculture Trade and Consumer Protection (DATCP), investigated a *Salmonella* Thompson outbreak associated with shelled peas purchased at three different, geographically disparate, farmers markets located in southern and northeastern Wisconsin.

Routine case interviewing conducted early in the investigation proved instrumental. Before the outbreak was identified, a routine interview completed with a patient by a LHD identified peas as a possible source of infection for that person. DPH was notified about this concerning exposure. Residents of six counties in multiple regions of the state were quickly linked using PFGE subtyping, a type of DNA fingerprint. Follow-up interviews using an outbreak-specific interview were conducted by LHD staff with assistance from the Surveillance and Outbreak Support Team. In subsequent interviews, shelled peas were reported by patients in more than one region and in association with three farmers markets. The follow-up interviews obtained specific details about the vendor, dates and locations of purchase, and identified remaining product that one patient was willing to submit for testing.

DATCP was notified of the outbreak and requested vendor information from associated farmers markets. A single common vendor that sold shelled peas at all three markets was identified. An on-site assessment and sampling were conducted at the farm. Positive culture results for *S.* Thompson were received from equipment used to harvest peas, and leftover peas from a patient were also positive for *Salmonella*. Both matched the outbreak by PFGE. While this vehicle is a raw agricultural product, possible contributing factors to the outbreak were identified during the on-site assessment, and recommendations were made to the farmer to reduce risk in the future.

Outcome: This investigation identified a food sold exclusively at farmers markets during a short window. Consumers did not have any product labels or vendor identifiers, nor did most consumers recall the name of the individual vendor where they purchased the peas from at the market. Despite these obstacles, a common vendor selling shelled peas at all three locations was identified and an on-farm investigation conducted, resulting in recommendations to the farm for future risk prevention. This outbreak highlights Wisconsin's ability to rapidly identify and respond to a foodborne outbreak by coordinating activities across the three essential components of the system (public health agencies, laboratories, and regulatory agencies).

5.3 | SEOUL HANTAVIRUS IN RATS

Pathogen: Seoul hantavirus is a rodent-borne Old World hantavirus primarily found in Asia. The virus, whose reservoir is Norway rats, is spread to humans and other rats via the body fluids of infected rats (including urine, saliva, and feces), through bite wounds, and through inhalation of contaminated bedding dust or contact of these materials with broken skin. In rats, infections are asymptomatic and infection and shedding are believed to be life-long. Prior to this outbreak, Seoul virus had not been identified in the domesticated rat population of the United States; however, an outbreak of Seoul virus among pet rat owners in the United Kingdom (U.K.) had occurred during 2012.

Symptoms of infection in humans can range from asymptomatic infection, to a mild illness with fever, headache, abdominal pain, myalgia, nausea, conjunctivitis, blurred vision, rash, facial flushing. Symptoms of a severe form of illness called Hemorrhagic Fever with Renal Syndrome (HFRS) include proteinuria, thrombocytopenia, shock, and renal failure. Up to 2% of people infected can die from the infection.

Situation: On December 27, 2016, DPH was notified of a suspected case of hantavirus infection in a Wisconsin resident who operated a home-based rattery (breeding operation) and had 75-125 pet rats in their home at a given time. This infection was confirmed by CDC as Seoul hantavirus infection on January 3, 2017. Eight days later, CDC confirmed a second case of Seoul virus infection in a resident of the same household who had taken care of the rats while the other household member was ill. Because the rattery owner reported buying and selling rats to people in Wisconsin and at least two other states, an investigation was launched.

The investigation included interviewing rat owners and contacts to assess illness status as well as rat exposures. A source investigation was conducted using trace-back and trace-forward of rat movement between facilities (including ratteries, pet homes, and pet stores) to identify those that had supplied or accepted potentially infected rats. Both rats and humans were tested for Seoul virus infection. Facilities that had supplied or purchased rats from Seoul virus-positive facilities were quarantined in order to control further spread until all rats in the facility tested negative.

The ultimate goals of the investigation were to identify the source of the outbreak, identify all facilities that may have received infected rats, and prevent additional virus transmission and human and rat infections through appropriate eradication or control strategies.

A total of six facilities in Wisconsin had Seoul virus positive humans or rats identified. During January – May, 2017, 77 human contacts were identified; 34 (44%) consented to and were tested for Seoul virus infection. Of those, 5 human cases were identified; 3 were confirmed acute (recent) infections and 2 were convalescent (older) infections.

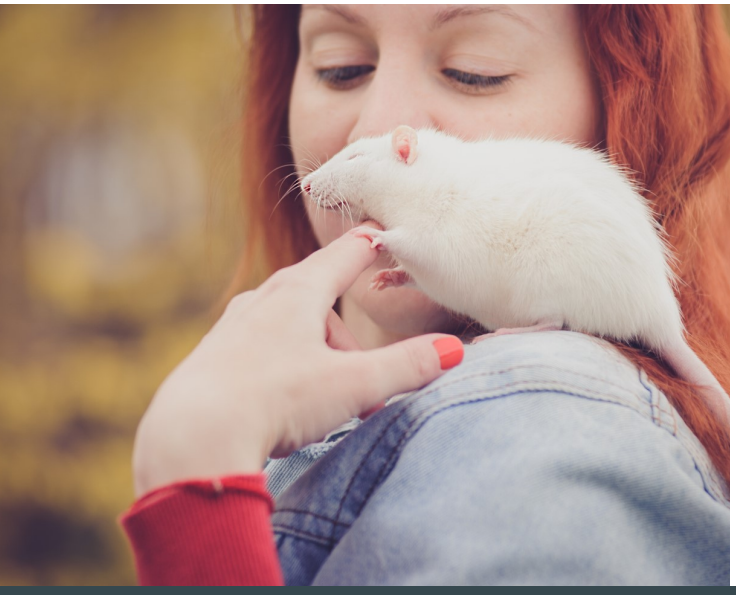
5.3 | SEOUL HANTAVIRUS IN RATS

From the 35 rat-housing facilities identified that had supplied or accepted rats from a positive facility, 456 rats were tested for Seoul virus. The percentage of rats positive ranged from 0-47% among facilities. Wisconsin facilities obtained rats from suppliers in eight different states. According to the CDC, 31 infected ratteries were identified in 11 states and Canada, and there were 17 acute human cases.

Outcome: Whole genome sequencing (DNA fingerprinting) performed at CDC determined that all U.S. and Canadian strains detected during this outbreak were indistinguishable from each other. The outbreak strain was an exact match to the 2012 U.K. outbreak strain, suggesting that infected pet rats from the U.K. were imported into the U.S. By the time the first human infections associated with pet rats were diagnosed in the U.S. in 2017, infected rats had likely been bred, traded, and moved around the U.S. for at least several months and possibly years. The multi-state investigation showed that infected rats had been distributed across the country without travel documentation to such an extent that public and animal health officials could no longer realistically eradicate the virus from the U.S. As a result, pet rats infected with Seoul hantavirus are still in circulation in the U.S. (including Wisconsin), and pose a risk to people who are in close contact with infected rats, their urine, droppings, saliva, or contaminated bedding.

Since infected rats don't look sick, CDC and DHS recommend that pet rats be tested for Seoul hantavirus before introducing them to other rats or people. Owners should talk to their veterinarian if they are interested in testing. People with more rats in their homes or frequent exposure to pet rats are likely at higher risk of infection than someone who has very little contact with pet rats. Rat owners should practice good hand hygiene and routinely disinfect rat cages and accessories, including used bedding, with a 10% bleach solution or a commercial disinfectant.

Public health in Wisconsin continues to conduct surveillance for human hantavirus infections. Seoul virus infections in animals are also reportable to the Wisconsin Department of Agriculture, Trade, and Consumer Protection.

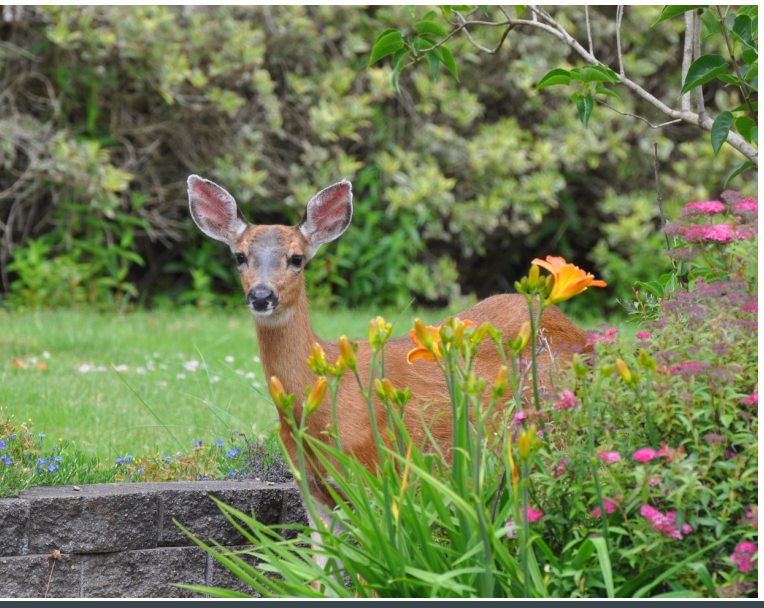


5.4 | TOXOPLASMOSIS IN VENISON

Pathogen*:* Toxoplasmosis is one of the leading foodborne causes of death in the U.S. It is caused by the parasite *Toxoplasma gondii*. Many healthy people infected with *Toxoplasma* won't experience any symptoms. Those who do have symptoms usually experience a flu-like illness but occasionally experience more serious effects, such as damage to the retina. Severe illness can occur for immunosuppressed persons, including encephalitis. If a woman is infected while pregnant, the parasite can cause birth defects or fetal death.

Cats and other felines are essential to *Toxoplasma's* reproductive cycle and the process by which it infects humans and other warm-blooded animals. Infected cats shed *Toxoplasma* cysts in their feces. Indoor cats contaminate their litter box; feral cats and other felines contaminate soil, water, and plants. Human infection can occur through accidental ingestion of these cysts, such as eating after cleaning a litter box or drinking contaminated water. Eating undercooked meat from an infected animal can also expose people to *Toxoplasma* because the muscle tissue of infected animals is contaminated with cysts for life.

Situation: During October 2017, DHS was contacted by an infectious disease physician about what appeared to be an outbreak of an unknown flu-like illness among a group of men (22–75 years of age) who had all attended a weekend retreat. The consumption of venison at the retreat prompted DHS to recommend testing for *Toxoplasma* infection. Initial test results for three attendees came back positive, but follow-up testing was needed to confirm the diagnosis. A questionnaire was developed for the outbreak, and DHS collaborated with local health departments to complete questionnaires for all 12 attendees, coordinate confirmatory testing, and obtain a sample of the venison. Serology panels to confirm human *Toxoplasma* infection and testing of the venison to confirm and categorize the presence and type of *Toxoplasma* were completed by national reference laboratories in the U.S. and France. Nine of the 11 attendees who consumed the venison became ill. All patients sought health care but none died.

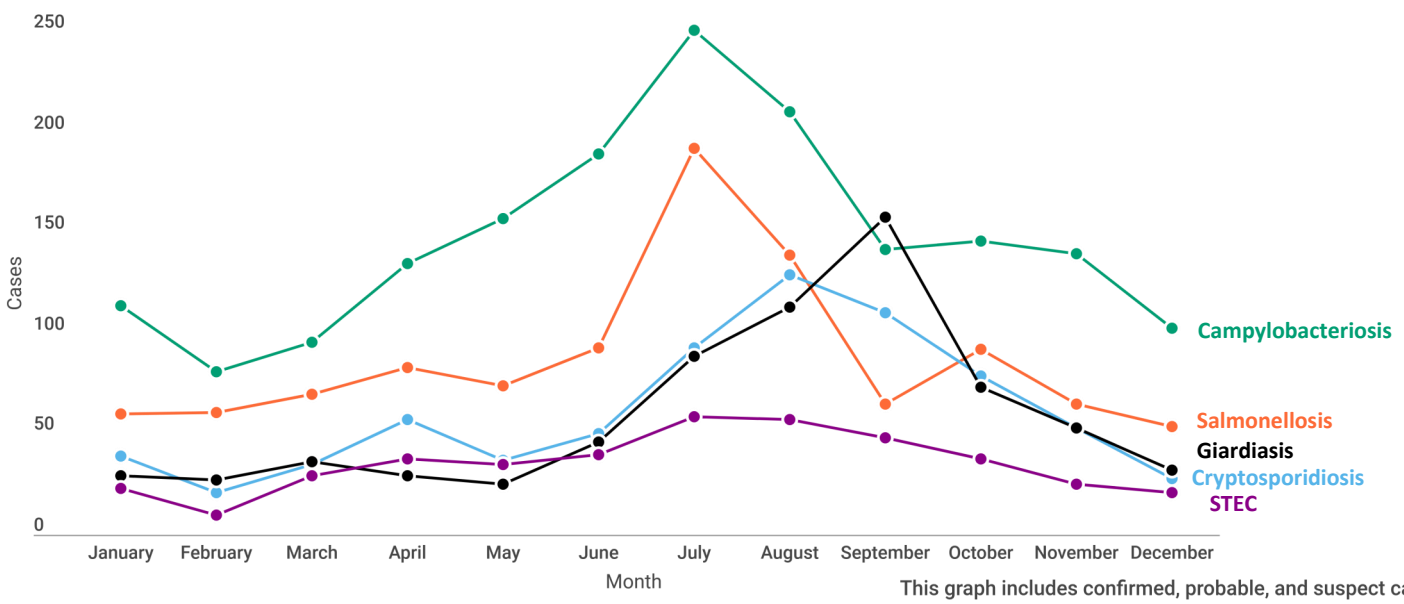


Outcome: The disease was confirmed to be toxoplasmosis and the venison was confirmed as the source of the infection. This outbreak was caused by a strain of *Toxoplasma* that is potentially more virulent than other stains, explaining the high attack rate. Research has demonstrated that *Toxoplasma* infections are common in white-tailed deer in the U.S., including the strain of *Toxoplasma* found in this outbreak. Future outbreaks of toxoplasmosis and other parasitic diseases can be prevented by cooking all wild game meat to an internal temperature of at least 160°F.

6.0 | ENTERIC/GASTROINTESTINAL DISEASES

Enteric diseases are illnesses caused by infection of the intestines and typically result in gastrointestinal symptoms. Common symptoms of enteric illnesses are diarrhea, vomiting, stomach cramps, fatigue, and fever. Enteric illnesses can be caused by bacteria, viruses, or parasites. They are acquired through swallowing contaminated food or water, by indirect or direct contact with animals or their environments, by contact with the feces (poop) or vomit of an infected person, or by contact with contaminated objects. The reportable enteric diseases included in this report are: campylobacteriosis, cryptosporidiosis, cyclosporiasis, giardiasis, diarrheagenic *E. coli* infections (Shiga toxin-producing *E. coli* [STEC], enterotoxigenic *E. coli* [ETEC], enteropathogenic *E. coli* [EPEC] and Enteroinvasive *E. coli* [EIEC]), hemolytic uremic syndrome (HUS), listeriosis, salmonellosis, shigellosis, typhoid fever, vibriosis (cholera and non-cholera), and yersiniosis. **During 2017, 6,185 notifiable enteric infections were reported in Wisconsin.**

Select Enteric Illnesses by Month of Symptom Onset, Wisconsin, 2017



This graph includes confirmed, probable, and suspect cases.

Seasonality

Most bacterial and parasitic infections peak during summer months (June—September). This summer seasonality is likely due to the following factors:

1. More people are cooking and eating outside where good hand hygiene and proper temperature control are more difficult.
2. Cross-contamination between foods, animals, and the environment are more likely to occur.
3. More people have contact with recreational water during this time.
4. More people come in contact with animals that can spread these organisms.

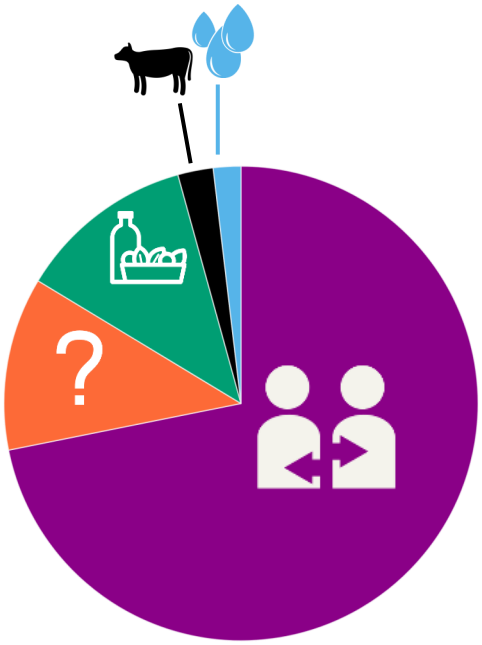
6.1 | ENTERIC DISEASE OUTBREAKS

In coordination with staff at local, state, and federal agencies, DHS epidemiologists investigate many enteric disease outbreaks each year. These outbreaks result from transmission of pathogens via food, water, or by contact with infected animals, people, or their environment. Detecting, investigating, and responding to outbreaks is a core function of public health. Outbreak investigations are necessary to ensure rapid implementation of control measures to prevent additional illnesses, and are also important for preventing outbreaks from occurring again in the future. Suspected and confirmed outbreaks are required to be reported immediately to local and state public health agencies per Wis. Admin. Code § DHS 145.04 (3) (a). Enteric disease outbreaks investigated by local and state agencies in Wisconsin are also reported to the CDC's National Outbreak Reporting System (NORS).

2017 Outbreaks of Gastrointestinal Illnesses by Agent

Agent	# outbreaks (%)
Viral	**251 (67%)**
Norovirus	244 (65%)
Other viruses	7 (2%)
Bacterial	**33 (9%)**
Salmonella	21 (6%)
Shiga toxin-producing *E. coli* (STEC)	5 (1%)
Shigella	3 (1%)
Enteropathic *E. coli* (EPEC)	2 (1%)
Vibrio	2 (1%)
Parasitic	**7 (2%)**
Cyptosporidium	8 (3%)
Giardia	2 (1%)
Toxoplasma	1 (<1%)
Bacterial Toxin (*Clostridium perfringens*)	**6 (2%)**
Unknown* Most of these outbreaks occur in communal settings where norovirus or another gastrointestinal virus is the likely cause.	**68 (18%)**

MODES OF TRANSMISSION



265 (73%) Person-to-person

45 (12%) Foodborne

9 (2%) Zoonotic

2 (1%) Waterborne*

44 (12%) Undetermined

* Does not include legionellosis outbreaks or pool chemical events

DEFINITIONS

Person-to-person | Disease spread through direct contact with an infected person.

Foodborne | Disease spread by consuming contaminated food or drink.

Zoonotic | Disease spread through contact with infected animals or their environment.

Waterborne* | Disease spread through exposure to contaminated water.

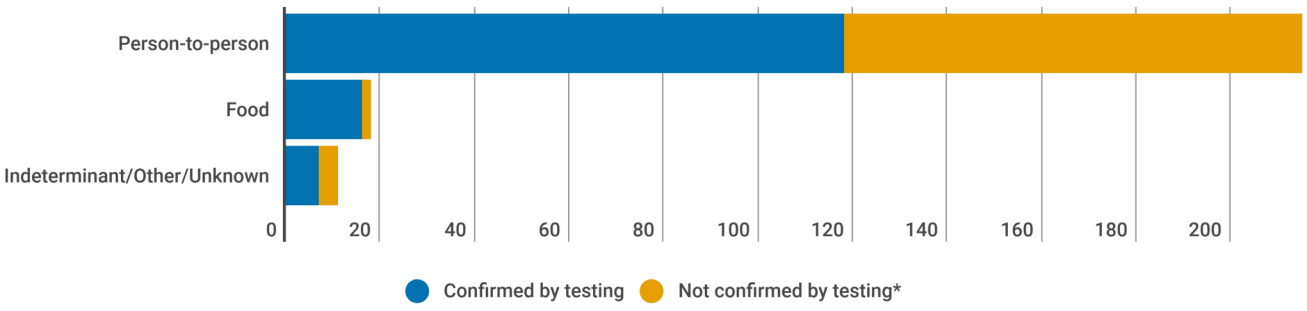
Undetermined | The transmission route was not determined for the outbreak.

6.2 | NOROVIRUS OUTBREAKS

Norovirus is the leading cause of person-to-person and foodborne outbreaks in Wisconsin. While individual cases of norovirus infection are not reportable, outbreaks of norovirus are reportable. Norovirus is a virus that causes vomiting, diarrhea, and abdominal cramping. Norovirus is often incorrectly referred to as "the stomach flu." However, norovirus illness is not related to the flu (influenza), which causes respiratory symptoms. Norovirus causes approximately 20 million illnesses each year in the U.S. Anyone can get norovirus infection and become sick. Because there are many types of norovirus, you can get it multiple times in your lifetime.

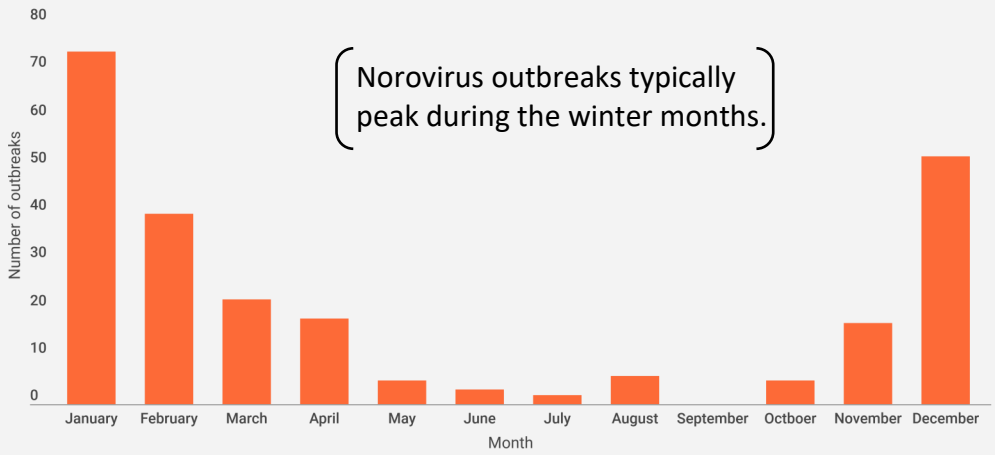
Norovirus outbreaks are most often spread from person-to-person, although they are also the leading cause of foodborne outbreaks. Norovirus can persist in the environment and is resistant to many commonly used disinfectants, so contamination in the environment also plays a key role in transmission. Norovirus outbreaks can be detected early by recognizing the typical symptoms of illness. Early recognition allows for the implementation of aggressive infection prevention and control measures to reduce environmental or person-to-person transmission. When appropriate prevention and control measures are not implemented promptly, outbreaks can continue to cause illness for weeks, leading to hospitalizations in some people and occasionally death from dehydration and other complications of vomiting and diarrhea. **Of the 244 norovirus outbreaks reported in 2017, 196 (80%) were in long-term care facilities.**

Norovirus Outbreaks by Transmission Mode, Wisconsin, 2017



*Most of these outbreaks occur in communal settings where norovirus is the likely cause.

Norovirus Outbreaks by Month, Wisconsin, 2017



Norovirus outbreaks typically peak during the winter months.

WANT MORE INFORMATION?

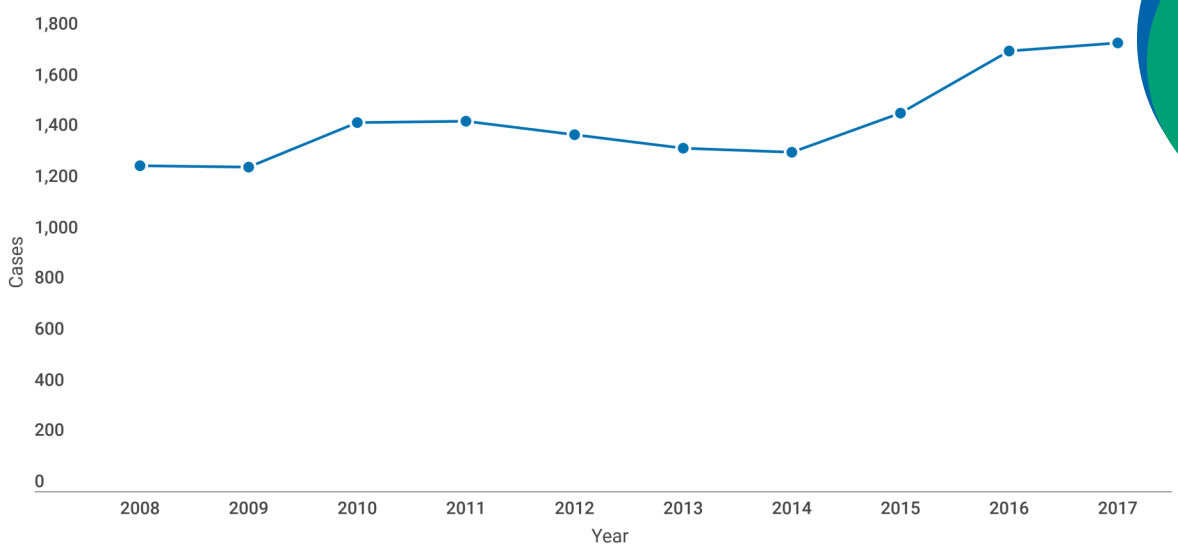
Please refer to the:

Recommendations for Prevention and Control of Acute Gastroenteritis Outbreaks in Wisconsin Long-Term Care Facilities.

6.3 | CAMPYLOBACTERIOSIS

Campylobacteriosis is an infection caused by *Campylobacter* bacteria. It is one of the most common causes of diarrhea in the U.S. It affects the intestinal tract and, in rare cases, the bloodstream. It is the most commonly reported cause of bacterial diarrhea in Wisconsin. It occurs more frequently in the summer months. Many cases of campylobacteriosis are caused by eating raw or undercooked poultry, or from cross-contamination of other foods by these items. In 2011, *Campylobacter* was found on 47% of raw chicken samples bought in grocery stores and tested through the National Antimicrobial Resistance Monitoring System (NARMS). Outbreaks of *Campylobacter* in Wisconsin have most often been associated with consumption of unpasteurized dairy products. Many animals can shed *Campylobacter* in their feces, including cattle, poultry, dogs, and cats (especially puppies and kittens), and people can become infected from contact with the stool of an infected animal. The organism is not usually spread from one person to another, but this can happen if the infected person is having diarrhea and does not use good hand hygiene.

Campylobacteriosis Cases, Wisconsin, 2008-2017



1,764 cases of campylobacteriosis were reported in Wisconsin in 2017

This graph includes confirmed, probable, and suspect cases.

Contact with cattle

Of Wisconsin residents diagnosed with campylobacteriosis in 2017, 313 (18%) reported contact with cattle.

Prevention measures

Avoid drinking raw milk and wash your hands after having contact with cattle as well as poultry.

Hospitalizations

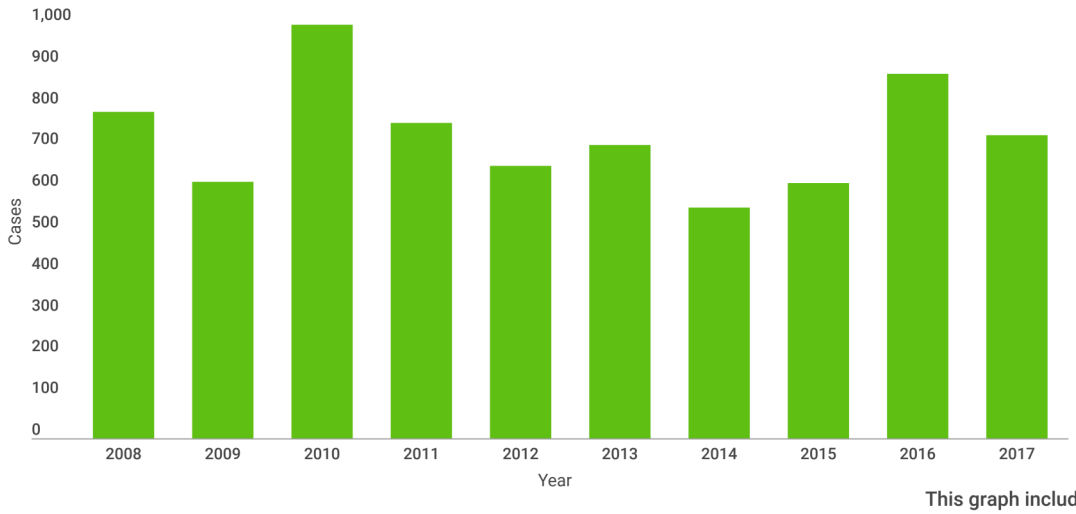
Of Wisconsin residents diagnosed with campylobacteriosis in 2017, 247 (14%) were hospitalized for their illness.

6.4 | CRYPTOSPORIDIOSIS

Cryptosporidiosis is a diarrheal illness that is caused by the parasite called *Cryptosporidium*. The parasite and the disease are commonly called "Crypto." *Cryptosporidium* is a leading cause of waterborne disease and waterborne disease outbreaks in the U.S. The parasite can live outside the body for long periods of time and is highly resistant to chlorine disinfection. The resistance to chlorine means Crypto can survive in swimming pools even if the pool is properly treated with chlorine. The most common way that the parasite is spread is through ingestion of contaminated recreational water or contact with infected animals, especially calves and adult cattle.

The main symptom of cryptosporidiosis is frequent watery diarrhea. Abdominal cramping is also reported, along with nausea, vomiting, fever, headache, and loss of appetite. *Cryptosporidium* is shed in feces of infected humans, as well as infected animals. Humans typically shed *Cryptosporidium* for up to two weeks after feeling well. Person-to-person transmission can occur via direct contact or indirectly through food handling if the infected person did not wash their hands thoroughly after using the restroom. Thorough handwashing, good hygiene, and not swimming for 14 days after you are well are the best ways to prevent *Cryptosporidium* from spreading to others.

Cryptosporidiosis Cases, Wisconsin, 2008-2017



This graph includes confirmed and probable cases.

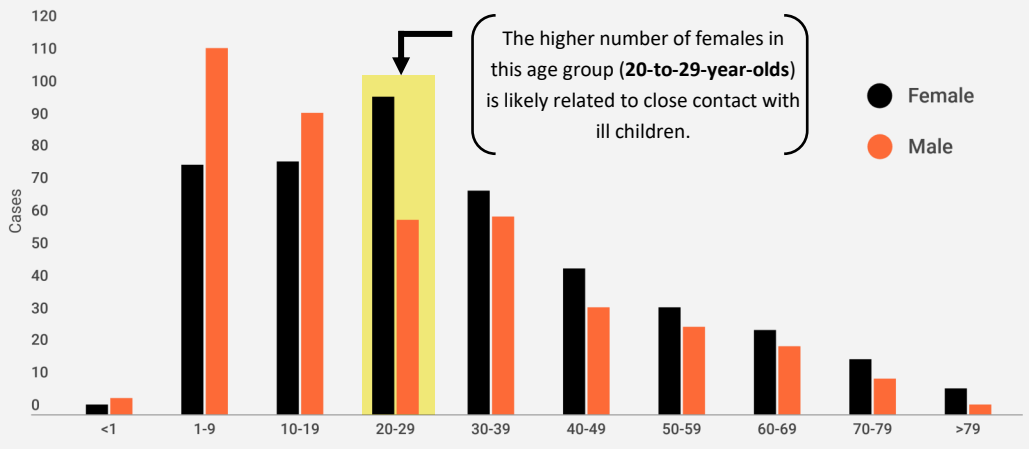
731

cases of cryptosporidiosis were reported in Wisconsin in 2017

Children

The highest number of cryptosporidiosis cases occurred in children ages 1 to 9 years.

Cryptosporidiosis Cases by Age and Sex, Wisconsin, 2017

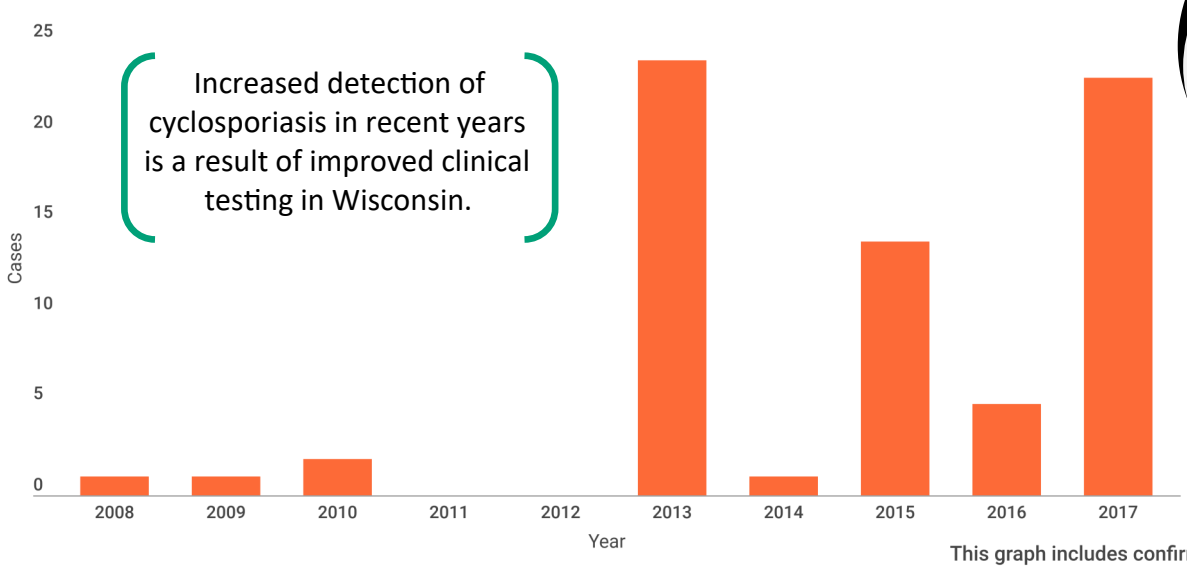


This graph includes confirmed, probable, and suspect cases.

6.5 | CYCLOSPORIASIS

Cyclosporiasis is a diarrheal illness that is caused by the parasite *Cyclospora cayetanensis*. The *Cyclospora* parasite is spread when people ingest food or water that is contaminated with feces (poop). *Cyclospora* is not endemic, or typically found, in the U.S. People in the U.S. most commonly become infected when traveling to tropical or subtropical regions where it is endemic, or by consuming contaminated fresh produce imported from endemic regions. Outbreaks of cyclosporiasis in the U.S. have been linked to various types of imported fresh produce. The time between becoming infected and having symptoms is usually one week. The symptoms of cyclosporiasis are frequent watery diarrhea along with loss of appetite, stomach cramps, bloating, increased gas, nausea, and fatigue. Symptoms may come and go. It is unlikely that *Cyclospora* is spread from one person to another because *Cyclospora* passed in feces requires days to weeks, under proper environmental conditions, to become infectious to another person. Improvements in laboratory testing at clinical laboratories around the state have resulted in an increased number of cases reported in recent years.

Cyclosporiasis Cases, Wisconsin, 2008-2017



23
cases of cyclosporiasis were reported in Wisconsin in 2017

This graph includes confirmed, probable, and suspect cases.

RISK FACTORS

Imported produce

such as berries (raspberries and blackberries), basil, snow peas, mesclun lettuce, and cilantro.

Travel

to tropical or subtropical regions, and consuming contaminated food.

Treatment

If untreated, the illness may last for days to a month or more, and may have a remitting-relapsing course. Trimethoprim-sulfamethoxazole (TMP-SMX) is the treatment of choice.

6.6 | DIARRHEAGENIC *E. COLI*

Escherichia coli (E. coli) are a group of bacteria found in the intestines of people and animals that can also be found in the environment. Most types of *E. coli* are harmless and serve an important role in our digestive system. However, some types of *E. coli* are pathogenic, meaning they can cause illness in humans. Many of these pathogenic *E. coli* cause diarrhea and are referred to as diarrheagenic *E. coli*. Other *E. coli* can leave the intestines and cause infections in other sites of the body such as urinary tract infections, bloodstream infections, and respiratory illnesses. Diarrheagenic *E. coli* infections are easily spread from person-to-person. To help limit the spread of diarrheagenic *E. coli*, wash your hands before handling, serving, or eating food, and especially after touching animals, working in animal environments, or using the bathroom.

There are six pathotypes of *E. coli* that cause diarrhea. In Wisconsin, 4 of the 6 pathotypes are reportable.

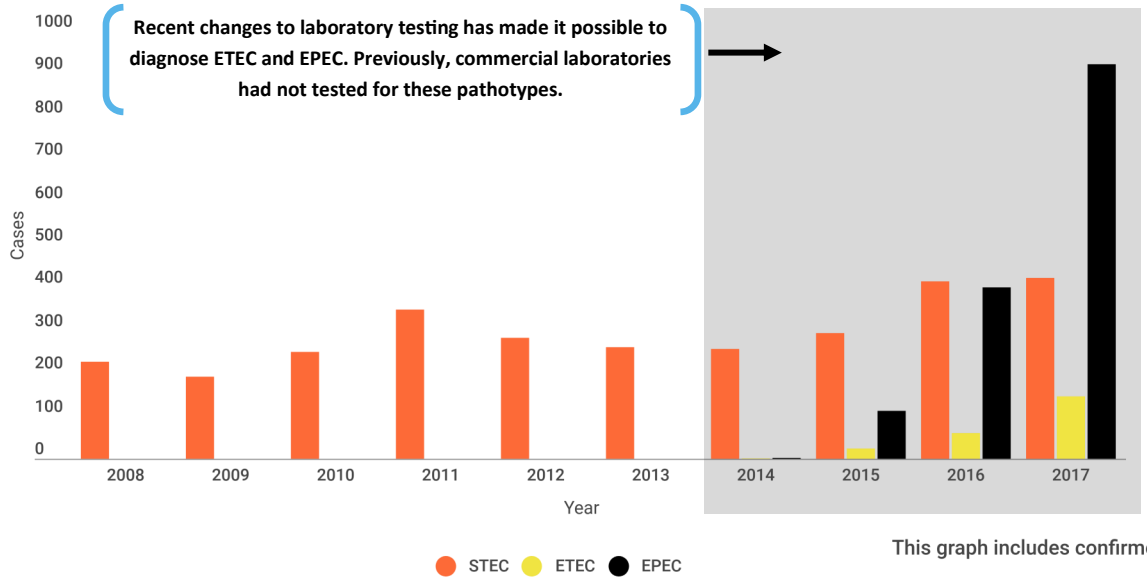
Shiga toxin-producing *E. coli* (STEC) may also be referred to as verocytotoxin-producing *E. coli* (VTEC) or enterohemorrhagic *E. coli* (EHEC). This pathotype is the one most commonly heard about in the news in association with foodborne outbreaks and includes *E. coli* O157: H7 (see STEC page). Culture confirmation is available.

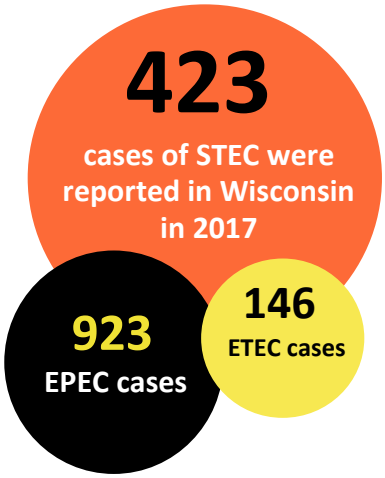
Enterotoxigenic *E. coli* (ETEC) is a common cause of diarrhea in developing countries, especially among children and travelers to those countries. However, even people who do not leave the U.S. can get ETEC. ETEC can be spread if people with ETEC do not properly wash their hands when preparing food or beverages, or if crops are watered using water contaminated with ETEC. At this time, no culture confirmation is routinely available, even at public health laboratories.

Enteropathogenic *E. coli* (EPEC) is common among children less than two years old, and causes watery diarrhea with mucus, fever, and dehydration. EPEC is spread in contaminated food and water, and on surfaces contaminated with the feces of people with EPEC. At this time, no culture confirmation is routinely available, even at public health laboratories.

Enteroinvasive *E. coli* (EIEC) are more closely related to *Shigella* than other types of diarrheagenic *E. coli*. The test used to identify EIEC cannot tell the difference between EIEC and *Shigella*, so EIEC cases are managed as probable *Shigella* infections. For more information on this topic, please see the shigellosis section.

Diarrheagenic *E. coli* by pathotype, Wisconsin, 2008-2017





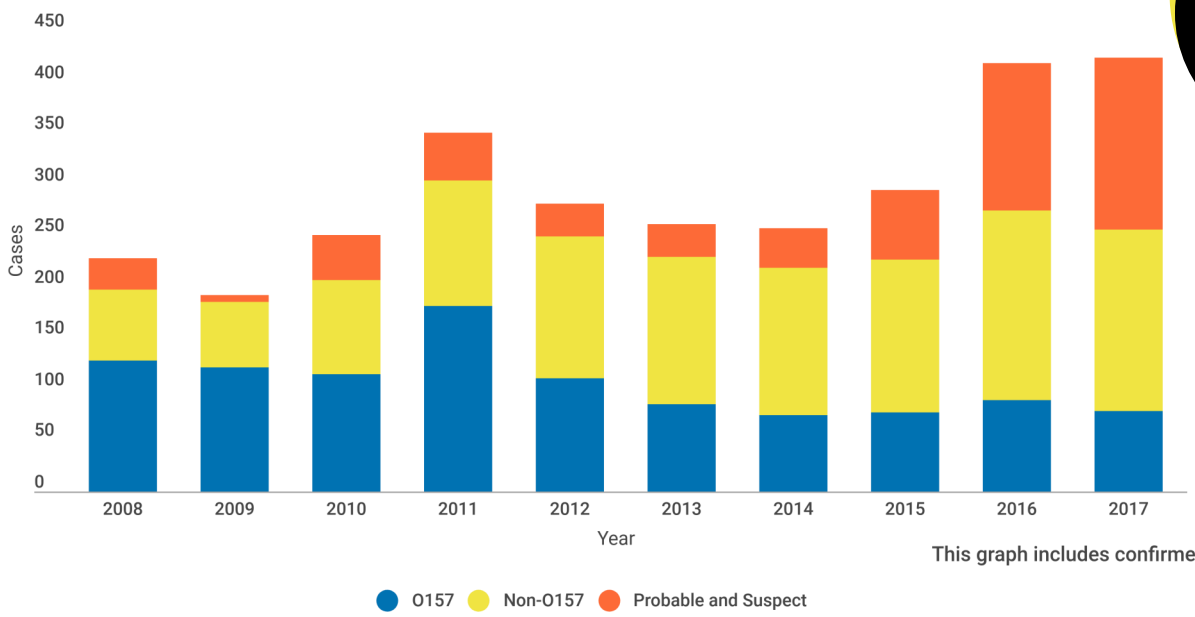
This graph includes confirmed, probable, and suspect cases.

6.7 | SHIGA TOXIN-PRODUCING *E. COLI* (STEC)

STEC bacteria produce a toxin called Shiga toxin. The most commonly identified STEC in North America is *E. coli* O157:H7 (often shortened to *E. coli* O157 or even just "O157"). Anyone can get infected with STEC, but children and the elderly are more likely to develop severe complications, including hemolytic uremic syndrome (HUS). Symptoms of STEC are stomach cramps, diarrhea that is often bloody, and vomiting. STEC live in the guts of cattle, goats, sheep, deer, and elk. People become infected with STEC in a variety of ways. Food, such as ground beef, fresh leafy greens, and raw milk can become contaminated with STEC, or people can be infected from contact with animals or their manure. Additionally, STEC can be spread from person-to-person, which most often occurs when young children are infected. An estimated 265,000 STEC infections occur each year in the U.S. STEC O157 causes about 36% of these infections, and non-O157 STEC cause the rest.

424
cases of STEC were reported in Wisconsin in 2017

STEC cases, Wisconsin, 2008-2017



This graph includes confirmed, probable, and suspect cases.

Prevention measures

Wash your hands after changing a diaper or going to the bathroom, and before and after preparing foods.

Hospitalizations

Of Wisconsin residents diagnosed with STEC in 2017, 88 (21%) were hospitalized for their illness.

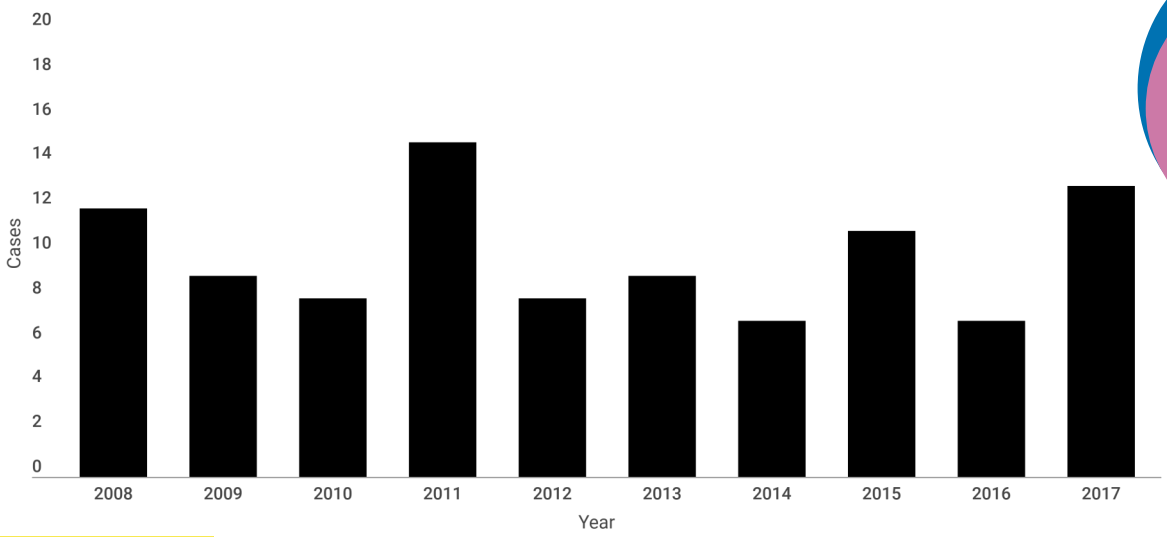
Ages affected

Of Wisconsin residents diagnosed with STEC in 2017, 140 (33%) were less than 5 years old.

6.8 | HEMOLYTIC UREMIC SYNDROME (HUS)

Hemolytic uremic syndrome (HUS) is a serious disease that affects the kidneys and blood clotting system. It is a rare disease, but is more common in children under 5 years of age than in adults. In most cases, HUS is caused by infection with the bacteria *E. coli* O157:H7. However, the majority of individuals infected with *E. coli* O157:H7 do not develop HUS. These bacteria produce a toxin that can cause damage to the kidneys and blood clotting system. It is not clear why some people infected with these bacteria develop HUS, while many others do not. Some cases of HUS are not caused by *E. coli* O157:H7; these individuals may be infected with another type of toxin-producing bacteria. HUS can be mild or severe. In severe cases, kidney function is greatly reduced and dialysis (purification of an individual's blood with an artificial kidney) may be necessary to temporarily take over the function of the kidneys. Abnormalities of the blood clotting system can create bleeding disorders and the blood count may be low (anemia). Transfusions of blood or blood-clotting factors (platelets) are often needed in severe cases. Most individuals with HUS recover completely and kidney function returns to normal. However, a prolonged hospital stay is often required.

HUS cases, Wisconsin, 2008-2017



13
cases of HUS were reported in Wisconsin in 2017

IN 2017:

Ages affected

85% of Wisconsin cases of HUS were in children less than 10 years old.

Hospitalizations

100% of HUS cases were hospitalized, with one death.

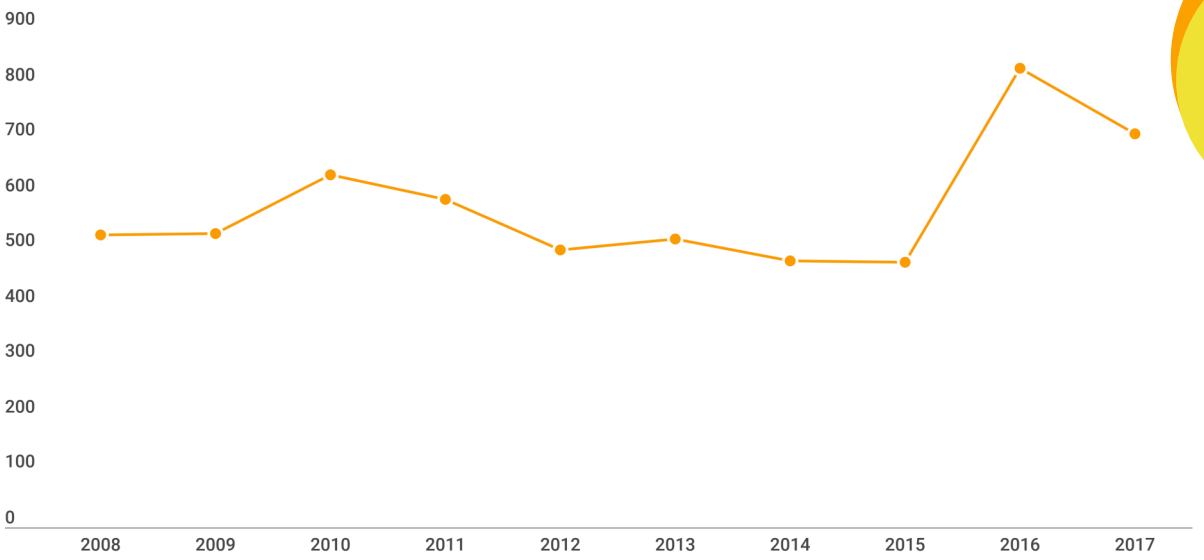
E. coli O157

54% of reported HUS cases were caused by confirmed *E. coli* O157 infections.

6.9 | GIARDIASIS

Giardiasis is a diarrheal illness caused by the parasite *Giardia*. Once someone is infected with the parasite, the parasite lives in the intestines and the person sheds the parasite in their feces (poop). *Giardia* is found on surfaces or in water, soil, or food that have been contaminated with feces from an infected human or animal. The most common way that *Giardia* is spread is through ingestion of contaminated untreated water. It is important to use a filter or treatment method effective against *Giardia* when using natural surface water (rivers, ponds, streams) for drinking and cooking. Exposure to natural surface water during activities such as swimming, fishing, canoeing, and kayaking increase a person's risk of becoming infected with *Giardia*. The main symptoms of giardiasis are diarrhea, gas, greasy poop that floats, stomach cramps, nausea, and dehydration. Thorough handwashing and drinking only safe water are the best way to prevent *Giardia* infection.

Giardiasis Cases, Wisconsin, 2008-2017



710 cases of giardiasis were reported in Wisconsin in 2017

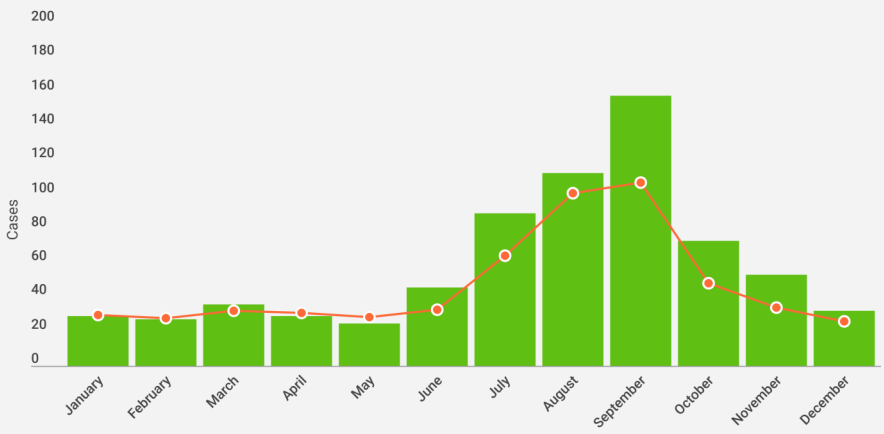
This graph includes confirmed, probable, and suspect cases.

Giardiasis Cases by Sex, Wisconsin, 2017

58% Male

42% Female

Giardiasis Cases by Month, Wisconsin, 2017

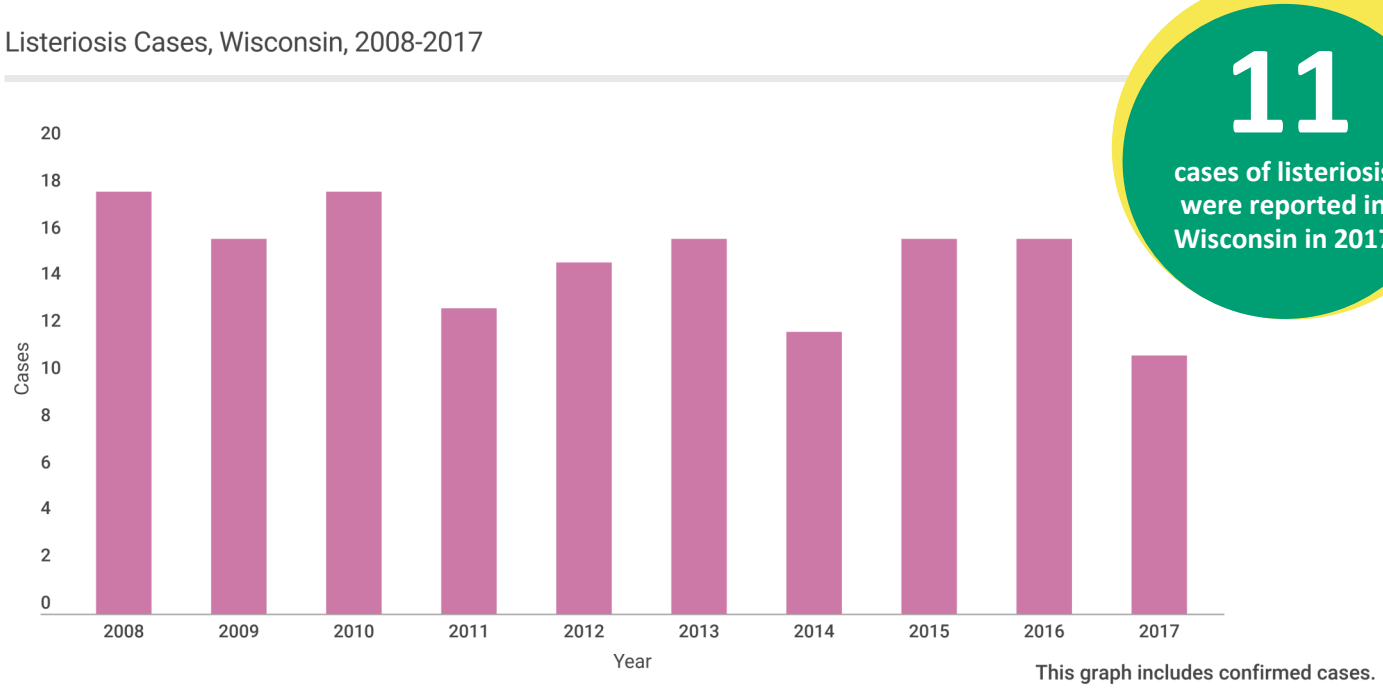


Past 5-year average, Wisconsin 2013-2017

This graph includes confirmed, probable, and suspect cases.

6.10 | LISTERIOSIS

Listeriosis is a serious infection that is caused by eating food contaminated with the bacteria *Listeria monocytogenes*. People at risk for becoming ill with listeriosis include pregnant women and their unborn babies, newborns, the elderly, and those with weakened immune systems. The symptoms of listeriosis may include sudden onset of fever, muscle aches, chills, and sometimes nausea or diarrhea. If the infection spreads to the nervous system and causes meningitis, serious complications such as stiff neck, headache, confusion, convulsions, and coma may occur. Infected pregnant women may experience only a mild gastrointestinal illness, but *L. monocytogenes* can be transmitted to the fetus through the placenta even if the mother is not showing signs of illness. This can lead to infections in the newborn, premature delivery, miscarriage, or stillbirth.



11 cases of listeriosis were reported in Wisconsin in 2017

Hospitalizations

In 2017, 10 of 11 (91%) individuals with listeriosis were hospitalized for their illness.

High-risk foods

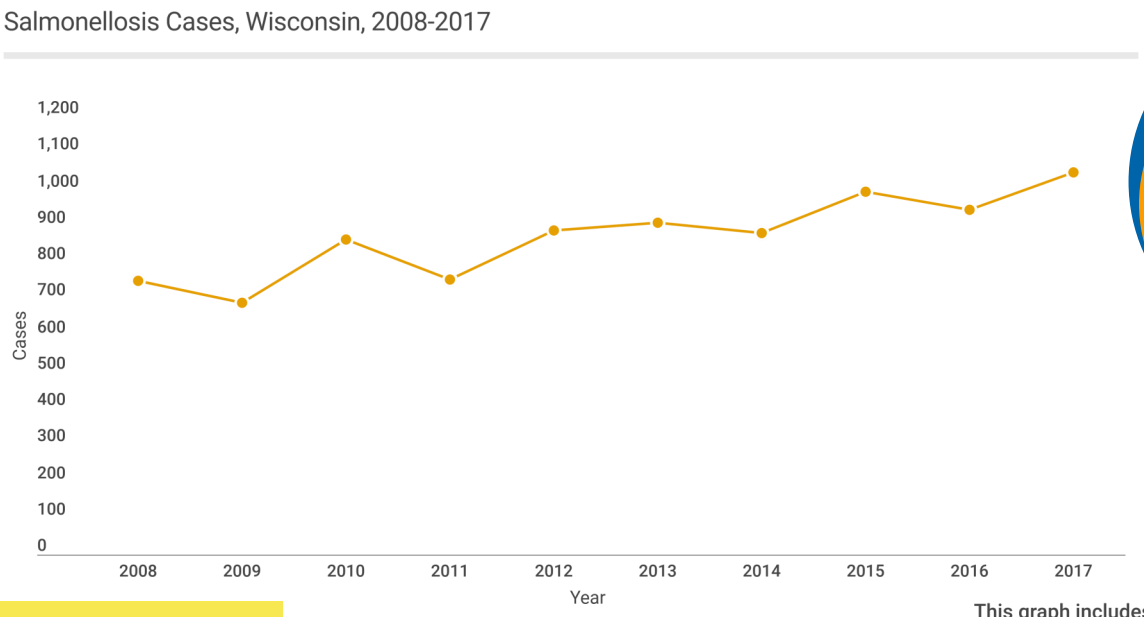
Pregnant women or immune compromised individuals should not eat high-risk foods: raw milk, soft cheeses, raw sprouts, melons, hot dogs, and lunch meats.

Cold temperatures

***L. monocytogenes* likes to grow at colder temperatures, for example in the refrigerator. Make sure your refrigerator is set ≤ 40˚F and freezer ≤ 0˚F .**

6.11 | SALMONELLOSIS

Salmonellosis is a bacterial infection that generally affects the intestinal tract and occasionally urine, the bloodstream, or other body tissues. It is a common cause of diarrheal illness in Wisconsin. *Salmonella* bacteria are spread by eating or drinking contaminated food or water, or by direct or indirect contact with feces (poop) from infected people or animals. *Salmonella* are widely distributed in our food chain and environment. The bacteria can be found in raw meats, poultry, eggs, and raw dairy products as well as fresh fruits and vegetables, and even some processed foods. People may also become exposed to *Salmonella* bacteria through contact with animals such as live chicks, cattle, reptiles, or sometimes dogs and cats. People exposed to *Salmonella* bacteria may experience mild to severe diarrhea, abdominal pains, fever, and occasionally vomiting for several days. Bloodstream infections are infrequent but can be quite serious, particularly in the very young or elderly.



1,048 cases of salmonellosis were reported in Wisconsin in 2017

This graph includes confirmed, probable, and suspect cases.

IN 2017:

Antibiotic resistance

Antibiotic-resistant nontyphoidal *Salmonella* infections are on the rise and approaching 20% for ciprofloxacin.

Hospitalizations

229 (22%) individuals with salmonellosis were hospitalized for their illness.

Children

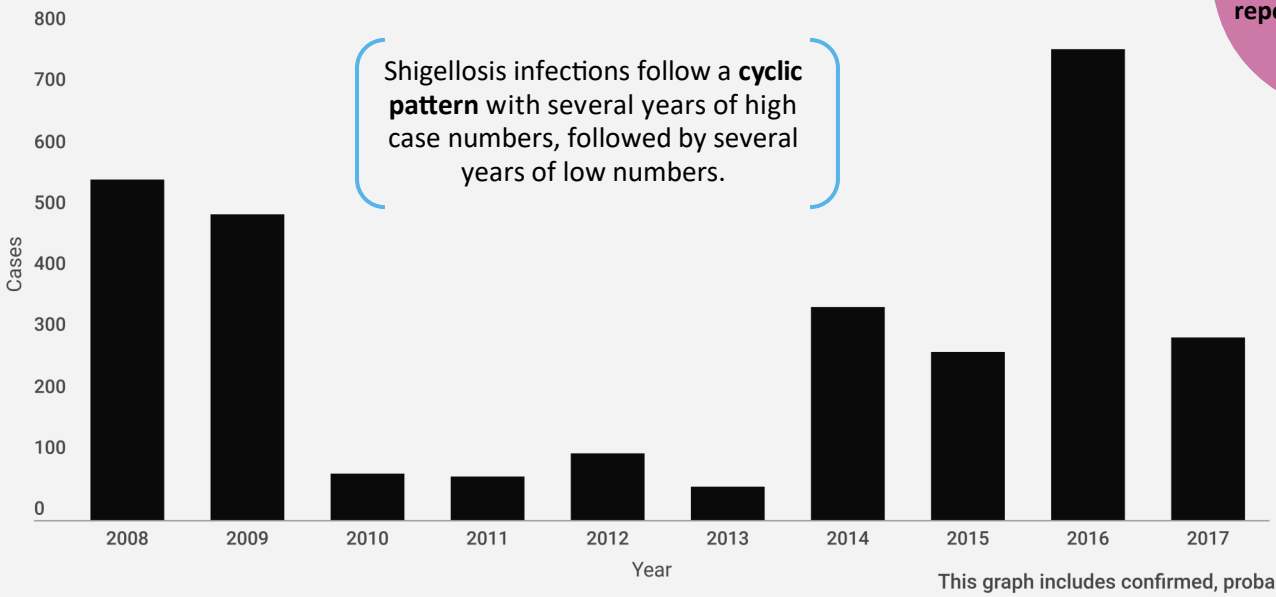
112 (11%) individuals with salmonellosis were under 5 years of age.

6.12 | SHIGELLOSIS

Shigellosis is a bacterial infection most commonly seen in the summer and early fall as single cases or outbreaks. *Shigella* bacteria are found in the intestinal tract of infected people, who may then contaminate food or water. The bacteria are spread by eating or drinking contaminated food or water, or by direct or indirect contact with feces (poop) from an infected person. Anyone can get shigellosis, but it is recognized more often in young children. Those who may be at greater risk include children in day care centers, travelers to certain countries, institutionalized people, and men who have sex with men. Other than primates, animals are not infected with and do not carry *Shigella*. *Shigella* is easily spread from person-to-person and thorough handwashing is necessary to reduce the chances of getting sick.

298
cases of shigellosis were reported in Wisconsin in 2017

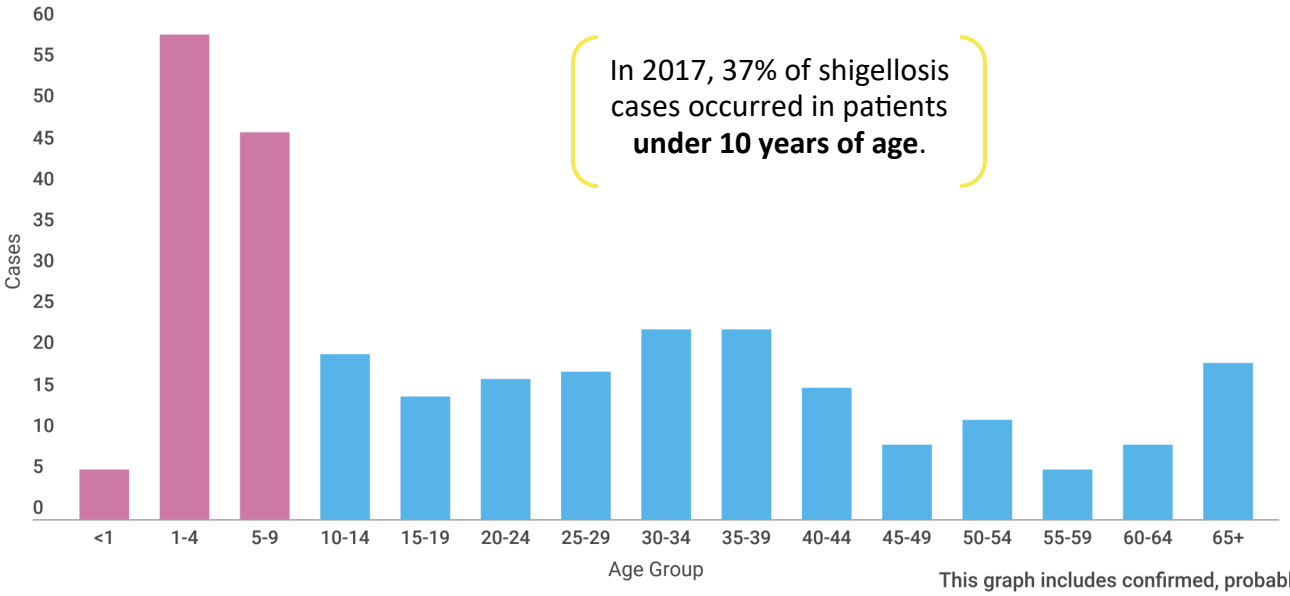
Shigellosis Cases, Wisconsin, 2008-2017



Shigellosis infections follow a **cyclic pattern** with several years of high case numbers, followed by several years of low numbers.

This graph includes confirmed, probable, and suspect cases.

Shigellosis Cases by Age, Wisconsin, 2017



In 2017, 37% of shigellosis cases occurred in patients **under 10 years of age**.

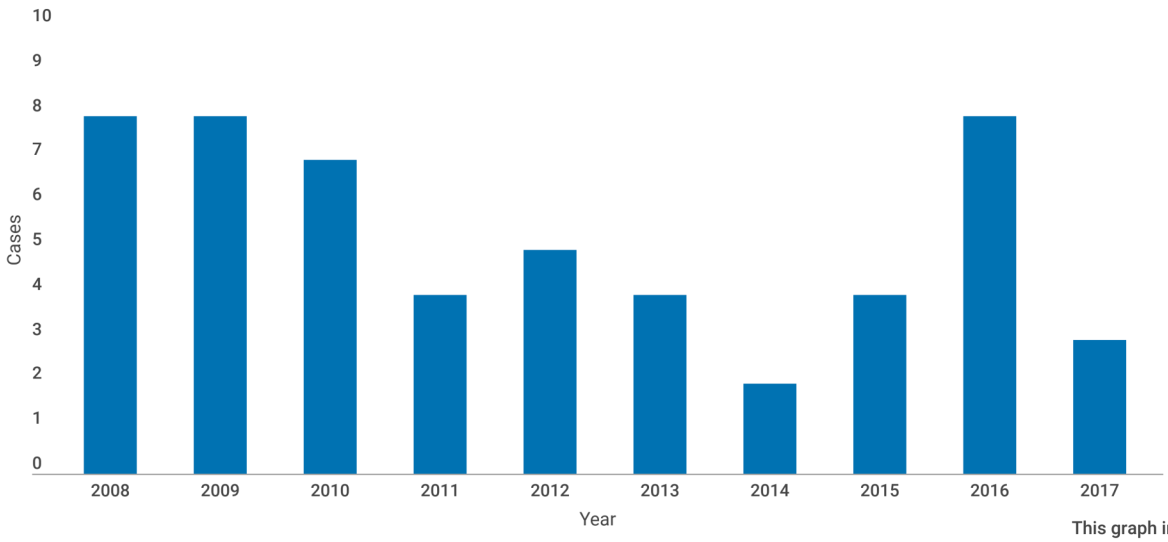
This graph includes confirmed, probable, and suspect cases.

6.13 | TYPHOID FEVER

Typhoid fever is an illness caused by the bacterium *Salmonella* Typhi, which can be life threatening. Approximately 5,700 cases occur each year in the U.S. Typhoid fever is still common in the developing world, where it affects about 21.5 million people each year. In Wisconsin residents, most cases are acquired while traveling internationally. *Salmonella* Typhi bacteria are shed in the stool of infected persons, including chronic carriers. There are no known animal reservoirs for typhoid fever. Typhoid fever is spread by eating or drinking contaminated food or water or by direct or indirect contact with feces (poop) from infected persons. Symptoms of *Salmonella* Typhi infection may be mild to severe and can include fever, headache, loss of appetite, constipation or diarrhea, and nonproductive cough.

People traveling to developing countries should take precautions to decrease their risk of typhoid fever, including getting vaccinated prior to travelling and avoiding risky food and drink. Some high-risk foods are raw fruits and vegetables, raw seafood, undercooked meat or poultry, food from street vendors, and untreated water (including ice) in areas where there is not enough chlorination.

Typhoid Fever Cases, Wisconsin, 2008-2017



This graph includes confirmed cases.

3 cases of typhoid fever were reported in Wisconsin in 2017

DURING 2008-2017:

Hospitalizations*

39 (67%) typhoid fever cases were hospitalized for their

Specimen source*

48 (90%) typhoid fever cases had positive blood cultures.

International travel*

43 (74%) typhoid fever cases reported travel outside the

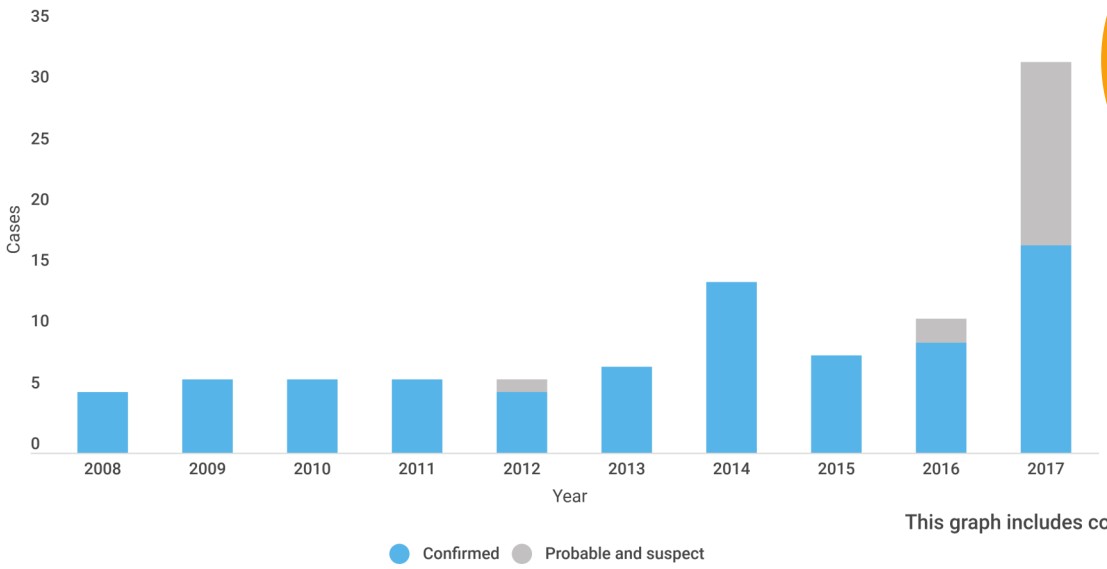
*Percent based on cases with information available

6.14 | VIBRIOSIS

Vibriosis is an illness caused by about a dozen *Vibrio* species. *Vibrio* species can cause gastrointestinal illness, primary septicemia, and wound infections. The most common species causing human illness in the U.S. are *Vibrio parahaemolyticus*, *Vibrio vulnificus*, and *Vibrio alginolyticus.*

Vibrio bacteria naturally live in certain coastal waters (brackish and saltwater) and are present in higher concentrations between May and October when water temperatures are warmer. Most people become infected by eating raw or undercooked shellfish, particularly raw oysters, that come from those waters. Certain *Vibrio* species can also cause a skin infection when an open wound is exposed to brackish or saltwater. People with compromised immune systems, especially those with chronic liver disease, are more likely to get vibriosis. Eating raw seafood, especially oysters, and exposing open wounds to brackish or saltwater can increase a person's chance for getting vibriosis. CDC estimates that vibriosis causes 80,000 illnesses each year in the U.S. About 52,000 of these illnesses are estimated to be the result of eating contaminated seafood.

Vibriosis Cases, Wisconsin, 2008-2017



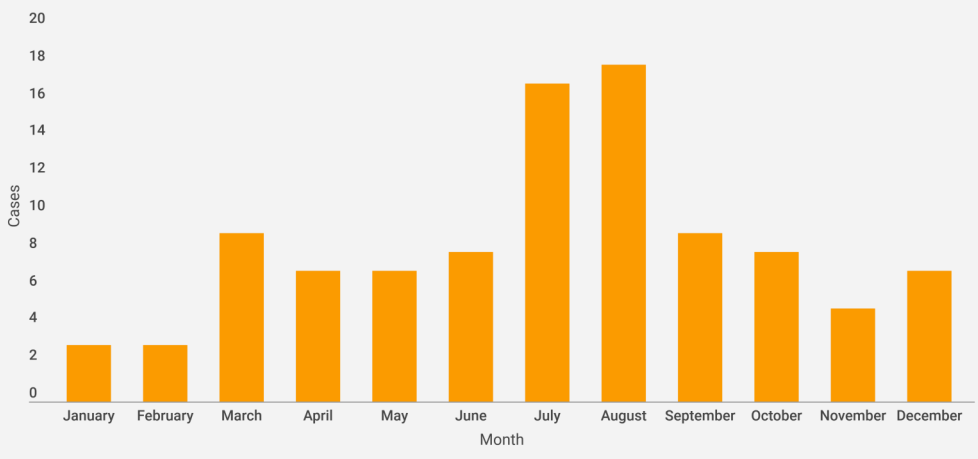
This graph includes confirmed, probable, and suspect cases.

32
cases of vibriosis were reported in Wisconsin in 2017

Raw oysters

Of Wisconsin residents diagnosed with vibriosis in 2017, 10 reported eating raw oysters.

Total Vibriosis Cases by Month, Wisconsin, 2008-2017

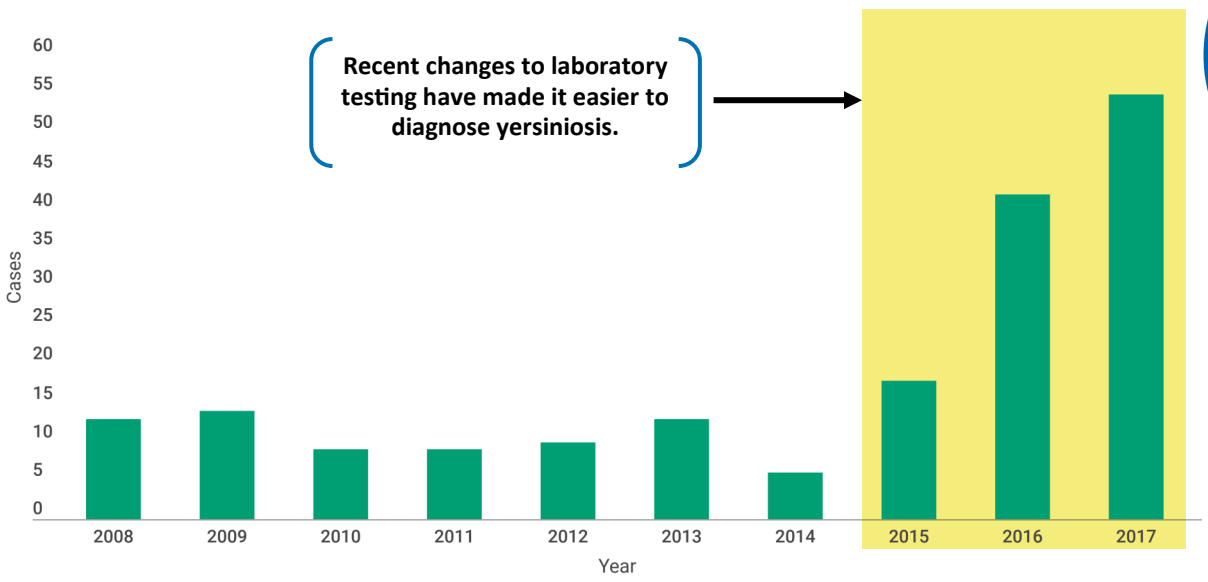


This graph includes confirmed, probable, and suspect cases.

6.15 | YERSINIOSIS

Yersiniosis is a disease caused by the bacterium *Yersinia enterocolitica*. Yersiniosis usually occurs as an isolated event, however, occasional outbreaks have been reported due to a common exposure. Anyone can get yersiniosis from eating contaminated food, especially raw or undercooked pork products. The preparation of chitterlings (raw pork intestines) may be particularly risky. Drinking unpasteurized milk or untreated water can also cause infection. People may occasionally become infected with *Y. enterocolitica* after contact with animals, especially pigs. Symptoms of yersiniosis can differ based on the age of the infected person. In young children, common symptoms are fever, abdominal pain, and diarrhea, often bloody. In older children and adults, lower right-sided abdominal pain and fever may be confused with appendicitis. In a small number of cases joint pains, skin rash, and bloodstream infections may occur. Increases in reported cases during 2015 and 2017 are likely due to availability of new test methods at clinical laboratories.

Yersiniosis Cases, Wisconsin, 2008-2017



55 cases of yersiniosis were reported in Wisconsin in 2017

This graph includes confirmed, probable, and suspect cases.

Hospitalizations

In 2017, 17 (31%) yersiniosis cases were hospitalized for their illness.

Abdominal pain

Yersiniosis can mimic appendicitis with abdominal pain and right lower quadrant tenderness.

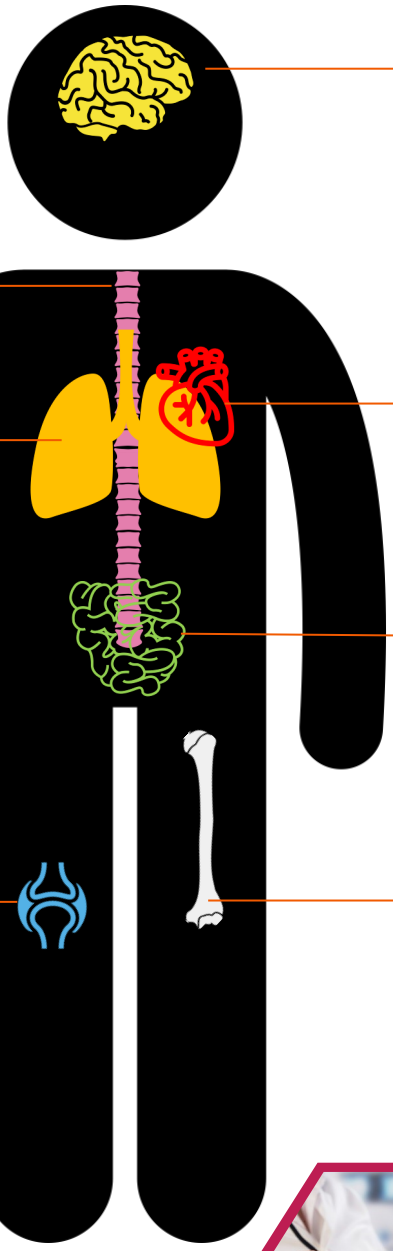
Cases by sex

In 2017, 31 (56%) yersiniosis cases were female and 24 (44%) were male.

7.0 | INVASIVE BACTERIAL DISEASES

Invasive bacteria are pathogens that can invade parts of the body where bacteria are not normally present, such as the bloodstream, soft tissues like muscle or fat, and the meninges (the tissues covering the brain and spinal cord). The invasive bacterial diseases included in this report are: group A streptococci, group B streptococci, rheumatic fever, and toxic shock syndrome. Overall, Wisconsin has seen an increase in cases of invasive bacteria diseases due at least in part to improved reporting, including electronic lab reports.

In order for bacteria to be "invasive," they have to cross certain barriers. Some of the most common locations of invasive infections are blood, brain, pericardium, peritoneum, cerebrospinal fluid (CSF), synovial fluid, pleural fluid, bone, or other sites that are normally considered sterile.



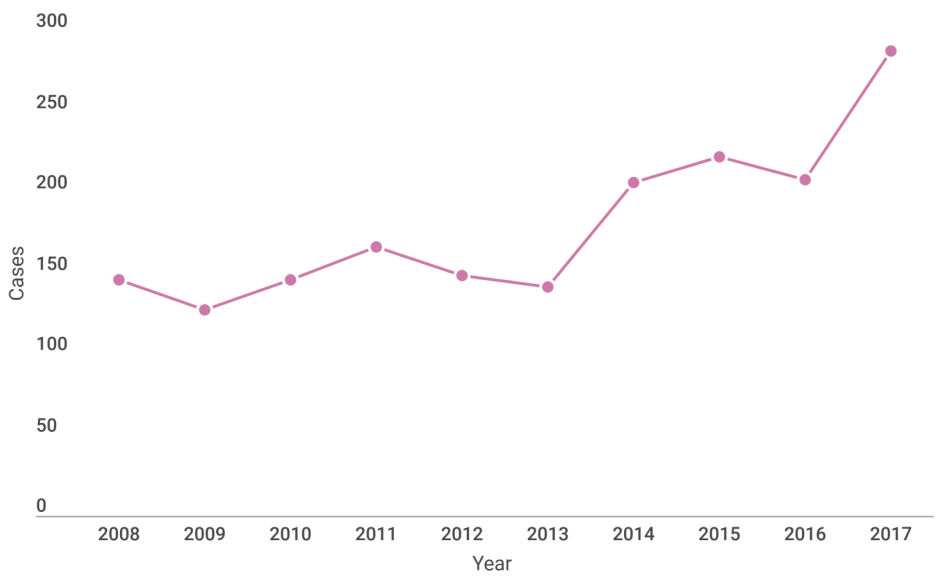
WHAT IS NOT CONSIDERED STERILE?

For invasive bacterial disease surveillance, urine, sputum, bronchial wash, abscess, and wound specimens are not considered sterile sites.

7.1 | GROUP A STREPTOCOCCAL DISEASE

Group A *Streptococcus* (GAS) or *Streptococcus pyogenes* is a bacterium commonly found in the throat and on the skin. Many people can carry this bacterium without any symptoms of disease. The majority of group A streptococcal diseases are relatively mild illnesses, such as streptococcal pharyngitis ("strep throat") or impetigo. However, occasionally these bacteria can cause potentially life-threatening "invasive" infections. Invasive infection occurs when group A *Streptococci* invade parts of the body where bacteria are not normally present, including the blood and soft tissues such as muscle or fat.

Invasive Group A Streptococcal Disease Cases, Wisconsin, 2008-2017



This graph includes confirmed cases.

288

cases of invasive Group A streptococcal disease were reported in Wisconsin in 2017

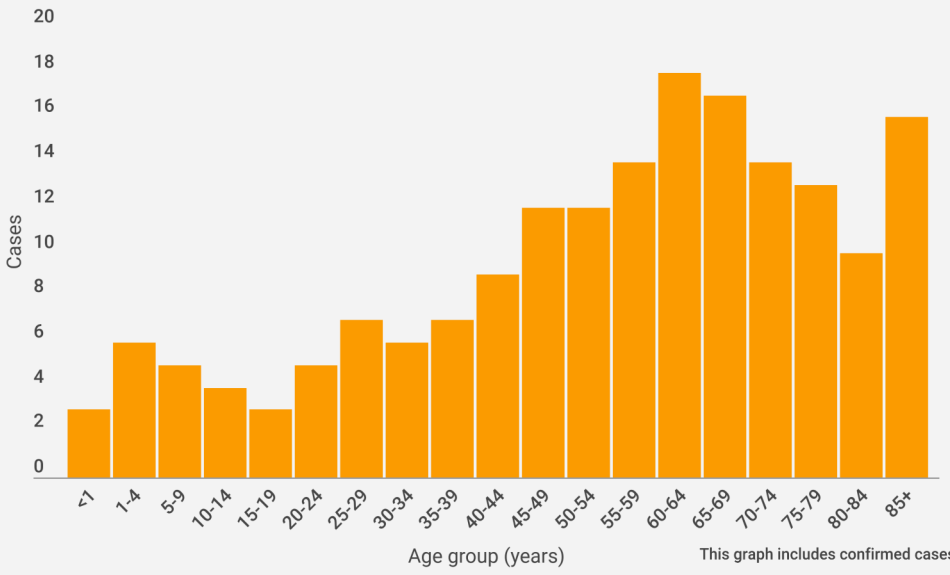
60-64 years

Reported cases of invasive Group A *Streptococci* occur most frequently in people who are 60-64 years of age.

Time of year

Most reported cases of invasive Group A *Streptococci* occur in the months from December to May.

Invasive Group A Streptococcal Disease Cases by Age Group, 2008-2017 Average

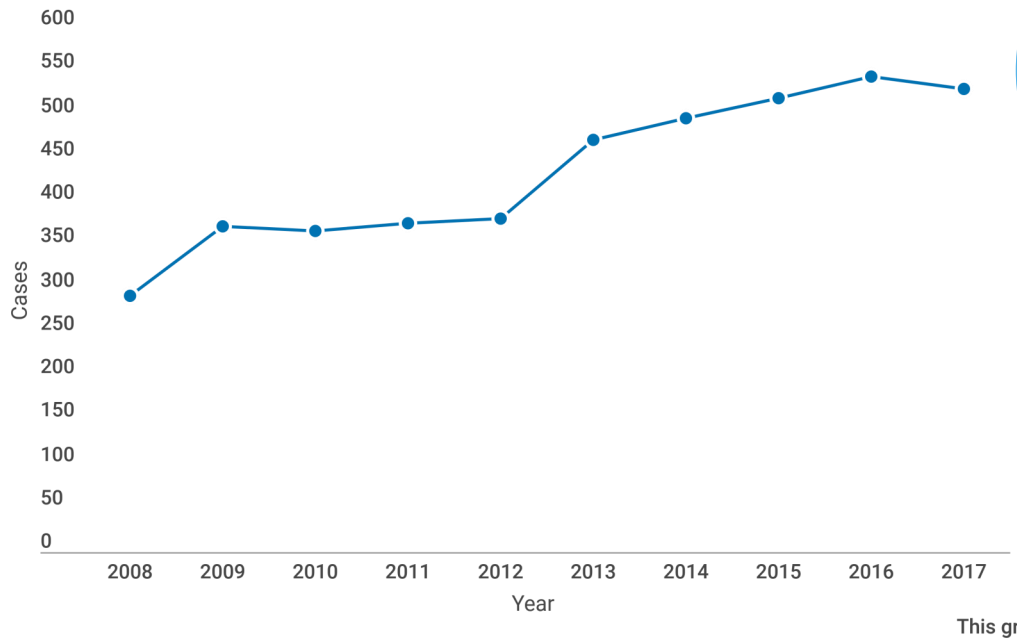


This graph includes confirmed cases.

7.2 | GROUP B STREPTOCOCCAL DISEASE

Group B streptococcal (GBS) disease is caused by the bacterium *Streptococcus agalactiae*. It can cause illness in newborn babies, pregnant women, the elderly, and those with weakened immune systems. GBS disease is the most common cause of life-threatening infections in newborn babies. GBS bacteria are commonly found in the gastrointestinal (GI) tract, and can be on your skin without making you ill. Approximately 25% of pregnant women have GBS bacteria in their rectum or vagina. Babies born to mothers with GBS bacteria during pregnancy are at a higher risk of developing GBS disease after birth. Babies who are born before 37 weeks gestation or 18 hours after amniotic membranes have ruptured ("water break") are at a higher risk for developing GBS disease. Person-to-person transmission is rare, except from mother to baby.

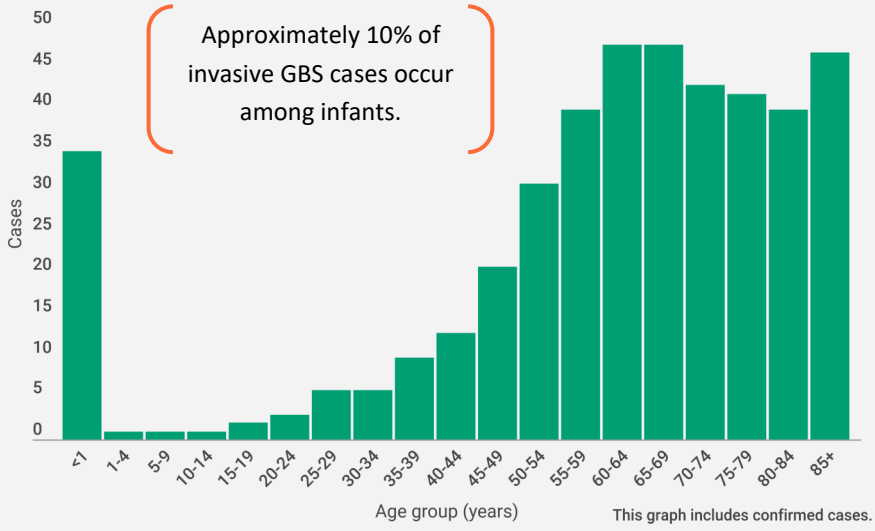
Invasive Group B Streptococcal Disease Cases, Wisconsin, 2008-2017



This graph includes confirmed cases.

531 cases of Group B streptococcal disease were reported in Wisconsin in 2017

Invasive Group B Streptococcal Disease Cases by Age Group, 2008-2017 Average



This graph includes confirmed cases.

Infant morbidity

On average, 45% of infants with GBS disease became sick during their first week after birth.

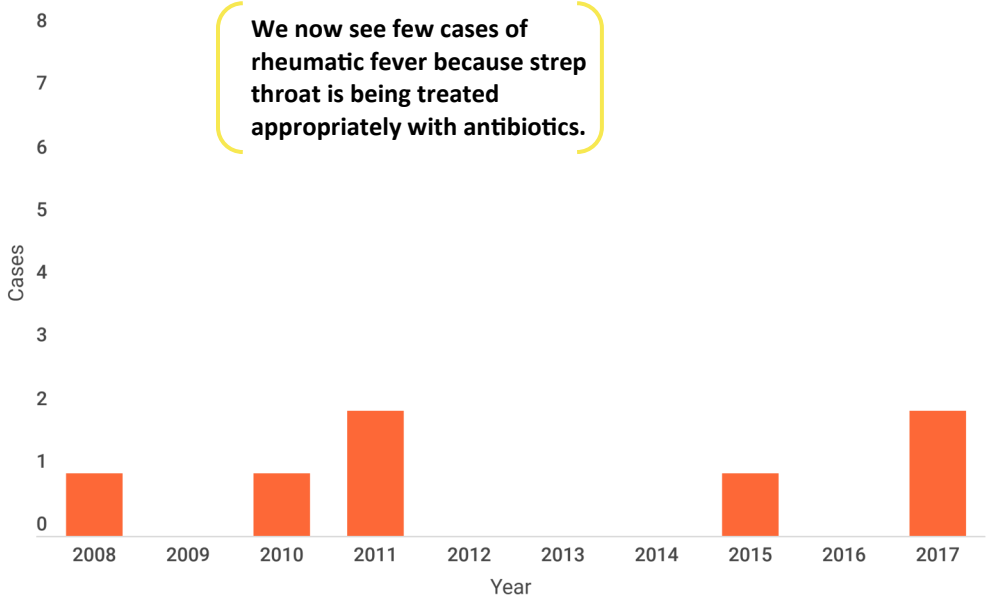
Infant mortality

During 2008-2017, 19 (5%) infants who had GBS disease died.

7.3 | RHEUMATIC FEVER

Rheumatic fever is a disease that can affect the heart, joints, brain, and skin. It is caused by Group A streptococcus bacteria (*Streptococcus pyogenes*), also called group A strep. Rheumatic fever can develop if certain strains of strep throat or scarlet fever are not treated properly. Rheumatic fever is thought to be caused by a response of the body's immune system. It reacts to the earlier strep throat or scarlet fever infection and causes a generalized inflammatory response. People cannot catch rheumatic fever from someone else because it is an immune response and not an infection. Signs and symptoms of rheumatic fever are painful, tender joints (arthritis), most commonly in the knees, ankles, elbows, and wrists; symptoms of congestive heart failure, including chest pain, shortness of breath, fast heartbeat; fatigue; jerky, uncontrollable body movements (called "chorea"); painless lumps (nodules) under the skin near joints (this is a rare symptom); and rash that appears as pink rings with a clear center (this is a rare symptom). Treatment focuses on managing inflammation and symptoms.

Rheumatic Fever Cases, Wisconsin, 2008-2017



2 cases of rheumatic fever were reported in Wisconsin in 2017

This graph includes confirmed cases.

Children

Rheumatic fever is most common in school aged children. During 2008-2017, 4 (57%) people with rheumatic fever were aged 5-17 years.

Good hygiene

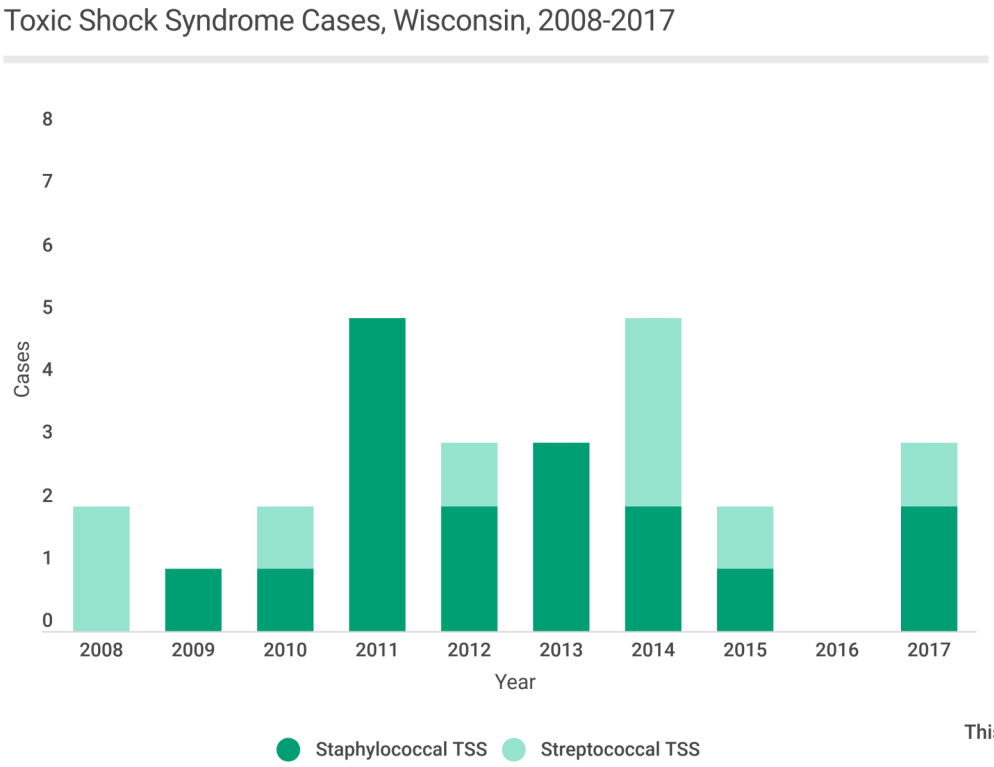
To prevent group A strep and other infections, wash your hands often, especially after coughing or sneezing, or when preparing foods and eating.

Crowded settings

People in crowded settings, like schools, day cares, and military training facilities tend to be at higher risk of getting group A strep infections.

7.4 | TOXIC SHOCK SYNDROME

Toxic Shock Syndrome (TSS) is a rare condition caused by a toxin that is produced by certain types of bacteria, mainly Staphylococcus aureus (staph) and group A streptococcus (strep). Toxic Shock Syndrome has been associated primarily with the use of super-absorbent tampons. However, since manufacturers pulled certain types of tampons off the market, cases of TSS in menstruating women have declined. TSS can affect anyone, including men, children, and postmenopausal women. Risk factors for TSS include skin wounds and surgery. Possible signs and symptoms of TSS include: a sudden high fever; low blood pressure (hypotension); vomiting or diarrhea; a rash resembling a sunburn, particularly on your palms and soles; confusion; muscle aches; redness of the eyes, mouth and throat; seizures; and headaches. To help prevent TSS, use a tampon with the lowest absorbency required for your flow and change tampons often, and make sure surgical incisions are kept clean to avoid infection. Follow directions when using vaginal contraceptives such as sponges or diaphragms.



3

cases of toxic shock syndrome were reported in Wisconsin in 2017

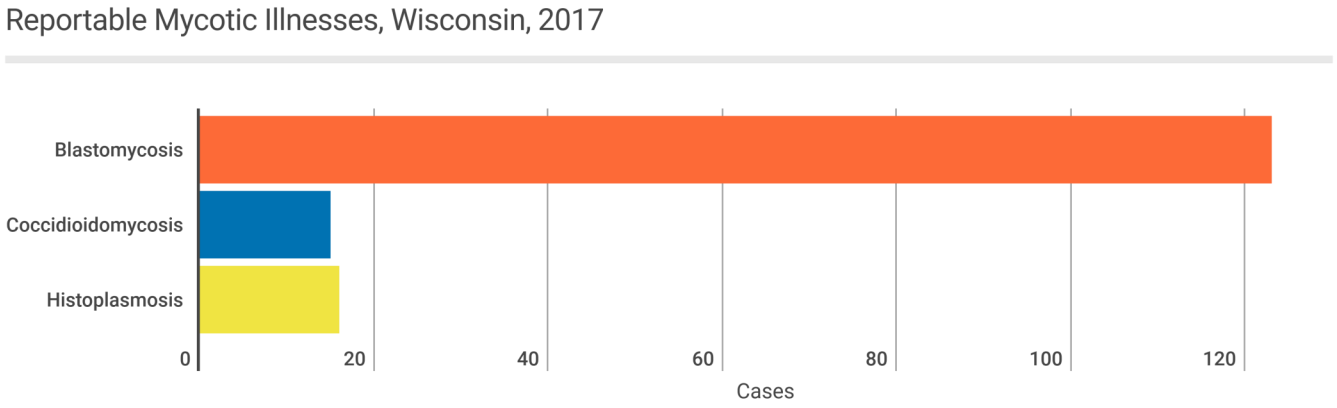
This graph includes confirmed and probable cases.

RISK FACTORS:

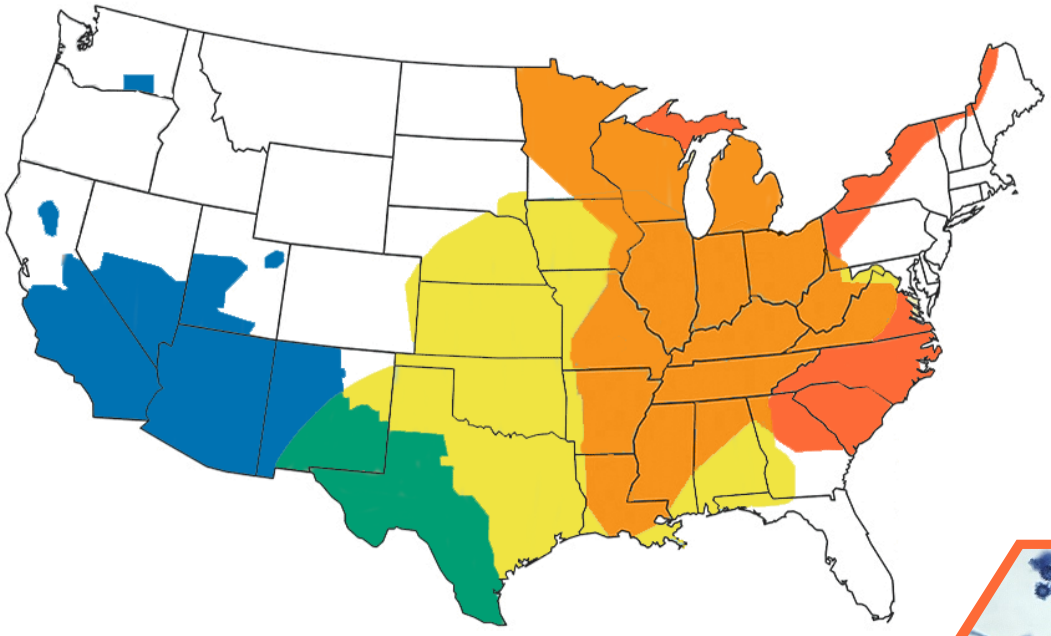
- Super-absorbent tampon use
- Surgical wounds
- Localized skin or deep tissue infections
- Diaphragm or contraceptive sponge use
- Childbirth or abortion

8.0 | MYCOTIC/FUNGAL DISEASES

Mycotic diseases are those that are caused by fungi, and are of increasing public health concern. There is a growing number of people who have weakened immune systems, and fungal infections thrive in people who are immunocompromised. There have also been changes and advancements that can provide opportunities for new and drug-resistant fungi to emerge in health care settings. Many fungal diseases, such as blastomycosis and histoplasmosis are caused by fungi that live in the soil. Individuals may become ill when they breathe in the spores or when they are exposed to the fungus in the environment. Symptoms often begin in the lungs, but the illness can progress to affect other body systems. The reportable mycotic diseases included in this report are: blastomycosis, coccidioidomycosis, and histoplasmosis. These three diseases are not transmissible from person-to-person.



Range of Endemic Environmental Mycotic Diseases in the U.S.*



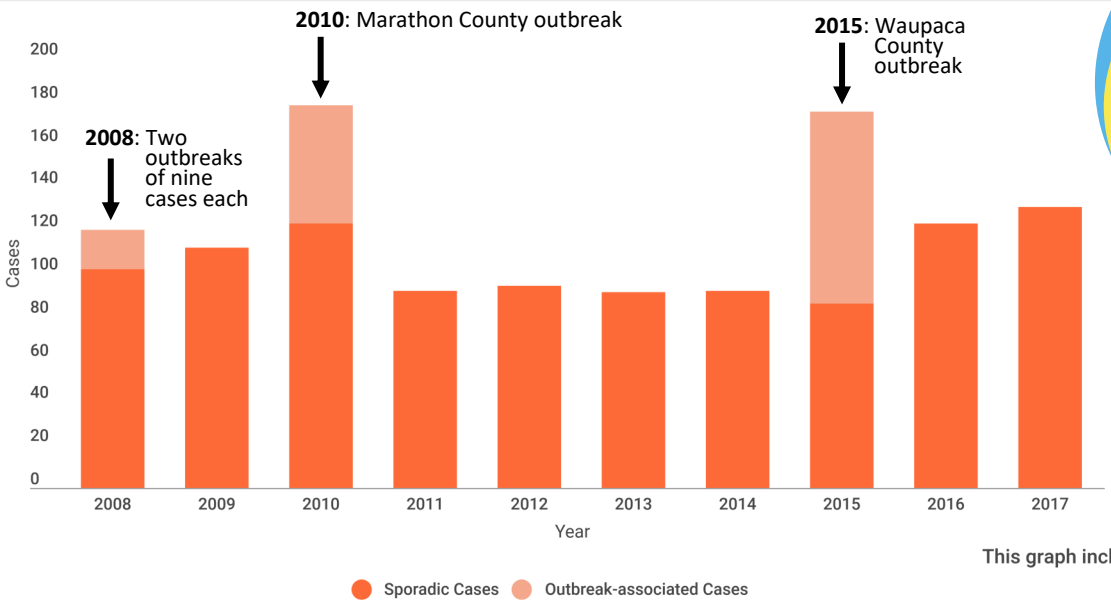
Cocciodioidomycosis
Cocciodioidomycosis + Histoplasmosis
Histoplasmosis
Histoplasmosis + Blastomycosis
Blastomycosis

*Map has been adapted from CDC. Borders are approximate.

8.1 | BLASTOMYCOSIS

Blastomycosis is an uncommon, but potentially serious fungal infection. It primarily affects the lungs, and is caused by *Blastomyces* fungi. Blastomycosis can develop when a person inhales spores of *Blastomyces* and the lungs become infected. In nature, the fungus can live in moist soil where decomposing plant matter (leaves, wood, etc.) is plentiful. The fungus grows and produces the infecting spores only under specific conditions of humidity, temperature, and nutrition. In Wisconsin, these conditions are commonly found near lakes and rivers. *Blastomyces* fungi are found near the Mississippi and Ohio River Valleys and Great Lakes regions. The spores become airborne when the soil is disturbed during activities such as hunting, hiking, gardening, excavating, and brush clearing. Participating in these activities in areas that commonly have the spores can increase a person's risk of breathing in the spores and becoming ill. Only about half of people infected with *Blastomyces* will develop symptoms. The symptoms of blastomycosis are flu-like and can include fever, chills, cough, muscle aches, and pain in the back or chest. In serious cases of blastomycosis, the fungus can spread to other areas of the body, like the skin, joints, bones, organs, and central nervous system. Blastomycosis is treatable with antifungal medication.

Blastomycosis Cases, Wisconsin, 2008-2017



131 cases of blastomycosis were reported in Wisconsin in 2017

This graph includes confirmed and probable cases.

RISK FACTORS:

Outdoor exposures

to fungal spores in soil during activities like camping, hunting, or hiking.

Soil disruption

when doing lawn care, excavation, mulching, composting, construction, and brush clearing can stir up *Blastomyces* spores and make them easier to inhale.

Chronic lung diseases

like asthma and chronic obstructive pulmonary disease (COPD) can lead to more severe illness.

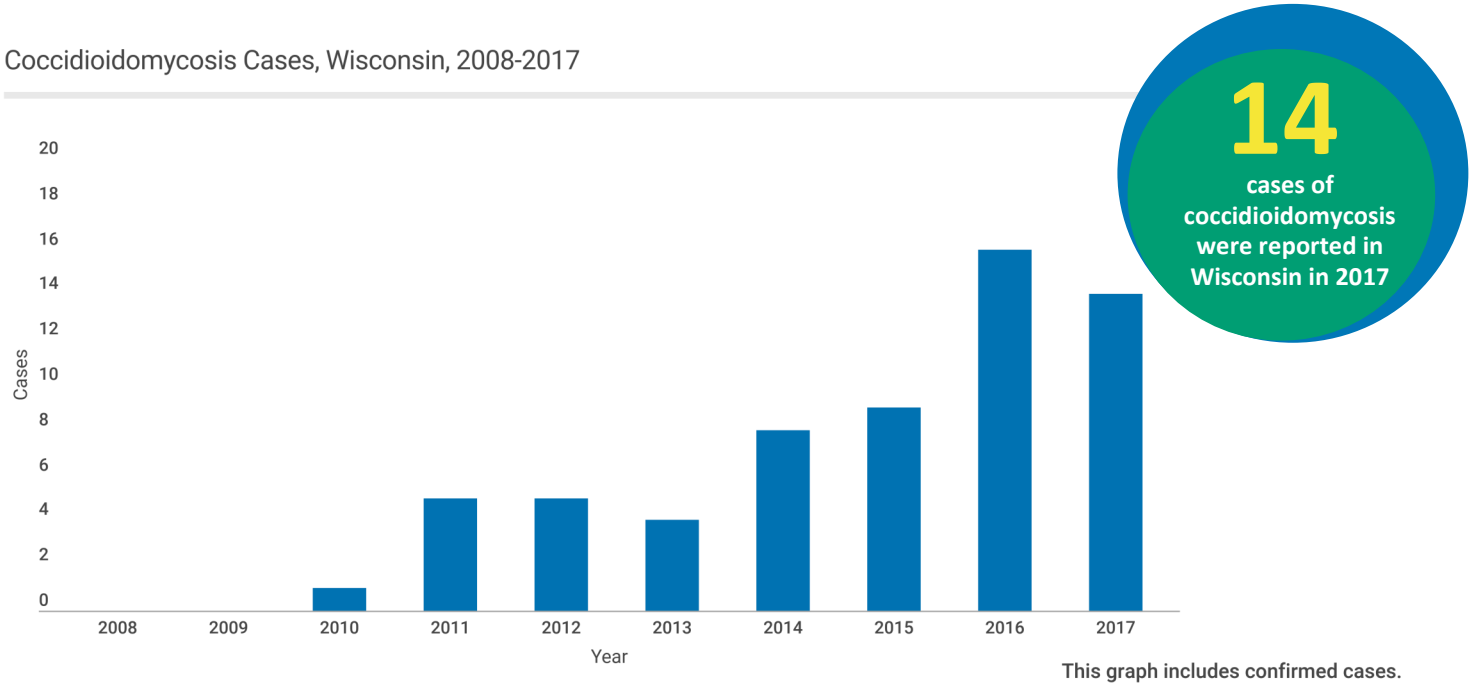
Weakened immune system

makes you more likely to get ill with blastomycosis.

8.2 | COCCIDIOIDOMYCOSIS

Coccidioidomycosis, commonly known as Valley fever, is a fungal disease caused by inhaling spores from *Coccidioides* species. This fungus lives in the soil of semi-arid regions of the world and is endemic in areas of the southwestern U.S., northern Mexico, and portions of Central and South America. When asked, most people diagnosed with Valley fever in Wisconsin have a history of travel to Arizona, California, Nevada, New Mexico, or Texas. About 60% of infected people exhibit mild or no clinical illness.

People who develop symptoms most often experience a flu-like illness, with fever, cough, night sweats, fatigue, and muscle and joint aches, from which they recover within several months. A rash of tender red bumps on the shins or forearms may also develop. A small number of infected people may develop a chronic pulmonary infection or widespread disseminated infection in the brain, joints, bones, or soft tissues.



This graph includes confirmed cases.

Travel-related

All reported cases of Valley fever in Wisconsin are travel-related. None have been acquired in Wisconsin.

Desert soil

Valley fever is commonly spread in the desert when the soil is disturbed. People who are pregnant or have weakened immune systems should use caution.

Lung complications

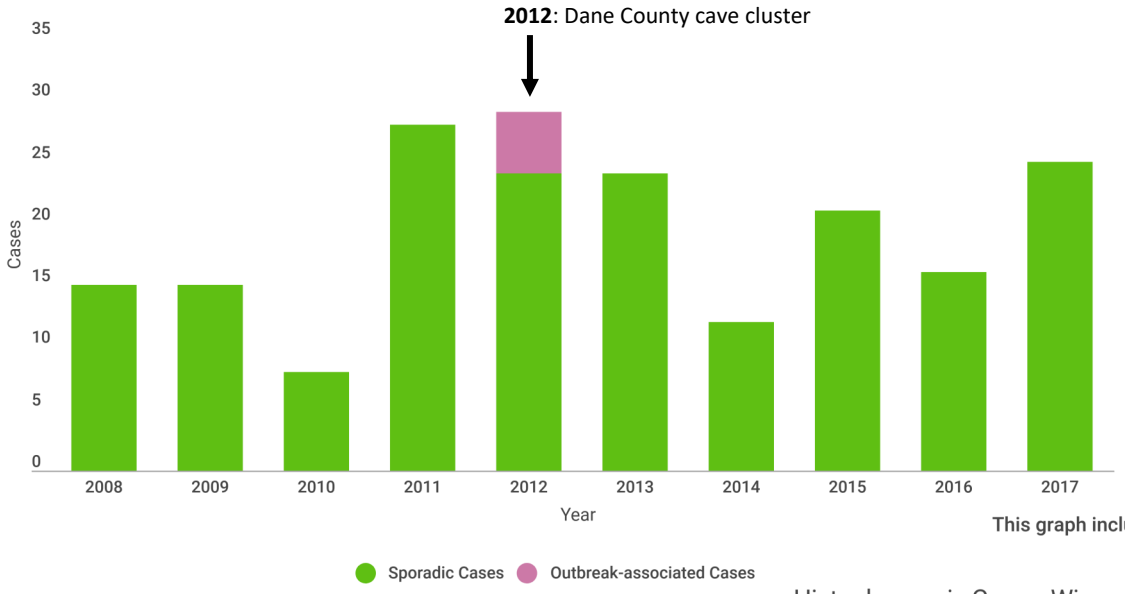
5%-10% of people who get Valley fever will develop serious or long-term problems in their lungs.

8.3 | HISTOPLASMOSIS

Histoplasmosis is an infection caused by a fungus called *Histoplasma*. Approximately 15 cases are reported each year in Wisconsin. Most people infected with histoplasmosis do not become ill. When a person develops symptoms, it usually involves the lungs and is characterized by weakness, chills, fever, muscle aches, chest pains, and cough. Disseminated disease may occur and progress over months to years.

Histoplasma is found throughout the world, including in the U.S. The fungus can grow in soil around chicken houses, areas harboring bats, in caves, and under starling and blackbird roosts. The fungus grows in soil contaminated with bird or bat droppings that have piled up over time. It produces spores that can become airborne if the soil is disturbed. If a person breathes in these spores, they may become infected. The disease cannot be spread from person-to-person.

Histoplasmosis Cases, Wisconsin, 2008-2017

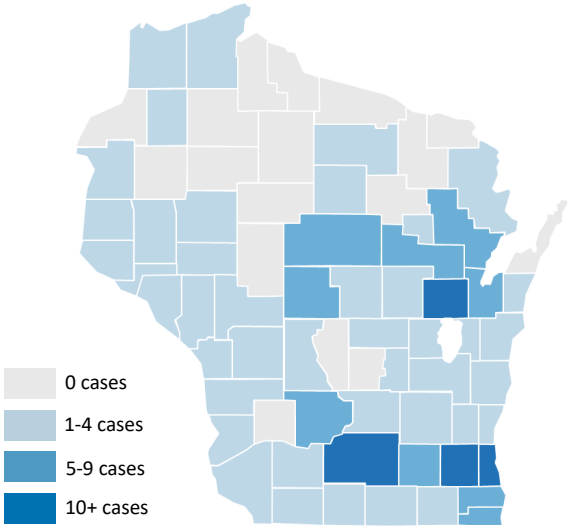


25

cases of histoplasmosis were reported in Wisconsin in 2017

This graph includes confirmed and probable cases.

Histoplasmosis Cases, Wisconsin, 2008-2017



This map shows the county of residence for cases and may not reflect county of exposure.

RISK FACTORS:

Disrupting soil

that contains bat or bird droppings. This can occur when digging in soil or chopping wood with bird or bat droppings, cleaning chicken coops, exploring caves, and cleaning, remodeling, or tearing down old buildings.

Weakened immune system

makes you more likely to get ill from histoplasmosis.

9.0 | RESPIRATORY DISEASES

Respiratory diseases are those that affect the lungs and someone's breathing. There are four reportable conditions that primarily affect the respiratory system: influenza (associated hospitalizations and pediatric deaths), legionellosis, mycobacterial disease (non-tuberculosis), and tuberculosis (TB). Influenza-associated hospitalizations reported through WEDSS are those influenza cases that are confirmed by PCR (polymerase chain reaction) or rapid antigen test and result in a hospitalization.

	Influenza	Legionellosis	Tuberculosis
Cause	Influenza virus	*Legionella* bacteria	*Mycobacterium tuberculosis* bacteria
Incubation period	1–4 days	2–10 days	2–12 weeks or longer
Mode of transmission	Direct person-to-person contact, contact with contaminated objects, breathing in virus	Breathing in mist that has *Legionella* bacteria	Breathing in air particles with the TB bacteria
Risk factors	■ Age (children and those over 65 years of age) ■ Having a compromised immune system ■ Having a chronic illness ■ Being pregnant ■ Being obese	■ Smoking (current or past) ■ Chronic obstructive pulmonary disease (COPD) ■ Over 50 years of age ■ Having a compromised immune system ■ Having diabetes	■ Recent exposure to someone with TB disease ■ Having a compromised immune system

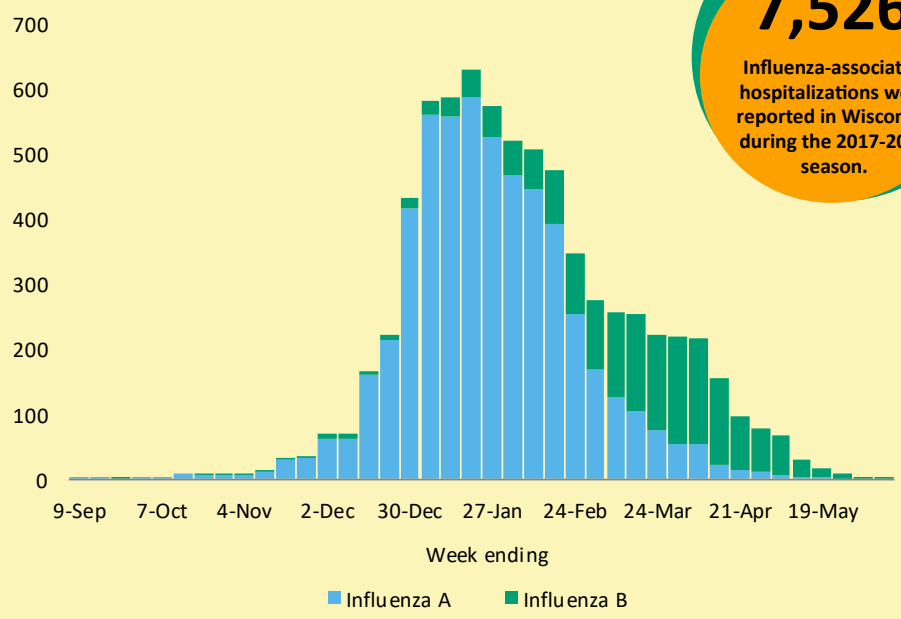
9.1 | INFLUENZA-ASSOCIATED HOSPITALIZATIONS

Influenza is a contagious disease caused by influenza viruses that infect the respiratory tract (nose, throat, and lungs). It can cause mild to severe illness, sometimes leading to death. Influenza symptoms often begin suddenly, with fever, headache, tiredness, dry cough, sore throat, nasal congestion, and body aches. Influenza-associated hospitalizations and pediatric deaths are reportable. There were three influenza-associated pediatric deaths in 2017. **Only 37% of Wisconsin residents received the influenza vaccination in the 2017-2018 influenza season.** The best way to prevent influenza is to get vaccinated each year.

WANT MORE INFORMATION?

Check out our Weekly Respiratory Report! It contains state summary information and region-specific data. Seasonal influenza vaccination rates are also included.

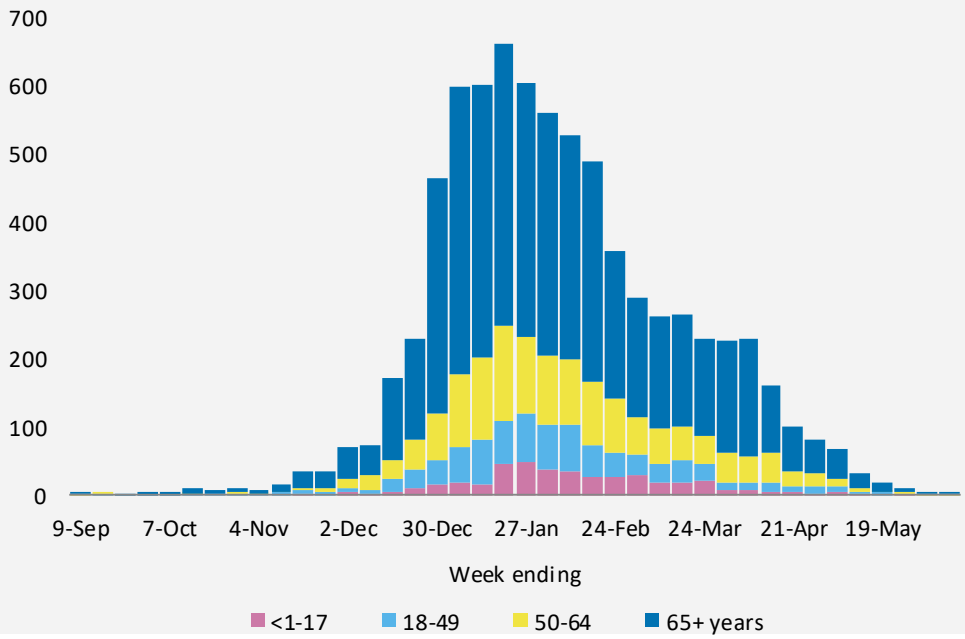
Reported Cases of Influenza-associated Hospitalizations by Week and Type, Wisconsin, 2017-2018 Influenza Season



7,526

Influenza-associated hospitalizations were reported in Wisconsin during the 2017-2018 season.

Reported Cases of Influenza-associated Hospitalizations by Week and Age Group, Wisconsin, 2017-2018 Influenza Season



DURING THE 2017-2018 FLU SEASON

65+ years

65% of those who had an influenza-associated hospitalization were 65 years of age or older.

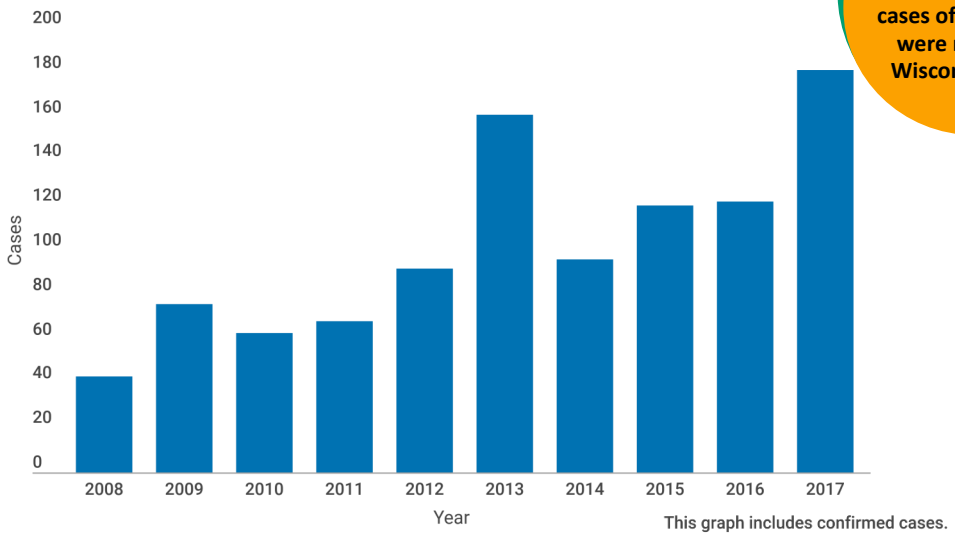
Pregnant women

52 pregnant women had influenza-associated hospitalizations.

9.2 | LEGIONELLOSIS

Legionellosis is an infection caused by *Legionella* bacteria. There are two different kinds of legionellosis: Pontiac fever and Legionnaires' disease. Pontiac fever is a mild respiratory illness, and Legionnaires' disease is more severe and is a type of pneumonia. Most of the time, cases of legionellosis happen as a single event, but outbreaks involving large numbers of people have occurred. People who have chronic lung disease or a weakened immune system, who smoke, or who are 50 years of age or older are more likely to develop legionellosis. *Legionella* is found naturally in freshwater, like lakes and rivers, but can become a public health problem when it grows in and spreads through human-made water sources. Such water sources can include improperly maintained cooling towers, hot tubs, large plumbing systems, hot water tanks, and decorative fountains. People become sick when they breathe in mist from a water source that contains *Legionella* bacteria.

Legionellosis Cases, Wisconsin, 2008-2017



This graph includes confirmed cases.

181

cases of legionellosis were reported in Wisconsin in 2017

Risk factors

In 2017, 119 (66%) legionellosis cases were current or former smokers.

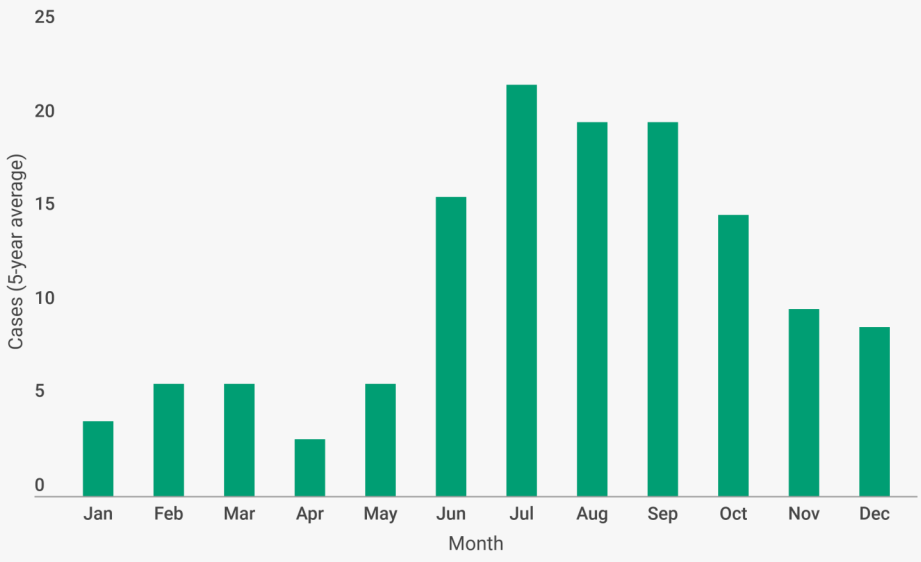
≥50 years of age

In 2017, 78% of legionellosis cases were among people 50 years and older.

Case-fatality rate

On average, 1 in 10 people who get sick from Legionnaires' disease will die.

Seasonality of Legionellosis by Month of Illness Onset, Wisconsin, 2013-2017

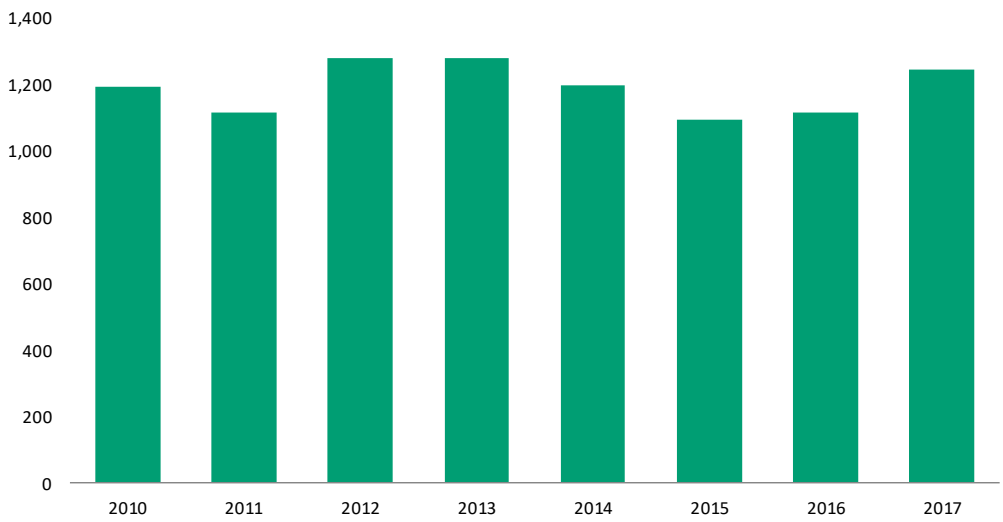


9.3 | MYCOBACTERIAL DISEASE (NON-TUBERCULOUS)

Apart from *M. tuberculosis* complex, there are approximately 130 species of non-tuberculous mycobacteria (NTM), some of which can cause illness in humans. The most common site for infections is in the lungs, but infections of skin, lymph nodes, and other internal organs are also important. NTM are opportunistic pathogens; disease occurs more frequently in immunocompromised individuals. In the U.S., *M. avium* complex (MAC) and *M. kansasii* are the most frequently cultured pathogenic species, both causing pulmonary disease that can mimic tuberculosis.

NTM are widely distributed in the environment and most do not cause illness in humans. Organisms can be found in samples of soil and water, including both natural and treated water sources. There is no evidence of animal-to-human or human-to-human transmission of NTM. Human disease due to NTM is assumed to be acquired from environmental sources by directly inhaling aerosolized organisms, or by consuming or having contact with contaminated food or water.

Non-Tuberculous Mycobacterial Disease Cases, Wisconsin, 2010-2017

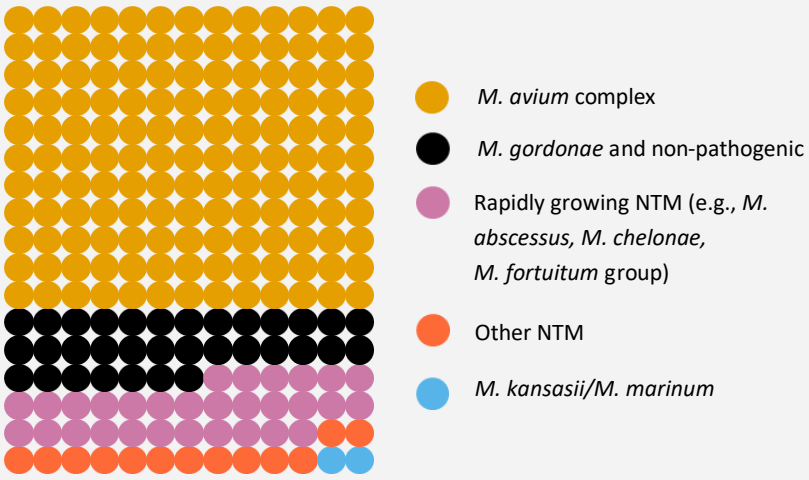


1,246
cases of NTM were reported in Wisconsin in 2017

NTM isolations may be considered clinically significant if:

- The same organism is isolated multiple times from the patient.
- The specimens were collected aseptically or during surgery.
- The patient is immunocompromised in some way.

Proportion of NTM Identified among Patient Specimens at the Wisconsin State Laboratory of Hygiene, 2014-2018

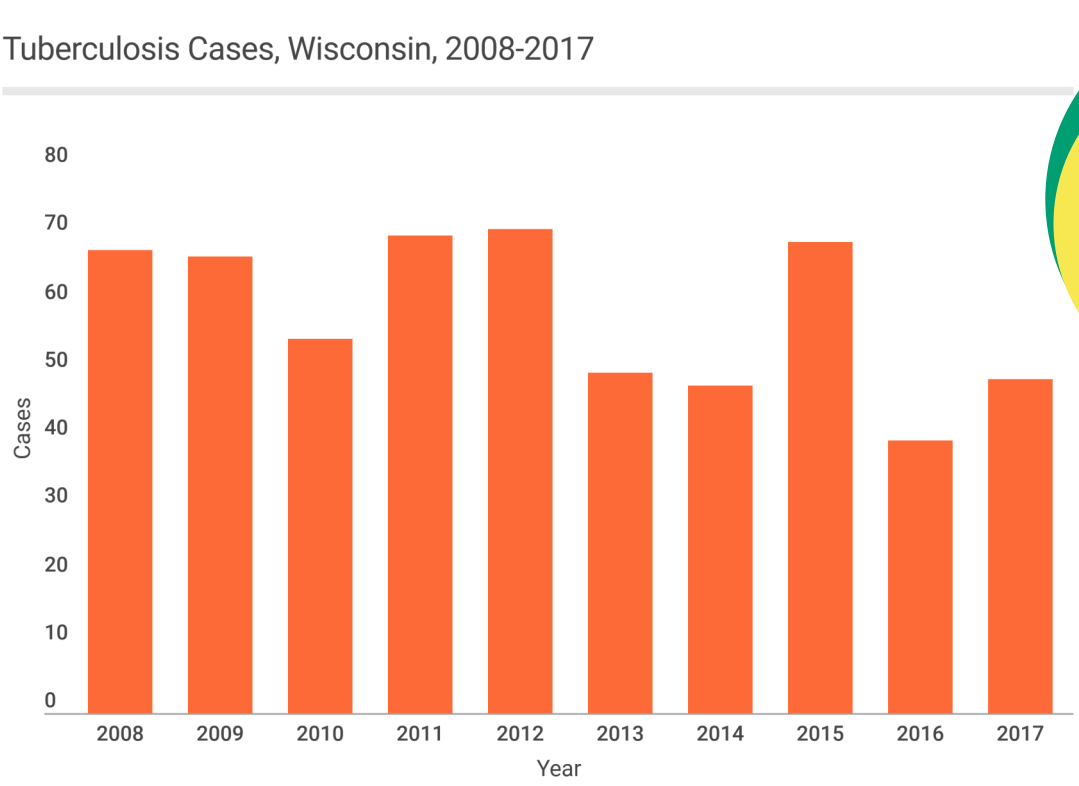


9.4 | TUBERCULOSIS

Tuberculosis, or TB, is a disease caused by bacteria called *Mycobacterium tuberculosis*. The bacteria usually attack the lungs (pulmonary TB), but can attack any part of the body (non-pulmonary TB). TB can be spread when a person with TB disease coughs or sneezes. People with TB disease can be treated and cured if they seek medical help for their symptoms.

Not everyone infected with TB bacteria becomes sick. People with latent TB infection do not feel sick, do not have any symptoms, and cannot spread TB. People who have latent TB infection can take medicine so they will never develop TB disease.

There were 49 patients diagnosed with TB in Wisconsin during 2017. Most of these patients were exposed to TB outside of the U.S. or had close contact to someone with active TB disease.



49
cases of tuberculosis were reported in Wisconsin in 2017

Case average

Wisconsin has had an average of 59 TB cases per year during the past 10 years.

Multi-drug resistance

Wisconsin's rate of drug resistant TB is one of the highest in the U.S. In the last five years, 13% of Wisconsin TB patients had some drug resistance (resistant to one or more TB drugs).

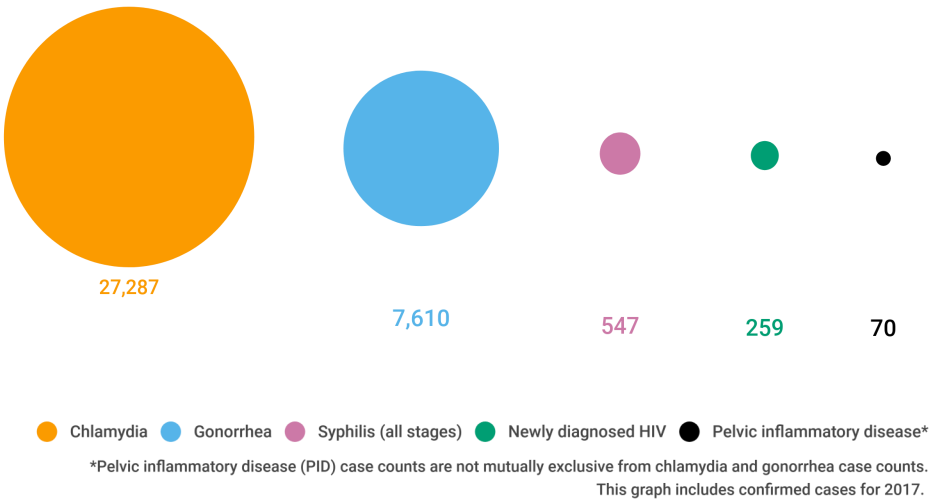
Treatment

Wisconsin treated 19 patients with multi-drug resistant TB in the last 10 years.

10.0 | SEXUALLY TRANSMITTED INFECTIONS

DHS and CDC staff, from offices in Madison and Milwaukee, consult with local health departments to provide disease intervention and partner service activities to patients, and perform disease surveillance, monitoring of statistical trends, and implementation of prevention programs. Staff provide sexually transmitted infection (STI) intervention consultation and training to health care providers statewide. The reportable conditions included in this section are: chlamydia, gonorrhea, HIV, pelvic inflammatory disease (PID), and syphilis.

Sexually Transmitted Diseases, Wisconsin, 2017



*Pelvic inflammatory disease (PID) case counts are not mutually exclusive from chlamydia and gonorrhea case counts. This graph includes confirmed cases for 2017.

IN 2017:

Ages affected

62% of reported STIs were in youth 15-24 years of age.

Women and STIs

In 2017, 64% of the 34,897 reported cases of chlamydia and gonorrhea were in women.

STI FAST FACTS

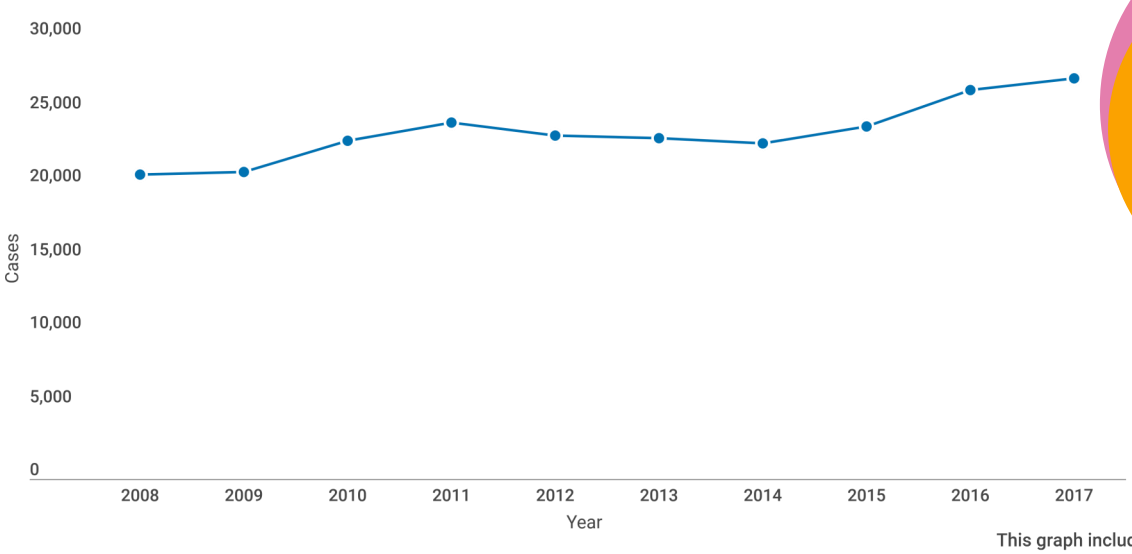
In Wisconsin:

- More STIs are reported than all other reportable communicable diseases combined.
- Chlamydia is the most commonly reported infection.
- PID is a complication of untreated STIs and other infections.
- Having an STI makes you more susceptible to getting HIV.
- HIV can be prevented with a pill—this is called PrEP!

10.1 | CHLAMYDIA

Chlamydia is a sexually transmitted infection (STI) caused by a bacterium called *Chlamydia trachomatis*. It is the most commonly reported communicable disease in Wisconsin and in the U.S., especially in people 15–24 years of age. It is spread by having vaginal, anal, or oral sex with someone who has chlamydia. Babies can become infected with chlamydia during birth if the mother is infected. Babies can get an eye infection or develop pneumonia if *C. trachomatis* gets into their eyes or lungs when passing through the birth canal. The majority of people who are infected with chlamydia do not have any symptoms at all. If women have symptoms, they may include vaginal discharge or bleeding between periods. For men, penile discharge, burning during urination, and the feeling of needing to urinate can occur. Chlamydia can be treated with antibiotics. If untreated, chlamydia can lead to pelvic inflammatory disease (PID), pregnancy outside the womb (ectopic pregnancy), and other complications in women that can make it difficult to get pregnant (infertility), as well as infertility in men.

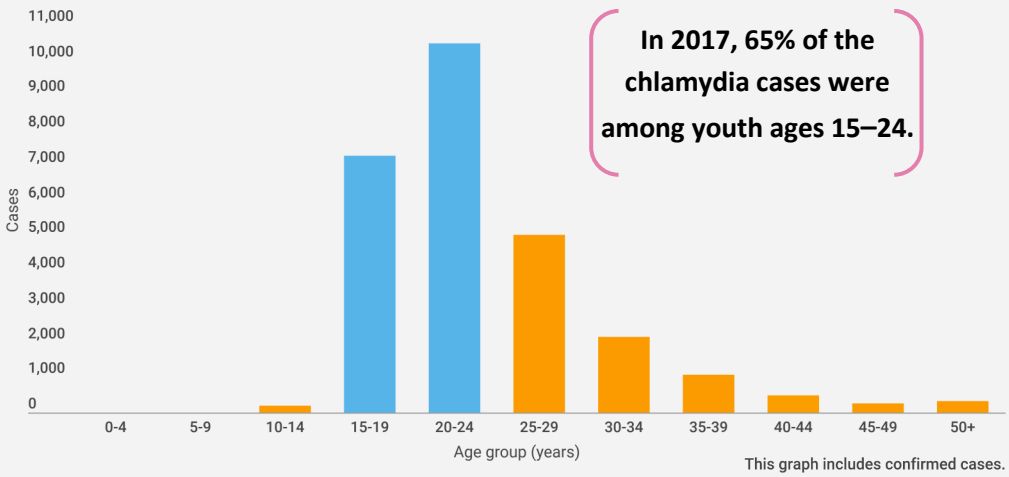
Chlamydia Cases, Wisconsin, 2008-2017



27,287 cases of chlamydia were reported in Wisconsin in 2017

This graph includes confirmed cases.

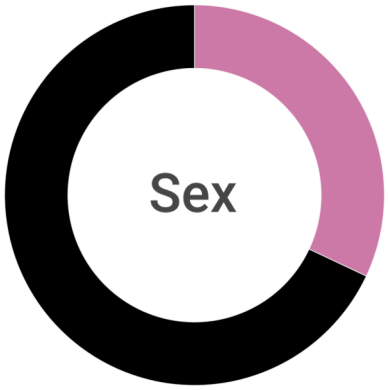
Chlamydia Cases by Age, Wisconsin, 2017



In 2017, 65% of the chlamydia cases were among youth ages 15–24.

This graph includes confirmed cases.

Chlamydia Cases by Sex, Wisconsin 2017

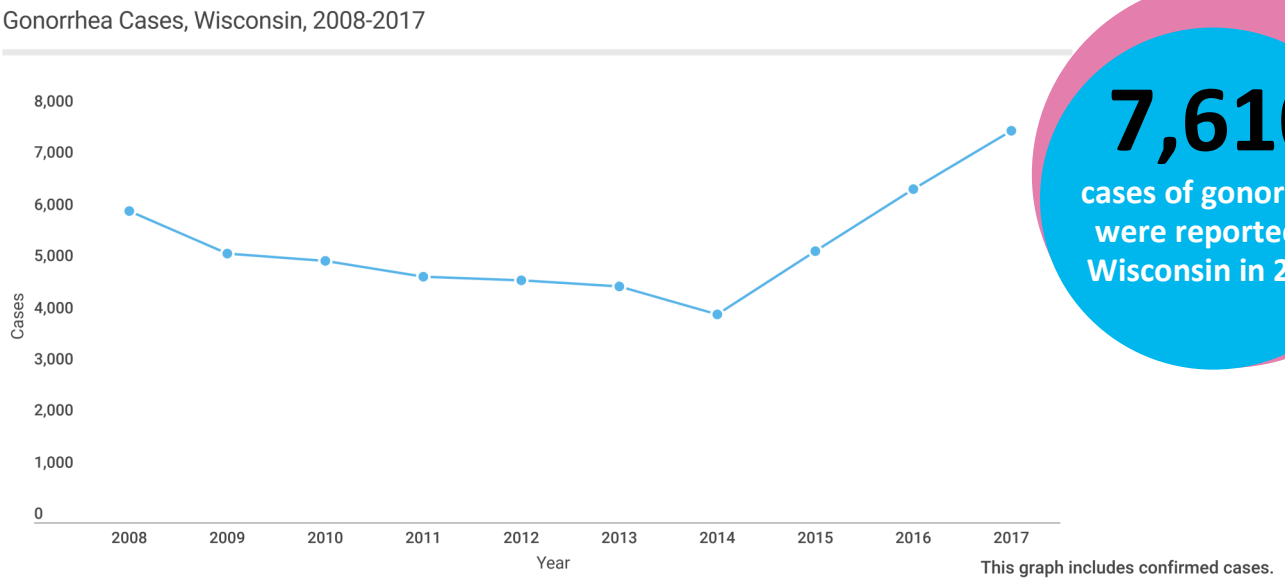


68% Female

32% Male

10.2 | GONORRHEA

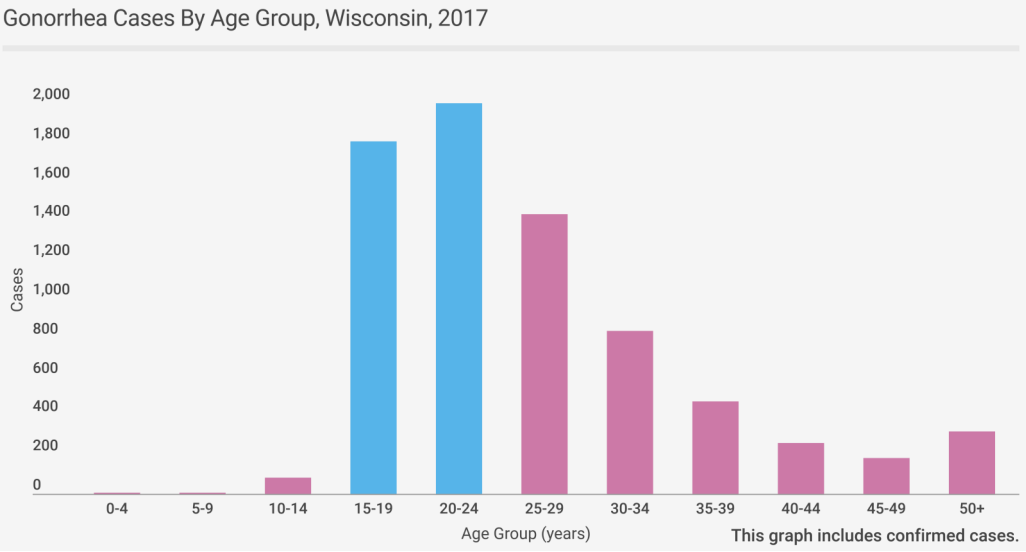
Gonorrhea is a sexually transmitted infection (STI) caused by a bacterium called *Neisseria gonorrhoeae*. It is the second most commonly reported communicable disease in Wisconsin. It causes infections in the genitals, rectum, and throat. It is a common infection, especially in people 15–24 years of age. It is spread by having sex with someone who has gonorrhea. Symptoms in men can include a burning sensation when urinating; a white, yellow, or green discharge from the penis; or painful or swollen testicles. Women infected with gonorrhea may not have symptoms, but for those who do, symptoms can include pain or a burning sensation during urination, increased vaginal discharge, or vaginal bleeding between periods. If untreated, gonorrhea can cause pelvic inflammatory disease (PID) in women leading to infertility, as well as infertility in men. Babies can get a gonorrhea infection in their eyes when they pass through the birth canal during childbirth. Effective treatment for gonorrhea as well as prevention of emerging antibiotic resistant gonorrhea (ARGC) requires dual therapy with two antibiotics taken at the same time. The growing antibiotic resistance of gonorrhea nationwide is an urgent threat. Wisconsin has been selected to promote innovative prevention and control strategies through the project Strengthen the U.S. Response to Resistant Gonorrhea (SURRG).



7,610
cases of gonorrhea were reported in Wisconsin in 2017

Ages affected

In 2017, 53% of confirmed gonorrhea cases were reported among youth 15–24 years of age.

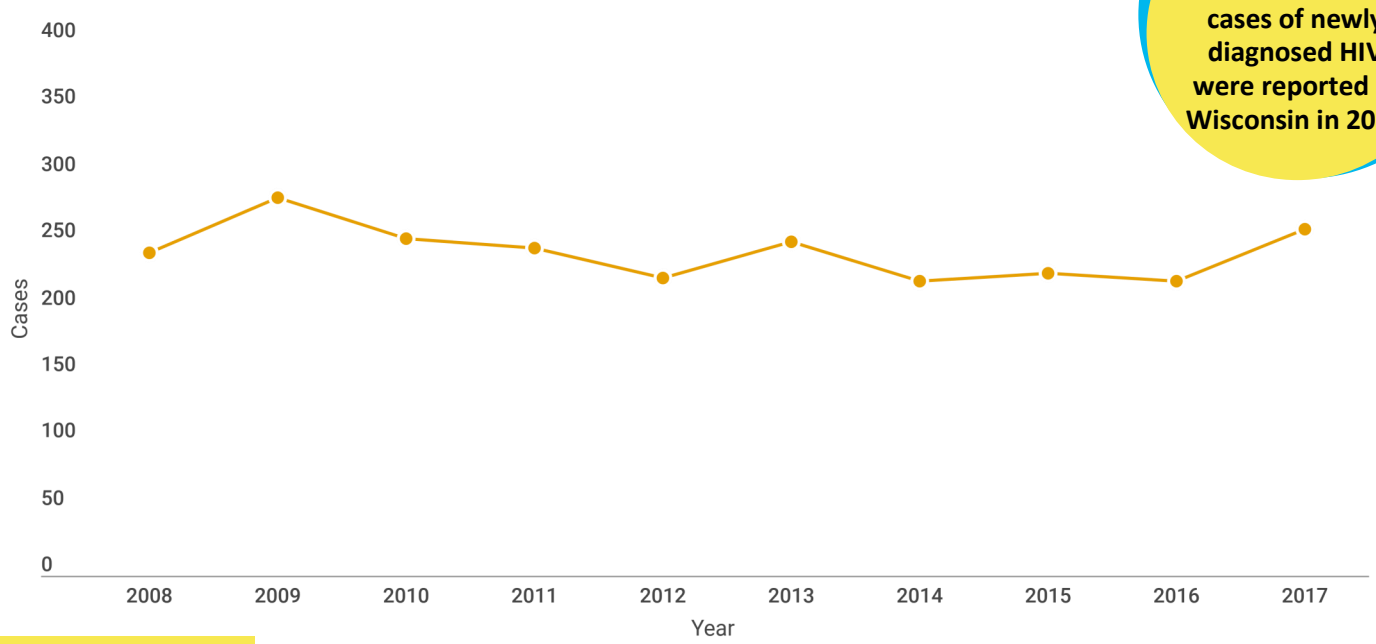


10.3 | HIV

HIV infection is a communicable disease caused by the human immunodeficiency virus (HIV), which damages the body's immune system, the system that fights infections. Without treatment, HIV makes it difficult for the body to fight off diseases, and untreated HIV can lead to the person developing Acquired Immune Deficiency Syndrome (AIDS). However, people who consistently take medication to treat HIV live long, healthy lives, and do not transmit the virus to others sexually.

During 2017, 259 people were newly diagnosed with HIV in Wisconsin. Between 2008 and 2017, both the number and the rate of new diagnoses declined. The number of new diagnoses over the last decade ranged from a low of 221 (2014) to a high of 282 (2009), with an average of 242 new diagnoses per year. The HIV diagnosis rate in Wisconsin was the 8th lowest among the 50 states in 2016.

Newly Diagnosed HIV Cases, Wisconsin, 2008-2017



259
cases of newly diagnosed HIV were reported in Wisconsin in 2017

IN 2017:

Care continuum

72% of people living with HIV in Wisconsin received some medical care, 53% had two or more care visits, and 65% were virally suppressed.

Racial and ethnic disparities

61% of new HIV diagnoses were among racial and ethnic minorities, despite minorities making up only 17% of Wisconsin's population.

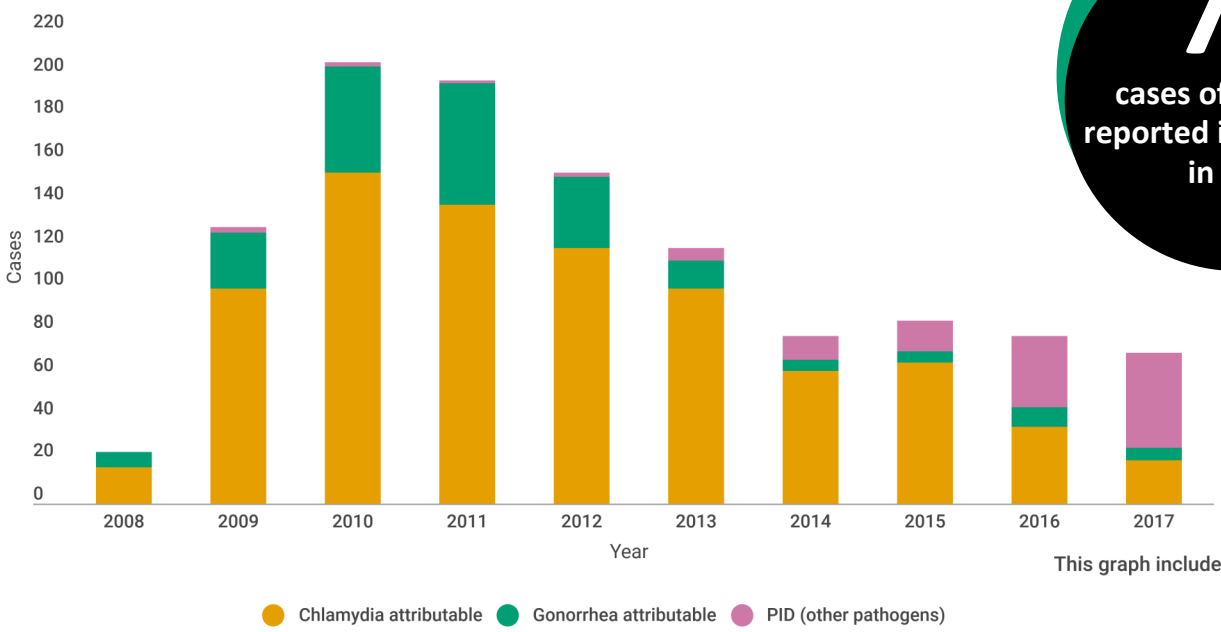
Case attribution

75% of new diagnoses were attributed to male-male sexual contact.

10.4 | SEXUALLY TRANSMITTED PELVIC INFLAMMATORY DISEASE

Pelvic inflammatory disease (PID) is the infection of the upper female genital tract, including the uterus, fallopian tubes, and other reproductive organs. Untreated STIs, like chlamydia and gonorrhea, can cause PID. There is no laboratory test for PID; clinical examination along with previous medical and sexual history are used to make a diagnosis. PID can be treated, but if treatment is delayed, long-term complications can occur such as scar tissue inside and outside the fallopian tubes that can lead to tubal blockage, pregnancy outside the womb (ectopic pregnancy), inability to get pregnant (infertility), and long-term pelvic or abdominal pain.

PID Cases, Wisconsin, 2008-2017



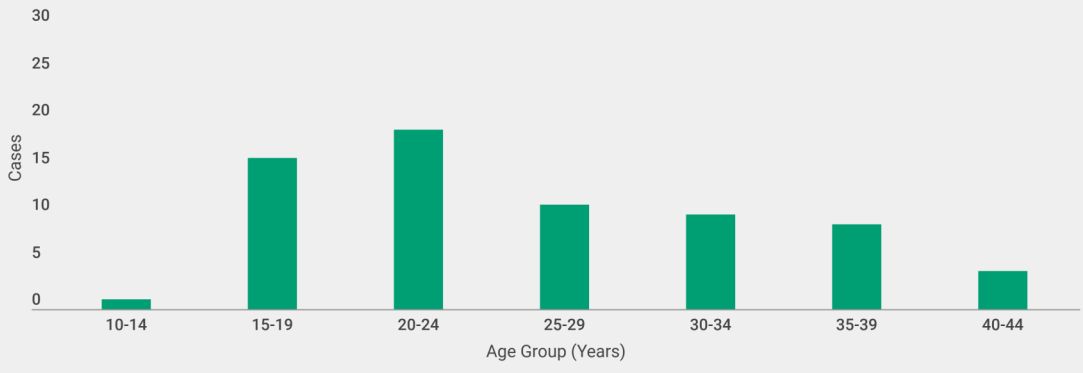
70
cases of PID were reported in Wisconsin in 2017

This graph includes confirmed cases.

Causes

In 2017, 37% of all PID cases were caused by chlamydia or gonorrhea infections.

PID Cases By Age Group, Wisconsin 2017

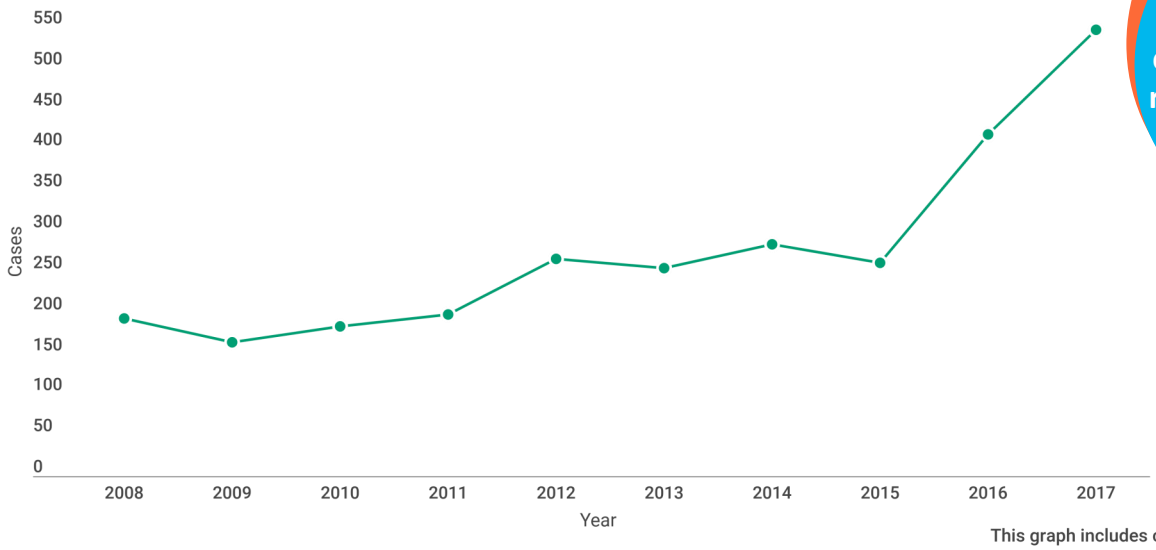


This graph includes confirmed cases.

10.5 | SYPHILIS

Syphilis is an STI caused by the bacterium called *Treponema pallidum*. Reported syphilis cases in Wisconsin have been increasing. Syphilis prevention remains important because of the serious consequences of untreated or inadequately treated syphilis. Syphilis is a potential risk factor for HIV infection and transmission, and it can cause congenital syphilis in babies. Syphilis is divided into stages (primary, secondary, latent, and tertiary) and there are different signs and symptoms associated with each stage. Sometimes the symptoms of primary (sore) and secondary (rash) can be mild or may not occur. During the latent stage, there are no symptoms. Tertiary symptoms are associated with severe medical problems and are usually diagnosed by a doctor through laboratory tests. Syphilis can be treated with antibiotics.

Syphilis Cases (all stages), Wisconsin 2008-2017



547 cases of syphilis were reported in Wisconsin in 2017

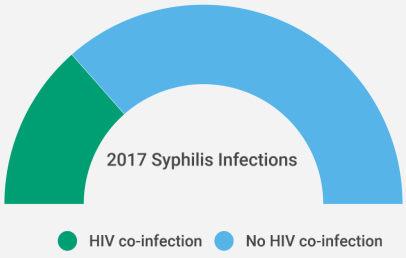
This graph includes confirmed cases.

IN 2017:

Cases by reported sex

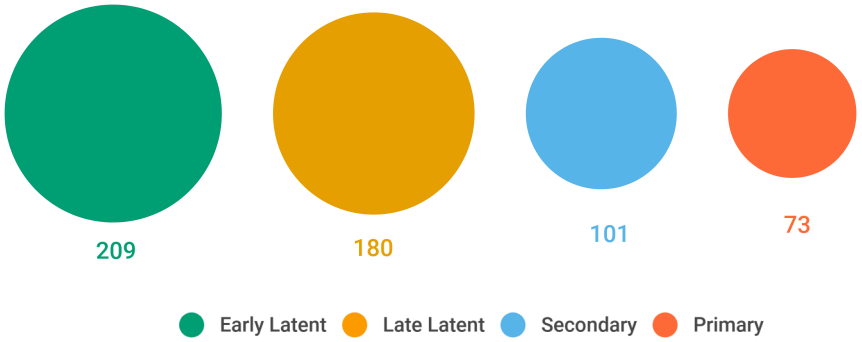
84% of syphilis cases were among men.

HIV co-infections



27% of syphilis cases also had an HIV infection.

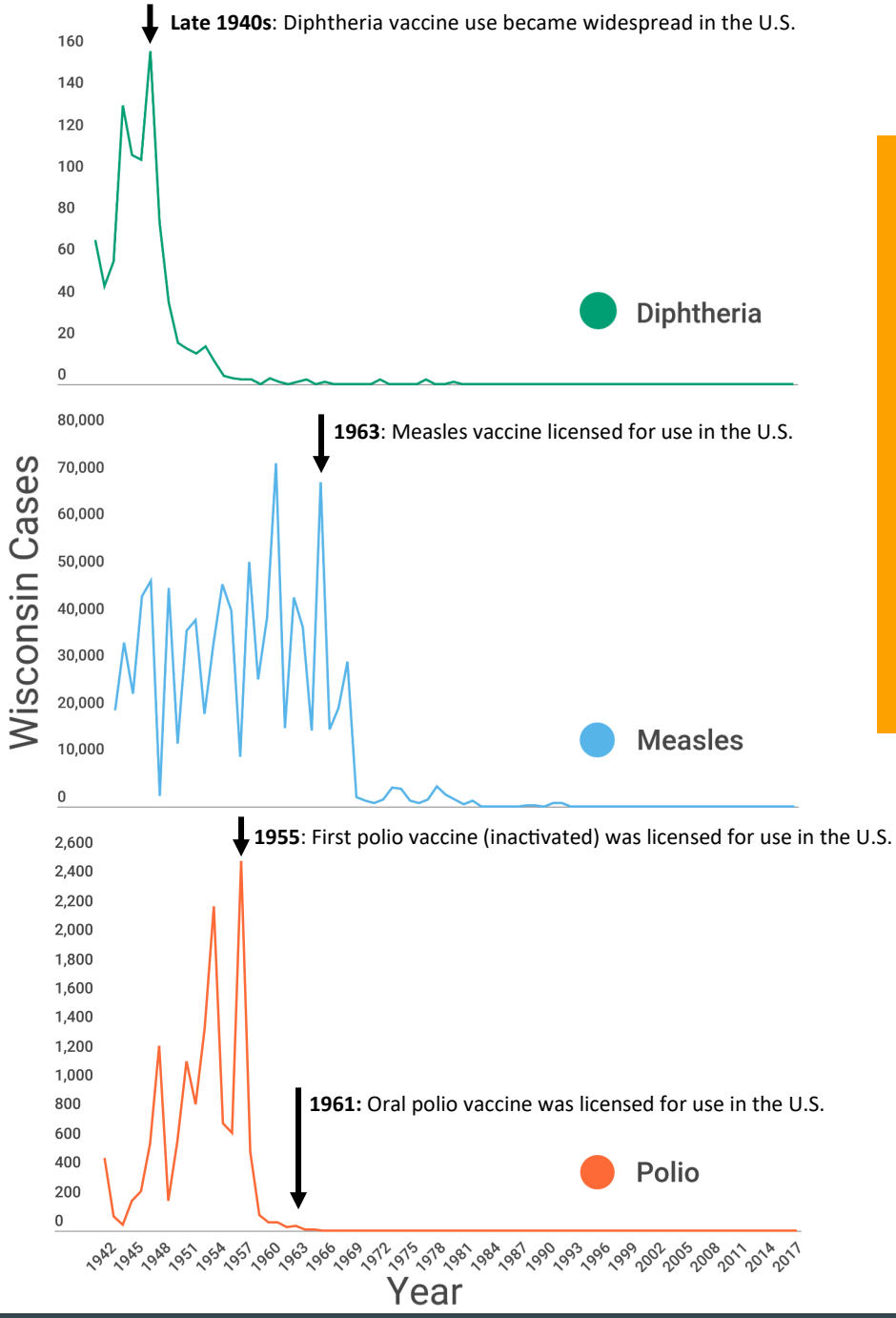
Cases of Syphilis by Stage, Wisconsin, 2017



This graph includes confirmed cases.

11.0 | VACCINE PREVENTABLE DISEASES

Immunizations, also called vaccinations, are one of the greatest achievements in public health. Vaccines prevent disease in people who receive them. Additionally, if enough people in the community are vaccinated, the entire community can be protected because there is little opportunity for an outbreak to occur. The reportable vaccine preventable diseases included in this report are: *Haemophilus influenzae* invasive disease, hepatitis B, meningococcal disease, mumps, *Streptococcus pneumoniae* invasive disease, pertussis, tetanus, and varicella.

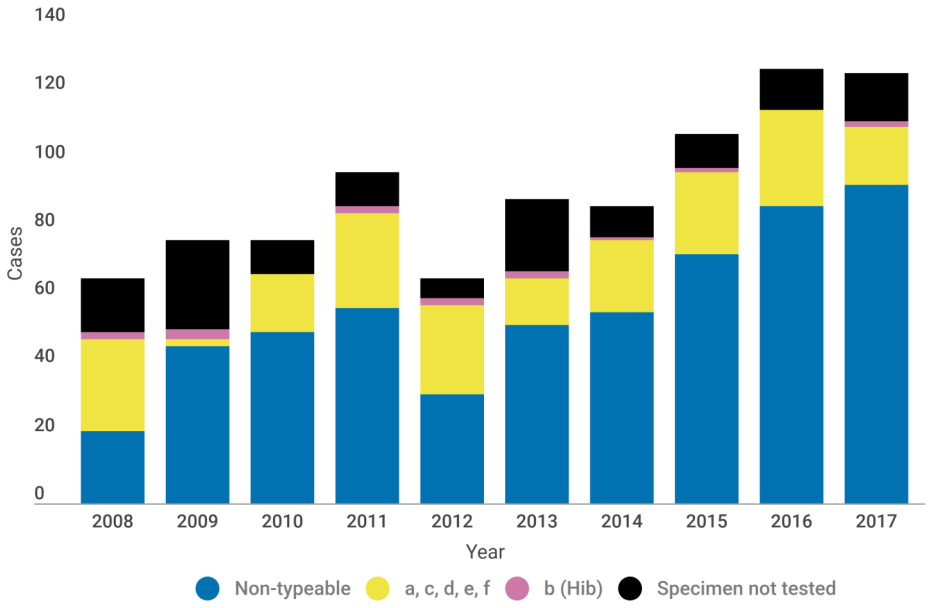


Before vaccines, many children died from diseases like diphtheria, measles, and polio. Through the introduction of routine vaccinations, these and other vaccine-preventable diseases occur much less often in the U.S. However, the viruses and bacteria that cause these diseases still exist. **Vaccinations are the best way to prevent these diseases and the serious effects they can cause.**

11.1 | *HAEMOPHILUS INFLUENZAE* INVASIVE DISEASE

Haemophilus influenzae is a bacterium that can cause a variety of serious diseases, including sepsis (bloodstream infection), meningitis (inflammation of the tissues that cover the brain and spinal cord), pneumonia, and epiglottis (inflammation of and swelling of the cartilage that covers the windpipe). There are many different strains or types of *H. influenzae*, including serotype b (Hib). Before the vaccine, Hib was the most common cause of life-threatening infections in children younger than 5 years of age. Other types or strains (non-type b) of *H. influenzae* can cause invasive disease similar to Hib, but generally occur among the elderly or among people with weakened immune systems. Hib bacteria are spread by direct contact with the respiratory and oral secretions (saliva, sputum, or nasal mucus) of an infected person with or without symptoms. Usually the Hib bacteria remain in the nose and throat without causing any harm. Sometimes the Hib bacteria can enter the blood and spread, causing serious disease, primarily in unvaccinated children under 4.

Invasive *Haemophilus influenzae* Cases by Serotype, Wisconsin, 2008-2017



126

cases of *Haemophilus influenzae* invasive disease, including 2 cases of Hib were reported in Wisconsin in 2017

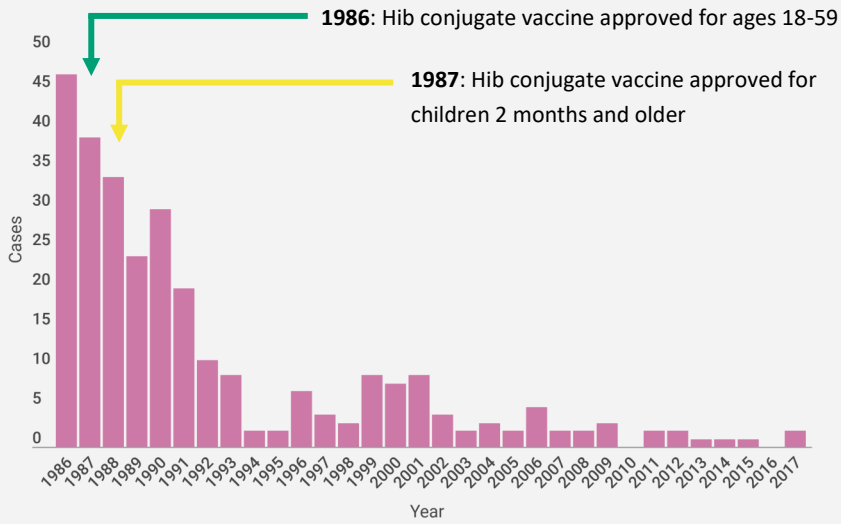
Blood

Over 90% of invasive *H. influenzae* cases had the bacteria isolated from blood.

Ages affected

In the post-vaccine era, about 10% of invasive *H. influenzae* cases are younger than 5 years of age. On average, over 50% of invasive *H. influenzae* cases are aged 65 years and older.

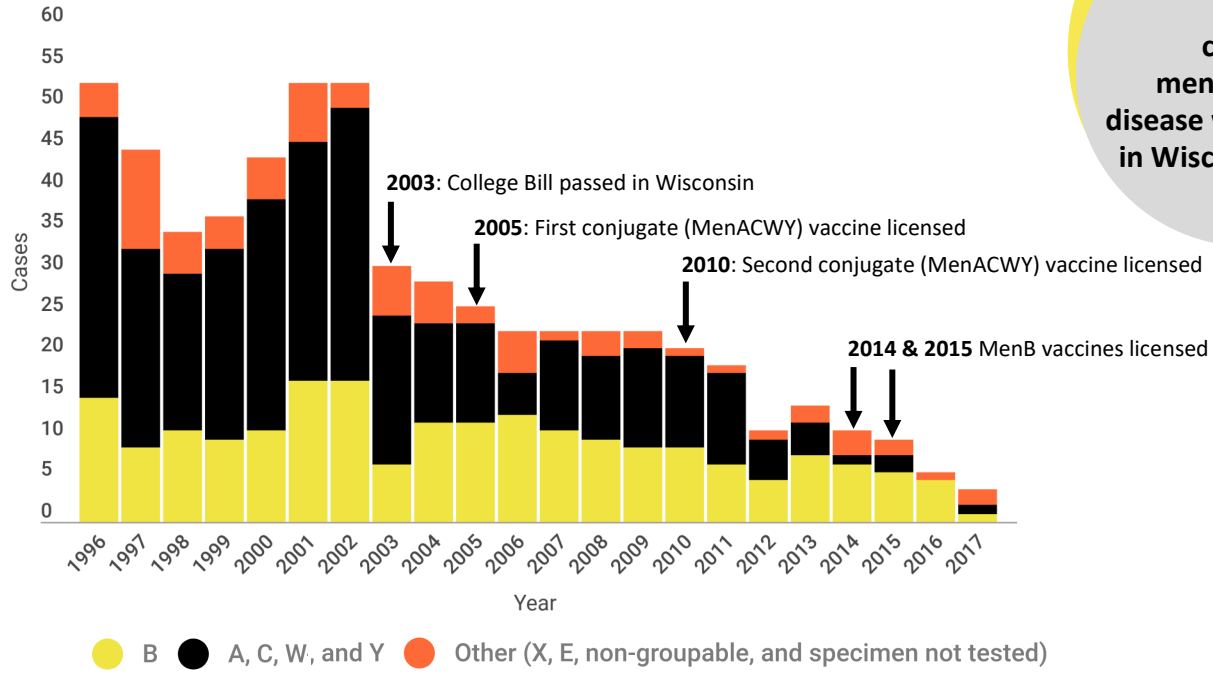
Invasive *Haemophilus influenzae* type b (Hib) Cases, Wisconsin, 1986-2017



11.2 | MENINGOCOCCAL DISEASE

Meningococcal disease is caused by *Neisseria meningitidis* bacteria. Meningococcal disease includes meningitis (swelling of the tissues that cover the brain and spinal cord) and sepsis (blood infection). Someone with meningococcal disease can have meningitis, sepsis, or both at the same time. Anyone can get meningococcal disease, but it is most common in children under 5 years of age and young adults ages 16 through 23 years. *N. meningitidis* bacteria are often found in the nose and throat without causing illness. Most people who come into contact with *N. meningitidis* do not get sick. However, some people become seriously ill, which may be related to societal factors such as overcrowding or smoke exposure, or physical factors such as a weakened immune system that make them more likely to get sick. There are 13 serogroups ("strains") of *N. meningitidis*. The five strains that cause the most disease worldwide are A, B, C, W, and Y. There are vaccines available to prevent these five strains.

Meningococcal Disease Cases by Serogroup, Wisconsin, 1996-2017



4

cases of meningococcal disease were reported in Wisconsin in 2017

Case-fatality rate

On average, 1 in 10 cases of meningococcal disease are fatal.

Long-term complications

1 out of every 10 survivors of meningococcal disease develop some type of long-term complication, such as loss of limb(s), deafness, nervous system problems, or brain damage.

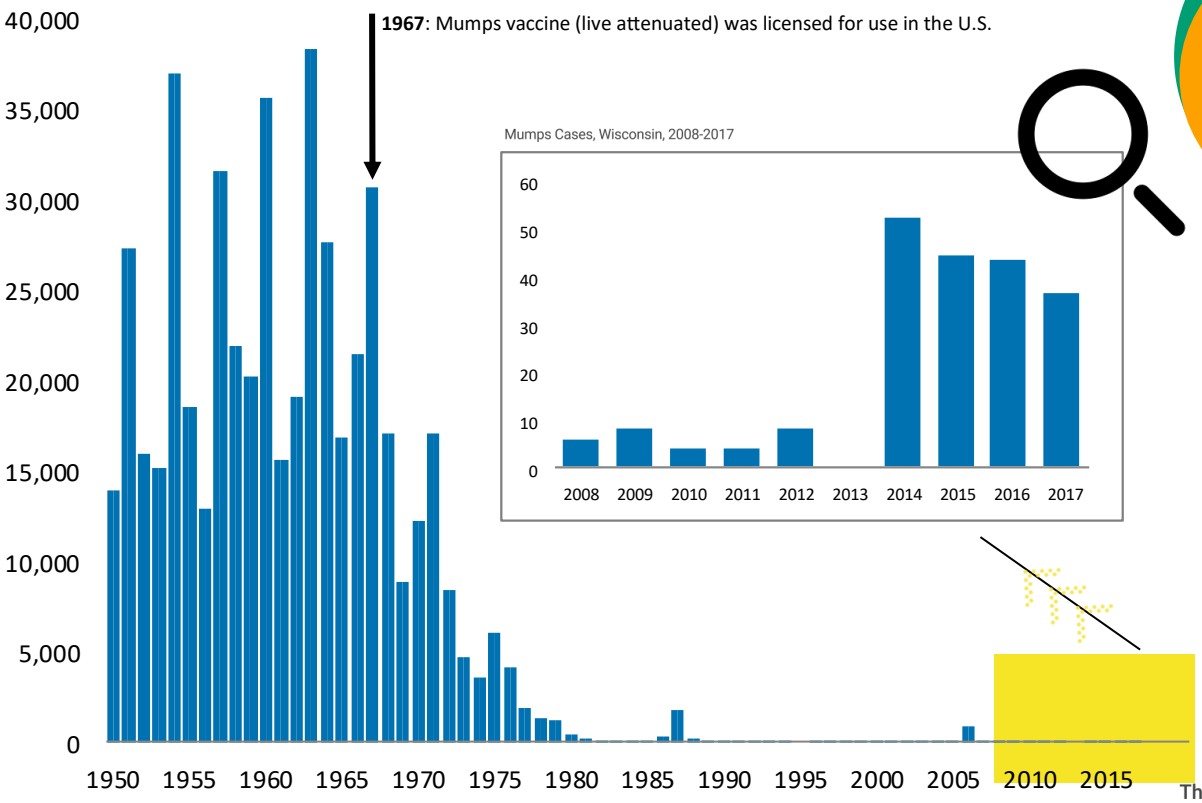
Vaccines

Two conjugate vaccines protect against serogroups A, C, W, and Y (MenACWY). Two additional vaccines protect against serogroup B (MenB).

11.3 | MUMPS

Mumps is a disease caused by the mumps virus. It is best known for the puffy cheeks and swollen jaw that it causes. This is a result of swollen salivary glands. The most common symptoms include fever, headache, muscle aches, tiredness, loss of appetite, and swollen and tender salivary glands under the ears on one or both sides (parotitis). It is contagious and spreads from person-to-person through the air or by direct contact with saliva or infected droplets. The MMR vaccine protects against mumps, measles, and rubella. Two doses of the vaccine are needed for best protection. The first dose should be given at 12–15 months of age, and the second dose at 4–6 years of age.

Mumps Cases, Wisconsin, 1950-2017

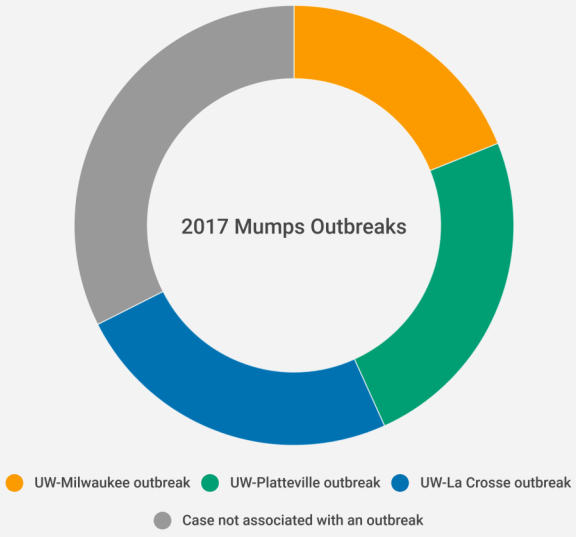


37
cases of mumps were reported in Wisconsin in 2017

This graph includes confirmed cases.

2017 CASE BREAKDOWN

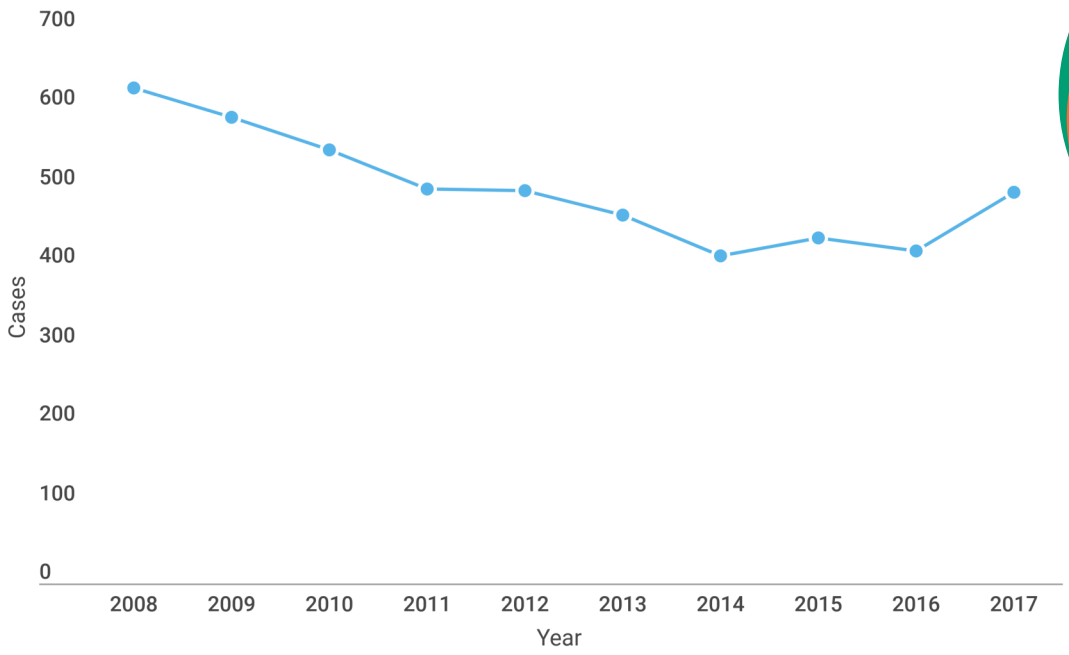
- 37 confirmed mumps cases were reported among Wisconsin residents in 11 counties.
- Zero cases were hospitalized.
- 25 of the 37 cases (68%) were associated with three outbreaks:
  - Outbreak #1 included nine cases in the University of Wisconsin (UW)-La Crosse
  - Outbreak #2 included seven cases at UW-Milwaukee
  - Outbreak #3 included nine cases at UW-Platteville



11.4 | *STREPTOCOCCUS PNEUMONIAE* INVASIVE DISEASE

Streptococcus pneumoniae is a bacterium that is most often associated with mild illness, such as ear and sinus infections. It may also cause life-threatening invasive disease, like pneumonia, sepsis (bloodstream infection), and meningitis (inflammation of the tissues that cover the brain and spinal cord). These types of illness are most common in babies, children under 5 years of age, the elderly, and people with weakened immune systems. *S. pneumoniae* is considered "invasive" when it is found in the blood, spinal fluid, or other normally sterile sites. It is one of the most common bacterial complications of influenza.

Streptococcus pneumoniae Invasive Disease Cases, Wisconsin, 2008-2017



495

cases of *Streptococcus pneumoniae* invasive disease were reported in Wisconsin in 2017

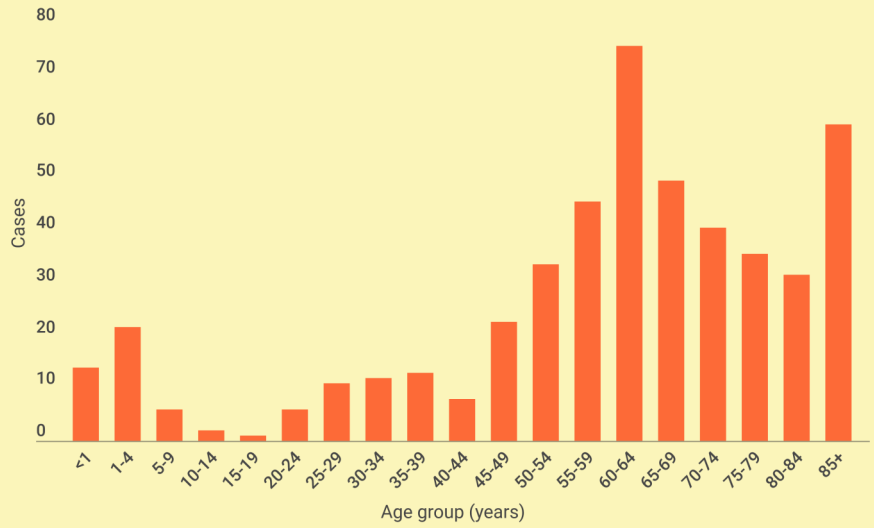
Vaccines

There are two vaccines for *Streptococcus pneumoniae.* Children under 5 years of age and adults over the age of 65 are routinely recommended to receive this vaccine.

Time of year

The highest number of cases of *Streptococcus pneumoniae* occur when winter viruses are most common.

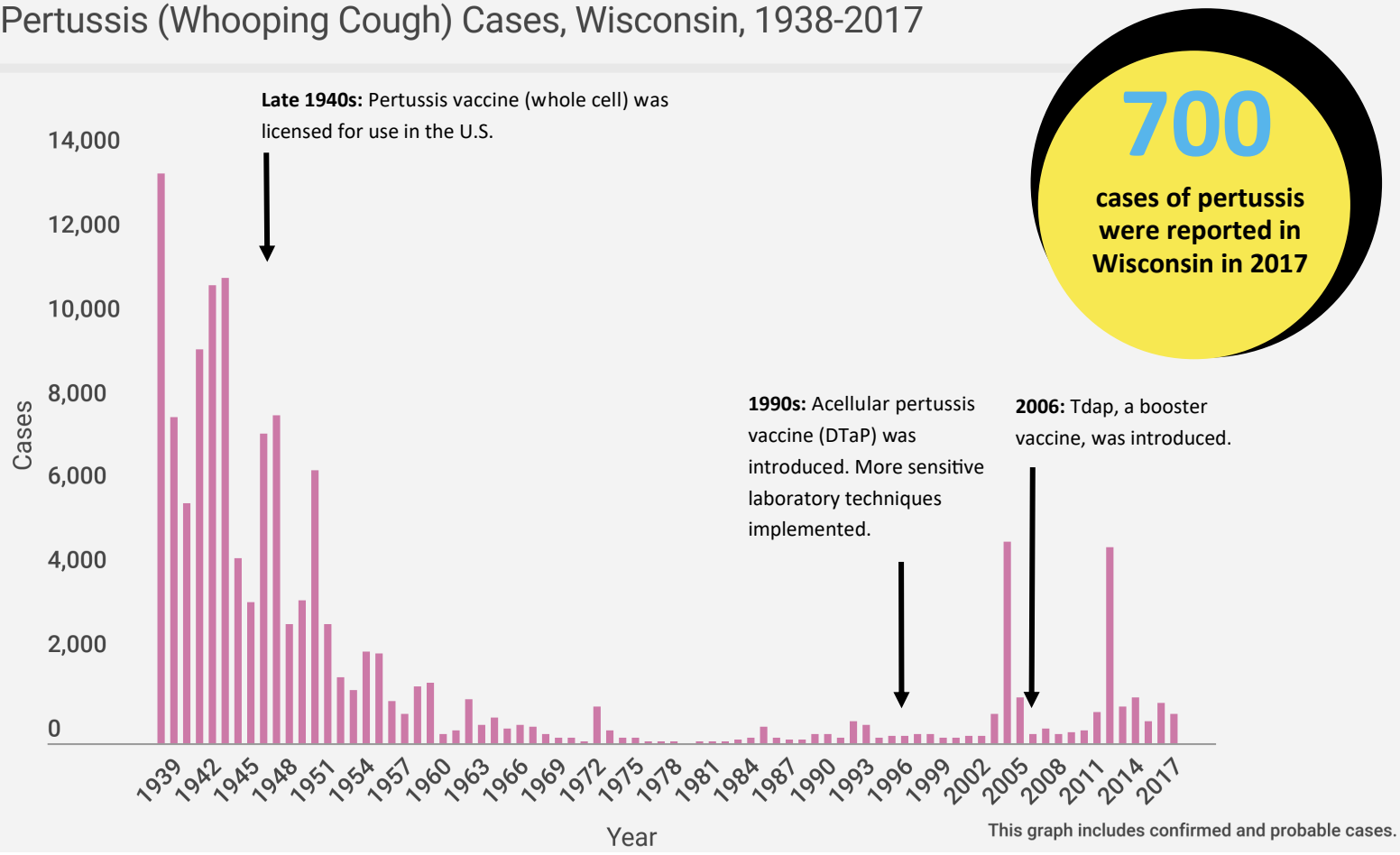
Streptococcus pneumoniae Invasive Disease Cases by Age, Wisconsin, 2017



I I.5 | PERTUSSIS (WHOOPING COUGH)

Pertussis is a serious bacterial respiratory illness caused by the bacterium *Bordetella pertussis*. Pertussis can infect people of all ages, but is most serious in infants and young children. The bacteria attach to the cilia (tiny, hair-like extensions) that line part of the upper respiratory system. The bacteria release toxins (poisons) that damage the cilia and cause airways to swell. Early symptoms can include a runny nose, low-grade fever, mild cough, and apnea (halt in breathing). Later stage symptoms include coughing fits that are followed by a high-pitched "whoop," vomiting and exhaustion. People with pertussis usually spread the disease to another person by coughing or sneezing, or when sharing breathing space with another person for a significant amount of time. Many babies who get pertussis are infected by older siblings, parents, or caregivers who might not even know they have the disease. **The best way to protect against pertussis is by getting vaccinated.**

Pertussis (Whooping Cough) Cases, Wisconsin, 1938-2017



This graph includes confirmed and probable cases.

Sources of pertussis

66% of infant pertussis sources are immediate family members.*

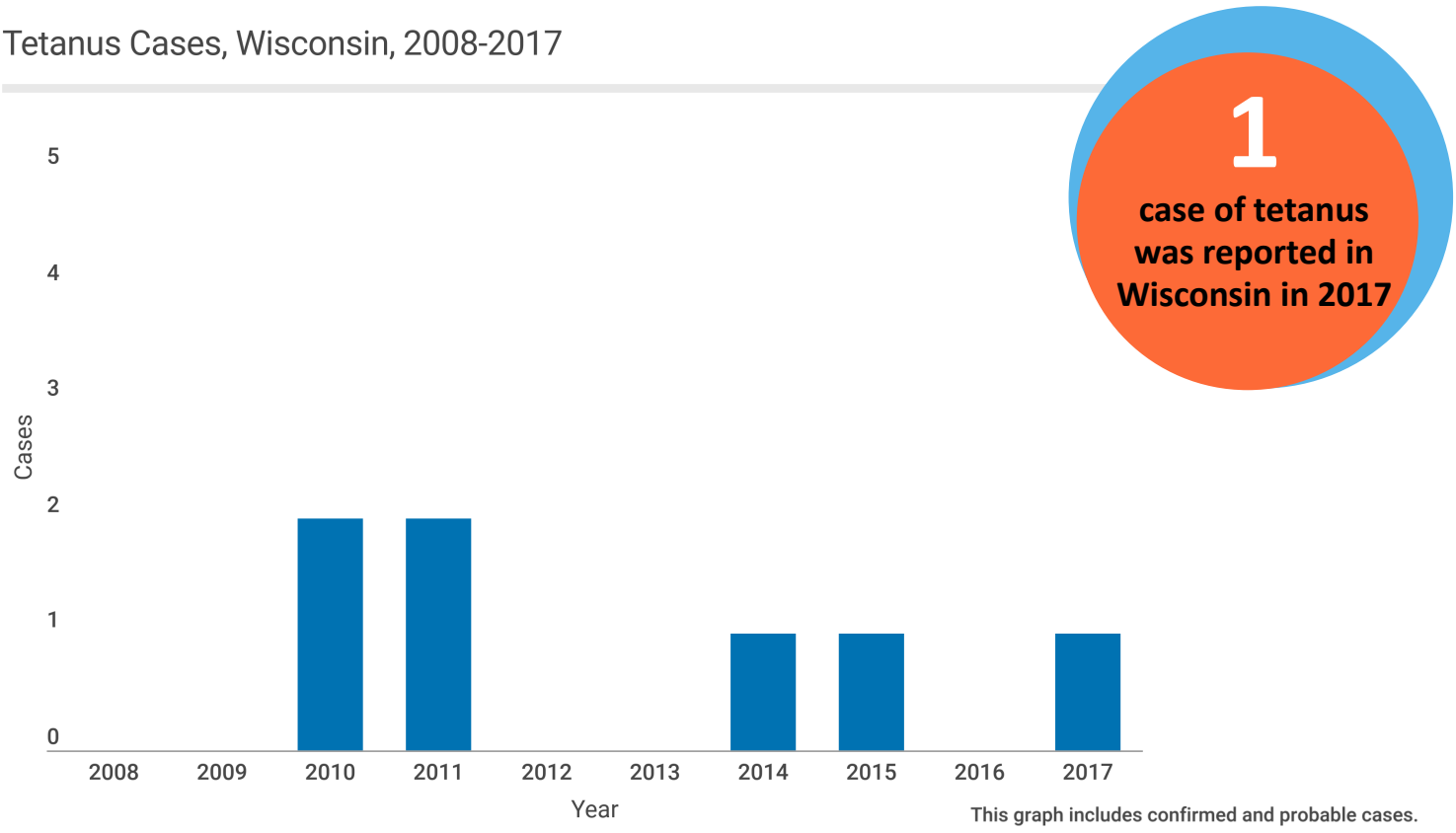
*Source: *Pediatrics*, "Sources of Infant Pertussis Infection in the U.S.," 2015, 136(4).

Tdap vaccination

Women should receive Tdap during each of their pregnancies (preferably in the third trimester between the 27th and 36th week). This will provide protection for the baby against whooping cough.

I I.6 | TETANUS

Tetanus is an infection also known as “lockjaw.” It is caused by a bacterium called *Clostridium tetani*. The spores of tetanus bacteria can be found everywhere in the environment, including in soil, dust, and manure. The spores can get into the body through breaks in the skin. It usually enters the body through a wound. Tetanus bacteria are more likely to infect certain breaks in the skin, including wounds that have dirt, feces (poop), or saliva (spit) in them; wounds caused by an object that punctures the skin (like a nail or needle); burns; crush injuries; and injuries with dead tissue. The first sign of tetanus is most commonly spasms of the jaw muscles, leading to “lockjaw.” Tetanus infection can lead to serious health problems, including being unable to open the mouth and having trouble swallowing and breathing. Being up to date with your tetanus vaccine is the best tool to prevent tetanus.



Recovery time

It can take months to recover fully from tetanus and can include weeks of hospital care. As many as 1 out of 5 people who get tetanus will die from the disease.

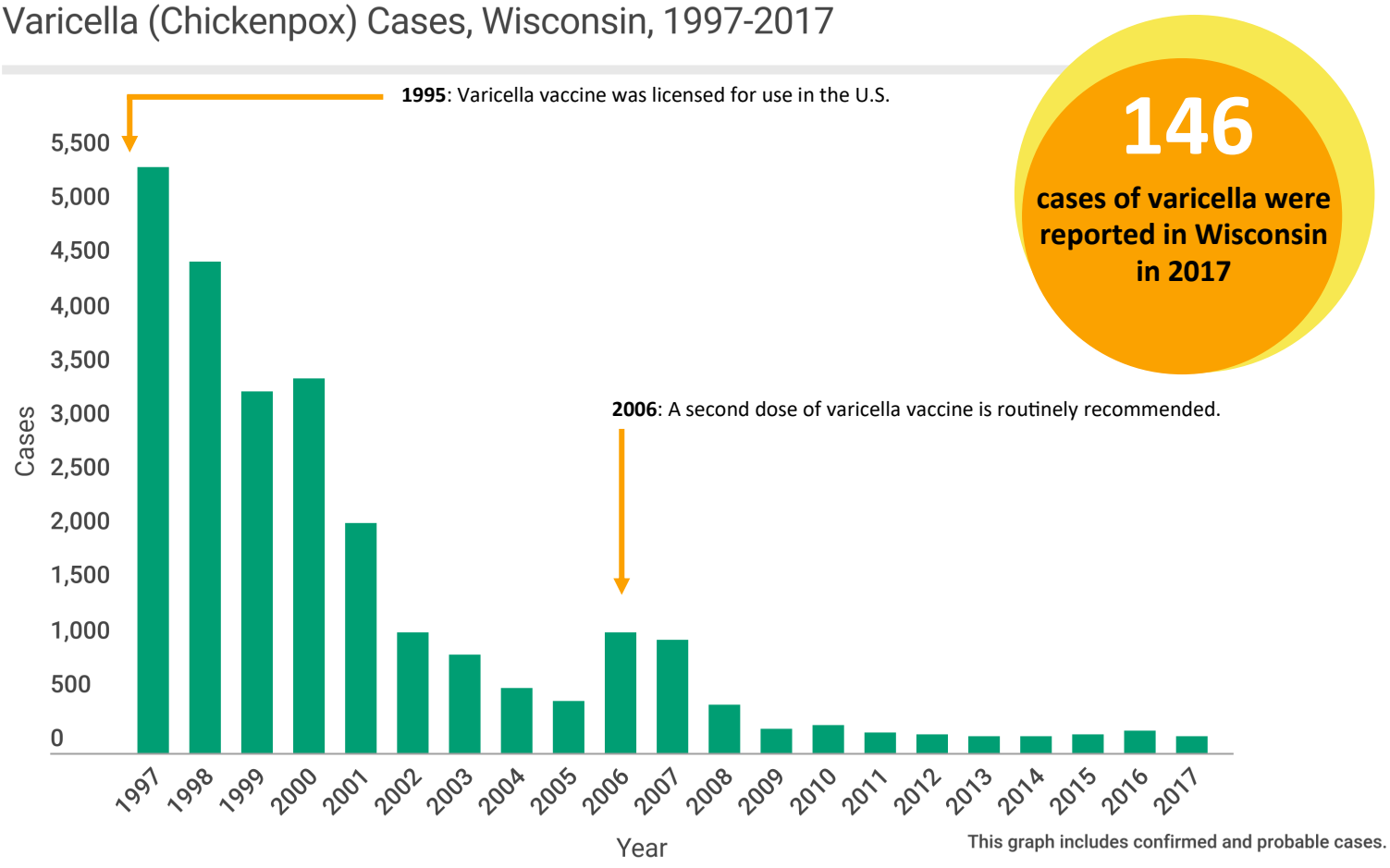
Tetanus in environment

Spores of tetanus bacteria are everywhere in the environment, including soil, dust, and manure and can get in the body through cuts, burns, or animals bites.

11.7 | VARICELLA (CHICKENPOX)

Chickenpox is a very contagious disease caused by the varicella-zoster virus (VZV). It causes a blister-like rash, itching, tiredness, and fever. The rash appears first on the torso, back, and face and can spread over the entire body causing between 250 and 500 itchy, fluid-filled blisters. It usually takes about one week for the blisters to turn into scabs. In addition to the blisters, symptoms can include fever, tiredness, loss of appetite, and headache. Chickenpox can be serious, especially in babies, adults, and people with weakened immune systems. **The best way to prevent chickenpox is to get the chickenpox vaccine.**

Varicella (Chickenpox) Cases, Wisconsin, 1997-2017



146

cases of varicella were reported in Wisconsin in 2017

This graph includes confirmed and probable cases.

Percentage immune

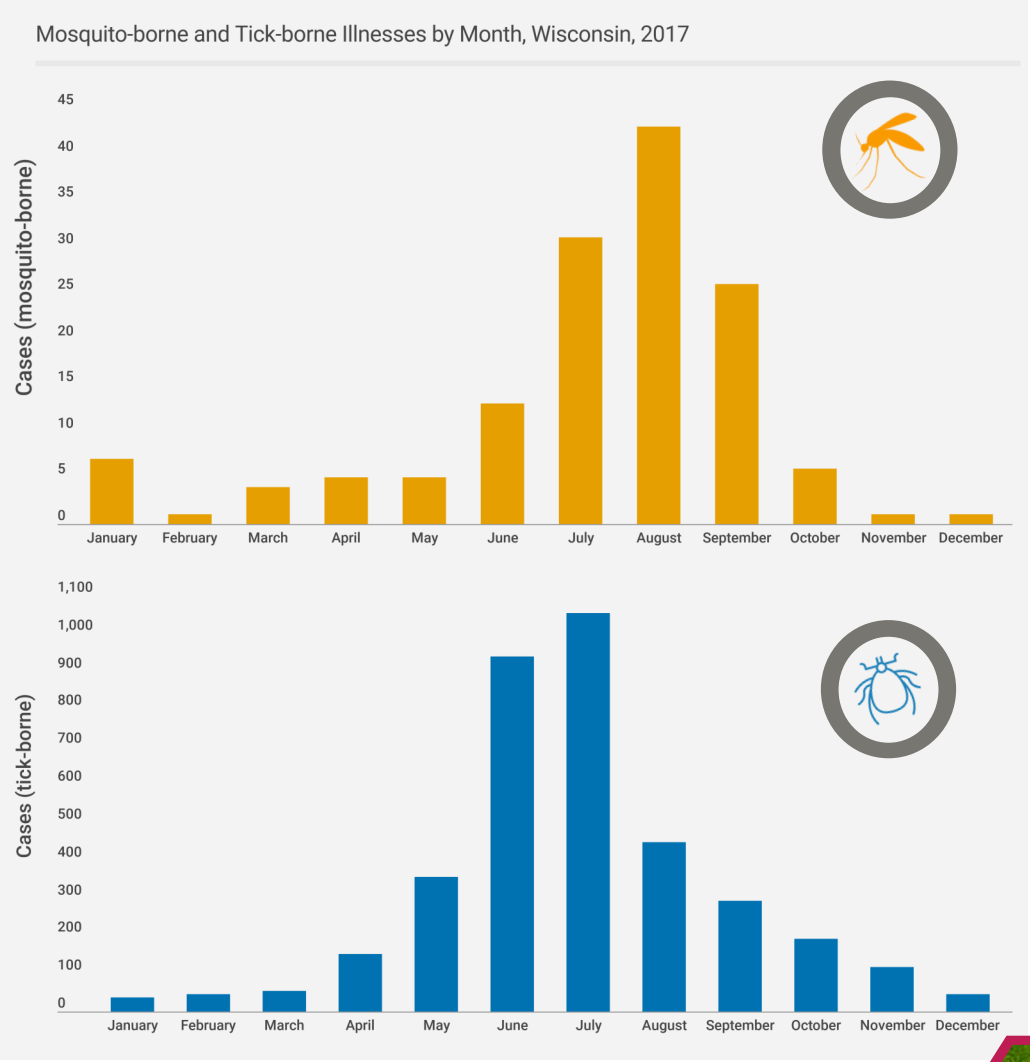
Of all Wisconsin children who turned 6 years old in 2017, 90% were up to date on their varicella vaccination, or had chickenpox in the past and were immune.

Shingles vaccination

The same virus that causes chickenpox also causes shingles. These diseases impact different age groups which is why we have separate chickenpox and shingles vaccines.

12.0 | VECTOR-BORNE DISEASES

Vectors are organisms that can spread infectious diseases between humans or from animals to humans. Many vectors are bloodsucking insects or arthropods, which consume disease-producing microorganisms during a blood meal from an infected host (human or animal) and later expose a new host to these microorganisms during their next blood meal. Vector-borne diseases in Wisconsin include those spread by ticks and mosquitoes. Some of these diseases have been in Wisconsin for decades, while others have recently emerged or increased, or are imported into the state only after travel to other states or countries. These include some of the world's most destructive diseases, many of which are increasing threats to human health as the environment changes and globalization increases. The reportable vector-borne diseases included in this report are: anaplasmosis, babesiosis, California serogroup viruses, ehrlichiosis, Lyme disease, malaria, Powassan virus infection, Rocky Mountain spotted fever, West Nile virus infection, and Zika virus infection.



This graph includes confirmed, probable, and travel-associated cases.

Seasonality

Vector-borne diseases follow a seasonal pattern. Most cases occur in the summer months when mosquitoes and ticks are more active.

12.1 | EASTERN EQUINE ENCEPHALITIS VIRUS (EEE)

Eastern equine encephalitis (EEE) virus can be spread to humans through the bite of an infected mosquito. Human infections are very rare because the virus is spread mainly among bird hosts by mosquitoes that primarily take blood meals from birds. Very rarely, some *Aedes*, *Coquillettidia*, and *Culex* mosquito species that feed on both birds and humans may spread the virus from birds to humans, causing illness. Horses are mammals that are also susceptible to illness caused by EEE. Wisconsin tracks cases of EEE reported in horses (usually unvaccinated or under-vaccinated) to help evaluate the risk of EEE infection in humans.

People who become infected with EEE may or may not have any symptoms. Patients who develop EEE disease may initially have fever, chills, joint pain, and muscle pain. In severe cases, the illness may progress to affect the central nervous system, causing encephalitis with symptoms such as headache, confusion, vomiting, seizures, or coma. One of three people with EEE will die from this rare illness, and those who recover often have permanent brain damage that causes mental and physical disabilities.

EEE Human Cases, Wisconsin, 1964-2017

Only three cases of EEE have ever been reported in Wisconsin residents.

1
Human case of EEE was reported in Wisconsin in 2017

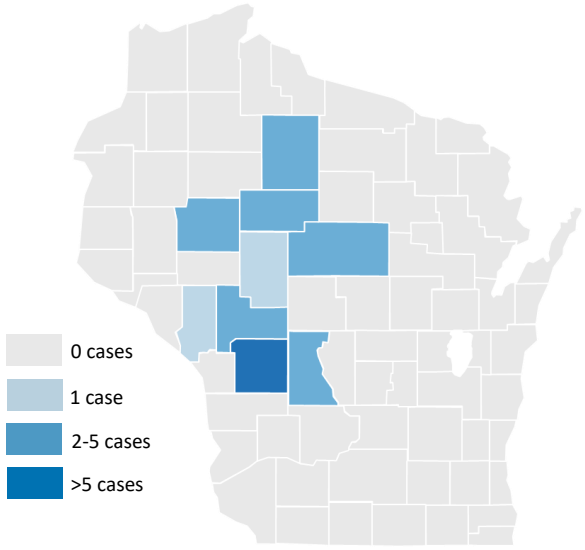
Geography

In 2017, a total of five human EEE cases were reported in the U.S.

Equine cases

In typical years, fewer than five equine cases are reported annually statewide. In 2017, 24 equine cases were reported in Wisconsin.

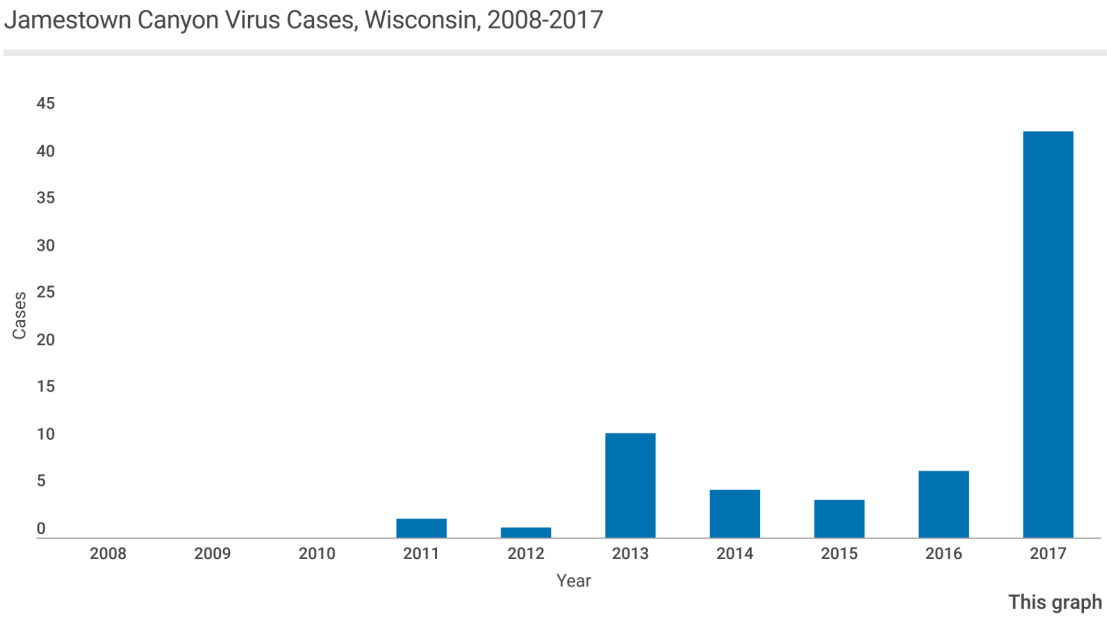
Reported EEE Equine Cases, Wisconsin, 2017



12.2 | JAMESTOWN CANYON VIRUS (JCV)

Jamestown Canyon virus is spread to humans by the bite of an infected mosquito. In Wisconsin, the mosquito species associated with these infections is not yet known. Jamestown Canyon virus is closely related to La Crosse encephalitis virus, which also is spread by certain mosquitoes that live in Wisconsin. People who are infected with Jamestown Canyon virus may or may not get sick, but when symptoms do develop, they may include fever, headache, fatigue, encephalitis (swelling of the brain), or meningoencephalitis (swelling of the brain and surrounding tissues).

In 2017, 75 cases of Jamestown Canyon infections were reported nationally, with over half of these occurring in Wisconsin residents. The number of Jamestown Canyon cases reported in Wisconsin in 2017 represented an eightfold increase in the average number of cases.



43

cases of JCV were reported in Wisconsin in 2017

This graph includes confirmed and probable cases.

Hospitalizations

Of Wisconsin residents diagnosed with JCV in 2017, 60% were hospitalized for their illness.

Neuroinvasive

82% of cases of JCV were classified as neuroinvasive disease in 2017. Neuroinvasive disease typically includes fever with altered mental status, meningitis, encephalitis, acute flaccid paralysis, or other neurological dysfunction.

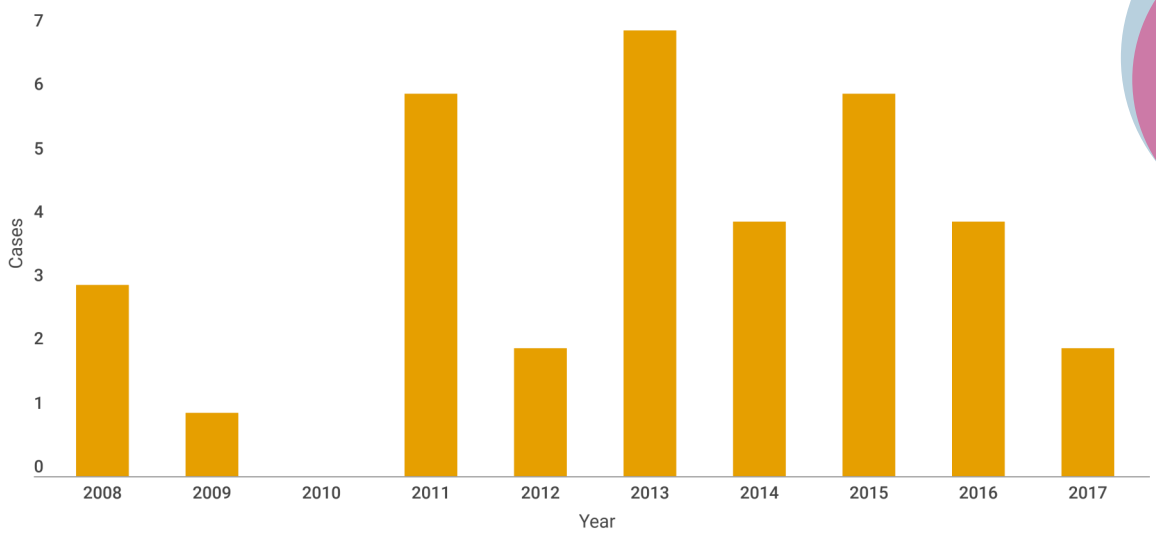
Geography

Generally, JCV cases are most common in northern Wisconsin.

12.3 | LA CROSSE VIRUS

La Crosse virus is spread to humans by the bite of an infected *Aedes triseriatus* mosquito (also known as the Eastern treehole mosquito). The Eastern treehole mosquito is abundant in Wisconsin and prefers to lay its eggs in the holes of deciduous trees. La Crosse virus is closely related to Jamestown Canyon virus, which also is spread by some species of mosquitoes that live in Wisconsin. Most people who are infected with La Crosse virus do not develop symptoms, but when illness does develop, symptoms may include fever, headache, nausea, vomiting, encephalitis (swelling of the brain), or meningoencephalitis (swelling of the brain and surrounding tissues).

La Crosse Virus Cases, Wisconsin, 2008-2017



2

cases of La Crosse virus were reported in Wisconsin in 2017

This graph includes confirmed and probable cases.

Children

Children under the age of 16 are at the highest risk of developing severe La Crosse virus disease.

Aedes triseriatus

This species, also called the Eastern treehole mosquito, usually lays eggs in water collected inside treeholes. They will also lay eggs in other containers that can hold standing water, like old automobile tires.

Statewide

Despite its name, La Crosse virus cases have been identified in all regions of Wisconsin, not just in the Western region.

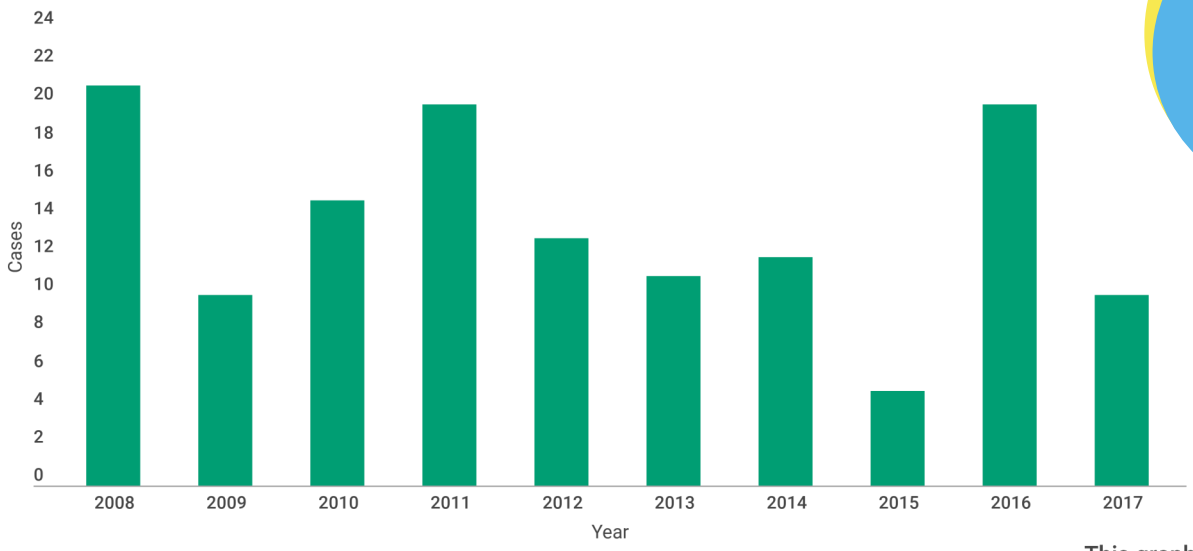
12.4 | MALARIA

Malaria is a serious disease caused by a microscopic parasite that affects red blood cells. There are four species of malaria that can infect humans: *Plasmodium falciparum, P. malariae, P. vivax*, and *P. ovale*. The severity of disease depends on the species of *Plasmodium* causing the infection. The parasite is transmitted by the bite of an infected *Anopheles* mosquito, commonly found in tropical and subtropical regions of the world.

People usually become ill with malaria within 7–30 days after being bitten by an infected mosquito. Infection with malaria parasites may range from the absence of symptoms to severe illness, including death. Initially, symptoms typically include fever, chills, sweats, headaches, nausea, vomiting, body aches, and general malaise. Severe symptoms may include neurologic abnormalities, severe anemia, acute respiratory distress syndrome, decrease in blood platelets, low blood glucose, cardiovascular collapse and shock, and acute kidney failure.

Most malaria cases in the U.S. are reported in returning travelers or immigrants. In Wisconsin, an average of 14 cases of malaria were reported annually between 2008 and 2017. All were reported in people who traveled to a malaria-endemic location.

Travel-associated Malaria Cases, Wisconsin, 2008-2017



10

cases of malaria were reported in Wisconsin in 2017

This graph includes confirmed cases.

Travel destination

In 2017, Wisconsin residents got malaria in East Africa (3), Central Africa (1), West Africa (5), and Southeast Asia (1).

Endemic areas

In 2016, 91 countries and areas had ongoing malaria transmission.

Source: World Health Organization

Prevention for travelers

Malaria prophylaxis and other protections such as bed net use and mosquito repellents can protect travelers.

12.5 | TRAVEL-ASSOCIATED ILLNESSES SPREAD BY MOSQUITOES

	Mosquitoes that spread it	Areas of highest risk	Spread in U.S.?	Prevention tips
Chikungunya	*Aedes (Ae.) aegypti* + *Ae. albopictus*	Sub-Saharan Africa, Asia, the Indian and Pacific Oceans, the Caribbean, and South and Central America	Rarely (TX)	Bite prevention
Dengue	*Ae. aegypti* + *Ae. albopictus*	India, SE Asia, East Africa, Central and South America, Indian and Pacific Islands	Rarely (FL, TX, HI)	Bite prevention
Malaria	*Anopheles* species	Tropical and subtropical regions	No	Chemo-prophylaxis + Bite prevention
Yellow Fever	*Ae. aegypti* + *Ae. albopictus*	Tropical and subtropical regions of Africa and South America	No	Vaccine + Bite prevention
Zika	*Ae. aegypti* + *Ae. albopictus*	Central and South America, India, Southeast Asia, Pacific Islands, and Caribbean	Previously (FL and TX)	Condom use + Bite prevention

2017 CASE COUNTS:

CHIKUNGUNYA	DENGUE	MALARIA	YELLOW FEVER	ZIKA VIRUS
5	**18**	**10**	**0**	**9**
Confirmed and probable cases	Confirmed and probable cases	Confirmed cases	Cases	Confirmed cases

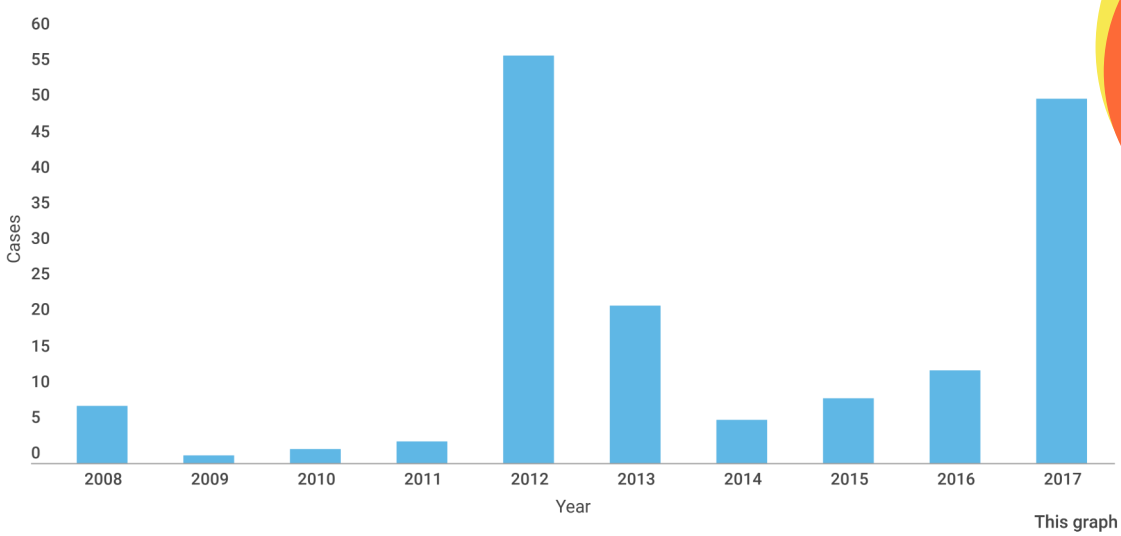
12.6 | WEST NILE VIRUS INFECTION

West Nile virus (WNV) is an arbovirus that is transmitted by the bite of an infected *Culex* mosquito. An arbovirus (arthropod-borne virus) is any virus transmitted by mosquitoes, ticks, or other arthropods. WNV, which has been widespread in Africa, southern Europe, the Middle East, and western Asia, first appeared in the New York City area of the U.S. in 1999. The first human cases of WNV in Wisconsin occurred in 2002. Few species of mosquitoes actually carry the virus.

An estimated 80% of people infected with WNV never have symptoms. Most of the remaining 20% will have relatively mild illness, with symptoms such as fever, headache, muscle pain, skin rash, swollen lymph nodes, and sensitivity to light. Less than 1% of people (approximately one in every 150) infected with WNV become seriously ill. Severe symptoms include sudden onset of a high fever, neck stiffness, extreme muscle weakness, tremors, convulsions, disorientation, encephalitis, or meningitis.

In nature, mosquitoes become infected with WNV by feeding on infected birds and can then transmit the virus to other animals, birds, and humans. The Wisconsin Division of Public Health monitors dead birds for WNV as an early warning system to indicate that the virus may be present in an area.

West Nile Virus Cases, Wisconsin, 2008-2017



This graph includes confirmed and probable cases.

51

cases of WNV were reported in Wisconsin in 2017

Culex mosquito

***Culex* mosquitoes spread WNV. They lay their eggs in stagnant (non-moving) water. Their eggs are commonly found in tin cans, puddles, old tires, or bird baths.**

Birds

Some birds, especially crows and jays, are known to get sick and die from WNV infections. These birds can give early warning signs of WNV activity in an area.

Time of year

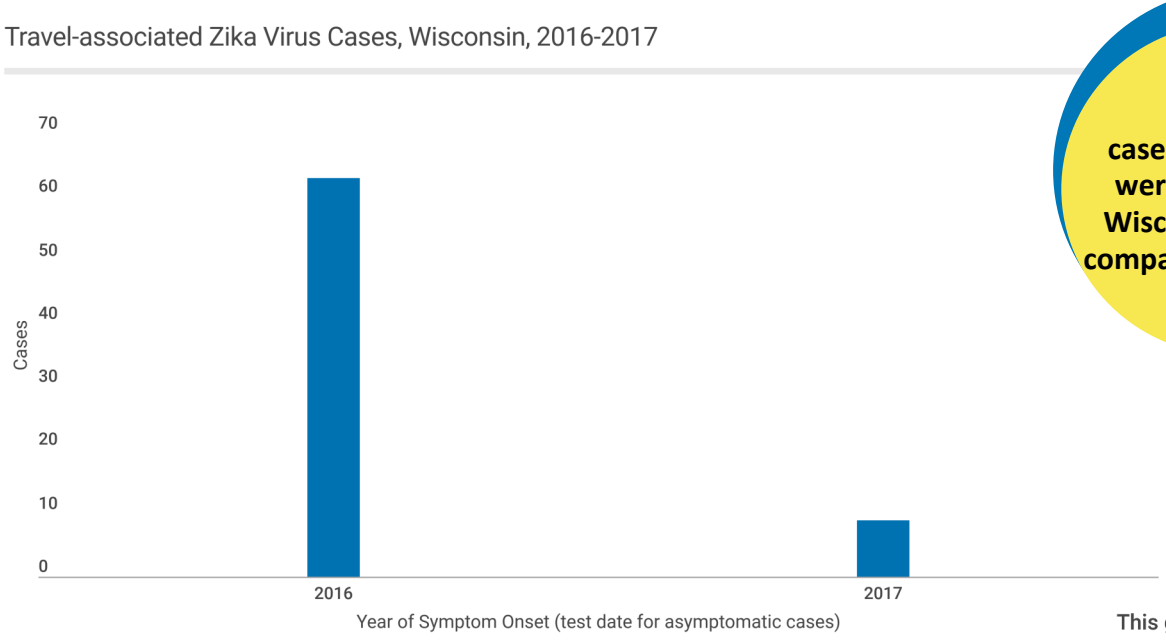
In Wisconsin, 80% of all human cases happen during August and September.

I 2.7 | ZIKA VIRUS

Zika virus is an arbovirus mainly spread through the bite of an infected mosquito. An arbovirus (arthropod-borne virus) is any virus transmitted by mosquitoes, ticks, or other arthropods. Many areas in the U.S. have the types of mosquitoes (*Aedes aegypti* and *Aedes albopictus*) that can spread Zika virus. Zika can also be passed through sex from a person who has Zika to their sex partners, and during pregnancy from mother to fetus.

The most common symptoms of Zika virus are fever, rash, headache, red eyes, muscle pain, and joint pain. Zika infection during pregnancy can cause birth defects such as microcephaly (unusually small head due to abnormal brain development) and other severe brain defects. It is also linked to other problems, such as miscarriage, stillbirth, hearing loss, joint contractures, and other birth defects. There have also been increased reports of Guillain-Barré syndrome, a rare sickness of the nervous system, in areas affected by Zika.

Currently, one type of mosquito that can spread Zika, *Aedes albopictus*, has been found in Wisconsin. There is no evidence of local Zika virus transmission in Wisconsin, and all cases that have been reported are associated with travel to a Zika-affected area, unprotected sex with a traveler to a Zika-affected area, or with maternal Zika infection during pregnancy.



9

cases of Zika virus were reported in Wisconsin in 2017, compared to 63 cases in 2016.

This graph includes confirmed cases.

Travel exposure

In 2017, Wisconsin travelers who tested positive for Zika reported exposures from nine different countries outside the continental U.S.

Zika and pregnancy

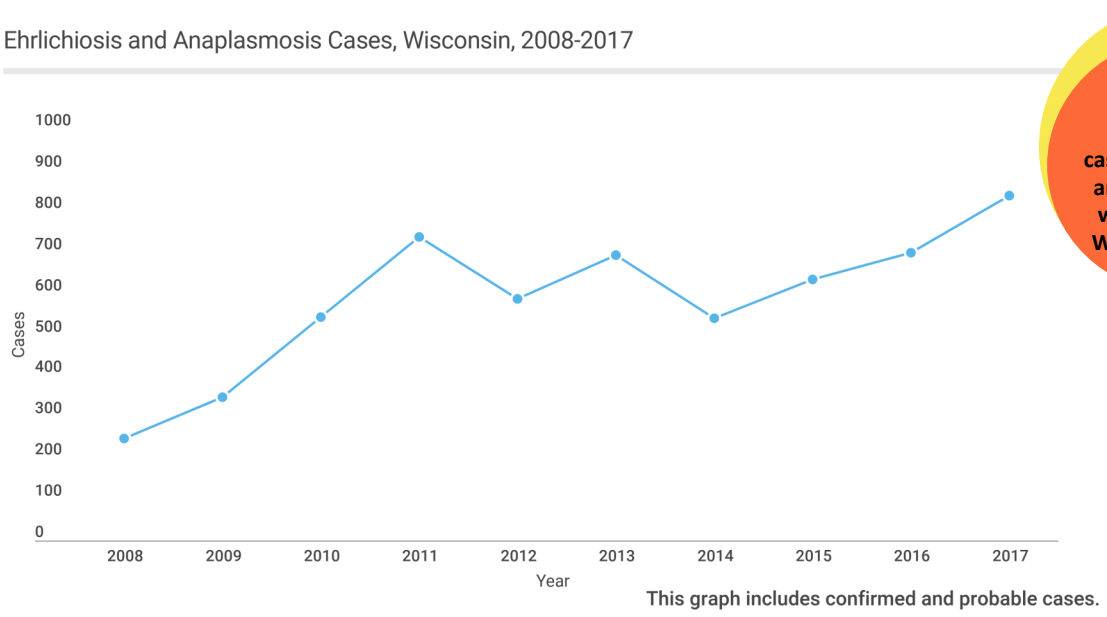
Zika can be passed from a pregnant woman to her baby anytime during pregnancy. Approximately 1 in 7 moms with potential Zika exposure have babies with health problems

Aedes mosquito

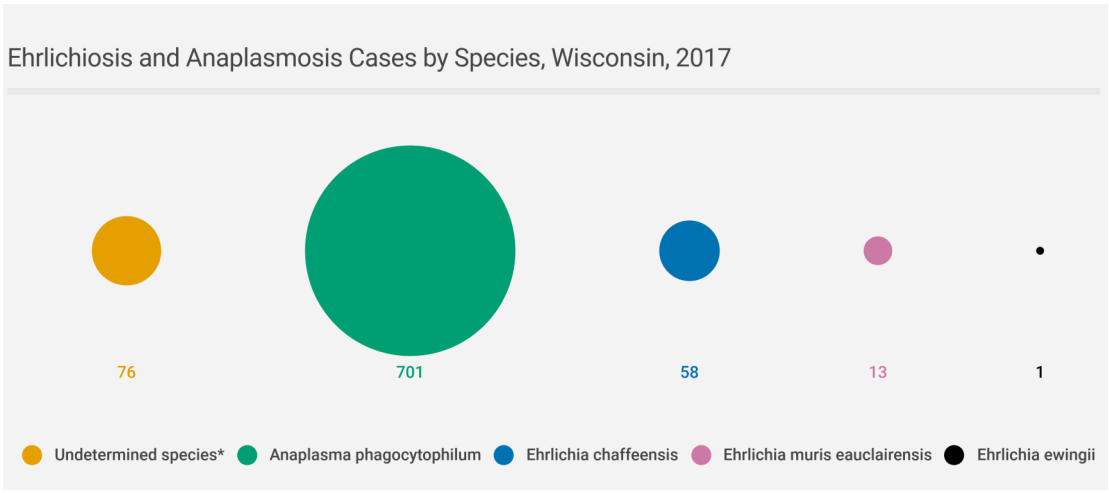
***Aedes* mosquitoes bite during the day and night. Travelers should use EPA-registered insect repellent when headed outdoors.**

12.8 | ANAPLASMOSIS & EHRLICHIOSIS

Anaplasmosis and ehrlichiosis are similar diseases caused by two different groups of bacteria called *Anaplasma* and *Ehrlichia*. In Wisconsin, both anaplasmosis and ehrlichiosis are spread by the bite of an infected *Ixodes scapularis* tick (also known as the black-legged or deer tick). Ehrlichiosis can also be spread by the bite of an infected *Amblyomma americanum* tick (lone star tick), a species of tick commonly found in the southeastern U.S. that has been emerging in Wisconsin over the past several years. Anaplasmosis is far more common than ehrlichiosis in Wisconsin; however, there has recently been an increase in cases of ehrlichiosis in Wisconsin. *Anaplasma* and *Ehrlichia* can be spread by both adult and nymph stage ticks, but because of their small size, nymphs are more likely to go undetected and are therefore more likely to spread these diseases. Ticks are found in areas with woods, brush, or tall grass, with nymph populations typically peaking during the late spring and summer, and adult populations peaking in late summer and fall. The symptoms of anaplasmosis and ehrlichiosis are similar. Both can include symptoms such as fever, headache, chills, muscle pain, tiredness, nausea, vomiting, diarrhea, and a rash (rare with anaplasmosis). People may not remember being bitten by a tick because the black-legged nymphs are very small, about the size of a poppy seed.



849
cases of ehrlichiosis and anaplasmosis were reported in Wisconsin in 2017



***Anaplasma* and *Ehrlichia* species are reported as "undetermined" in cases of dual infection, cross-reactivity, and when the infection is identified by blood smear only.**

Anaplasma

The agent that causes anaplasmosis is *Anaplasma phagocytophilum* and it was first discovered in several patients from Wisconsin and Minnesota between 1990 and 1993.

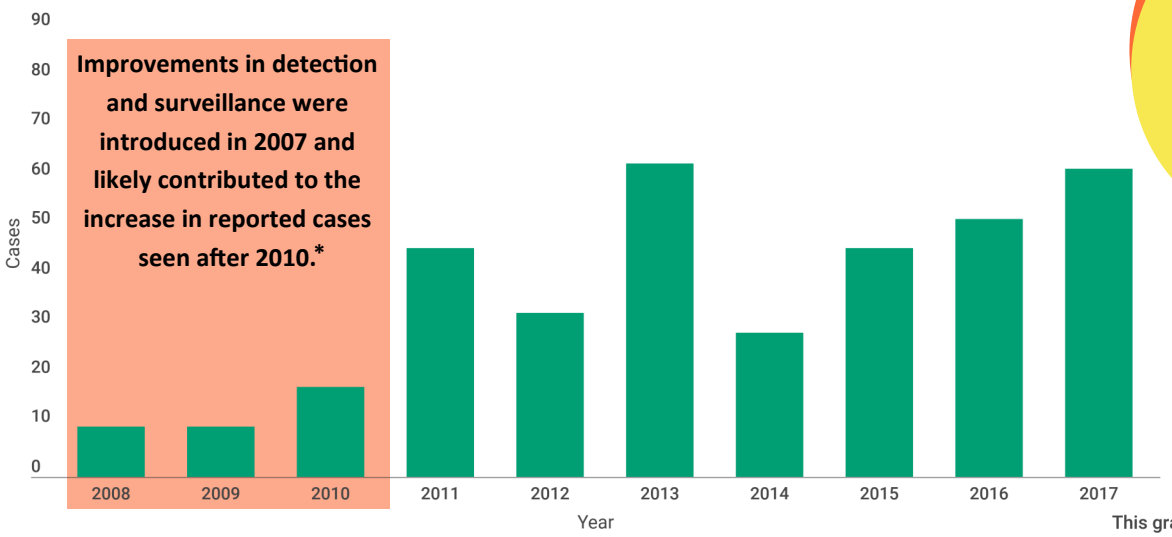
Ehrlichia

Ehrlichiosis is caused by at least three identified species including *Ehrlichia chaffeensis*, *E. ewingii*, and a newly discovered strain related to *E. muris,* known as *E. muris eauclairensis*, which was first discovered in several Wisconsin and Minnesota residents in 2009.

12.9 | BABESIOSIS

Babesiosis is a tick-borne disease caused by the tiny parasite, *Babesia*, that infects red blood cells. *Babesia* is spread by the *Ixodes scapularis* tick (also called the black-legged tick or deer tick). Babesiosis is most common in the Northeastern U.S. and Upper Midwest (including Wisconsin) and peaks during the warm months. The illness can range from relatively mild to life threatening. Anyone can get babesiosis, but it is more severe in the elderly and in those who have a weak immune system. *Babesia* is usually spread by the nymph stage of the tick. Nymphs are typically found during the warmer months (spring-summer) in areas with woods, brush, or tall grass. People may not remember being bitten by a tick because the black-legged nymphs are very small, about the size of a poppy seed. Although rare, people can also get babesiosis through transfusions with *Babesia*-contaminated blood.

Babesiosis Cases, Wisconsin, 2008-2017



This graph includes confirmed cases.

62

cases of babesiosis were reported in Wisconsin in 2017

*Over time, the range of the black-legged tick has expanded, leading to more cases in Wisconsin. In addition, automatic electronic lab reporting and increasing use of polymerase chain reaction (PCR) testing for diagnosis began in 2007. These two factors magnified the increase in babesiosis cases seen after 2010.

Transmission

Ticks must be attached to a person for more than 36 hours in order to transmit the parasite.

Source: CDC

Emerging disease

The first known case of babesiosis in Wisconsin was detected in 1985.

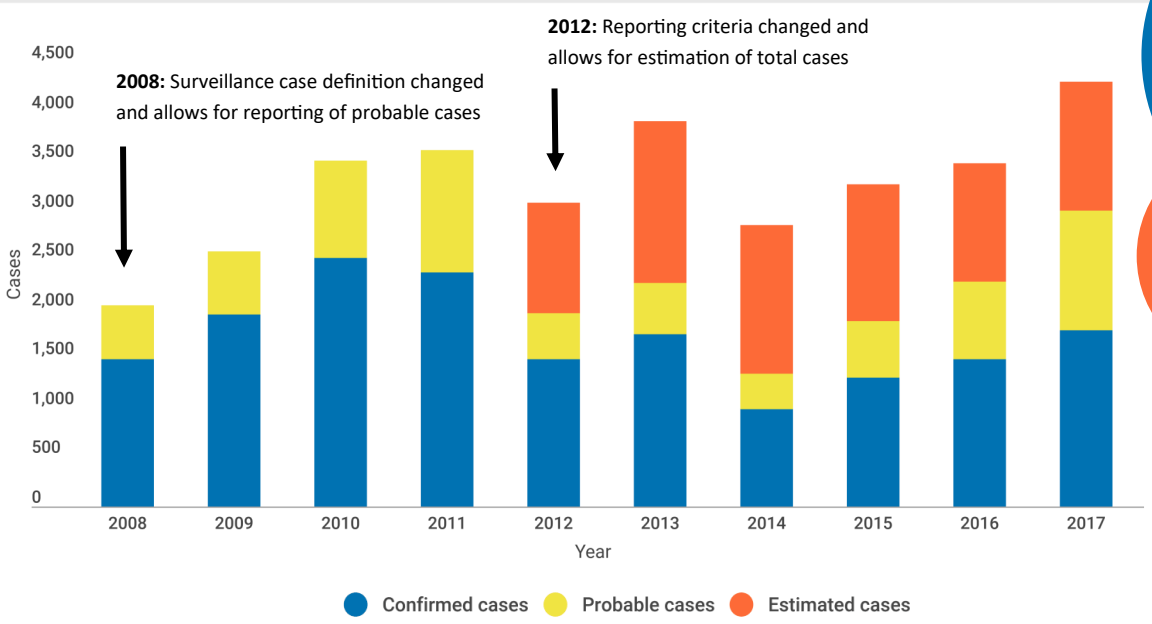
Increasing trend

Wisconsin data show an increase in geographic range and number of babesiosis cases reported in recent years.

12.10 | LYME DISEASE

Lyme disease is an illness caused by the bacterium, *Borrelia burgdorferi,* or more rarely *B. mayonii*. It is spread to humans by the *Ixodes scapularis* tick (also known as the blacklegged or deer tick). Anyone can get Lyme disease, but people who spend time more outdoors are at a higher risk of being bitten by a tick. In Wisconsin, the highest number of cases is seen in the western and northern regions, but recently cases have increased in the central and eastern regions. Early symptoms of Lyme disease can include a characteristic bull's eye rash (erythema migrans), fever, joint pain or swelling, muscle aches, fatigue, headache, or stiff neck. If left untreated, more severe symptoms may develop including meningitis, facial palsy, heart abnormalities, or arthritis. To spread Lyme disease to a person, an infected tick must be attached for at least 24 hours. Lyme disease can be spread by both adult and nymph stage ticks, but because of their small size, nymphs are more likely to go undetected and are therefore more likely to spread the disease. Ticks are found in areas with woods, brush, or tall grass, with nymph populations typically peaking during the late spring and summer, and adult populations peaking in late summer and fall. People may not remember being bitten by a tick because the black-legged nymphs are very small, about the size of a poppy seed. **Wisconsin had 4,299 reported cases of Lyme disease in 2017.**

Lyme Disease Cases, Wisconsin, 2008-2017



1,788 confirmed cases of Lyme disease were reported in Wisconsin in 2017

1,306 estimated cases

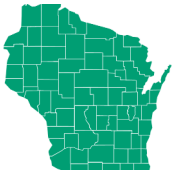
1,205 probable cases

Ages affected

22% of confirmed and probable Lyme disease cases in 2017 were in children and youth less than 20 years old.

Case estimation

In order to account for all cases of Lyme disease in Wisconsin, an estimation algorithm is used to identify additional cases that would be missed by current surveillance methods.



All counties

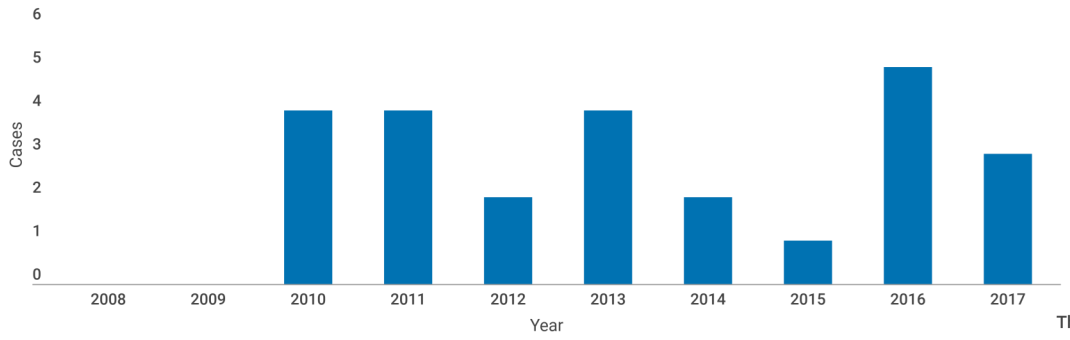
Lyme disease was reported in every county in Wisconsin in 2017.

12.11 | POWASSAN VIRUS INFECTION

Powassan virus (POWV) infection is a rare tick-borne arboviral infection, transmitted by the bite of infected deer or blacklegged tick (*Ixodes scapularis*), the same tick that causes Lyme disease and most other tick-borne diseases in Wisconsin. An arbovirus (arthropod-borne virus) is any virus transmitted by mosquitoes, ticks, or other arthropods. POWV is the only tick-borne arbovirus that occurs in Wisconsin because all other tick-borne diseases are caused by bacteria and parasites. In North America, POWV has been documented in several small- and medium-sized mammal species (rodents, woodchucks, and skunks).

People who are infected with POWV may experience a variety of symptoms, from mild illnesses to life-threatening complications, while some people may not have any symptoms. POWV may be transmitted from a tick in as little as 15 minutes, as compared to 24–36 hours for Lyme disease. Symptoms of illness usually begin 7–14 days (range 7–34 days) after being exposed to an infected tick bite. Signs and symptoms include fever, muscle weakness, confusion, headache, nausea, vomiting, and stiff neck. Severe illness can include confusion, paralysis, speech difficulties, memory loss, and meningoencephalitis (inflammation of the brain and meninges).

Powassan Virus Cases, Wisconsin, 2008-2017



3

cases of Powassan virus were reported in Wisconsin in 2017

This graph includes confirmed and probable cases.

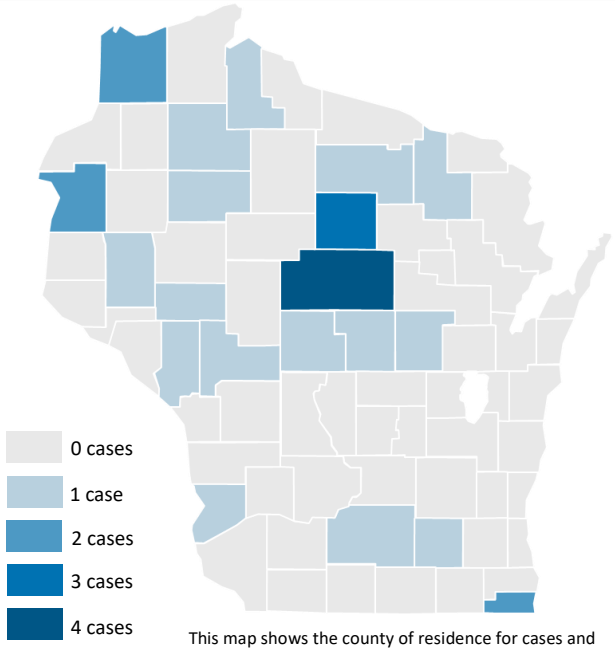
2003

The first case of Powassan virus infection in Wisconsin was identified in 2003.

Total cases

Since 2003, a total of 28 Powassan virus cases have been reported in Wisconsin.

Powassan Virus Cases, Wisconsin, 2003-2017

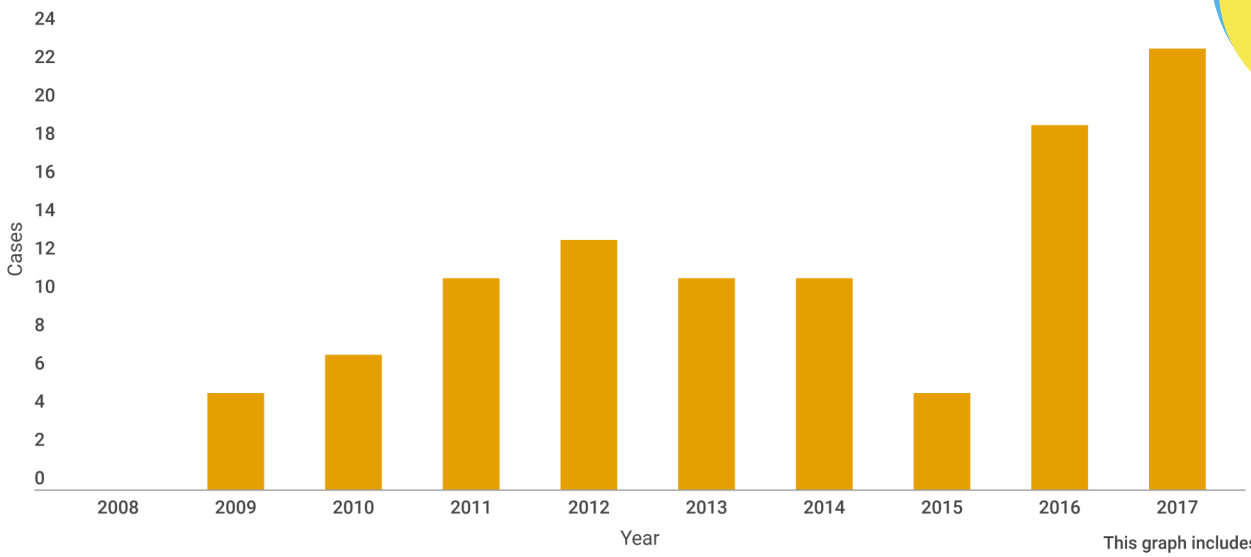


This map shows the county of residence for cases and may not reflect county of exposure.

12.12 | ROCKY MOUNTAIN SPOTTED FEVER

Rocky Mountain Spotted Fever (RMSF) belongs to the spotted fever rickettsial group of tick-borne infections. RMSF disease is caused by the bacterium *Rickettsia rickettsii*, and is transmitted to humans by the bite of an infected American dog tick (*Dermacentor variabilis*) and other tick species. Symptoms begin about one week after an infected tick bite. Symptoms of illness include acute onset of fever, headache, tiredness, muscle pain, nausea, vomiting, and rash. Severe illness may involve neurologic symptoms that can progress rapidly. Clinical laboratory findings may include thrombocytopenia, lymphopenia, leucopenia, and elevated liver enzymes.

Rocky Mountain Spotted Fever Cases, Wisconsin, 2008-2017



23
cases of RMSF were reported in Wisconsin in 2017

This graph includes confirmed and probable cases.

Many cases of Rocky Mountain Spotted Fever in Wisconsin are found when testing for evidence of *R. rickettsii*, but these tests often cross-react with other antibodies from different spotted fever group rickettsioses. Therefore, it is possible that some cases that are reported as RMSF are actually caused by a different type of spotted fever group bacterium.

Location

RMSF is rare in Wisconsin. Most cases in the U.S. are acquired in the southeastern states.

Travel

In 2017, of the 23 cases reported in Wisconsin, 14 had traveled out of state in the 30 days before they became sick.

Antibiotics

Serious complications and death can occur if antibiotic treatment is not started quickly.

13.0 | VIRAL HEPATITIS

Hepatitis is inflammation of the liver. Hepatitis viruses are the most common cause of hepatitis, but other infections, toxic substances (for example, alcohol, certain drugs), and autoimmune diseases can also cause hepatitis. There are five main hepatitis viruses: A, B, C, D, and E. These five types are of greatest concern because of the high number of illnesses and deaths they cause, and the potential for outbreaks. The types of viral hepatitis included in this report are: Hepatitis A, Hepatitis B, Hepatitis C, and Hepatitis E.

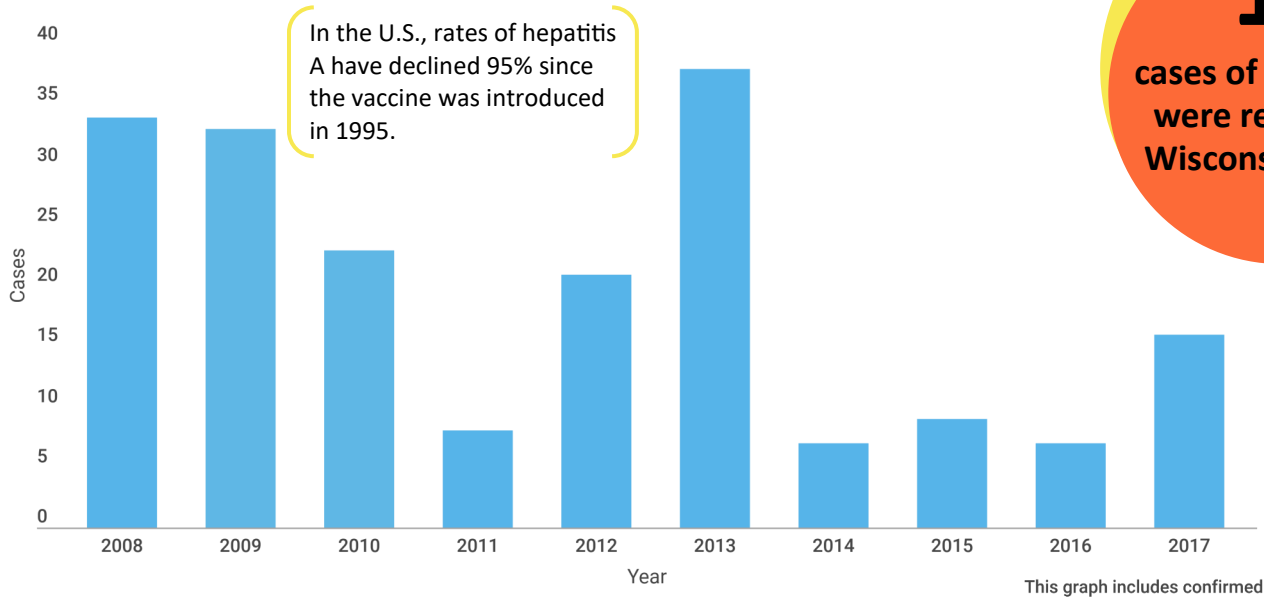
	Hepatitis A	Hepatitis B	Hepatitis C	Hepatitis E
How is it spread?	■ Consuming contaminated food or water ■ Exposure to stool ■ Injection drug use ■ Sexual contact	■ Exposure to infected blood ■ From mother to child during birth ■ Injection drug use ■ Sexual contact	■ Exposure to infected blood ■ From mother to child during birth ■ Injection drug use ■ Sexual contact	■ Consuming contaminated food or water ■ Exposure to stool ■ From mother to child during birth
Can it be passed from mother to baby?	YES	YES	YES	YES
Is a vaccine available?	YES	YES	NO	NO

13.1 | HEPATITIS A

Hepatitis A (formerly known as infectious hepatitis) is a liver disease caused by the hepatitis A virus. Wisconsin has averaged 16 cases annually over the past five years. Hepatitis A is still very common in developing countries. Unlike hepatitis B and hepatitis C, hepatitis A does not result in a chronic infection, and is not associated with liver cancer.

The hepatitis A virus enters through the mouth, multiplies in the body, and is passed in the stool, which becomes highly infectious. If careful handwashing with soap is not done, the virus can then be carried on an infected person's hands. From there, the virus can be spread to others by direct contact or by consuming food or drink that has been handled by that infected individual. In some cases, it can be spread by consuming water contaminated with sewage. Because the virus is passed in the stool, children with hepatitis A who are not toilet trained can be an important source of the infection. Hepatitis A can be prevented by vaccination against the disease.

Hepatitis A Cases, Wisconsin, 2008-2017



16
cases of hepatitis A were reported in Wisconsin in 2017

This graph includes confirmed and probable cases.

RISK FACTORS:

Contaminated food or water
including undercooked food and unsanitary conditions.

Direct contact
with a person who has hepatitis A, especially through fecal-oral route.

Travel
to countries where hepatitis A is common if the traveler is not vaccinated.

Sexual contact
especially between men who have sex with men (MSM).

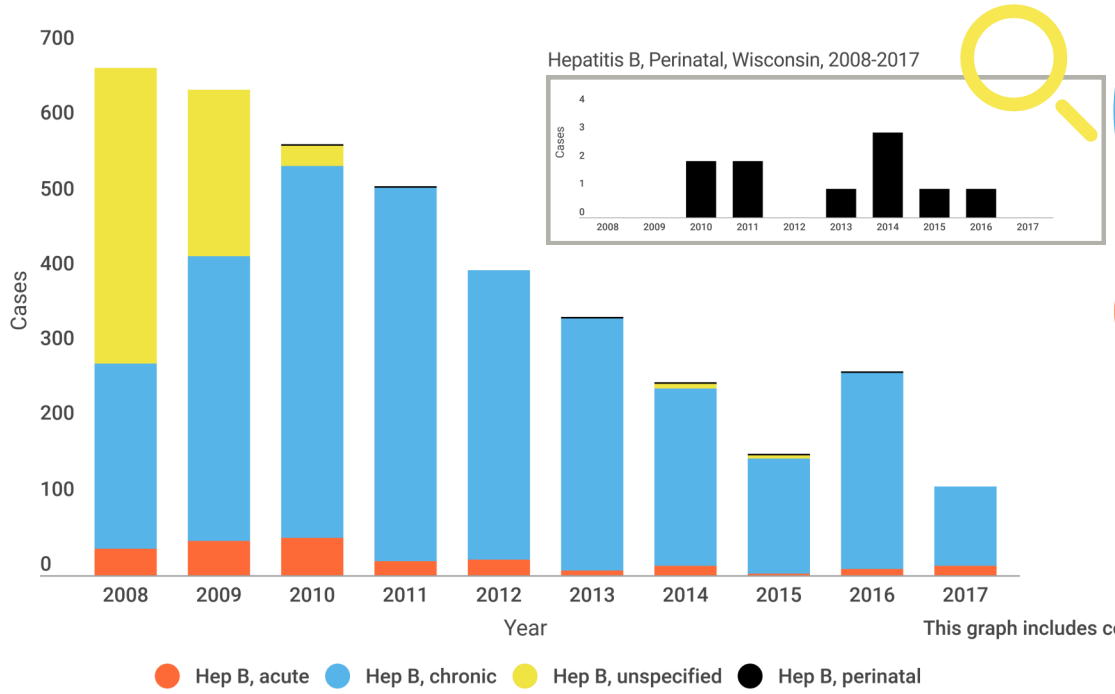
Household members
and other close contacts with people who have hepatitis A.

Drug use
including injection and non-injection drugs.

13.2 | HEPATITIS B

Hepatitis B is a viral illness that can be acute or chronic and is generally spread through sexual contact with an infected person or by sharing needles, syringes, or other drug-injection equipment. Hepatitis B can also be passed from an infected mother to her baby at birth. For some people, hepatitis B is an acute, or short-term, illness but for others, it can become a long-term, chronic infection. Risk for chronic infection is related to age at infection: approximately 90% of infected infants become chronically infected, compared with 2%–6% of adults. Chronic hepatitis B can lead to serious health issues, like cirrhosis or liver cancer. **The best way to prevent hepatitis B is by getting vaccinated.**

Hepatitis B, Wisconsin, 2008-2017



This graph includes confirmed and probable cases.

105 chronic cases of hepatitis B were reported in Wisconsin in 2017

13 acute cases

0 perinatal cases

Testing pregnant women

Every pregnant woman should be tested for hepatitis B surface antigen (HBsAg) during each pregnancy.

HBsAg negative women

A birth dose of hepatitis B vaccine should be administered to infants born to HBsAg-negative women within 24 hours of birth.

HBsAg positive women

A dose of hepatitis B vaccine and hepatitis B immunoglobulin (HBIG) should be administered within 12 hours of birth to each infant born to a hepatitis B- infected (HBsAg-positive) woman.

Post-vaccination serologic testing

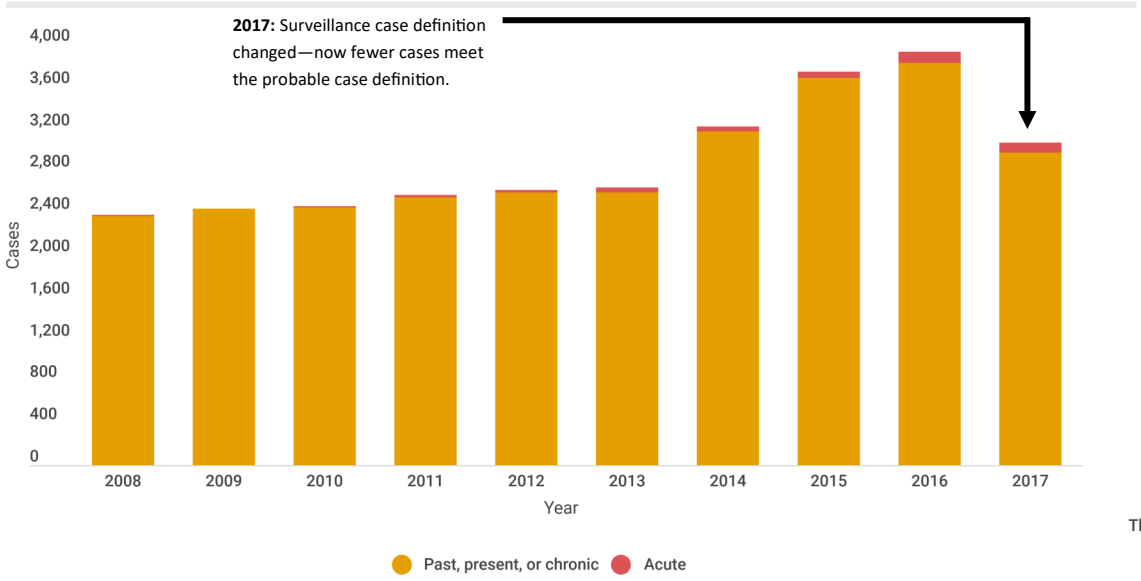
Post-vaccination serologic testing should be completed among infants born to hepatitis B-infected women 1–2 months following hepatitis B vaccine series completion, generally at age 9–12 months.

13.3 | HEPATITIS C

Hepatitis C is a contagious liver disease caused by the hepatitis C virus (HCV). Approximately 20% of persons newly infected with HCV develop symptoms of fatigue, abdominal pain, poor appetite, or jaundice. However, most persons with HCV infection do not have symptoms, and chronic liver disease progresses slowly for several decades. HCV is a leading cause of liver cancer, a leading reason for liver transplantation, and a leading infectious cause of death in the U.S. Because most persons with HCV do not have symptoms, many people with HCV do not know that they are infected.

HCV is spread primarily by exposure to human blood from an infected person. Today, HCV is most often transmitted through injection drug use with shared, unsterilized equipment. Nationwide and in Wisconsin, HCV infections among younger adults have increased dramatically as a result of increased injection drug use related to the opioid crisis. Less commonly, HCV can also be spread through sexual contact or from mother to infant around the time of birth (perinatal transmission). Before 1992, when widespread screening of the blood supply began in the U.S., HCV was also commonly spread through blood transfusions and organ transplants. It is thought that during this time, many people in the baby-boom generation (people born during 1945-1965) acquired HCV. Since 2012, CDC has recommended all baby boomers receive one-time screening for HCV to identify persons who were not yet aware of their diagnosis. Each year many baby boomers continue to be diagnosed with HCV.

Hepatitis C Cases, Wisconsin, 2008-2017

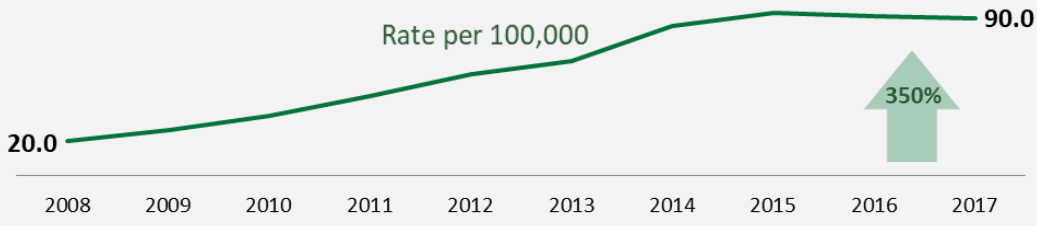


3,067 cases of hepatitis C were reported in Wisconsin in 2017

This graph includes confirmed and probable cases.

During the last 10 years, the rate of new positive hepatitis C test results among people age 15-29 increased 350%.

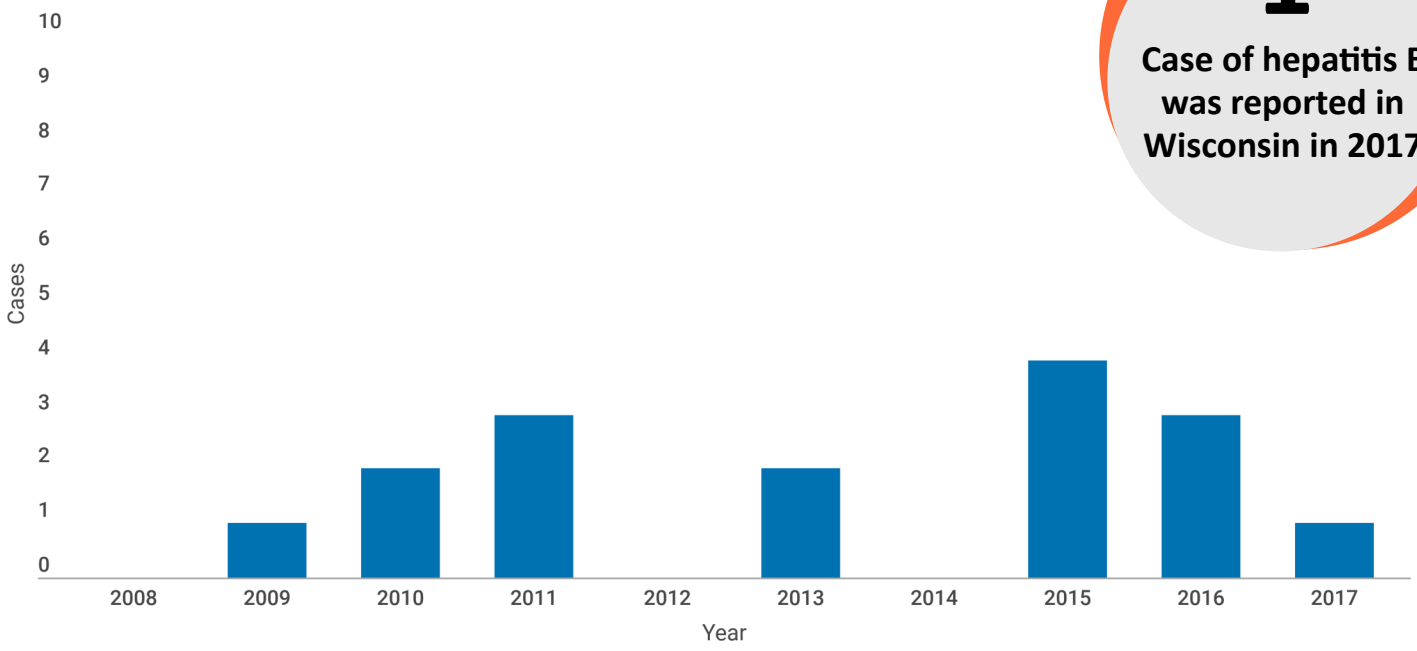
Rate per 100,000 of people newly reported with positive hepatitis C test results among persons age 15-29, Wisconsin 2008-2017



13.4 | HEPATITIS E

Hepatitis E is a serious liver disease caused by the hepatitis E virus that usually results in an acute infection. It does not lead to a chronic infection. While rare in the U.S., hepatitis E is common in many parts of the world. It is transmitted by ingesting feces (poop), even in microscopic amounts. Outbreaks are usually associated with contaminated water supplies in countries with poor sanitation. There is currently no FDA-approved laboratory test or vaccine for Hepatitis E.

Hepatitis E Cases, Wisconsin, 2008-2017



1

Case of hepatitis E was reported in Wisconsin in 2017

Traveling precautions

Travelers should not drink unpurified water or eat raw or undercooked meat.

Living conditions

People in refugee camps or living in overcrowded conditions after natural disasters can be at particularly high risk for hepatitis E.

Serious complications

Hepatitis E can seriously affect pregnant women and those who are immune compromised.

14.0 | ZOONOTIC DISEASES

Zoonotic diseases are those that are spread between animals and humans. They can be caused by bacteria, parasites, viruses, and fungi. People who have close contact with animals are more likely to get a zoonotic disease. Factors contributing to an increase in zoonotic diseases include an increased amount of contact between humans and wildlife, an increase in international travel, and the number of people living with immune compromising conditions. It is necessary to take a One Health approach when dealing with zoonotic diseases. This approach emphasizes that the health of humans is related to the health of animals and the environment. The zoonotic diseases included in this report are: brucellosis, hantavirus, lymphocytic choriomeningitis virus infection (LCMV), leptospirosis, Q fever, toxoplasmosis, and tularemia. Enteric zoonotic diseases can be found in the Enterics section of this report.

More than **6 out of every 10** known infectious diseases in people are spread from animals and **3 out of every 4** new or emerging infectious diseases in people are spread from animals. **The following factors contribute to this issue:**

Increased international travel

Zoonotic diseases have been on the rise in recent decades due to **increasing international travel, trade, and movement of animals**. This allows zoonotic diseases, which occur anywhere, to spread quickly around the globe.

Deforestation

As deforestation occurs, humans and domesticated animals have increased contact with wildlife hosts of zoonotic pathogens.

Urbanization

Urbanization destroys the natural habitat of some animals that are hosts to zoonotic diseases. As humans encroach on their environment, the animals are forced to move into urban environments, coming into contact with humans on more frequent basis.

Density dependent diseases

The spread of many zoonotic diseases is enhanced when the potential animal and human hosts of a pathogen, and the insect vectors that transmit the agent, are densely concentrated in a given area. This often occurs due to overcrowding in regions affected by poverty.

Immune compromising conditions

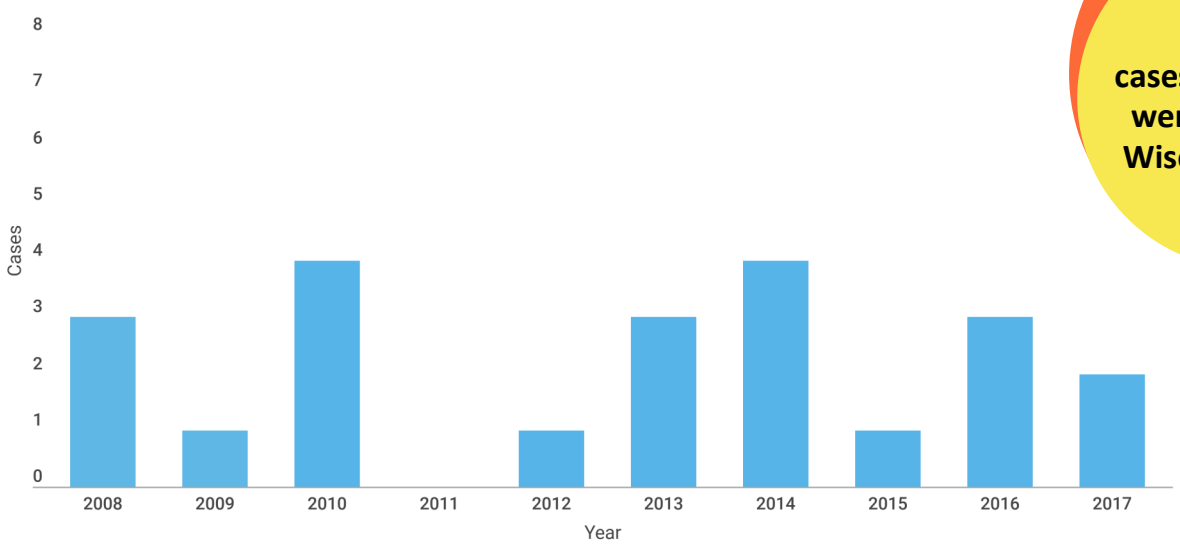
Individuals who are immunocompromised are at higher risk of getting sick from a zoonotic disease and transmitting it to others. Due to medical advances, more people are living with immune-compromising conditions than ever before.

14.1 | BRUCELLOSIS

Brucellosis is a bacterial disease that may affect various organs of the body, producing a wide variety of signs and symptoms, such as intermittent fever of variable duration, headache, weakness, swollen lymph nodes, profuse sweating, chills, weight loss, and generalized aching. Brucellosis can also cause infection and inflammation of the bones, testicles, and the lining of the heart.

The disease is generally transmitted from infected animals (cattle, goats, pigs, and dogs) to humans and occurs more commonly outside the U.S. and Canada. Wisconsin averages only 1–2 cases per year. Although everyone is susceptible and may get the disease if exposed to the *Brucella* bacteria, brucellosis occurs most commonly in people who work with livestock or in slaughterhouses, especially outside the U.S., or who consume unpasteurized dairy products. The consumption of raw milk cheese from Mexico is a well-recognized risk factor. Occasionally, persons who work in bacteriology laboratories or those who hunt and butcher wild pigs can get exposed to the bacteria.

Brucellosis Cases, Wisconsin, 2008-2017



2

cases of brucellosis were reported in Wisconsin in 2017

This graph includes confirmed cases.

RISK FACTORS

Unpasteurized dairy products

consumed through eating or drinking.

Animal exposures

to those animals that can transmit brucellosis, such as wild pigs, goats, cattle, dogs, elk, deer, bison, caribou, and moose.

Occupations

such as being a slaughterhouse worker, meat-packing employee, veterinarian, or laboratory worker.

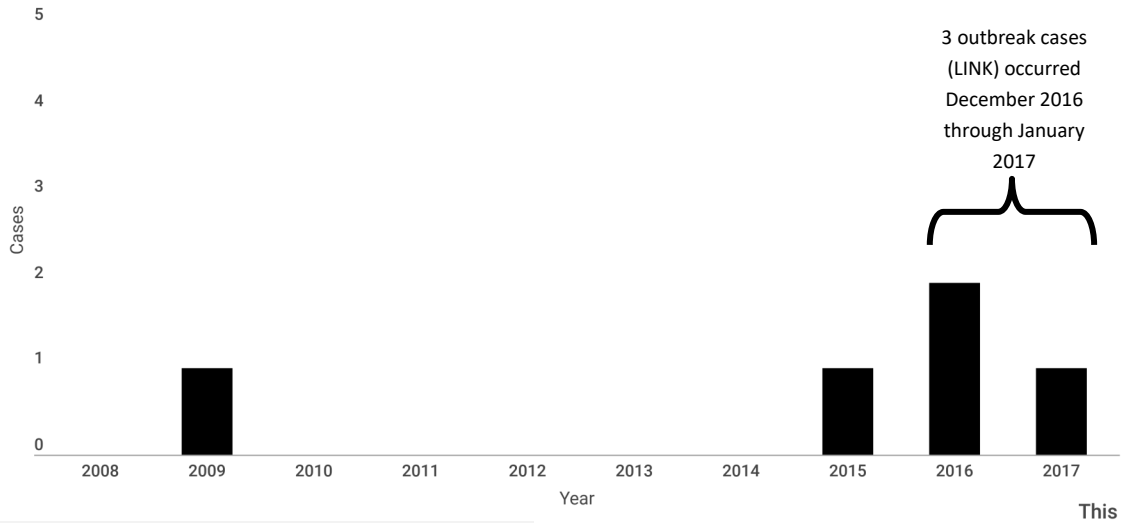
Travel to certain countries

and having contact with infected animals or contaminated food.

14.2 | HANTAVIRUS

Hantaviruses are a family of related viruses found worldwide, usually carried by rodents. There are two types of hantaviruses: New World and Old World. New World hantaviruses are usually found in the Americas and can cause hantavirus pulmonary syndrome (HPS) in humans. Most cases of hantavirus infection in the U.S. are caused by a New World hantavirus and occur in people who live or travel to the Western U.S. The case fatality rate of HPS is 38%. Old World hantaviruses are usually found in Europe and Asia and can cause hemorrhagic fever with renal syndrome (HFRS) in humans. There are multiple viruses that can cause HFRS. The case fatality rate among infected people can range from 1-15% depending on which virus is causing the disease. While less commonly seen, Old World hantaviruses do cause illnesses in the U.S. Notably a multistate outbreak of Seoul virus was investigated in 2017 (LINK to outbreak page in PDF) and was linked to contact with pet rats. This outbreak was initially detected in Wisconsin. Anyone can get hantaviruses, but people who have contact with rodents or rodent-infested areas are at highest risk of getting sick.

Hantavirus Cases, Wisconsin, 2008-2017



1
case of hantavirus was reported in Wisconsin in 2017

This graph includes confirmed cases.

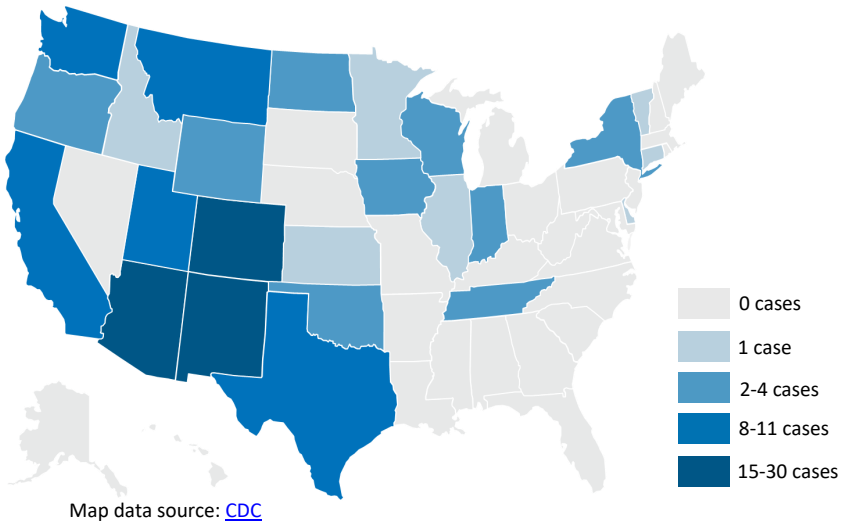
Geography

96% of hantavirus cases reported in the U.S. were in states west of the Mississippi River.

Prevention

Rodent control in your home and avoiding extended contact with rodents, their nests, or droppings are key to preventing hantavirus infections.

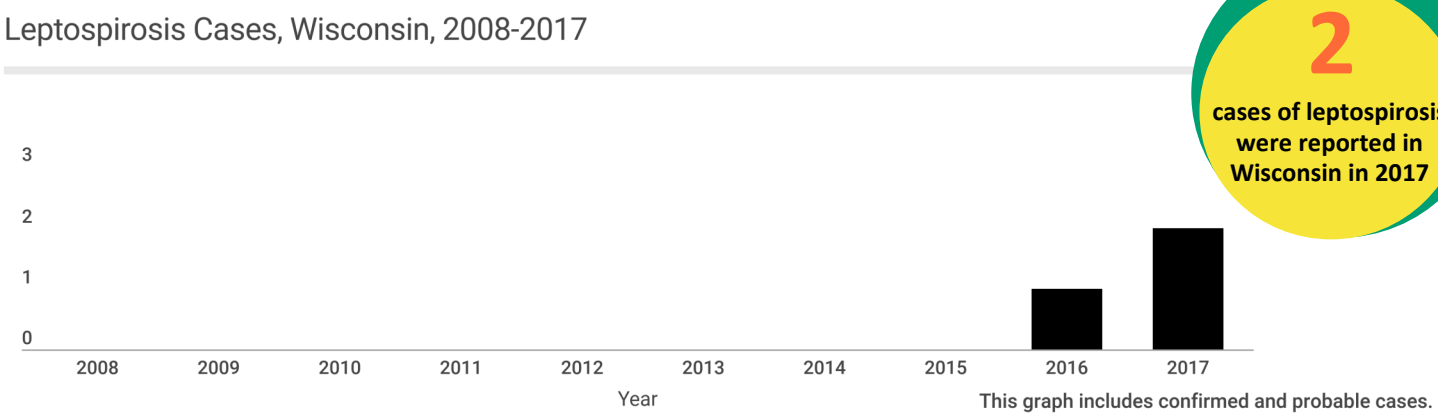
National Hantavirus Cases, 2013-2017



Map data source: CDC

14.3 | LEPTOSPIROSIS

Leptospirosis is a zoonotic disease with worldwide distribution, but human cases are rare in Wisconsin. It is caused by several strains of bacteria called *Leptospira*. *Leptospira* are harbored in various animal species, especially rodents. Rodents excrete the bacteria in their urine, which can contaminate surface water, moist soil, and vegetation. Illness can range from mild to severe. The illness is often characterized by the abrupt onset of fever, chills, myalgias, and headache and may include conjunctivitis, abdominal pain, vomiting, diarrhea, and skin rashes. Less frequently, it can result in meningitis, liver and kidney dysfunction, pulmonary involvement, and mental confusion. Severe cases occur more commonly in older persons and can result in death.



2
cases of leptospirosis were reported in Wisconsin in 2017

RISK FACTORS

Flooding

after natural disasters can cause an increase in cases of leptospirosis.

Occupations

such as people who work on a farm, in a slaughterhouse, or with animals or fish; people who work in a mine or a sewer; or military personnel.

Contact with urine

from infected animals, especially rodents. Also contact with water, soil, or food that is contaminated with the urine of infected animals.

Water-related activities

such as mud runs, swimming, wading, kayaking, and rafting in contaminated lakes and rivers, as well as ingesting untreated surface water.

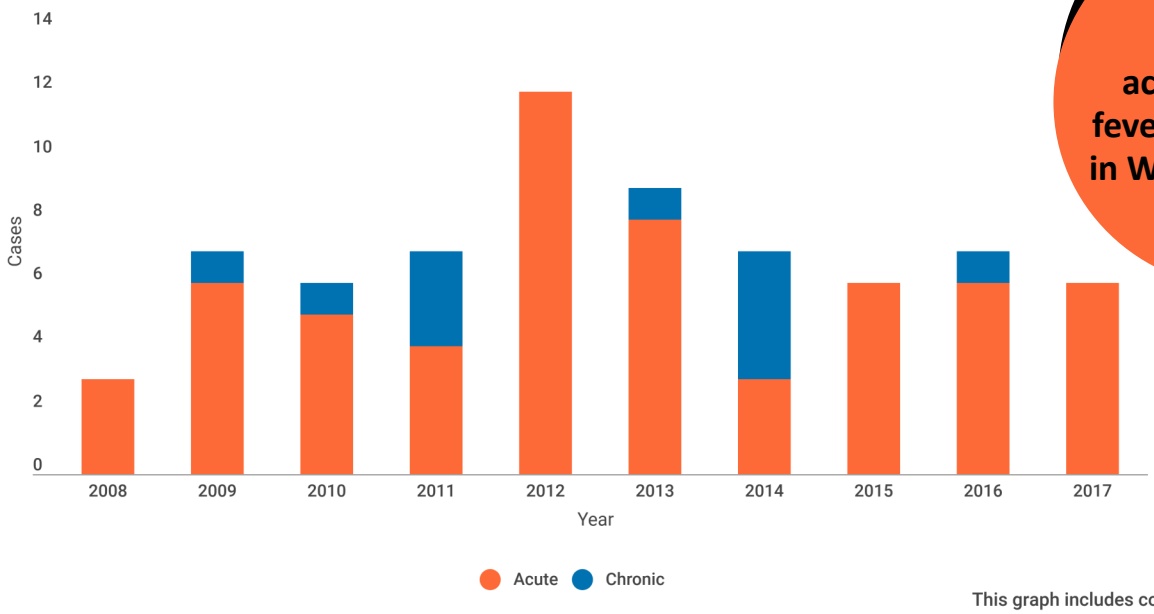
HOW CAN YOU PREVENT LEPTOSPIROSIS?

- Do not swim or wade in water that might be heavily contaminated with animal waste (e.g., floodwaters or murky lake water after a heavy rain).
- Wear protective clothing or footwear if you are exposed to water or soil that might contain animal urine.
- Eliminate rodent infestations around your home.

14.4 | Q FEVER

Q fever is a worldwide zoonotic disease caused by the bacterium *Coxiella burnetii*. Although a variety of animals may be infected, cattle, sheep, and goats are the primary reservoirs for *C. burnetii*. Infected animals can shed the organism in birthing fluids, placenta, milk, urine, and feces. *Coxiella* is extremely hardy and resistant to heat, drying, and many common disinfectants, which allows it to survive for long periods in a contaminated environment, such as a maternity pen, stall, or barnyard. Infection of humans usually occurs when a person breathes in *C. burnetii* from air that contains barnyard dust with dried placental material, birth fluids, and excreta of infected animals. The majority of infected humans exhibit no symptoms or may have mild flu-like symptoms such as fever, cough, headaches, and muscle pain. Pregnant women can also experience pre-term delivery or miscarriage. Q fever is treatable with antibiotics and cannot usually be spread person-to-person. A small percentage of individuals develop persistent infections that can cause cardiovascular diseases.

Q Fever Cases, Wisconsin, 2008-2017



6

acute cases of Q fever were reported in Wisconsin in 2017

This graph includes confirmed and probable cases.

RISK FACTORS

Contact with animals

especially cattle, sheep, and goats. Infected animals can shed the organism in birthing fluids, placenta, milk, urine, and feces.

Pre-existing conditions

such as heart disease, having a weakened immune system, or being pregnant.

Occupations

that involve working on a farm or with animals, such as farmers or veterinarians.

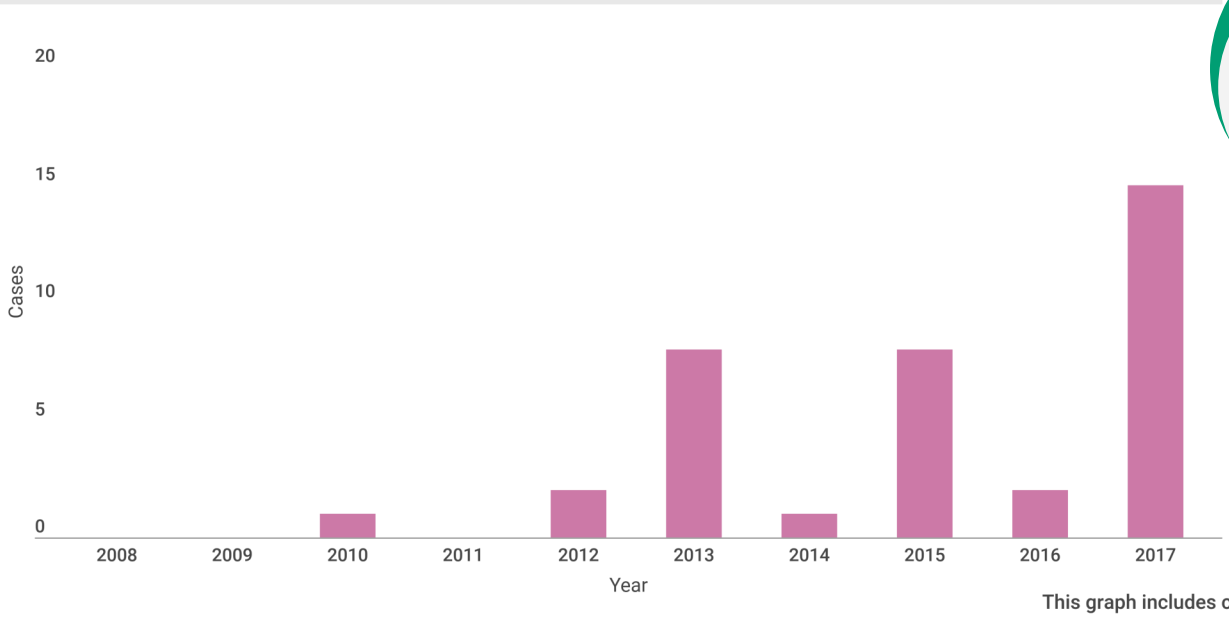
Men

are 2.5 times more likely than women to have Q fever symptoms when they are infected.

14.5 | TOXOPLASMOSIS

Toxoplasmosis is a disease caused by a single-celled parasite called *Toxoplasma gondii*. People can become infected by eating raw or undercooked infected meat—especially pork, lamb, or venison—or raw milk that contains the parasite. Another common route of infection is by the ingestion of food, water, or dirt that contains cat feces. The parasite is shed in feces from infected cats, takes 1–5 days to become infective, and may remain infective for months to years. Toxoplasmosis may cause flu-like symptoms such as fever, headache, fatigue, swollen lymph nodes, and body aches in some people, but most people never develop signs and symptoms. Toxoplasmosis can also be acquired through a transplacental infection, when an infected mother passes the infection to her fetus, potentially causing birth defects.

Toxoplasmosis Cases, Wisconsin, 2008-2017



15
cases of toxoplasmosis were reported in Wisconsin in 2017

This graph includes confirmed and probable cases.

REDUCING THE RISK OF TOXOPLASMOSIS

From food:

- Cook food to safe temperatures. Use a meat thermometer to test the internal temperature.
- Do not sample the meat until it is fully cooked.
- Freeze meat for several days at sub-zero (0)˚F temperatures before cooking.
- Peel or wash fruits before eating.
- Wash cooking utensils, countertops, and cutting boards after contact with raw meat or unwashed fruits or vegetables.

From the environment:

- Change the litter box daily if you own a cat. **Do not change the litter box if you are pregnant or immunocompromised.**
- Do not drink untreated drinking water.
- Wear gloves when gardening.
- Keep outdoor sandboxes covered to prevent animals from using it as a litter box.

15.0 | OTHER DISEASES

Two reportable diseases with cases in 2017 did not fit into the other categories in this report. These diseases are: Kawasaki disease and transmissible spongiform encephalopathy (TSE). Reportable conditions that did not have any cases in 2017 are not included in this report.

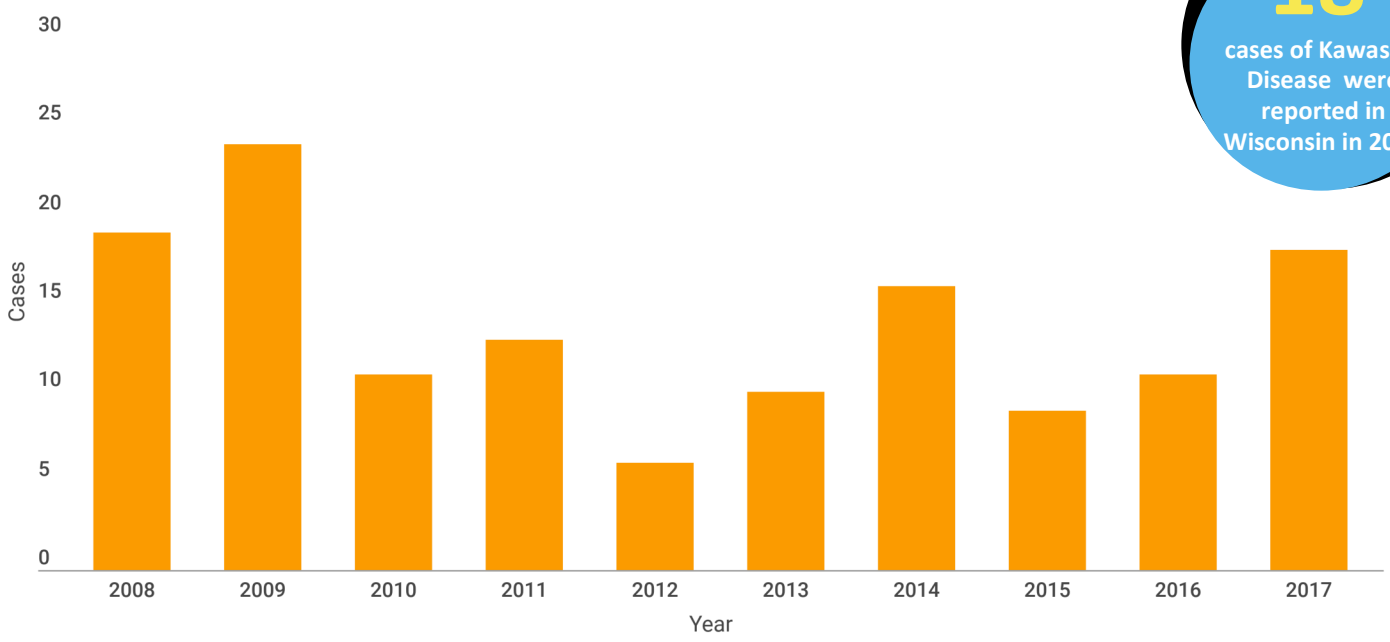
Reportable infectious diseases with zero cases reported in 2017

Category 1 *(must be reported immediately)*	**Category 2** *(must be reported within 72 hours)*
Anthrax	Leprosy (Hansen's Disease)
Botulism	Psittacosis
Cholera	Trichinosis
Diphtheria	Tularemia
Measles	Lymphocytic Choriomeningitis Infection
Plague	
Poliovirus infection	
Rabies (human)	
Rubella	
Severe Acute Respiratory Syndrome-associated Coronavirus (SARS-CoV) infection	
Smallpox	
Vancomycin-resistant *Staphylococcus aureus* (VRSA) infection	
Yellow Fever	

15.1 | KAWASAKI DISEASE

Kawasaki disease (KD), also known as Kawasaki syndrome, is a fever-causing illness, mainly in infants and children younger than 5 years of age. It has no known cause and is not thought to be spread from person-to-person. All cases of KD have a fever that lasts more than five days. Other symptoms are a rash, swollen lymph nodes, swelling of hands and feet, and red eyes, lips, throat, and tongue. The rash is usually only on the patient's torso. Sometimes the skin on the hands and fingers can peel after the rash. A serious complication of KD can be coronary artery aneurysms and dilatations (ballooning out of the vessels in the heart), which can lead to heart disease. Antibiotics do not work against KD. There are no known measures that can be taken to prevent KD.

Kawasaki Disease Cases, Wisconsin, 2008-2017



18 cases of Kawasaki Disease were reported in Wisconsin in 2017

This graph includes confirmed and probable cases.

Ages affected

Over the past 10 years, 98% of KD cases reported in Wisconsin have been in children under 15 years old.

KD in Japan

While KD is found worldwide, the highest number of cases occur in Japan.

Heart disease

In the U.S., KD is a leading cause of acquired heart disease in children.

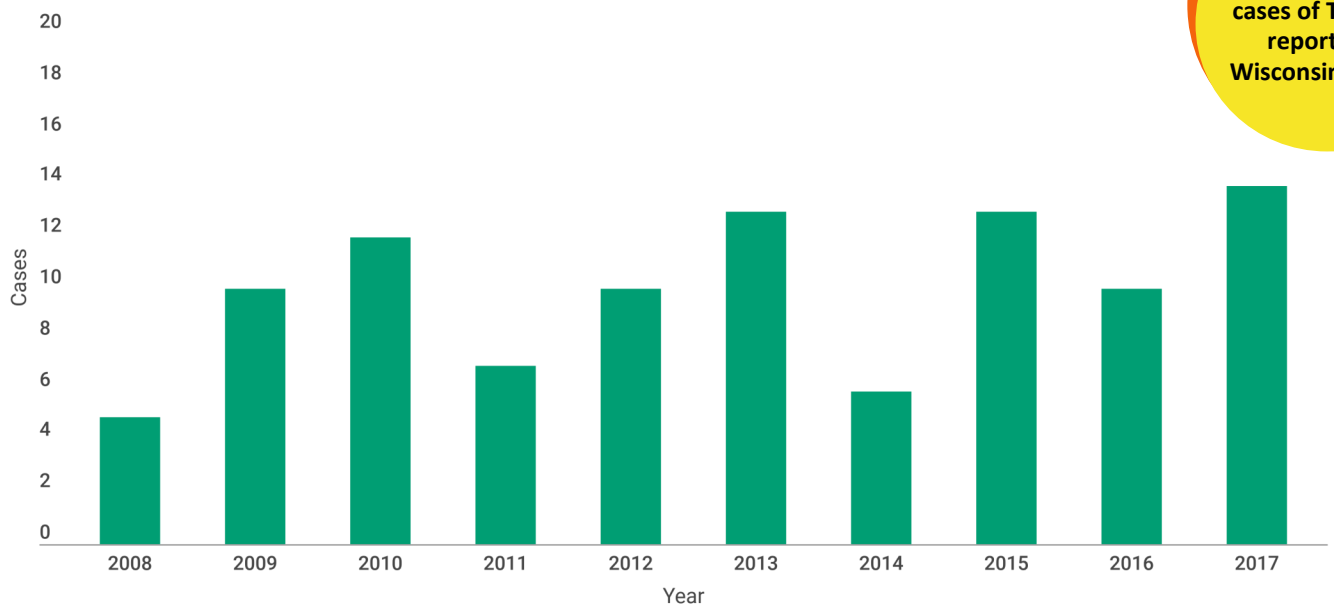
15.2 | TRANSMISSIBLE SPONGIFORM ENCEPHALOPATHY (HUMAN)

Transmissible spongiform encephalopathies (TSE), also called prion diseases, are a group of progressive, degenerative conditions that affect the brain and nervous system. Creutzfeldt-Jacob Disease (CJD) is the most common type of TSE in people. It is a rare, incurable disease of humans that affects the nervous system and results in rapidly progressive dementia, loss of motor control, and death. CJD can only be definitively diagnosed by brain autopsy or biopsy.

Various animal species have distinct types of TSEs. In addition to CJD, which affects humans, other TSEs include bovine spongiform encephalopathy (BSE, also known as "mad cow disease"), scrapie in sheep, and chronic wasting disease (CWD) in deer and elk. CJD is caused by an agent, called a prion, which is a self-replicating protein. The current theory is that the normal form of the prion, found in all people, is converted into an abnormal form that causes cell death and the resulting brain lesions.

TSE Cases, Wisconsin, 2008-2017

14
cases of TSE were reported in Wisconsin in 2017



This graph shows confirmed cases of TSE, including cases of familial CJD.

>50 years of age

In 2017, all cases of TSE were among people over 50 years of age.

Incidence

CJD is the most common type of TSE in humans. There are 1–2 cases reported each year per 1 million people.

Fatalities

CJD is always fatal. 85%-90% of people with CJD will die within one year of when their illness began.

Wisconsin Department of Health Services
Bureau of Communicable Diseases
Communicable Diseases Epidemiology Section
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Madison, Wisconsin 53703