

# WISCONSIN COMMUNICABLE DISEASES REPORT 2016



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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.



# CONTENTS

<b>1.0 Introduction</b>	<b>1</b>
<b>2.0 Disease Reporting</b>	<b>2</b>
<b>3.0 Wisconsin Electronic Disease Surveillance System (WEDSS)</b>	<b>3</b>
<b>4.0 Disease Surveillance Chart</b>	<b>5</b>
<b>5.0 Notable Outbreaks</b>	<b>7</b>
5.1 <i>Elizabethkingia</i>	8
5.2 Meningococcal Disease Serogroup B	9
5.3 <i>Salmonella</i> Heidelberg	10
5.4 Zika virus	11
<b>6.0 Enteric/Gastrointestinal Diseases</b>	<b>12</b>
6.1 Enteric Disease Outbreaks	13
6.2 Norovirus Outbreaks	14
6.3 Campylobacteriosis	15
6.4 Cryptosporidiosis	16
6.5 Cyclosporiasis	17
6.6 Diarrheagenic <i>E. coli</i>	18
6.7 Shiga toxin-producing <i>E. coli</i>	19
6.8 Hemolytic Uremic Syndrome (HUS)	20
6.9 Giardiasis	21
6.10 Listeriosis	22
6.11 Salmonellosis	23
6.12 Shigellosis	24
6.13 Typhoid fever	25
6.14 Vibriosis (Non-Cholera)	26
6.15 Yersiniosis	27
<b>7.0 Invasive Bacterial Diseases</b>	<b>28</b>
7.1 Group A Streptococcal Disease	29
7.2 Group B Streptococcal Disease	30
<b>8.0 Mycotic/Fungal Diseases</b>	<b>31</b>
8.1 Blastomycosis	32
8.2 Coccidioidomycosis	33
8.3 Histoplasmosis	34
<b>9.0 Respiratory Diseases</b>	<b>35</b>
9.1 Influenza-Associated Hospitalizations	36

# CONTENTS

9.2 Legionellosis .....	37
9.3 Tuberculosis .....	38
<b>10.0 Sexually Transmitted Diseases (STDs).....</b>	<b>39</b>
10.1 Chlamydia.....	40
10.2 Gonorrhea .....	41
10.3 HIV .....	42
10.4 Sexually Transmitted Pelvic Inflammatory Disease.....	43
10.5 Syphilis.....	44
<b>11.0 Vaccine Preventable Diseases .....</b>	<b>45</b>
11.1 <i>Haemophilus influenzae</i> Invasive Disease .....	46
11.2 Meningococcal Disease .....	47
11.3 Mumps .....	48
11.4 <i>Streptococcus pneumoniae</i> Invasive Disease .....	49
11.5 Pertussis (Whooping Cough).....	50
11.6 Varicella (Chickenpox).....	51
<b>12.0 Vectorborne Diseases .....</b>	<b>52</b>
<b>Mosquito-borne</b>	
12.1 California Serogroup Viruses.....	53
12.2 Malaria .....	54
12.3 West Nile Virus Infection.....	55
12.4 Zika Virus .....	56
<b>Tickborne</b>	
12.5 Anaplasmosis and Ehrlichiosis.....	57
12.6 Babesiosis.....	58
12.7 Lyme Disease.....	59
12.8 Powassan Virus Infection .....	60
12.9 Rocky Mountain Spotted Fever .....	61
<b>13.0 Viral Hepatitis.....</b>	<b>62</b>
13.1 Hepatitis A.....	63
13.2 Hepatitis B .....	64
13.3 Hepatitis C .....	65
13.4 Hepatitis E .....	66
<b>14.0 Zoonotic Diseases .....</b>	<b>67</b>
14.1 Brucellosis .....	68

# CONTENTS

14.2 Lymphocytic Choriomeningitis Infection.....	69
14.3 Leptospirosis .....	70
14.4 Q Fever .....	71
14.5 Toxoplasmosis .....	72
14.6 Tularemia .....	73
<b>15.0 Other Diseases.....</b>	<b>74</b>
15.1 Kawasaki Disease.....	75
15.2 Transmissible Spongiform Encephalopathy (Human) .....	76

# I.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 70 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, provides 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 2016 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, 2016–December 31, 2016.**

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. Conditions are only included in this report if **one or more cases were reported during 2016**. Information on conditions not included in this report can be found on the [DHS website](#).



Reportable conditions are included in this report if **one or more cases were reported during 2016.**



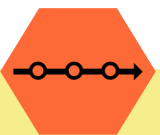
# 2.0 | DISEASE REPORTING

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.

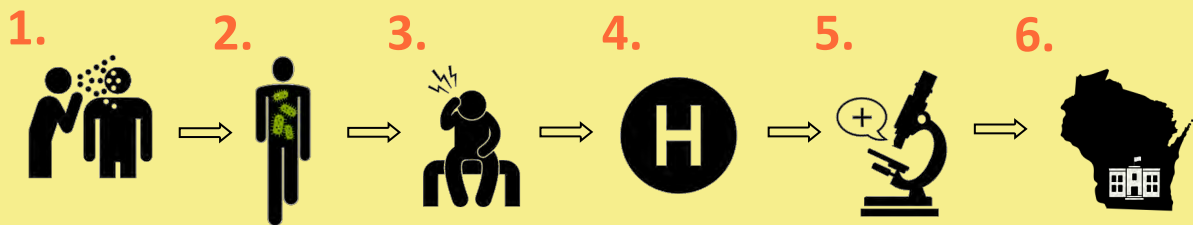


## WHAT IS THE PURPOSE OF DISEASE REPORTING FOR SURVEILLANCE?

- 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. Symptoms develop in ill individuals (most of the time, but not always).
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.

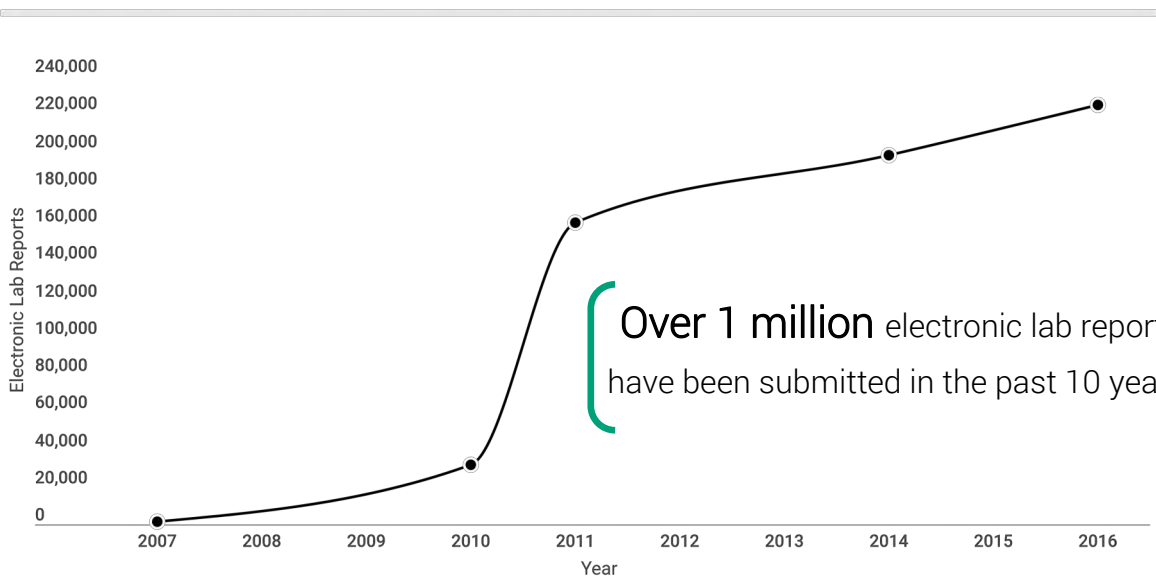
- **Lack of representativeness.** Wisconsin residents without access to health care or without insurance may be unable to visit a physician for a diagnosis, even if symptoms are severe. Populations likely to be underrepresented include (but are not limited to) migrant populations, persons experiencing 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

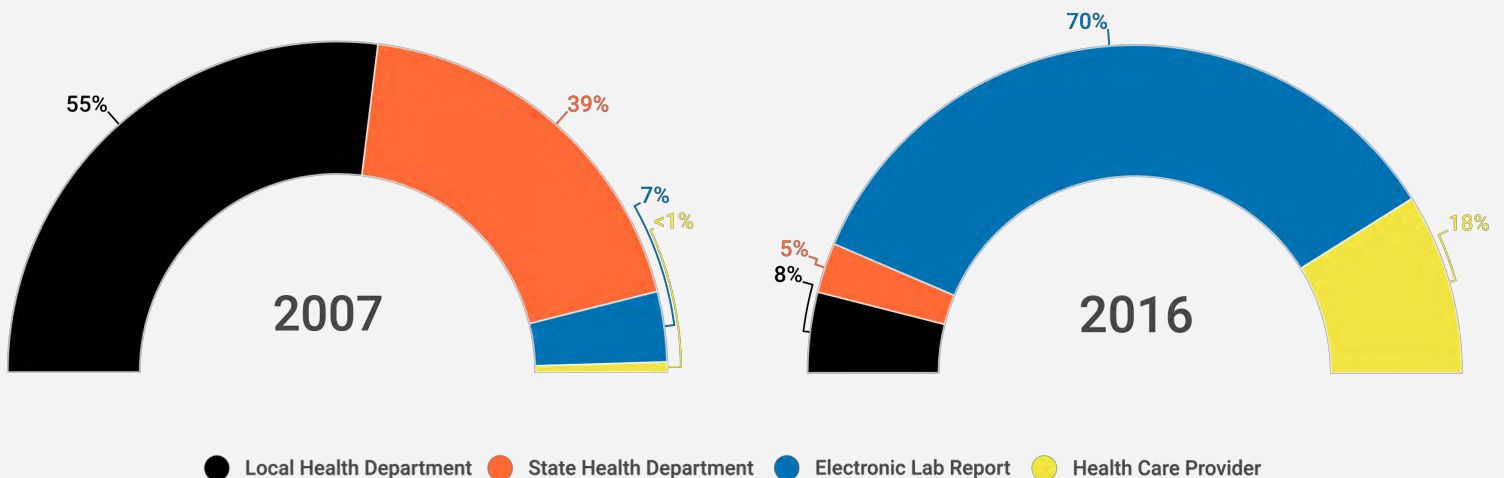
[WEDSS](#) is a secure, web-based system that facilitates reporting, investigation, surveillance, and notification of communicable diseases for the state. WEDSS is designed for use by public health staff, infection control practitioners, clinical laboratories, clinics, and other disease reporters. WEDSS 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, 2007-2016



Over 1 million electronic lab reports have been submitted in the past 10 years.

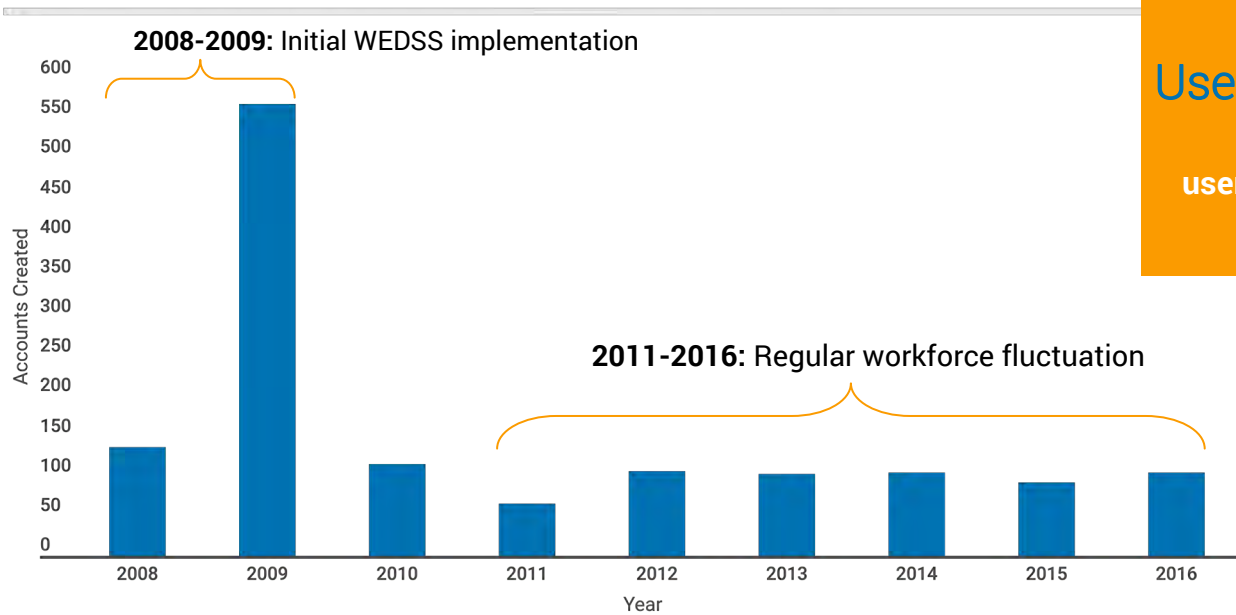
Who is Reporting into WEDSS: *Then and Now*



# 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, 2007-2016



**User accounts**   
More than 1,400 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 the 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](mailto: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 2016 Census Wisconsin population estimates (2016 U.S. Census Bureau, Population estimates, July 1, 2016 [V2016]). Retrieved from [www.census.gov/quickfacts/WI](http://www.census.gov/quickfacts/WI).

Disease	2016 Cases	Incidence per 100,000 Population
<b>Enteric/Gastrointestinal Diseases</b>		
<b>Bacterial</b>		
Campylobacteriosis	1,731	29.95
Enteropathogenic <i>E. coli</i> (EPEC)	401	6.94
Enterotoxigenic <i>E. coli</i> (ETEC)	60	1.04
Shiga toxin-producing <i>E. coli</i> (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
<b>Parasitic</b>		
Cryptosporidiosis	880	15.23
Cyclosporiasis	5	0.09
Giardiasis	824	14.26
<b>Other</b>		
Hemolytic Uremic Syndrome (HUS)	7	0.12
<b>Invasive Bacterial Diseases</b>		
Group A Streptococcal Disease	207	3.58
Group B Streptococcal Disease	545	9.43
<b>Mycotic/Fungal Diseases</b>		
Blastomycosis	123	2.13
Coccidioidomycosis	15	0.26
Histoplasmosis	16	0.28
<b>Respiratory Diseases</b>		
Influenza-Associated Hospitalizations (2016-2017 Influenza Season)	3,951	68.37
Legionellosis	116	2.01
Tuberculosis (TB)	40	0.69
<b>Sexually Transmitted Diseases (STDs)</b>		
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	2016 case counts	Incidence per 100,000 population
<b>Vaccine Preventable Diseases</b>		
<i>Haemophilus influenzae</i> Invasive Disease	127	2.20
Meningococcal disease	6	0.10
Mumps	44	0.76
Pertussis (whooping cough)	943	16.32
<i>Streptococcus pneumoniae</i> Invasive Disease	422	7.30
Varicella (chickenpox)	200	3.46
<b>Vectorborne Diseases</b>		
<b>Mosquito-borne</b>		
California serogroup, unspecified	2	0.03
Jamestown Canyon virus infection	7	0.12
La Crosse encephalitis	4	0.07
Malaria <sup>1</sup>	20	0.35
West Nile virus infection	13	0.22
Zika-virus infection <sup>1,2</sup>	63	1.09
<b>Tickborne</b>		
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
<b>Viral Hepatitis</b>		
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
<b>Zoonotic Diseases</b>		
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
<b>Other Diseases</b>		
Kawasaki disease	10	0.17
Transmissible spongiform encephalopathy (human)	10	0.17

<sup>1</sup> Denotes diseases where all cases in Wisconsin residents are travel-associated. No local transmission occurs.

<sup>2</sup> 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 2016. These outbreaks were: meningococcal disease serogroup B on the University of Wisconsin-Madison campus, *Elizabethkingia*, *Salmonella* Heidelberg, and Zika virus.



***Elizabethkingia***



**Meningococcal Disease Serogroup B**



***Salmonella* Heidelberg**



**Zika Virus**

## 5.1 | ELIZABETHKINGIA

**Pathogen:** *Elizabethkingia* are bacteria commonly found in the environment worldwide. *Elizabethkingia* is rarely reported to cause illness in humans, and does not commonly live in the respiratory tract. The signs and symptoms of illness that can result from exposure to the bacteria can include fever, shortness of breath, chills, or cellulitis. *Elizabethkingia* mainly causes illness among people who have a weakened immune system or patients who have underlying medical conditions. Confirmation of the illness requires a laboratory test.

**Situation:** In late December 2015, DHS began investigating a potential cluster of *Elizabethkingia meningoseptica* bloodstream infections. Six patients went to the hospital with signs and symptoms of sepsis. Most *E. meningoseptica* exposures happen in health care settings; however, sepsis from a community exposure has been reported. After the report of the first six individuals, DHS initiated epidemiologic, laboratory, and environmental investigations to find out the source of the bacteria and determine risk factors. The Centers for Disease Control and Prevention (CDC) did testing and found the specific strain of *Elizabethkingia* to be *Elizabethkingia anophelis*. Antimicrobial susceptibility testing conducted at CDC and Wisconsin State Laboratory of Hygiene (WSLH) identified effective antibiotic treatment for *E. anophelis*, and DHS alerted health care providers, infection preventionists, and laboratories statewide. A total of 63 confirmed cases of *E. anophelis* were identified as part of this outbreak. There were 18 deaths among individuals with confirmed *E. anophelis* infections and an additional one death among possible cases for a total of 19

### *Elizabethkingia* Outbreak Fast Facts

**Onset Dates:** November 2015–May 2016

**Confirmed Cases:** 66

**Counties Involved:** Columbia, Dane, Dodge, Fond du Lac, Jefferson, Milwaukee, Ozaukee, Racine, Sheboygan, Washington, Waukesha, and Winnebago

**Severity:** 18 deaths\*

\*Confirmed cases



deaths. It has not been determined if these deaths were caused by the infection or other serious pre-existing health problems. Individuals who died were residents in the following counties: Columbia, Dodge, Fond du lac, Milwaukee, Ozaukee, Racine, Sheboygan, Washington, and Waukesha.

**Outcome:** The source of these *E. anophelis* infections remains unknown. Although the outbreak is no longer active, DHS continues to maintain statewide laboratory surveillance.

## 5.2 | MENINGOCOCCAL DISEASE SEROGROUP B

**Pathogen:** [Meningococcal disease](#) is caused by the bacterium *Neisseria meningitidis* and can cause meningitis (inflammation of the meninges, the protective membranes covering the brain and spinal cord), sepsis (blood infection), pneumonia, or septic arthritis. The bacteria spread through direct contact with respiratory and oral secretions (saliva or spit) of an infected person or an asymptomatic carrier. Common ways it can spread are through kissing, sharing eating utensils, or drinking from the same container. Symptoms may include sudden onset of fever, headache, stiff neck, nausea, vomiting, photophobia (sensitivity to light), or altered mental status (confusion). Symptoms of meningococcal disease can appear quickly and progress rapidly. Typically they develop within 3–7 days after exposure. Prompt medical attention and treatment is crucial for survival.

**Situation:** During October 3–25, 2016, three confirmed cases of meningococcal disease were identified in students attending the University of Wisconsin-Madison. All three cases were determined to be caused by serogroup B, which was not contained in vaccines prior to 2014. The students ranged from 18–19 years of age, and contact investigations identified an average of 5–10 people per case that required antibiotic prophylaxis. Two of the cases lived on campus in different residence halls.

Following the first two cases, the UW-Madison University Health Services, DHS, and CDC collaborated to provide free vaccine to undergraduate students up to age 25, and older students that lived with or had intimate relationships with an undergraduate student. A total of seven vaccine clinics were held over two weeks on the UW-Madison campus through massive coordination efforts by UHS. The mass vaccination campaign mobilized hundreds of volunteers throughout campus to staff vaccine clinics and resulted in the vaccination of over 20,600 students in a two-week period. During the vaccine campaign, the third case was identified.

**Outcome:** After thorough investigations, no epidemiologic links were found between the patients. None had received either of the recently licensed serogroup B vaccines (Bexsero or Trumenba). All three cases survived. The UW vaccine clinics resulted in 67% of undergraduates receiving the first dose of the meningitis B vaccine, and no additional cases of meningococcal disease were identified through the remainder of the school year.

### Meningococcal Disease Serogroup B Outbreak Fast Facts

**Onset Dates:** October 2016

**Confirmed Cases:** 3

**Counties Involved:** Dane

**Severity:** 3 (100%) hospitalizations; no deaths



## 5.3 | SALMONELLA HEIDELBERG

**Pathogen:** [Salmonella](#) bacteria commonly live in the intestines of many types of animals, including cattle. Cattle can carry *Salmonella* bacteria and may become ill, but often look healthy. Infected calves are more likely to be sick than adult cattle. The primary way people get infected from cattle on farms is through direct contact with the animal's stool or environment.

**Situation:** In August 2016, DHS began investigating a cluster of multidrug resistant (MDR) [Salmonella Heidelberg](#) infections occurring among Wisconsin residents. During routine follow-up interviews conducted by public health, ill people reported contact with sick dairy bull calves. Animal health agencies in the state had also recognized an increase in ill dairy bull calves infected with MDR *S. Heidelberg*. DHS collaborated with animal health agencies to investigate the human and animal outbreaks. Molecular sub-typing was conducted on both human and cattle MDR *S. Heidelberg* isolates. Testing showed that they were highly related to one another, or the same strain. Standard antibiotic resistance testing showed this strain of *S. Heidelberg* is resistant to antibiotics normally used to treat severe *Salmonella* infections in people. The investigation eventually revealed the outbreak to be multistate with people and cattle infected with the same strain of *S. Heidelberg* in other states. Additionally, review of national and state surveillance data found several cases occurred in 2015. During January 2015 – November 2017, 56 people in 15 states became ill with the outbreak strain. In Wisconsin during the same time period, investigators identified 18 people living in 14 counties who tested positive for the outbreak strain of MDR *S. Heidelberg*. Among Wisconsin patients, seven were hospitalized and 50% of infections occurred in a person less than 18 years of age. No deaths were reported.

### *Salmonella Heidelberg* Outbreak Fast Facts

**Onset Dates:** October 2015–October 2017

**Confirmed Cases:** 18

**Counties Involved:** Barron, Chippewa, Clark, Crawford, Eau Claire, Lafayette, Marathon, Ozaukee, Rock, Rusk, St. Croix, Sawyer, Sheboygan, and Trempealeau.

**Severity:** No deaths

**Outcome:** Epidemiologic, laboratory, and animal traceback investigations identified contact with calves or cattle as the most important source of infection. Many of these animals were dairy bull calves from Wisconsin. Although treatment options are limited for people infected with this strain, infections caused by this strain of *Salmonella* have been successfully treated. Human and animal illnesses caused by the outbreak strain continue to be identified in Wisconsin and nationally. DHS, CDC, and partners will continue to monitor for new cases. Wisconsin and federal agencies have been providing outreach to the public, animal health professionals, and human health care providers aimed at reducing transmission and increasing awareness of MDR *Salmonella*. This outbreak highlights the need for providers to request antimicrobial susceptibility testing when treating someone for *Salmonella* infection.





## 5.4 | ZIKA VIRUS

**Pathogen:** [Zika virus](#) is a flavivirus related to the West Nile, Yellow Fever, and Dengue viruses. Zika virus is known to be transmitted by certain *Aedes* species of mosquitoes, with *Ae. aegypti* and *Ae. albopictus* identified as the primary vectors. Zika virus can also be spread through sexual contact, from an infected male or female to their sex partners. If a pregnant woman is infected with Zika virus, the virus can be passed to her unborn baby and cause serious birth defects including microcephaly and other brain abnormalities. For many healthy adults, a Zika virus infection may cause no symptoms at all, or only very mild symptoms. There is currently no vaccine or treatment for Zika virus infections.

**Situation:** By February of 2016, local, active Zika virus transmission had been reported in more than 20 countries and territories in the Americas. Wisconsin residents often travel to areas where Zika virus was being spread by the local mosquito population. During 2016, Wisconsin performed enhanced surveillance for Zika virus infections in Wisconsin residents, providing fee-exempt testing for asymptomatic pregnant women with possible Zika virus exposure, and any symptomatic patients with exposure within the two-week incubation period. A total of 1,062 Wisconsin residents were approved for fee-exempt Zika testing during 2016. Based on the reported exposures of the 63 cases in 2016, Wisconsin travelers presumably acquired Zika virus from 14 different countries outside of the U.S. (with one traveler presumably having acquired the virus from Miami, Florida). Some of the Wisconsin Zika cases reported both travel to an affected area and

### Zika Virus

#### Outbreak Fast Facts

**Onset Dates:** March 2016–Ongoing

**Confirmed cases (2016):** 63 cases in 2016

**Counties involved (2016):** Milwaukee (19) , Dane (15), Waukesha (9), Winnebago (4), Kenosha (3), Rock (2) , Sheboygan, Barron, Brown, Eau Claire, Jefferson, Marathon, Monroe, Outagamie, Ozaukee, Portage, Racine, Walworth, Waushara, and Wood.

sexual contact with a traveler to an affected area within a similar time period; for these cases, the mode of transmission cannot be easily determined.

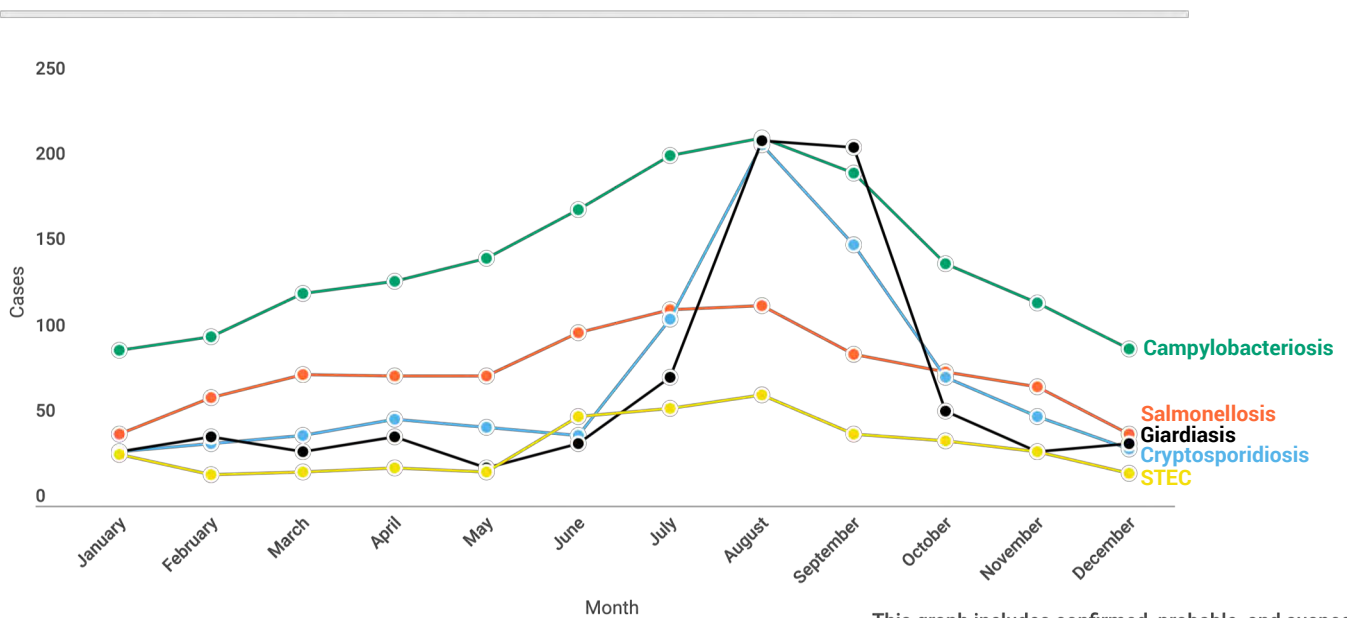
**Outcome:** Currently, the prevalence of Zika virus is decreasing in the Americas, and as a result, the incidence of Zika virus infections in Wisconsin travelers has decreased significantly. However, the risk of infection still exists for travelers to affected areas and Wisconsin continues to perform enhanced surveillance in residents returning with Zika-like symptoms from affected areas.



# 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* [EPEC], 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 2016, 6,124 notifiable enteric infections were reported in Wisconsin.**

Select Enteric Illnesses by Month of Symptom Onset, Wisconsin 2016



This graph includes confirmed, probable, and suspect cases.

## Seasonality

**Most bacterial and parasitic infections peak during the summer months of 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 is 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

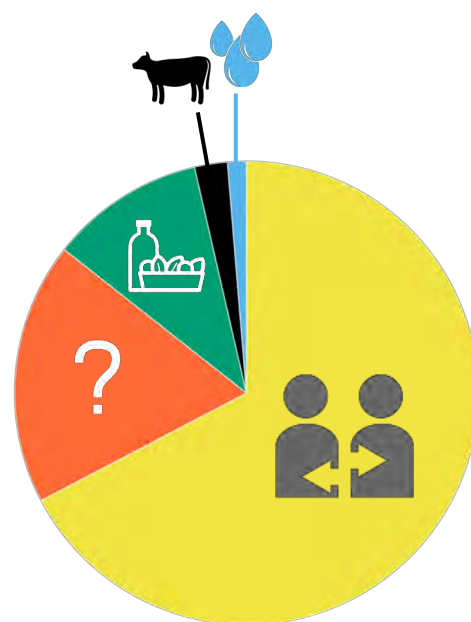
In coordination with staff at local, state, and federal agencies, DHS epidemiologists investigate many enteric disease outbreaks each year. These outbreaks result from transmission of pathogens via food, water, or by contact with infected animals, people, or their environment. Detecting, investigating, 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 \(NORS\)](#). Wisconsin had 306 enteric disease outbreaks reported in 2016 (14 (6%) were multistate).

## 2016 Outbreaks of Gastrointestinal Illnesses

Agent	# outbreaks (%)
<b>Viral</b>	<b>171 (56%)</b>
Norovirus	166 (54%)
Other viruses	5 (2%)
<b>Bacterial</b>	<b>25 (8%)</b>
<i>Salmonella</i>	13 (4%)
Shiga toxin-producing <i>E. coli</i> (STEC)	6 (2%)
<i>Shigella</i>	5 (2%)
<i>Campylobacter</i>	1 (<1%)
<b>Parasitic</b>	<b>9 (3%)</b>
<i>Cyptosporidium</i>	8 (3%)
<i>Trichinella</i>	1 (<1%)
<b>Bacterial Toxin (<i>Clostridium perfringens</i>)</b>	<b>4 (1%)</b>
<b>Unknown*</b>	<b>97 (32%)</b>

\*Most of these outbreaks occur in communal settings where norovirus or another gastrointestinal virus is the likely cause.

### Modes of transmission



## 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.

206 (67%) Person-to-person

33 (11%) Foodborne

7 (3%) Zoonotic

4 (1%) Waterborne

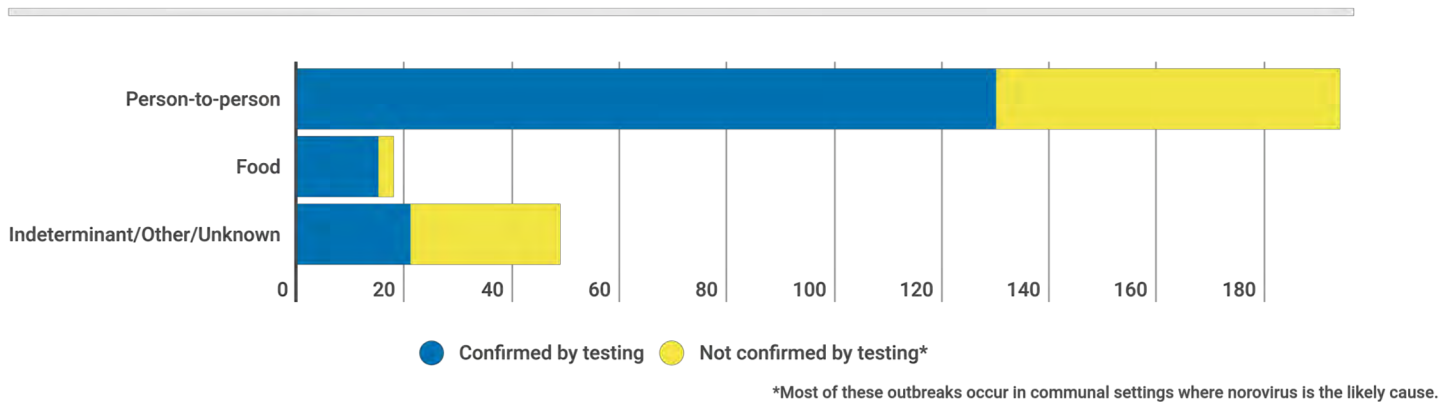
56 (18%) Undetermined

# 6.2 | NOROVIRUS OUTBREAKS

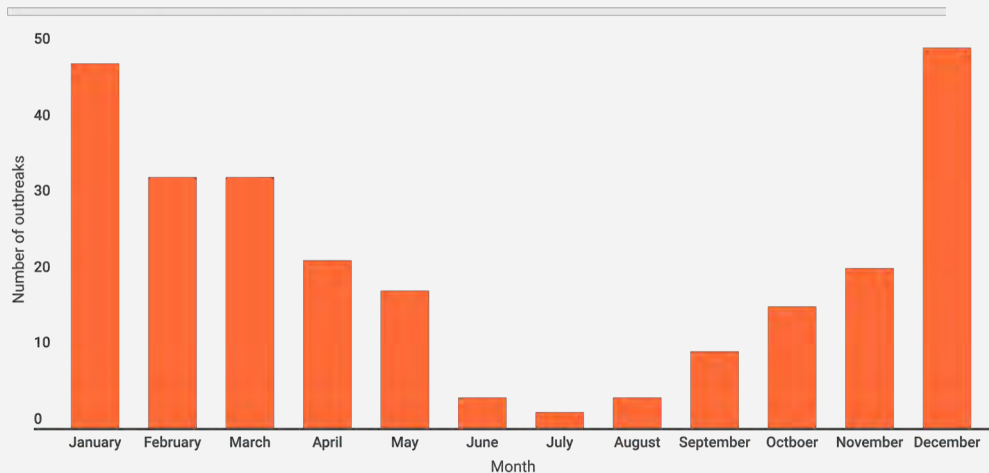
[Norovirus](#) is the leading cause of person-to-person and foodborne outbreaks in Wisconsin. While individual cases of norovirus infection are not reportable, outbreaks of norovirus are reportable. Norovirus is a virus that causes vomiting, diarrhea, and abdominal cramping. Norovirus is often incorrectly 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, and can be controlled by promptly implementing aggressive infection prevention and control measures to prevent environmental or person-to-person transmission. When appropriate prevention and control measures are not implemented immediately, 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. **Wisconsin had 261 norovirus outbreaks reported in 2016 (221 (85%) were in long-term care facilities).**

Norovirus Outbreaks by Transmission Mode, Wisconsin 2016



Norovirus Outbreaks by Month, Wisconsin 2016



**WANT MORE INFORMATION?**



Check out our newly updated:

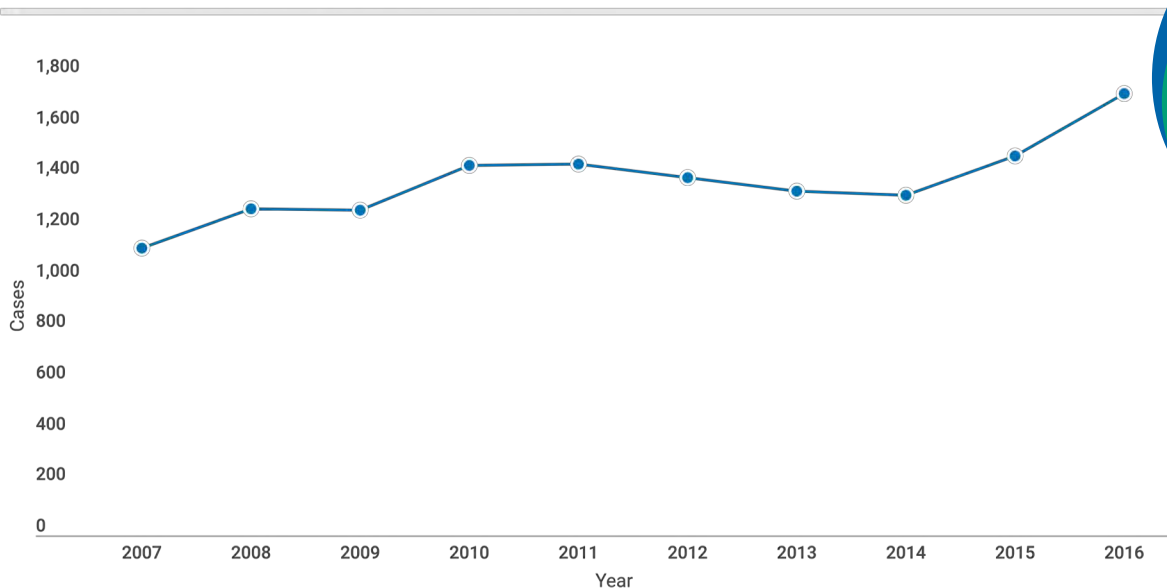


[Recommendations for Prevention and Control of Acute Gastroenteritis Outbreaks in Wisconsin Long-Term Care Facilities!](#)

## 6.3 | CAMPYLOBACTERIOSIS

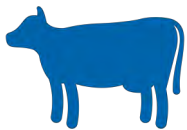
[Campylobacteriosis](#) is an infection caused by *Campylobacter* bacteria. It is one of the most common causes of diarrhea in the U.S. It affects the intestinal tract and, in rare cases, the bloodstream. It is the most commonly reported cause of bacterial diarrhea in Wisconsin. It occurs much more frequently in the summer months. Most 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 2007-2016



**1,731**  
cases of  
campylobacteriosis  
were reported in  
Wisconsin in 2016

This graph includes confirmed, probable, and suspect cases.



### Contact with cattle

Of Wisconsin residents diagnosed with campylobacteriosis in 2016, 307 (18%) reported contact with cattle.



### Prevention measures

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



### Hospitalizations

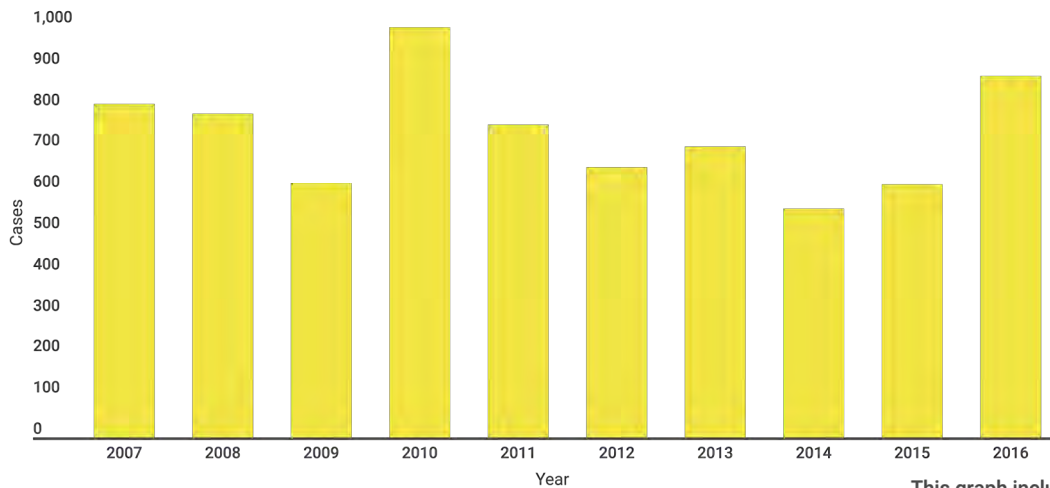
Of Wisconsin residents diagnosed with campylobacteriosis in 2016, 220 (13%) were hospitalized for their illness.

# 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 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 2007-2016



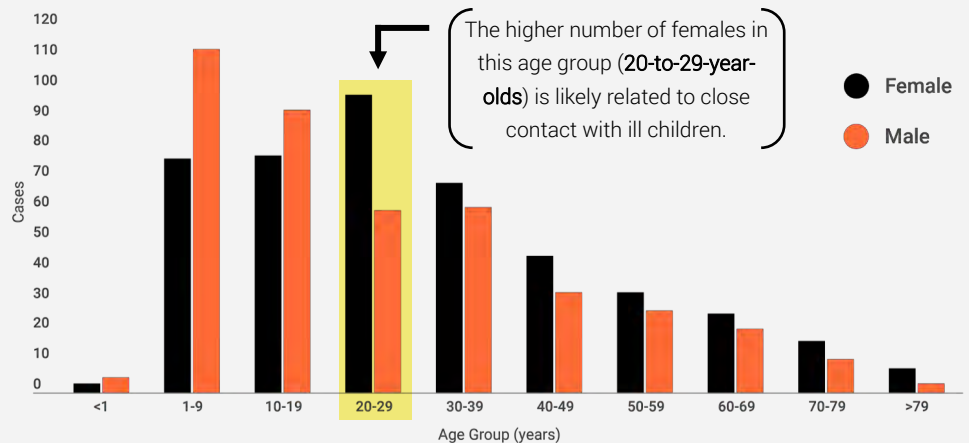
**880**  
cases of  
cryptosporidiosis were  
reported in Wisconsin  
in 2016

This graph includes confirmed cases.



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

Cryptosporidiosis Cases by Age and Sex, Wisconsin 2016



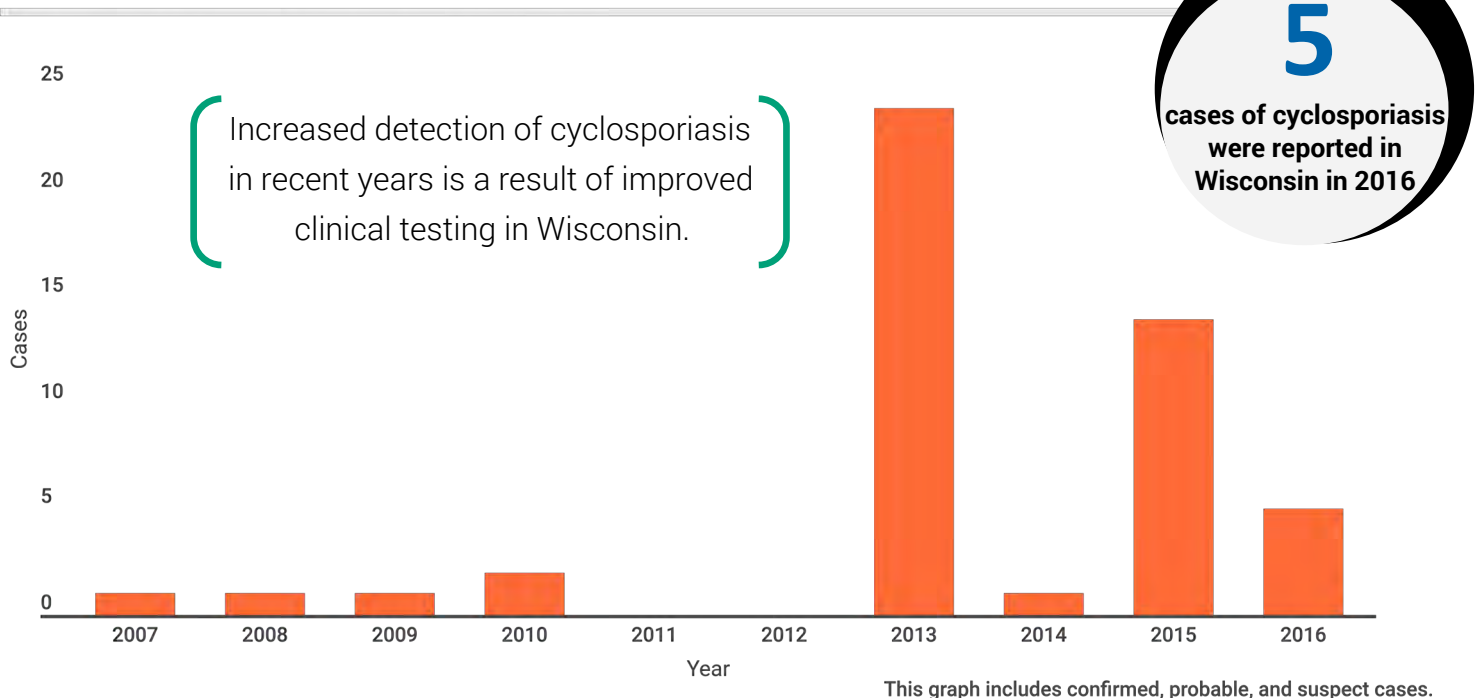
The higher number of females in this age group (20-to-29-year-olds) is likely related to close contact with ill children.

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 travelling 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. 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 increasing number of cases reported in recent years.

Cyclosporiasis Cases, Wisconsin 2007-2016



## 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. *E. coli* infections are easily spread from person to person. To help limit the spread of diarrheagenic *E. coli*, you should 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.**

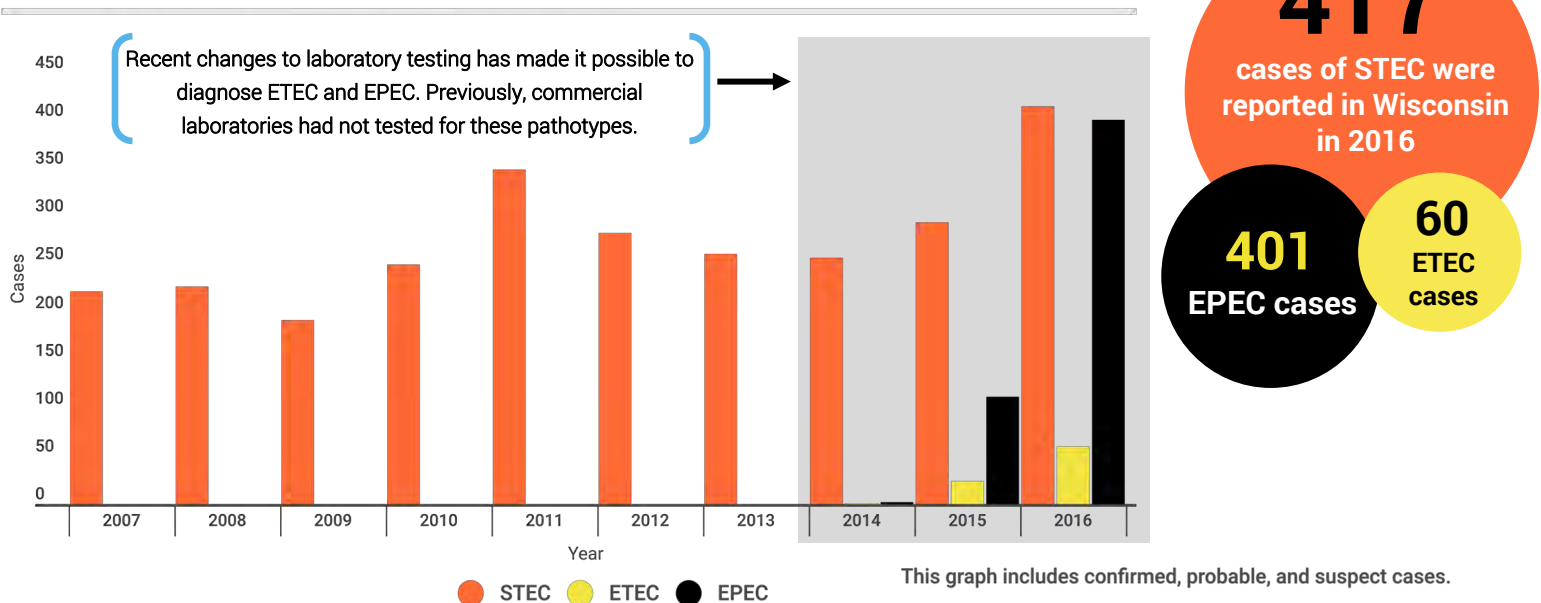
**Shiga toxin-producing *E. coli* (STEC)** may also be referred to as verocytotoxin-producing *E. coli* (VTEC) or enterohemorrhagic *E. coli* (EHEC). This pathotype is the one most commonly heard about in the news in association with foodborne outbreaks and includes *E. coli* O157: H7 (see STEC page). 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 2007-2016

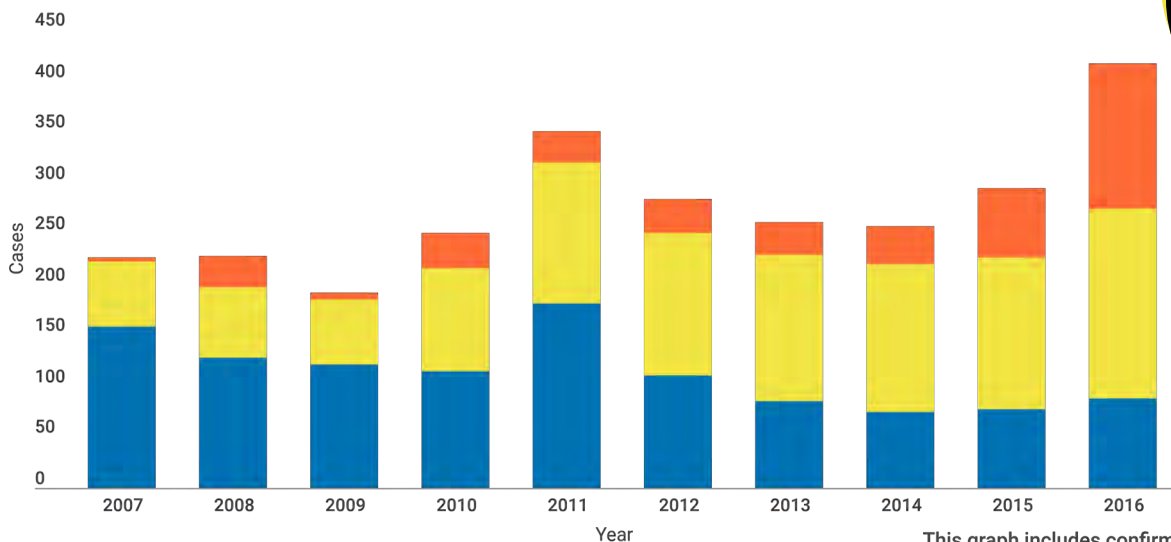




# 6.7 | SHIGA TOXIN-PRODUCING *E. COLI* (STEC)

STEC 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.

STEC cases, Wisconsin 2007-2016



**417**  
cases of STEC were reported in Wisconsin in 2016

This graph includes confirmed, probable, and suspect cases.

● O157 ● non-O157 ● Unconfirmed case (probable or suspect)



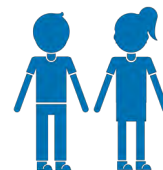
## Prevention measures

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 2016, 75 (18%) were hospitalized for their illness.



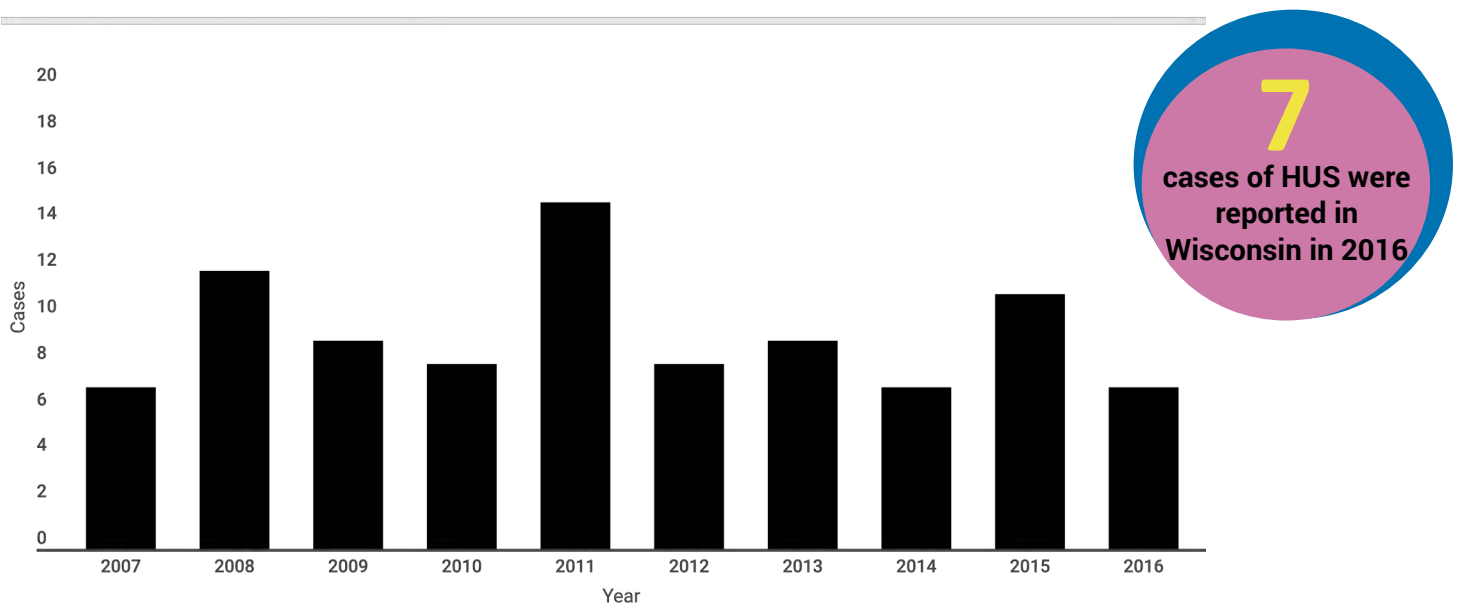
## Ages affected

Of Wisconsin residents diagnosed with STEC in 2016, 155 (37%) were less than 18 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 2007-2016



FROM 2012-2016:



Ages affected

81% of Wisconsin cases of HUS were in children less than 10 years old.



Hospitalizations

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



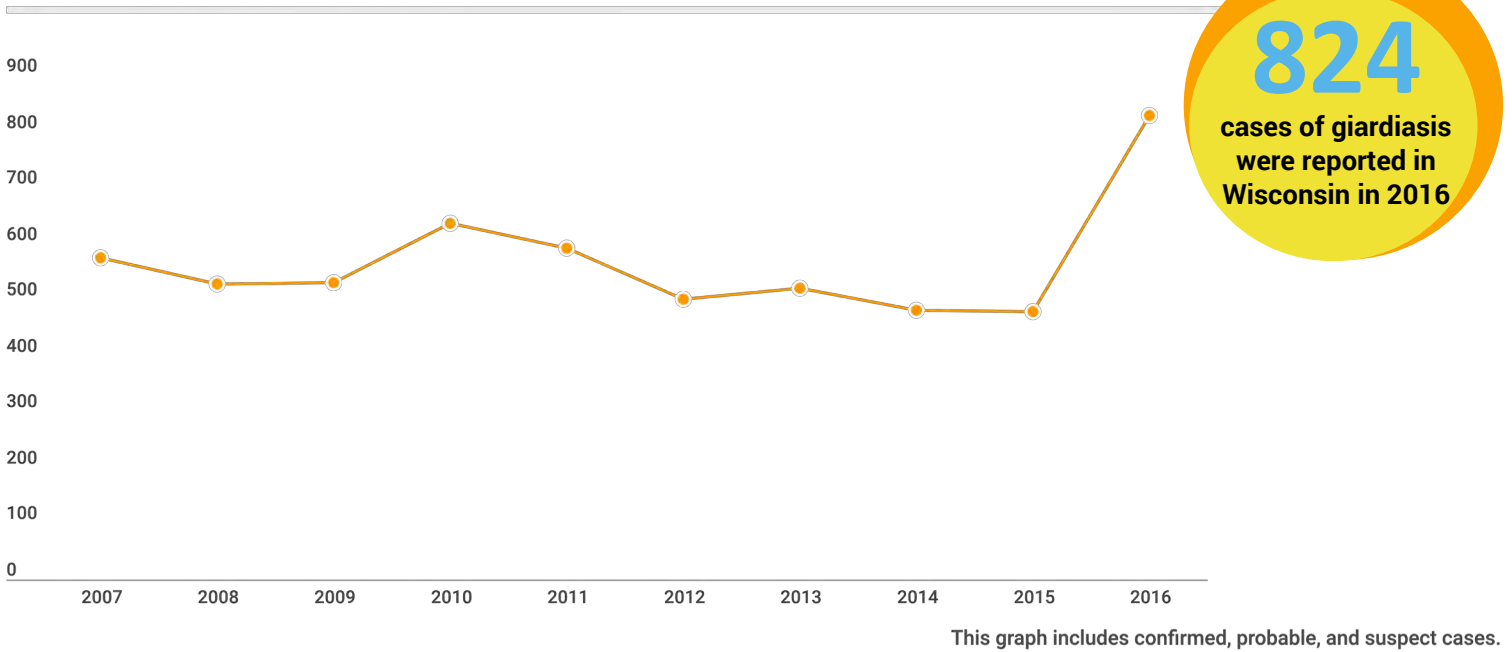
*E. coli* O157

62% 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. *Giardia* is found on surfaces or in water, soil, or food that have been contaminated with feces (poop) 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 2007-2016

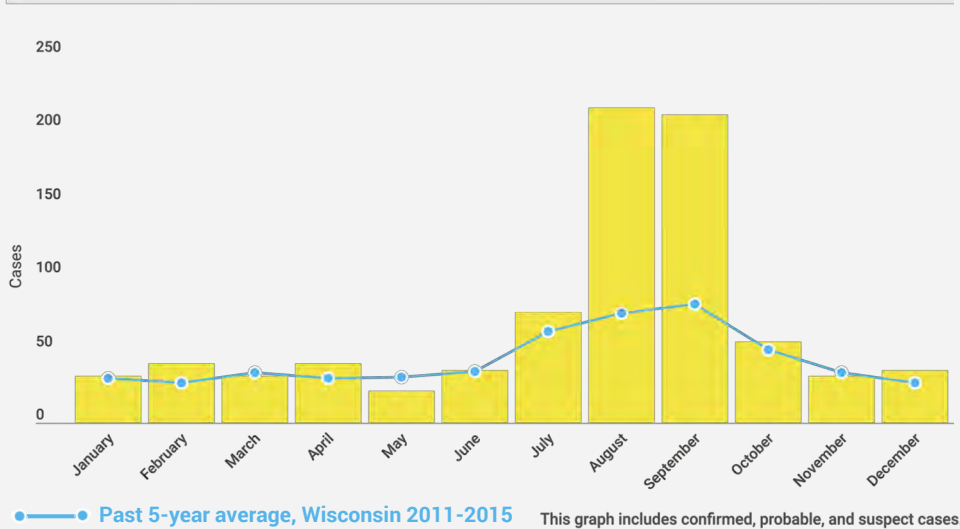


Giardiasis Cases by Sex, Wisconsin 2016



**56% Male**  
**44% Female**

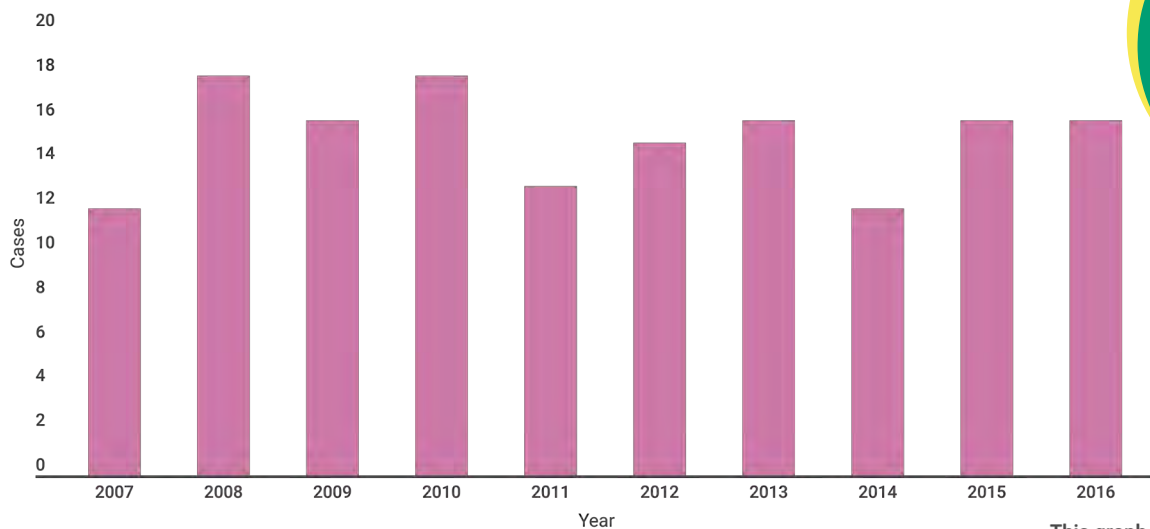
Giardiasis Cases by Month, Wisconsin 2016



# 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 (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.

Listeriosis Cases, Wisconsin 2007-2016



This graph includes confirmed cases.

**16**  
cases of listeriosis  
were reported in  
Wisconsin in 2016



## Hospitalizations

In 2016, 15 of 16 (94%) 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 lunchmeats.



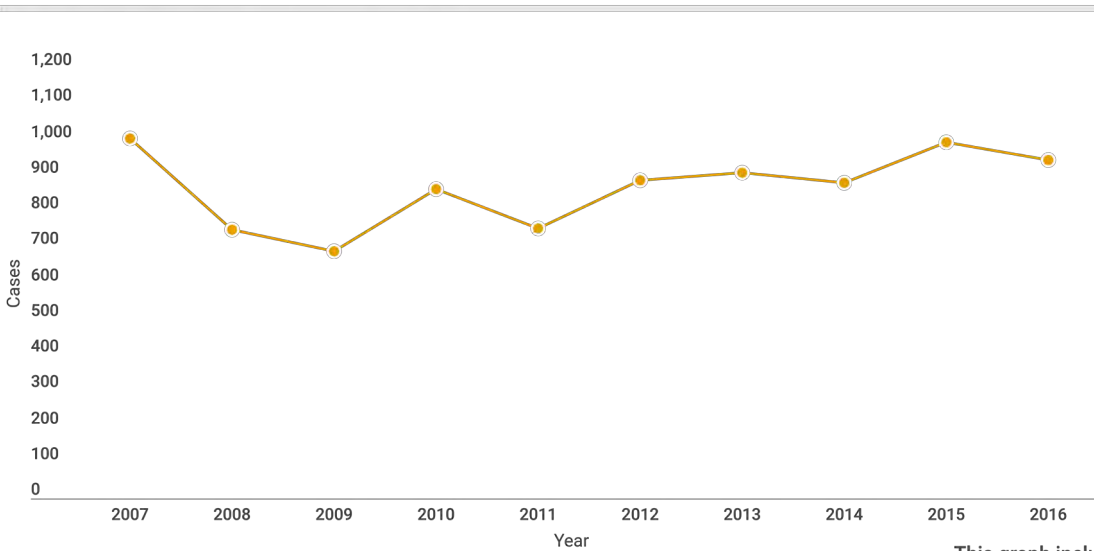
## Ages affected

In 2016, 13 (81%) individuals with listeriosis were aged 50 years or older.

# 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.

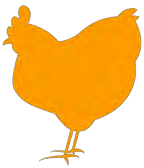
Salmonellosis Cases, Wisconsin 2007-2016



**946**  
cases of  
salmonellosis were  
reported in Wisconsin  
in 2016

This graph includes confirmed, probable, and suspect cases.

## In 2016:



### Live poultry

9% of salmonellosis cases reported contact with live poultry. Make sure to wash your hands after handling live poultry and don't keep live poultry in your house.



### Hospitalizations

188 (20%) individuals with salmonellosis were hospitalized for their illness.



### Children

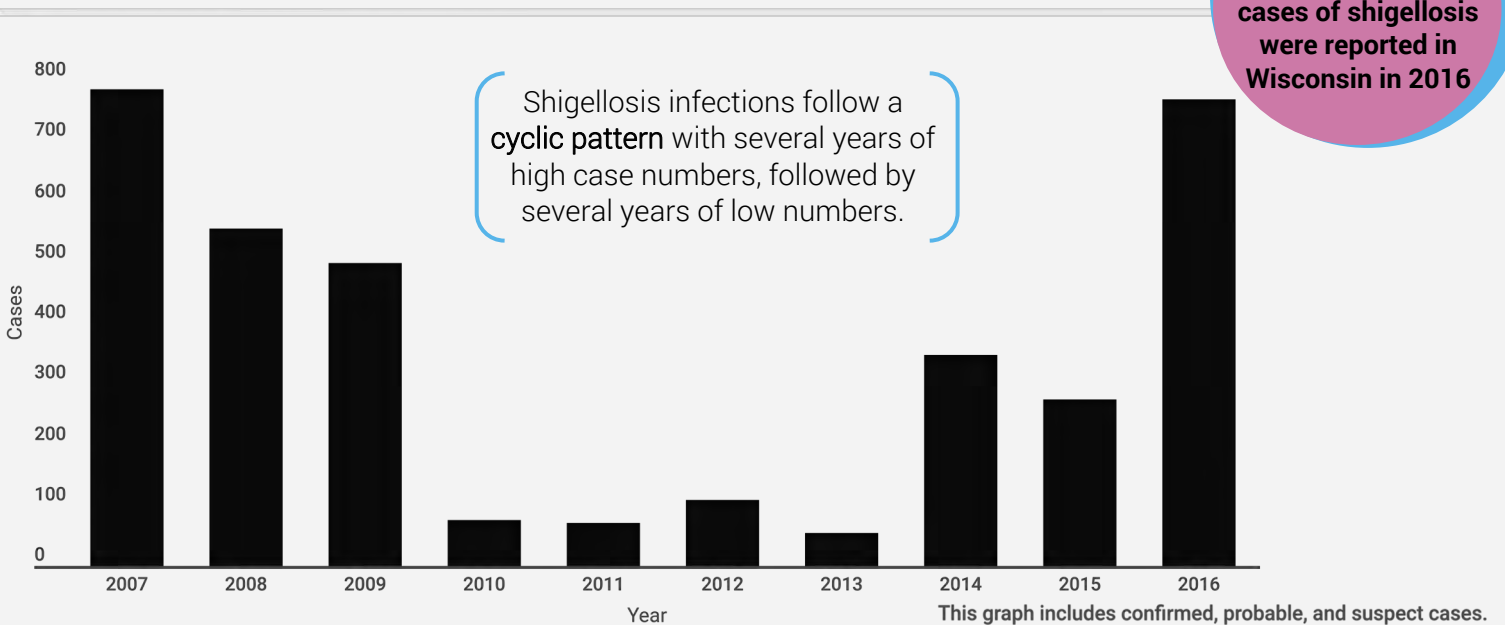
115 (12%) individuals with salmonellosis were under 5 years of age.

# 6.12 | SHIGELLOSIS

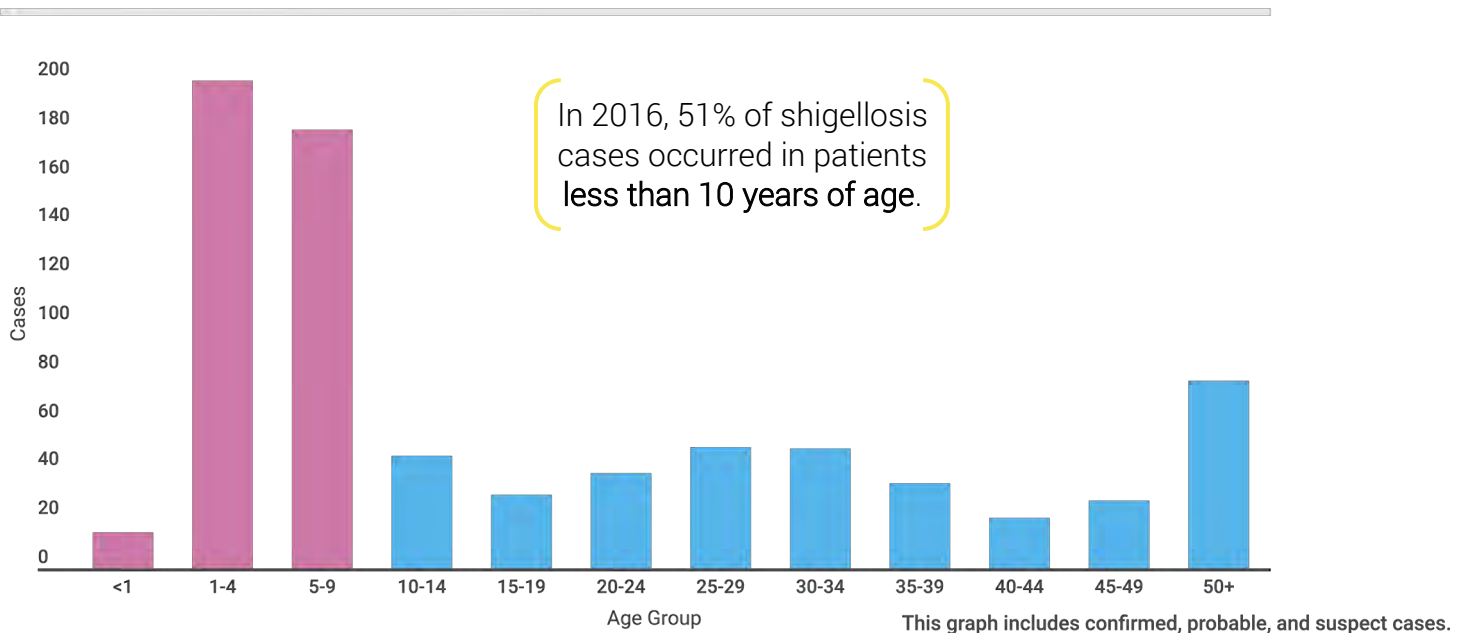
[Shigellosis](#) is a bacterial infection most commonly seen in the summer and early fall as single cases or outbreaks. *Shigella* bacteria are found in the intestinal tract of infected people, who then may contaminate food or water. The bacteria are spread by eating or drinking contaminated food or 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. Animals, other than primates, 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.

**770**  
cases of shigellosis were reported in Wisconsin in 2016

Shigellosis Cases, Wisconsin 2007-2016



Shigellosis Cases by Age, Wisconsin 2016

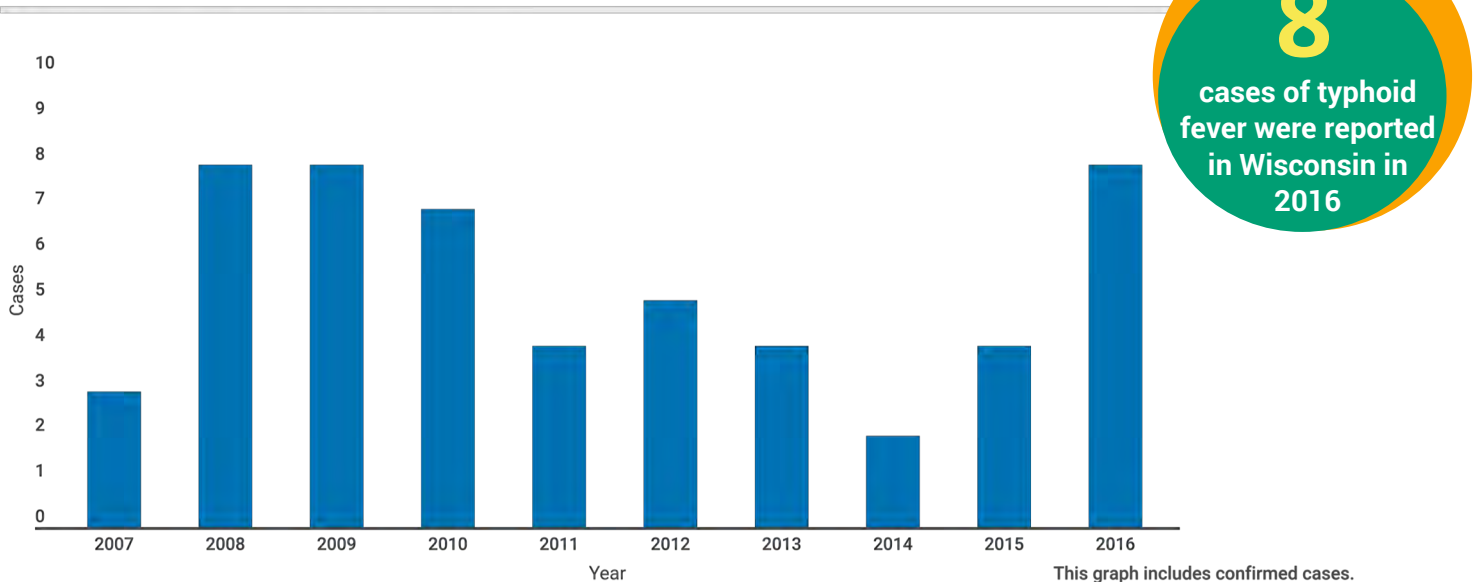


## 6.13 | TYPHOID FEVER

[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 2007-2016



### FROM 2007-2016:



#### Hospitalizations\*

**74% of typhoid fever cases were hospitalized for their illness.**



#### Specimen source\*

**90% of typhoid fever cases had positive blood cultures.**



#### International travel\*

**84% of typhoid fever cases reported travel outside the U.S.**

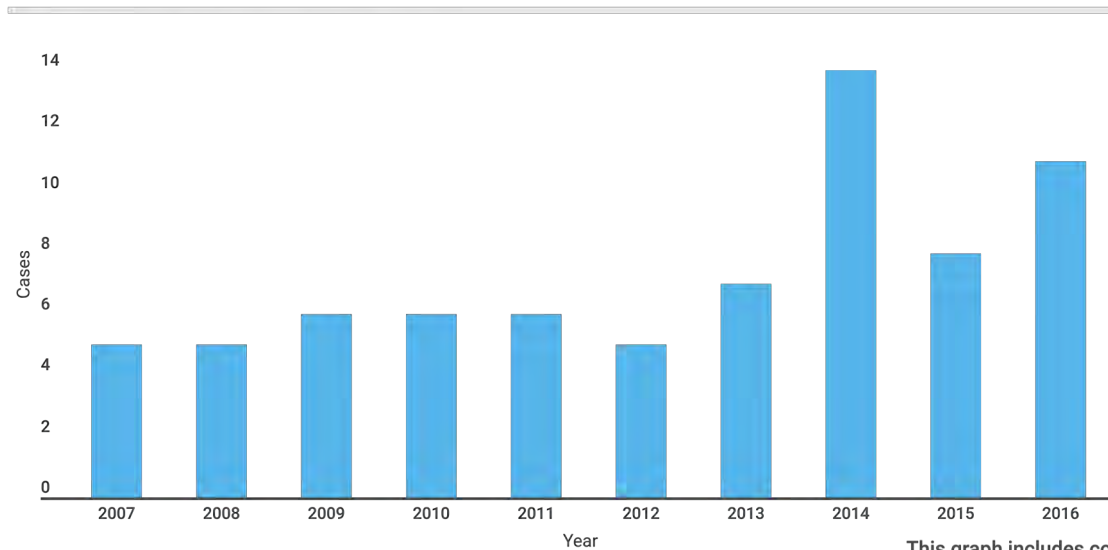
\*Percent based on cases with information available

# 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 salt water. 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 2007-2016



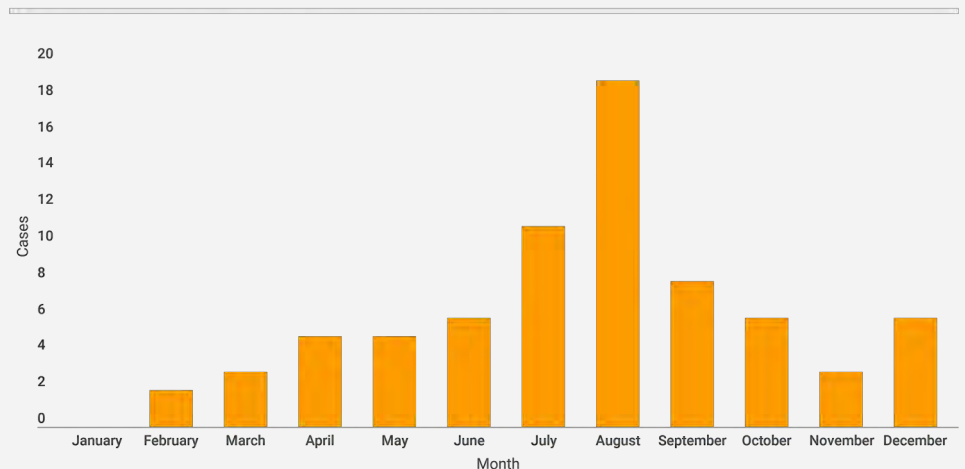
**11**  
cases of vibriosis  
were reported in  
Wisconsin in 2016

This graph includes confirmed, probable, and suspect cases.



**Of Wisconsin residents diagnosed with vibriosis in 2016, 7 (64%) reported eating raw oysters.**

Total Vibriosis Cases by Month, Wisconsin 2007-2016



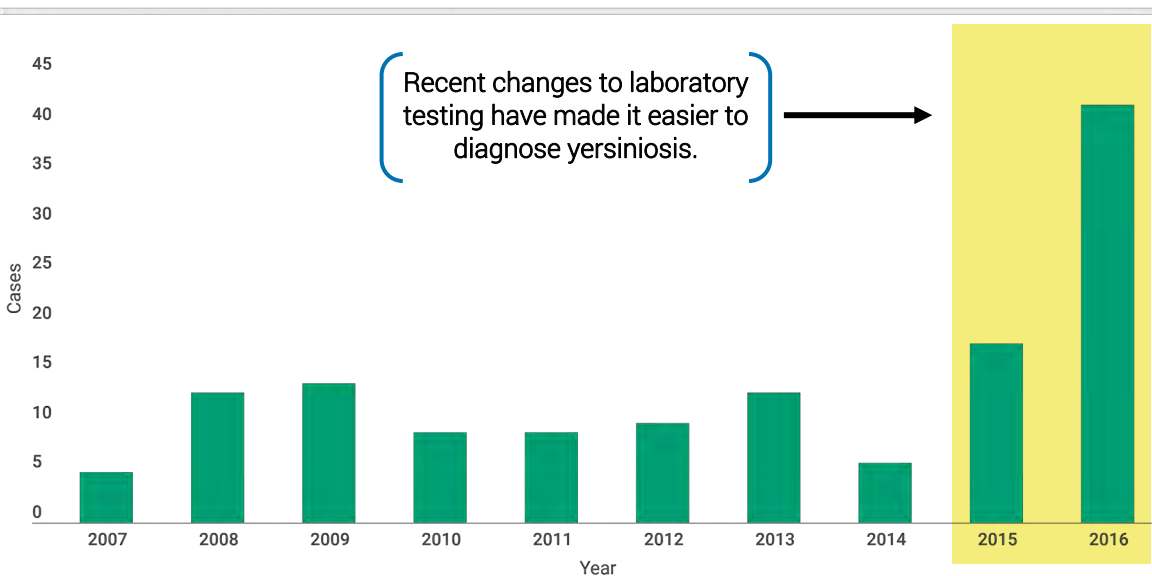
This graph includes confirmed, probable, and suspect cases.



# 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 blood stream infections may occur. Increases in reported cases during 2015 and 2016 are likely due to availability of new test methods at clinical laboratories.

Yersiniosis Cases, Wisconsin 2007-2016



**42**  
cases of yersiniosis  
were reported in  
Wisconsin in 2016

This graph includes confirmed, probable, and suspect cases.



## Hospitalizations

In 2016, 7 (17%) yersiniosis cases were hospitalized for their illness.



## Abdominal pain

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



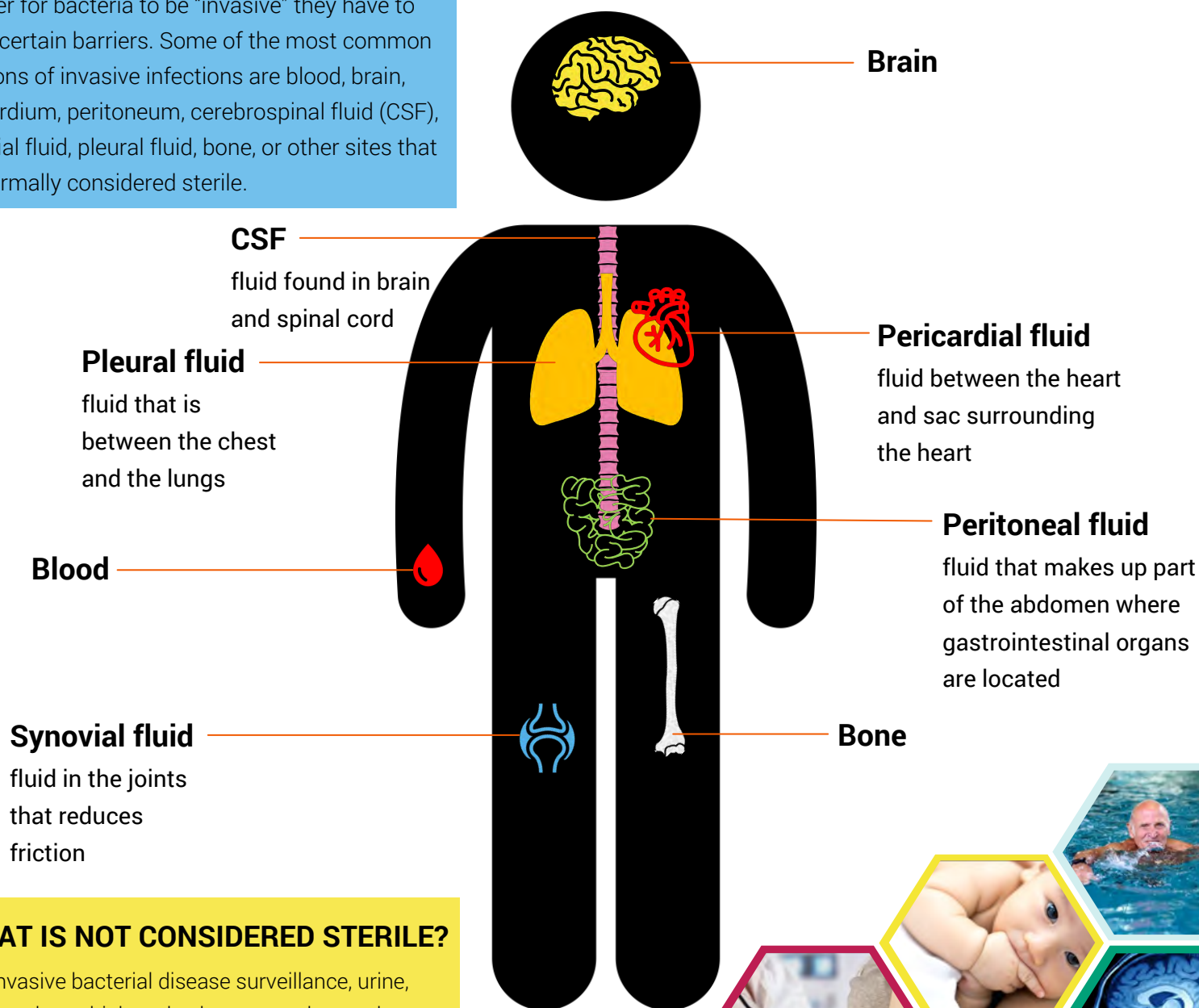
## Cases by sex

In 2016, 20 (48%) yersiniosis cases were female and 22 (52%) 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 and group B streptococci. 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?

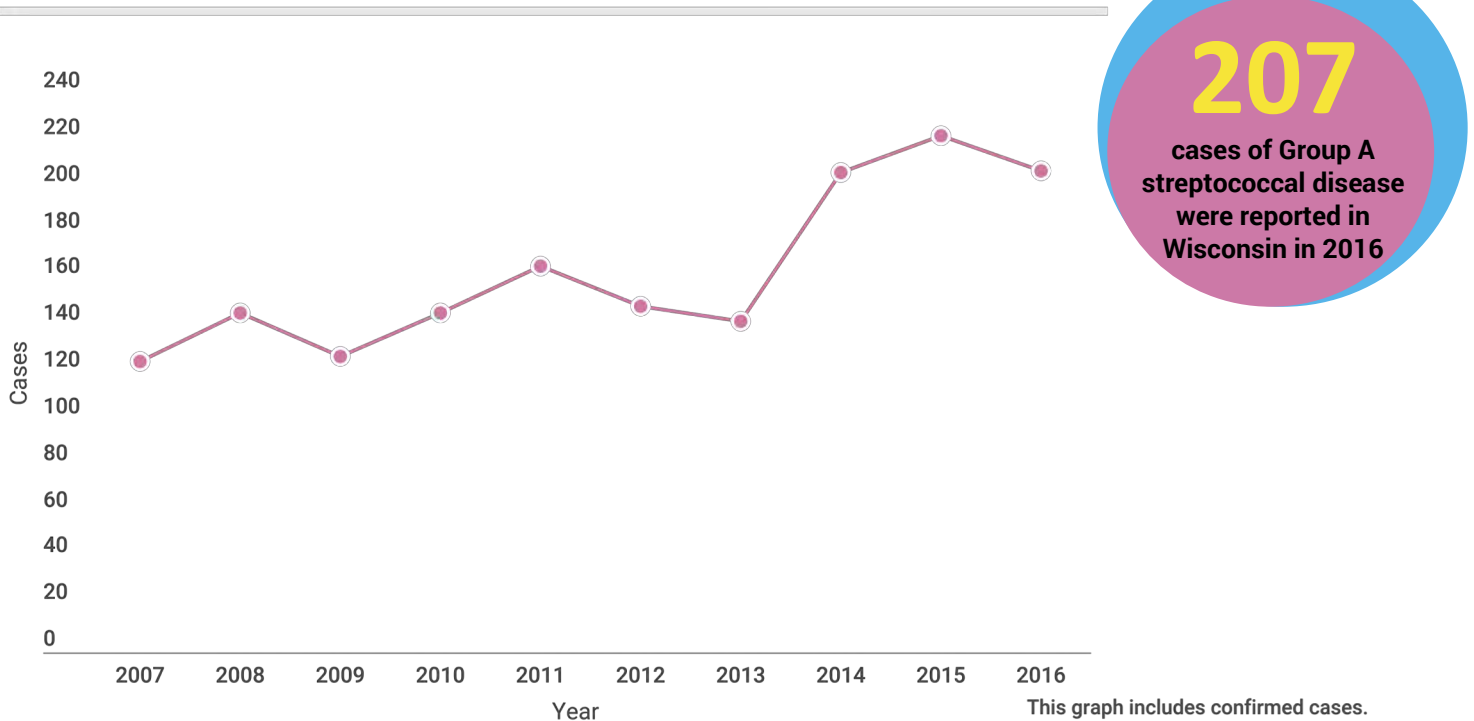
For invasive bacterial disease surveillance, urine, sputum, bronchial wash, abscess, and wound specimens are not considered sterile sites.



# 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 2007-2016



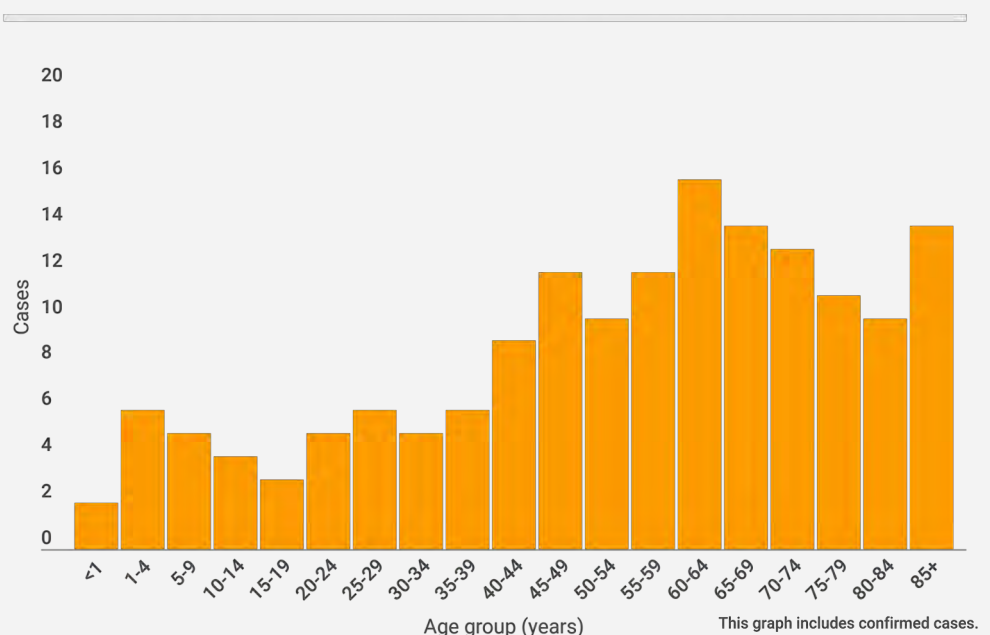
## 60-64 years

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

## Time of year

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

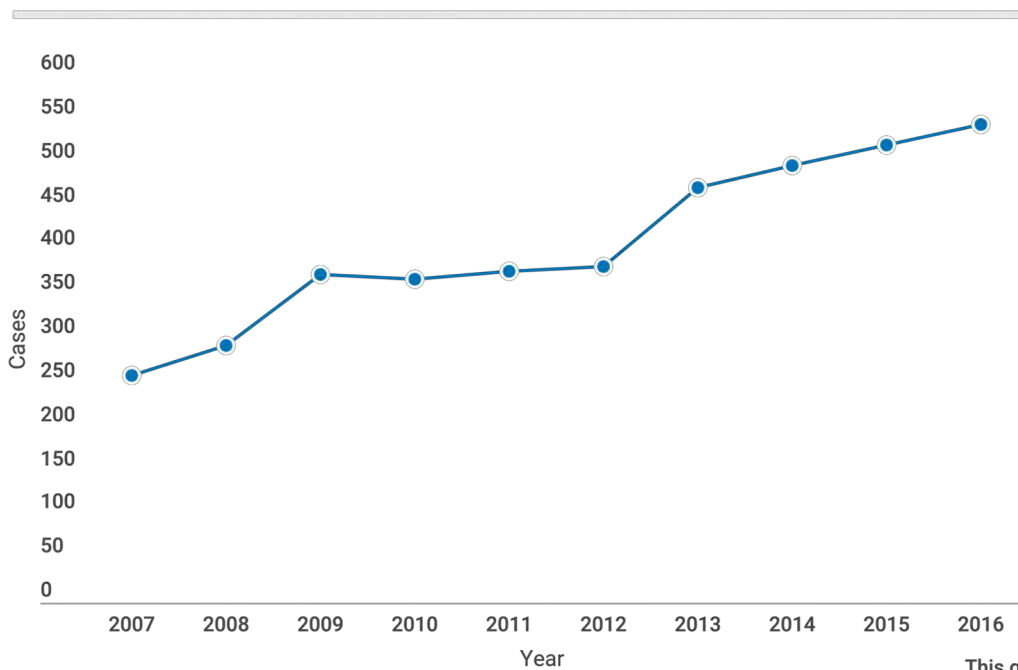
Confirmed Invasive Group A Streptococcal Disease Cases by Age Group, 2007-2016 Average



# 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.

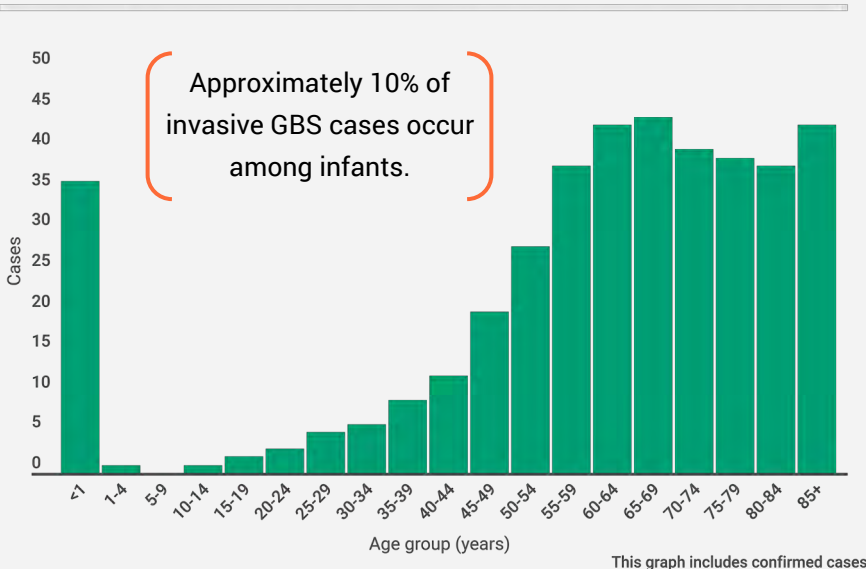
Invasive Group B Streptococcal Disease Cases, Wisconsin 2007-2016



**545**  
cases of Group B streptococcal disease were reported in Wisconsin in 2016

This graph includes confirmed cases.

Invasive Group B Streptococcal Disease Cases by Age Group, 2007-2016 Average



Approximately 10% of invasive GBS cases occur among infants.

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

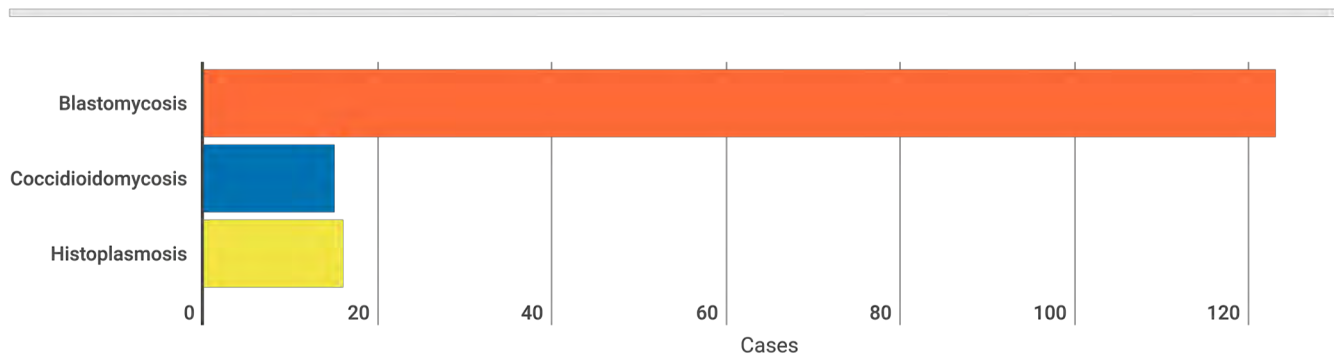


In 2016, 5 infants who had GBS disease died.

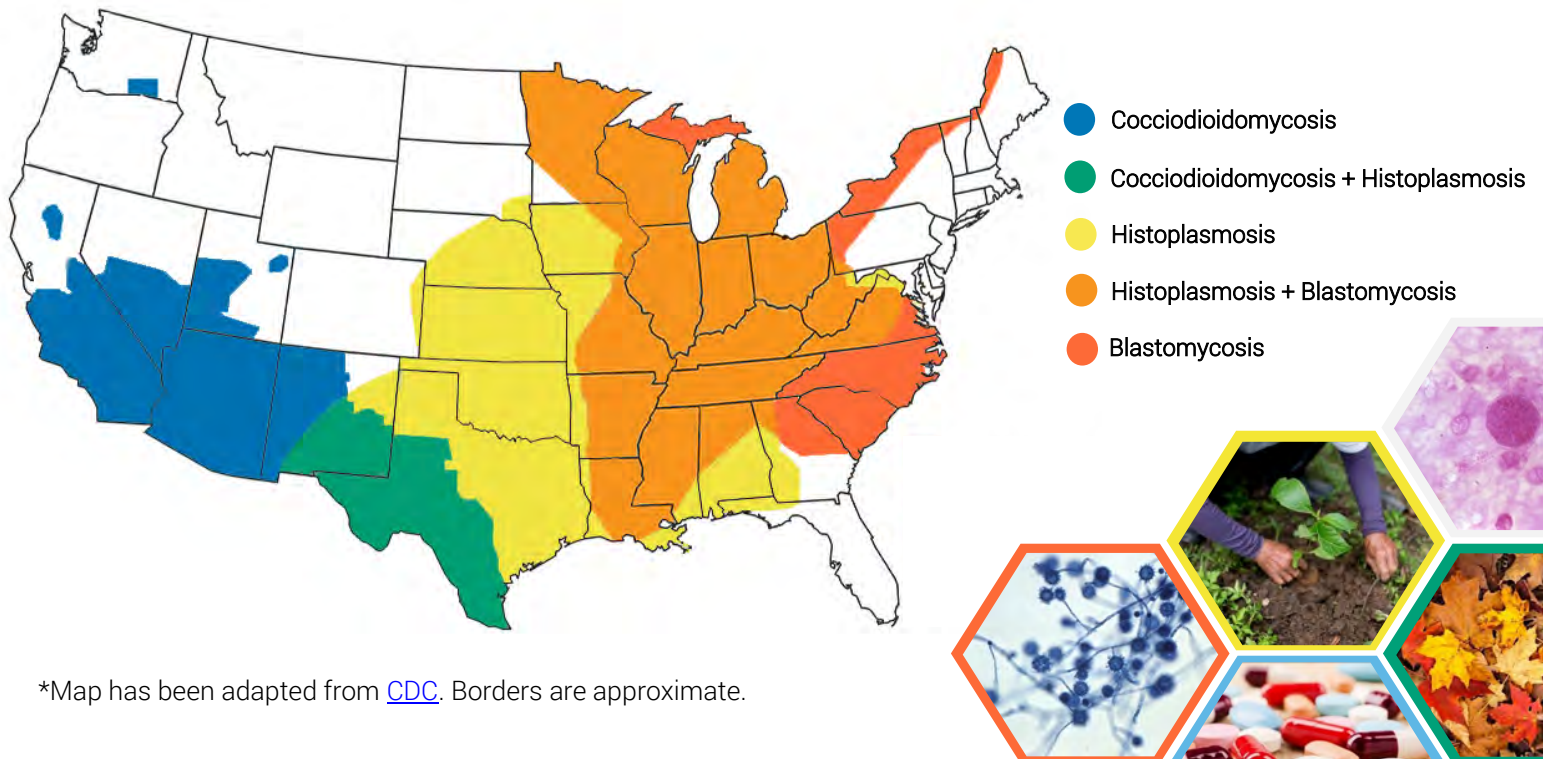
# 8.0 | MYCOTIC/FUNGAL DISEASES

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.

Reportable Mycotic Illnesses, Wisconsin 2016



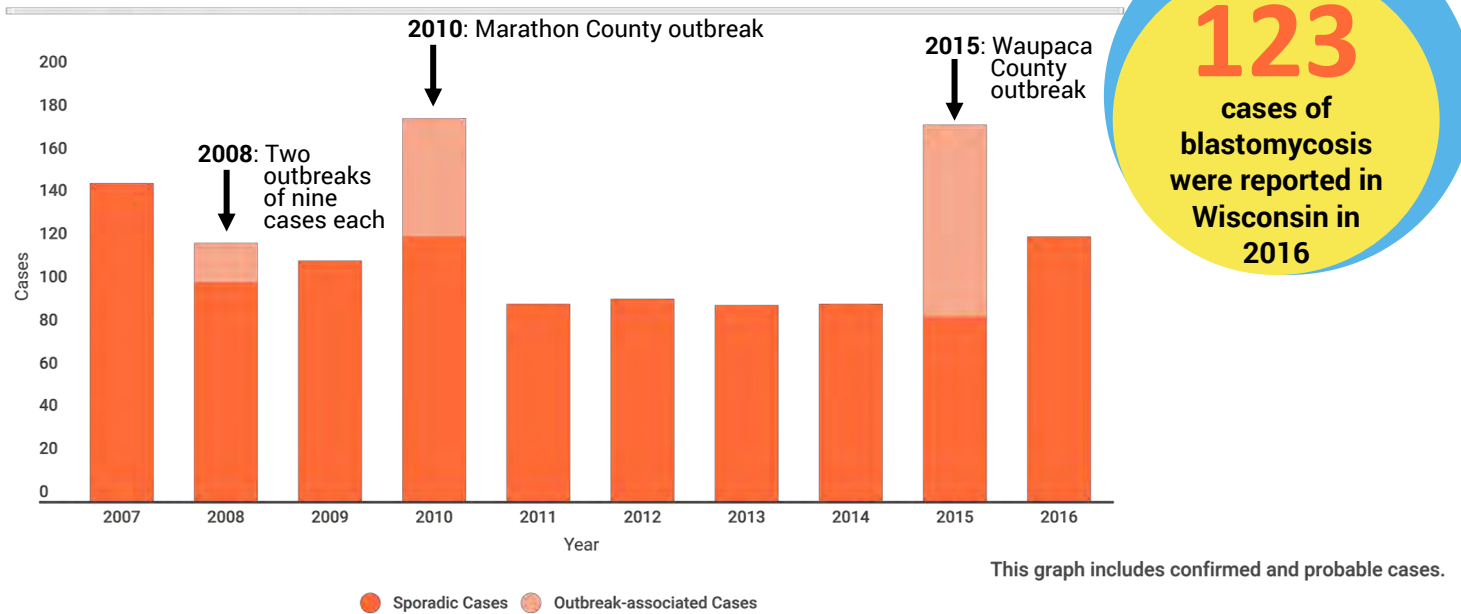
## Range of Endemic Environmental Mycotic Diseases in the U.S.\*



# 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 2007-2016



## 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

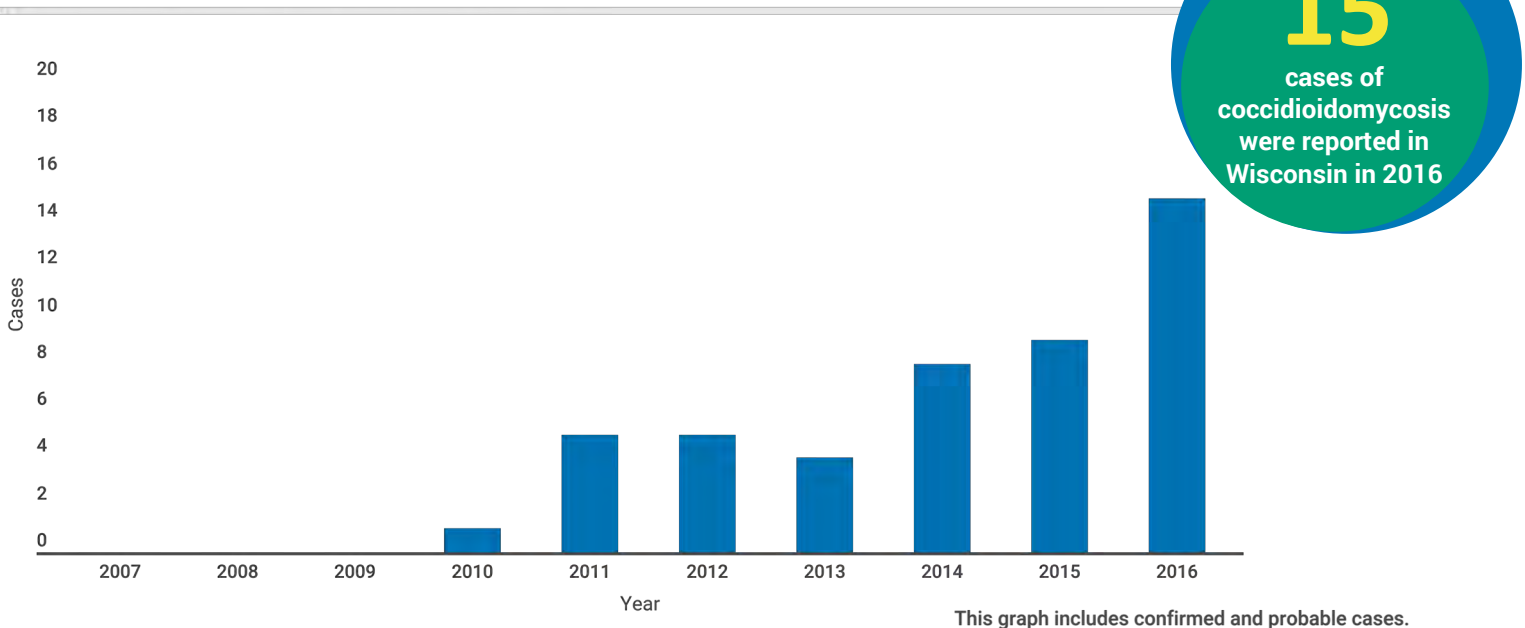
makes you more likely to get ill with blastomycosis.

## 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.

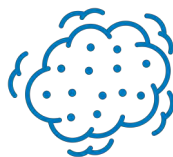
People who develop symptoms most often experience a flu-like illness, with fever, cough, headache, fatigue, rash, and muscle aches, from which they recover within several months. A small number of infected people may develop a chronic pulmonary infection or widespread disseminated infection in the brain,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

Coccidioidomycosis Cases, Wisconsin 2007-2016



### 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

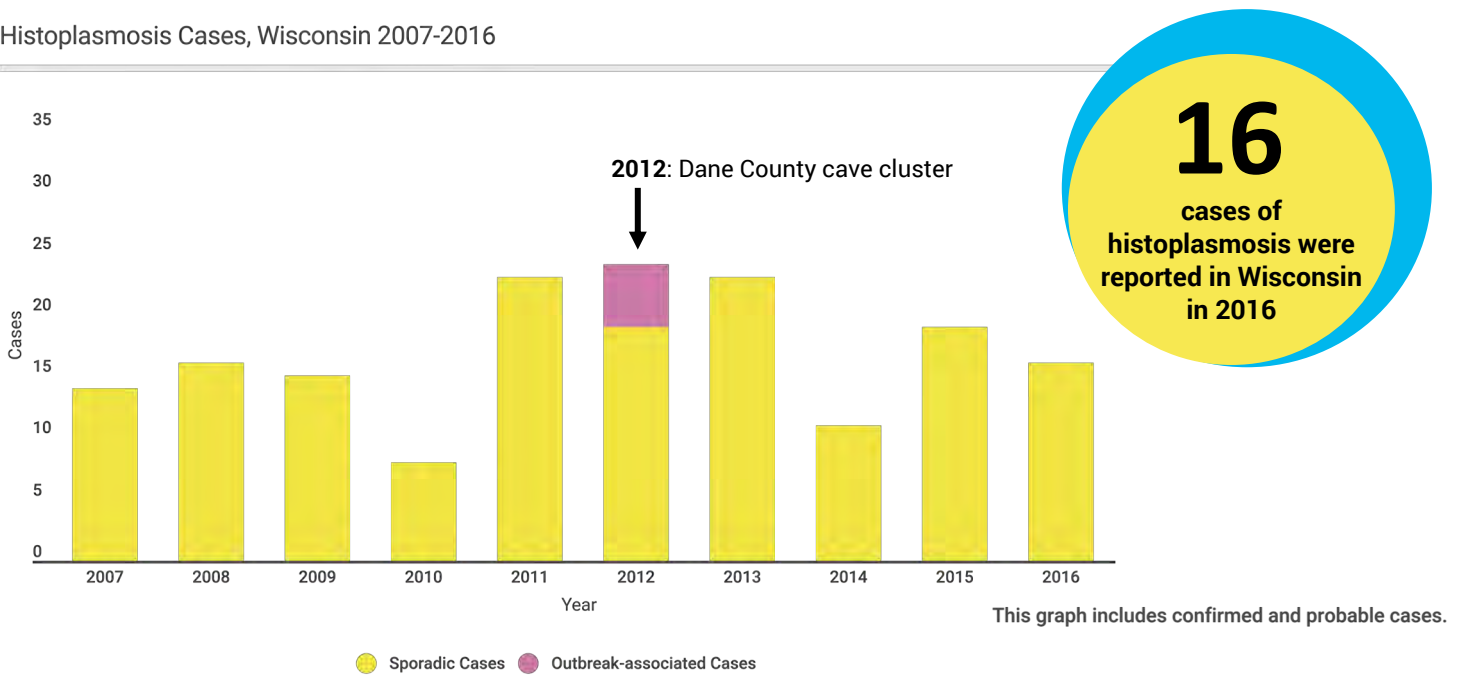
5%-10% of people who get Valley fever will develop serious or long-term problems in their lungs.

# 8.3 | HISTOPLASMOSIS

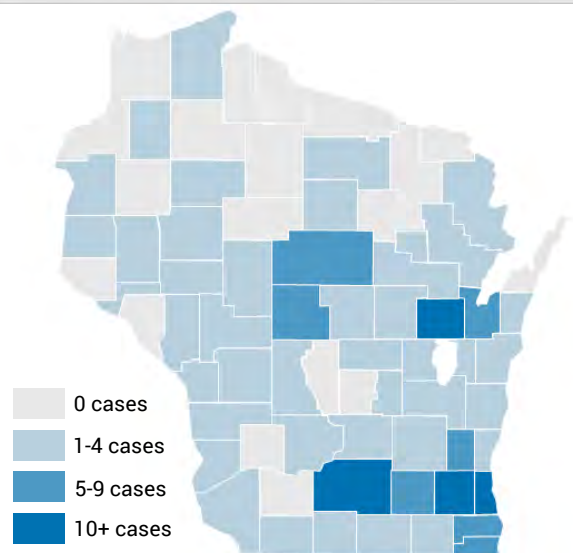
[Histoplasmosis](#) is an infection caused by a fungus called *Histoplasma*. Approximately 15 cases are reported each year in Wisconsin. Most people infected with histoplasmosis do not become ill. When a person develops symptoms, it usually involves the lungs and is characterized by weakness, chills, 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 2007-2016



Histoplasmosis Cases, Wisconsin 2007-2016



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 three reportable conditions that primarily affect the respiratory system: influenza (associated hospitalizations and pediatric deaths), legionellosis, and tuberculosis (TB). Influenza-associated hospitalizations reported through WEDSS are those influenza cases that are confirmed by PCR or rapid antigen test and result in a hospitalization.

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



# 9.1 | INFLUENZA-ASSOCIATED HOSPITALIZATIONS

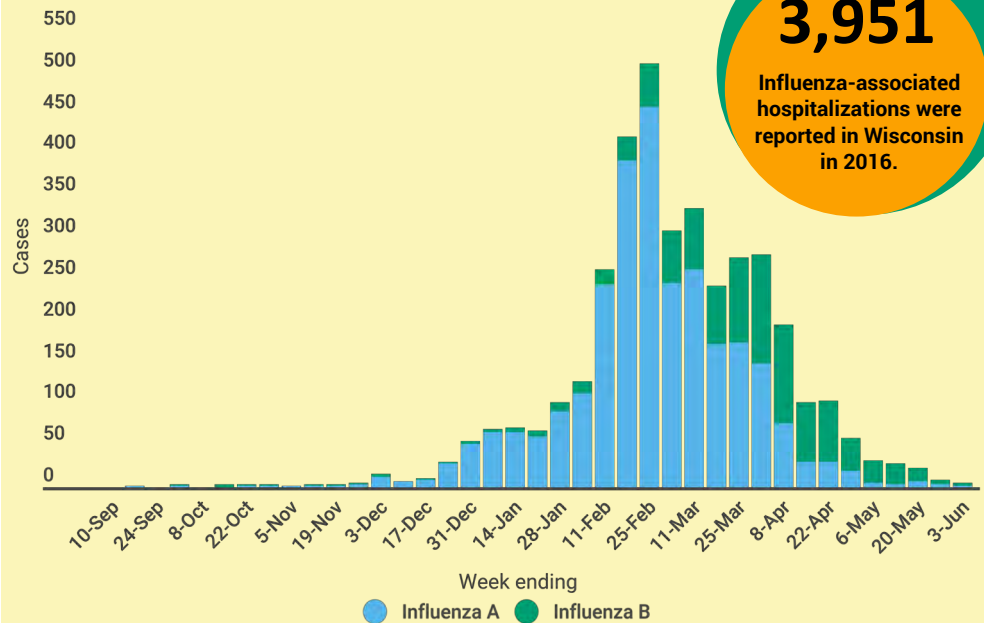
[Influenza](#) is a contagious disease caused by influenza viruses that infect the respiratory tract (nose, throat, and lungs). It can cause mild to severe illness, sometimes leading to death. Influenza symptoms often begin suddenly, with fever, headache, tiredness, dry cough, sore throat, nasal congestion, and body aches. Influenza-associated hospitalizations and pediatric deaths are reportable. There was one influenza-associated pediatric death in 2016. **Only 35% of Wisconsin residents received the influenza vaccination in the 2016-2017 influenza season.** The best way to prevent influenza is to get vaccinated each year.

**WANT MORE INFORMATION?**

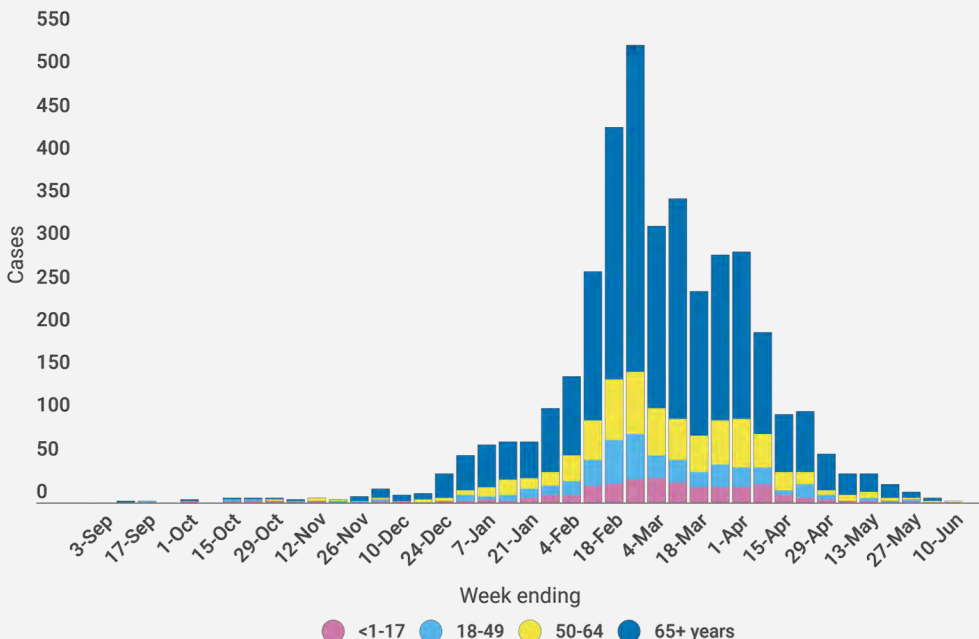


Check out our [Weekly Respiratory Report!](#) It contains state summary information and region-specific data. Seasonal influenza vaccination rates are also included.

Reported Cases of Influenza-associated Hospitalizations by Week and Type, Wisconsin 2016-2017 Influenza Season



Reported Cases of Influenza-associated Hospitalizations by Week and Age Group, Wisconsin 2016-2017 Influenza Season



**DURING THE 2016-2017 FLU SEASON,**

**65+ years**

**67% of those who had an influenza-associated hospitalization were 65 years of age or older.**

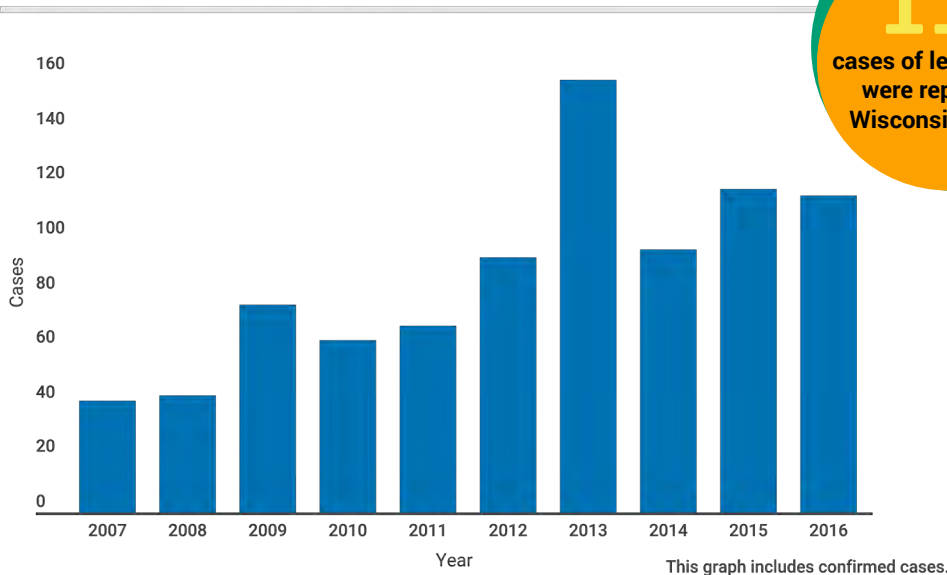
**Pregnant women**

**32 pregnant women had influenza-associated hospitalizations.**

# 9.2 | LEGIONELLOSIS

Legionellosis is an infection caused by the *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 involves 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 man-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 is contaminated with *Legionella* bacteria.

Legionellosis Cases, Wisconsin 2007-2016



## Risk factors

In 2016, 78 of the 116 (67%) legionellosis cases were current or former smokers.

## >50 years of age

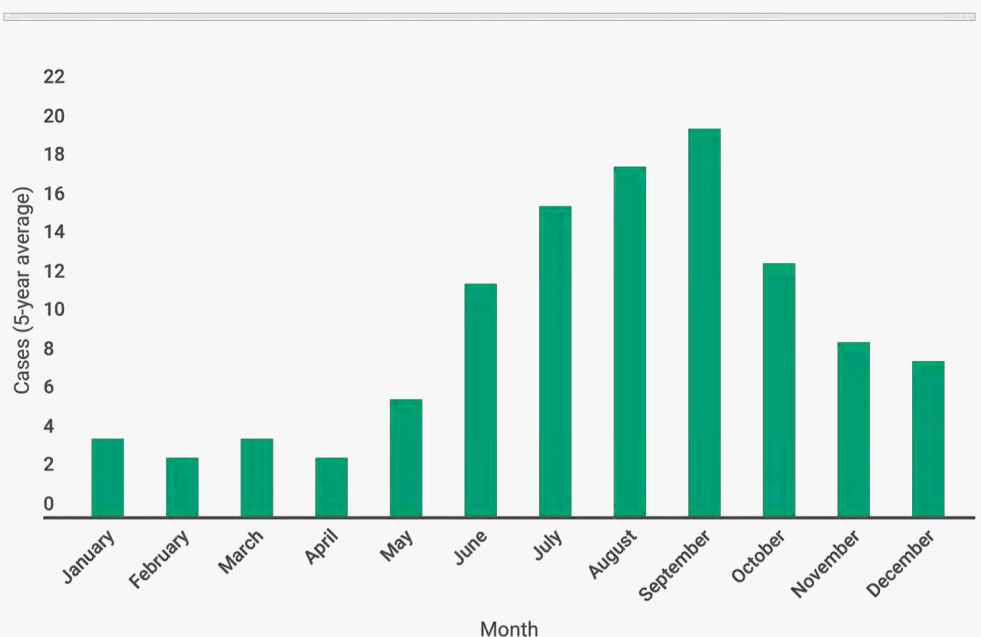
In 2016, 78% of legionellosis cases were among people 50 years and older.

## 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 2007-2016



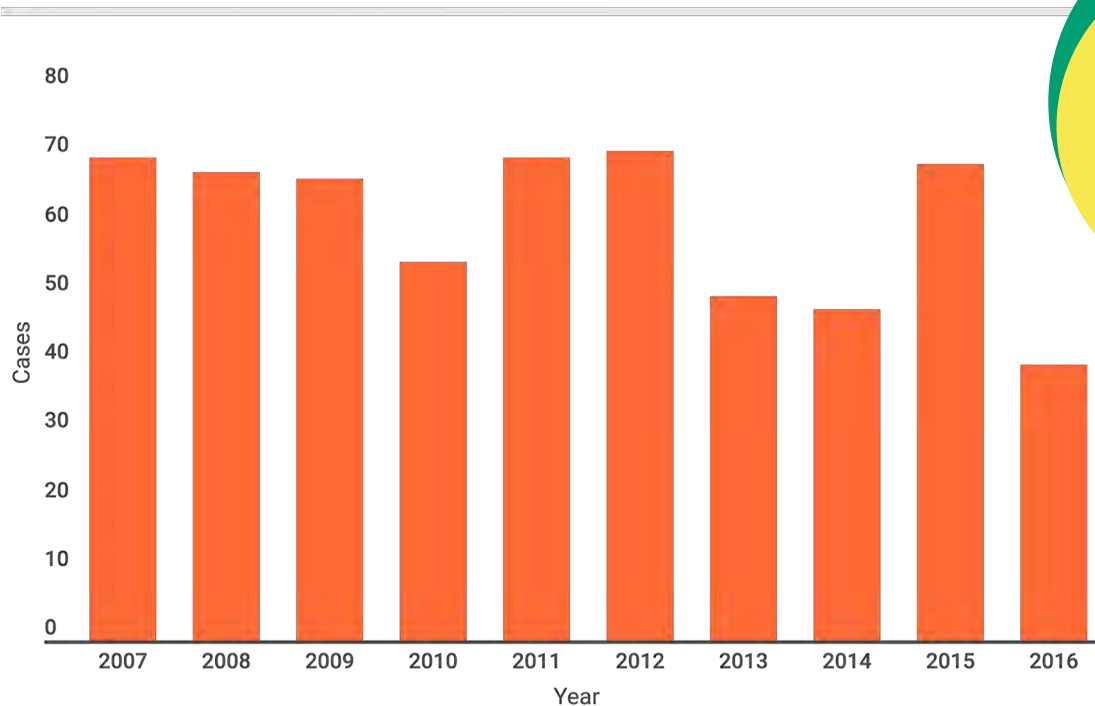
## 9.3 | TUBERCULOSIS

[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 active TB disease spreads bacteria into the air by coughing or sneezing. People with TB disease can be treated and cured if they seek medical help for their symptoms.

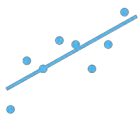
Not everyone infected with TB bacteria becomes sick. People with latent TB infection do not feel sick, do not have any symptoms, and cannot spread TB. People who have latent TB infection can take medicine so they will never develop active TB.

There were 40 patients diagnosed with TB in Wisconsin in 2016, which was the lowest number of cases in the last 10 years. Most of these patients were exposed to TB outside of the U.S. or had close contact to someone with active TB disease.

Tuberculosis Cases, Wisconsin 2007-2016



**40**  
cases of  
tuberculosis were  
reported in  
Wisconsin in 2016



### Case average

Wisconsin has had an average of 64 TB cases per year during the past 10 years.



### Multi-drug resistance

Wisconsin's rate of multi-drug resistant TB (5.2%\*) is one of the highest in the U.S., and nearly five times the national average rate.\*

\*Five-year average, 2012-2016



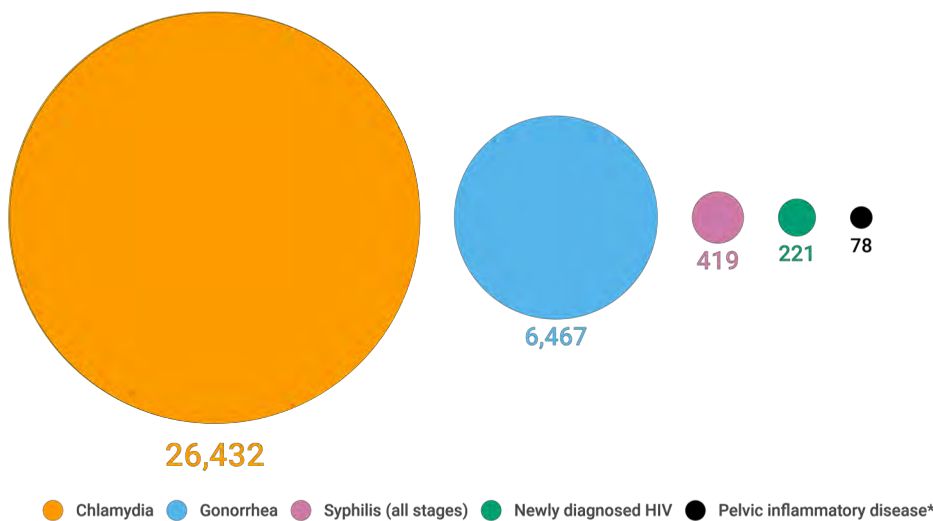
**2016**

2016 had the lowest number of TB cases in Wisconsin in over 10 years!

# 10.0 | SEXUALLY TRANSMITTED DISEASES (STDs)

DHS and CDC staff, from offices based in Madison and Milwaukee, consult with local health departments to provide disease intervention and partner service activities to patients, disease surveillance, monitoring of statistical trends, and implementation and maintenance of prevention programs. Staff provide STD 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 2016



\*Pelvic inflammatory disease (PID) case counts are not mutually exclusive from chlamydia and gonorrhea case counts. This graph includes confirmed cases for 2016.

## IN 2016:

### Ages affected

64% of reported STDs were among youth 15-24 years of age.

### Women and STDs

Women accounted for 65% of the 21,411 reported cases of chlamydia and gonorrhea.

## STD FAST FACTS

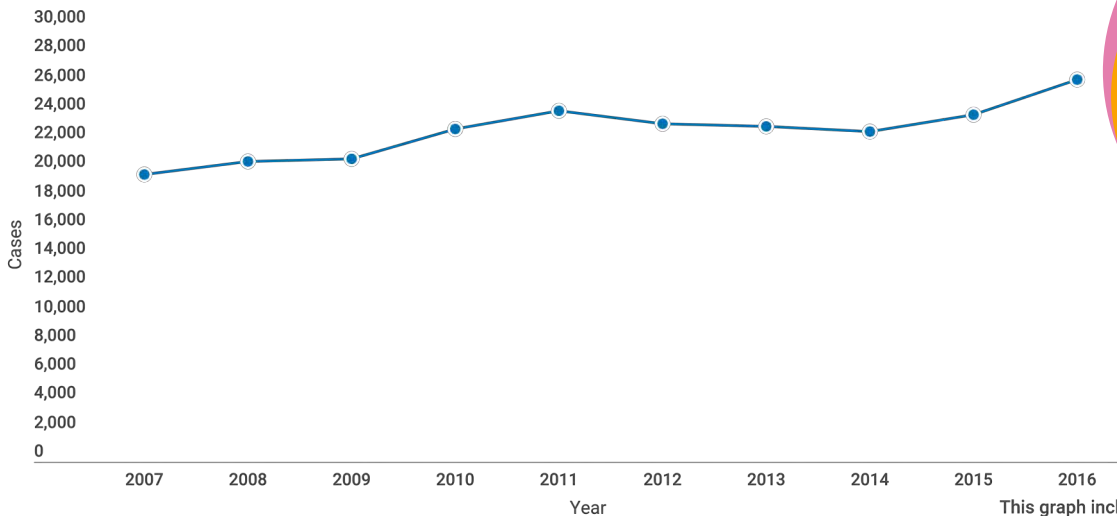
### In Wisconsin:

- More STDs are reported than all other reportable communicable diseases combined.
- Chlamydia is the most commonly reported infection.
- PID is a complication of untreated STDs and other infections.
- Having an STD 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 (STD) 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.

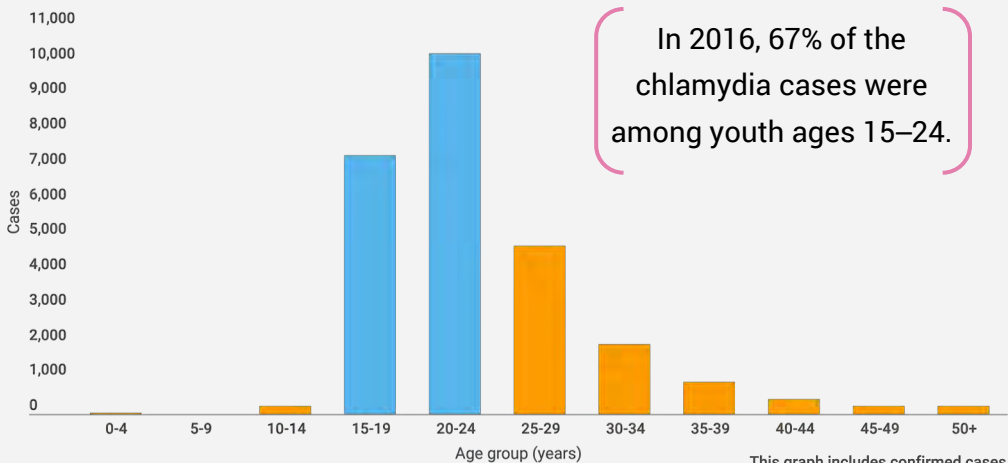
Chlamydia Cases, Wisconsin 2007-2016



**26,432**  
cases of chlamydia  
were reported in  
Wisconsin in 2016

This graph includes confirmed cases.

Chlamydia Cases by Age, Wisconsin 2016



In 2016, 67% of the chlamydia cases were among youth ages 15–24.

This graph includes confirmed cases.

Chlamydia Cases by Sex, Wisconsin 2016



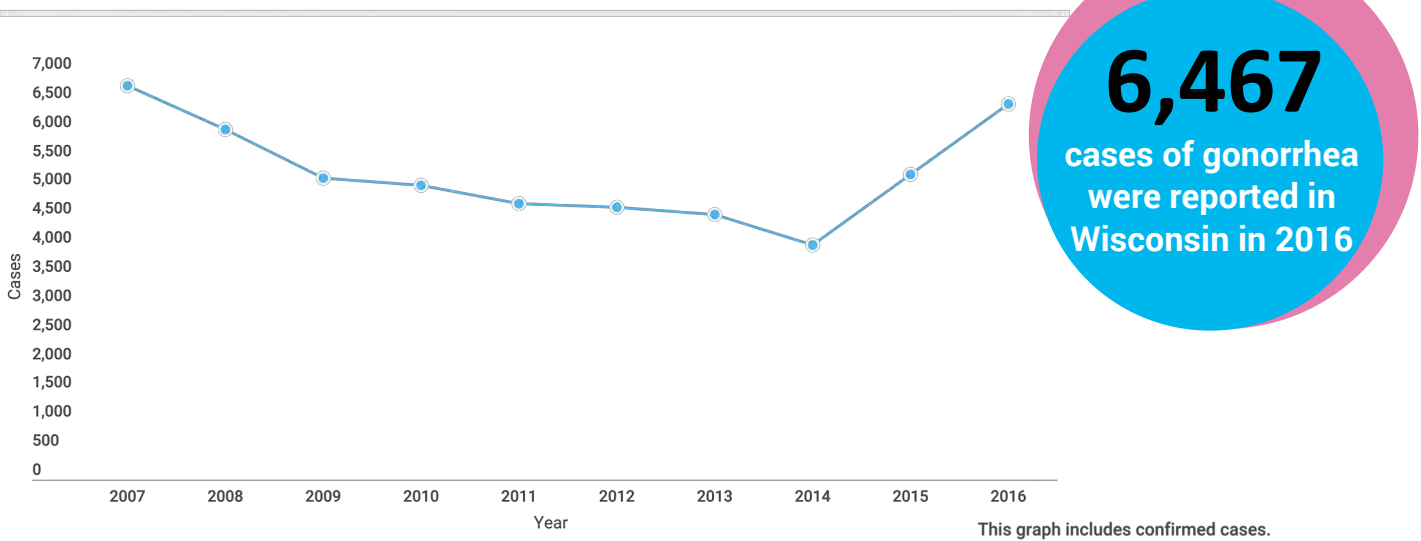
**69% Female**  
**31% Male**



# 10.2 | GONORRHEA

[Gonorrhea](#) is a sexually transmitted disease (STD) 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. Most cases of gonorrhea can be treated effectively with two antibiotics taken at the same time. However, 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 \(SURRG\)](#).

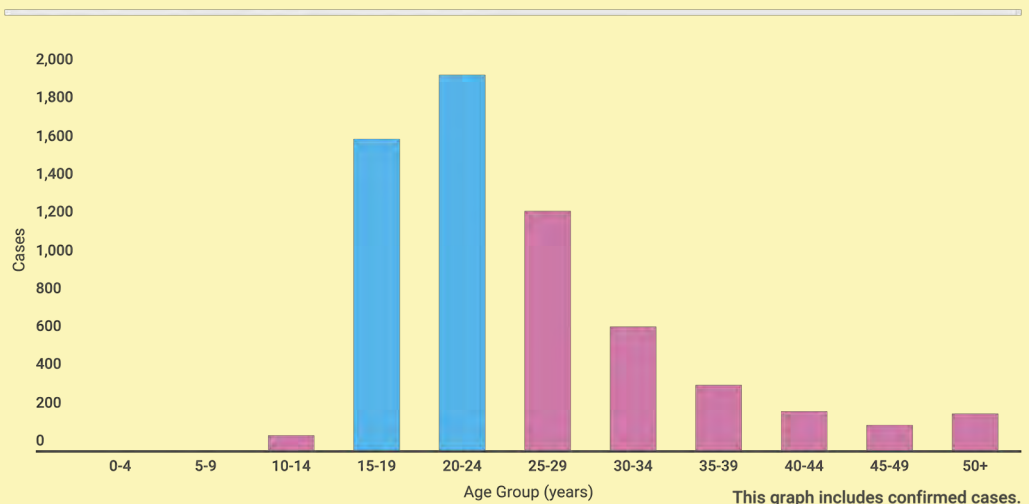
Gonorrhea Cases, Wisconsin 2007-2016



## Ages affected

**In 2016, 56% of confirmed gonorrhea cases were reported among youth 15–24 years of age.**

Gonorrhea Cases By Age Group, Wisconsin 2016

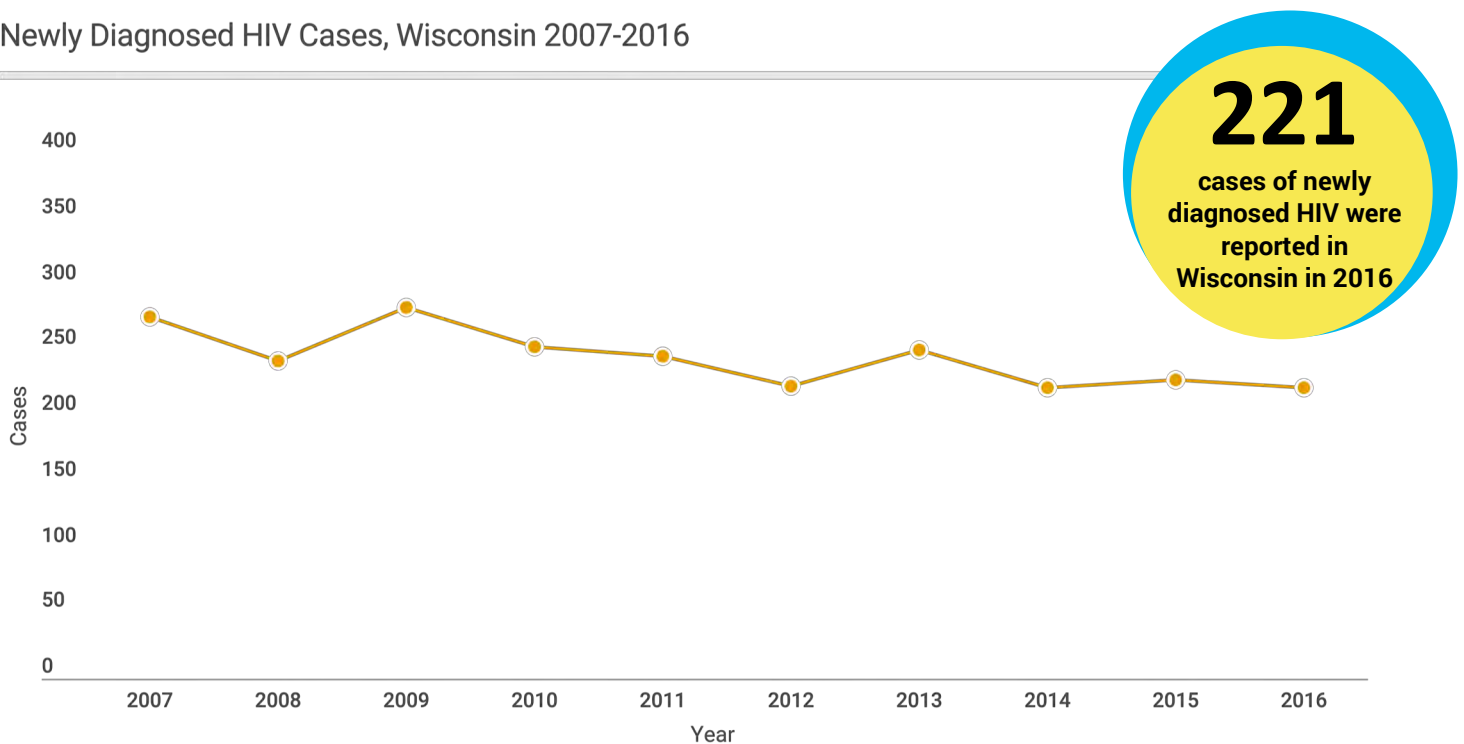


# 10.3 | HIV

[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 2016, 221 people were newly diagnosed with HIV in Wisconsin. Between 2007 and 2016, 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 and 2016) to a high of 283 (2009), with an average of 244 new diagnoses per year. The HIV diagnosis rate in Wisconsin was the 11th lowest among the 50 states in 2015.

Newly Diagnosed HIV Cases, Wisconsin 2007-2016



## In 2016:



### Care continuum

**71% of people living with HIV in Wisconsin received some medical care, 54% had two or more care visits, and 64% were virally suppressed.**



### Racial and ethnic disparities

**65% of new HIV diagnoses were among racial and ethnic minorities, despite minorities making up only 17% of Wisconsin's population.**



### Case attribution

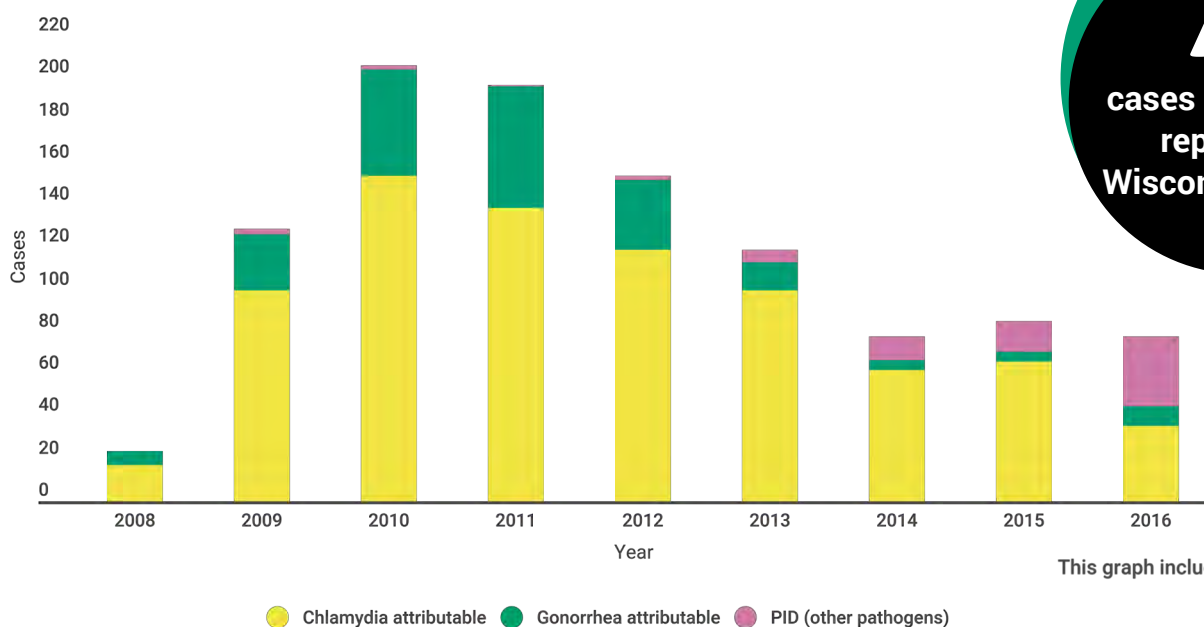
**80% of new diagnoses were attributed to male-male sexual contact.**



# 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 STDs, 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 2008-2016

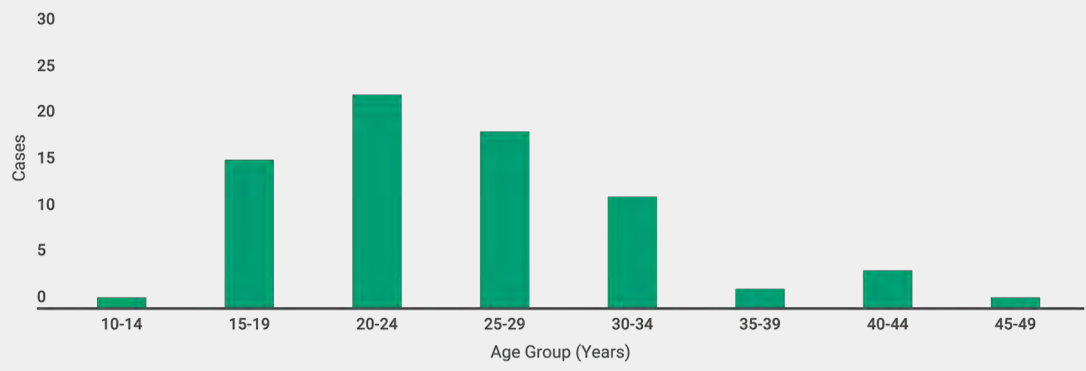


**78**  
cases of PID were reported in Wisconsin in 2016

## Causes

In 2016, 58% of all PID cases were caused by chlamydia or gonorrhea infections.

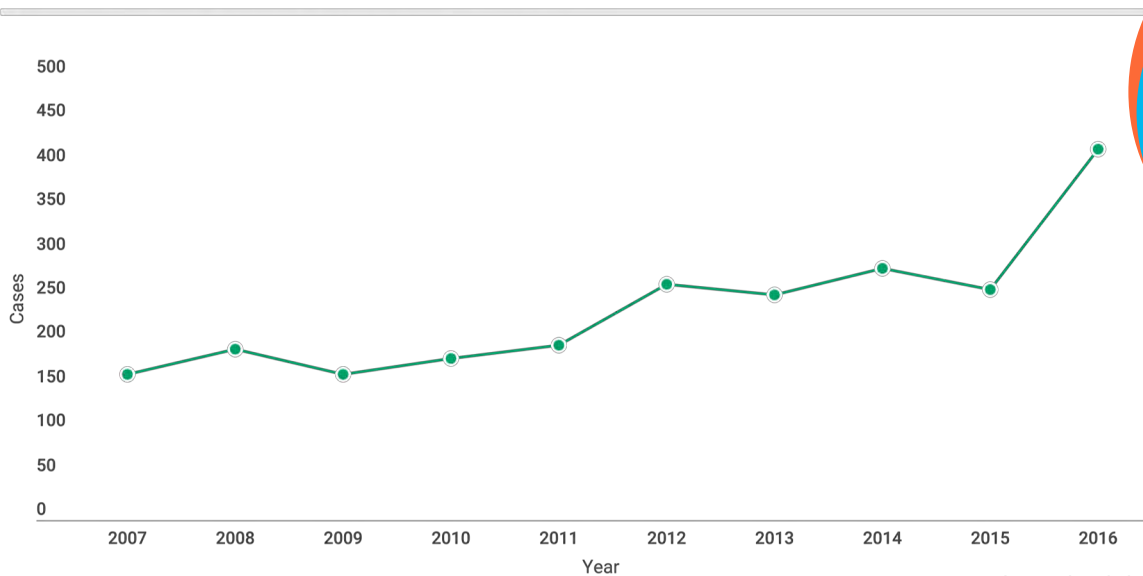
PID Cases By Age Group, Wisconsin 2016



# 10.5 | SYPHILIS

Syphilis is an STD 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. The signs and symptoms of primary and secondary syphilis can be mild and may not be noticed. 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 2007-2016



**419**  
cases of syphilis  
were reported in  
Wisconsin in 2016

This graph includes confirmed cases.

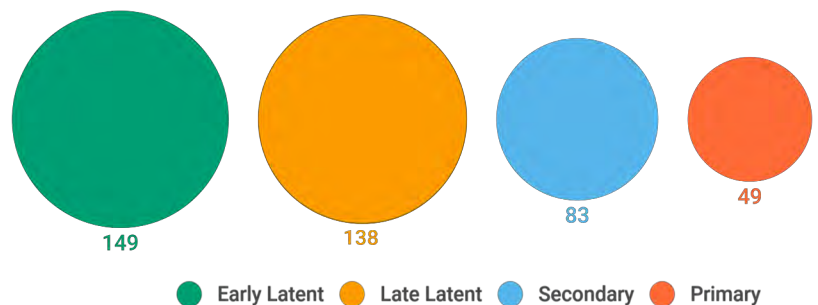
## IN 2016:

Cases by reported sex

87% of syphilis cases  
were among men.



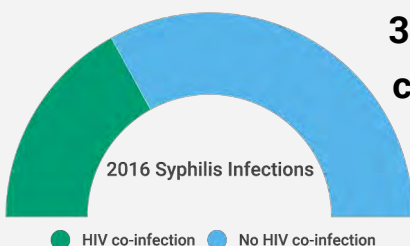
Cases of Syphilis by Stage, Wisconsin 2016



This graph includes confirmed cases.

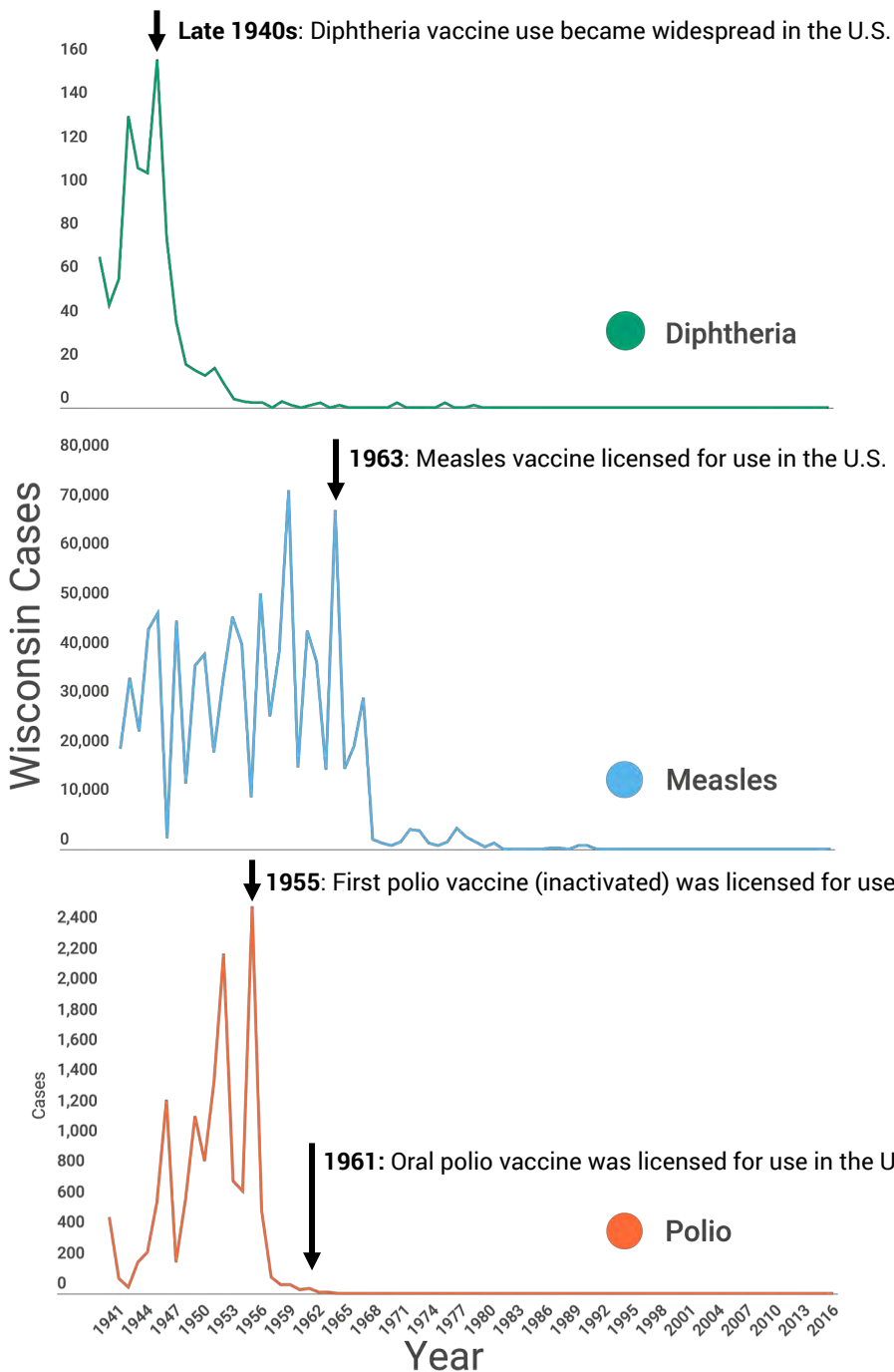
## HIV co-infections

34% of syphilis  
cases also had  
an HIV  
infection.



# I I.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, and varicella.



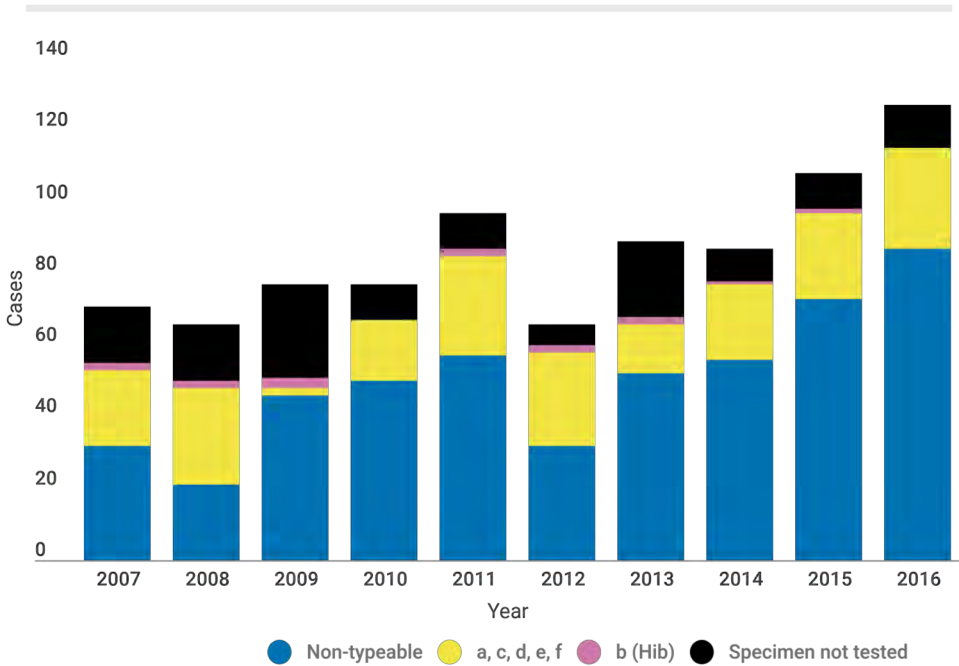
Before vaccines, many children died from diseases like diphtheria, measles, and polio. Through the introduction of routine vaccinations, these and other vaccine-preventable diseases occur much less often in the U.S. However, the viruses and bacteria that cause these diseases still exist. Vaccinations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



# I.I. | 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 epiglottitis (inflammation of and swelling of the cartilage that covers the windpipe). There are many different strains or types of *H. influenzae*, including type 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.

Invasive *Haemophilus influenzae* Cases by Serotype, Wisconsin 2007-2016



**127**  
cases of *Haemophilus influenzae* invasive disease and 0 cases of Hib were reported in Wisconsin in 2016



## Blood

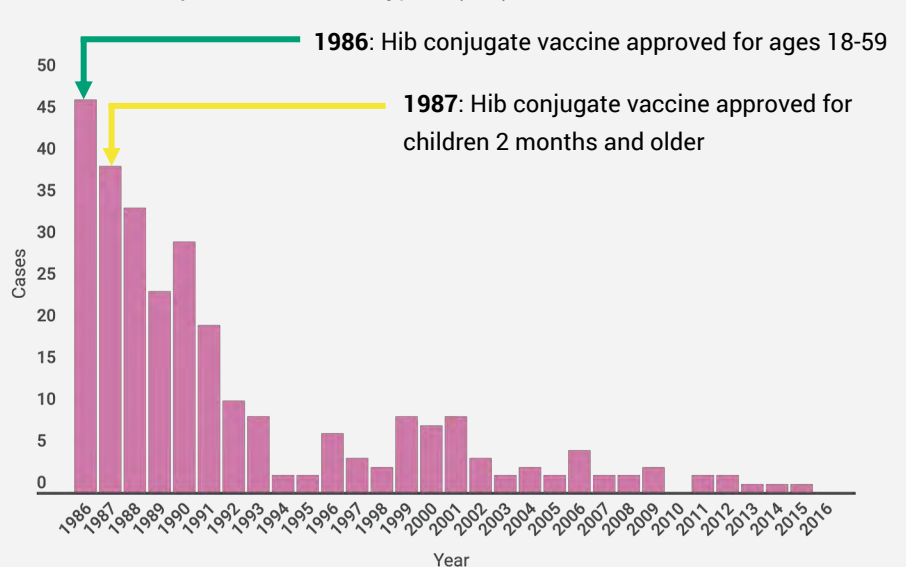
Over 90% of invasive *H. influenzae* cases had the bacteria isolated from blood.



## 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.

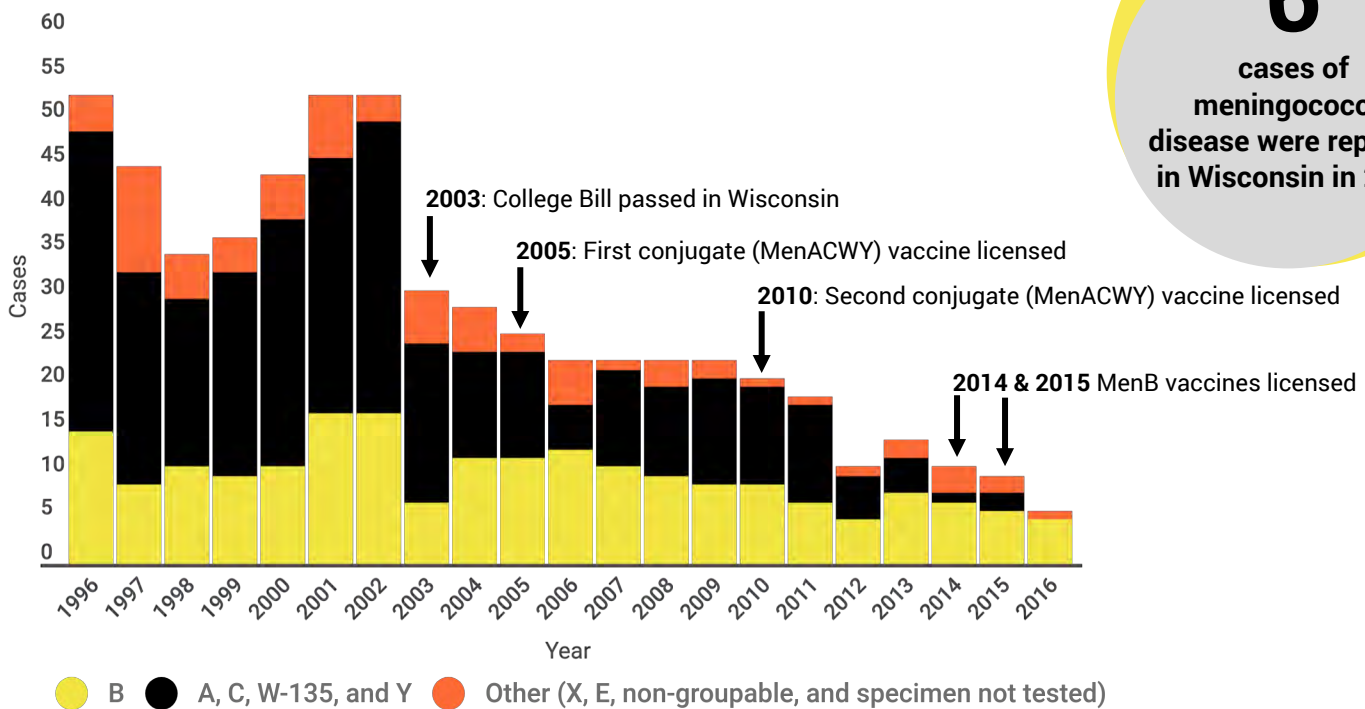
Invasive *Haemophilus influenzae* type b (Hib) Cases, Wisconsin 1986-2016



# I I.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-135, and Y. There are vaccines available to prevent these five strains.

Meningococcal Disease Cases by Serogroup, Wisconsin 1996-2016



6

cases of meningococcal disease were reported in Wisconsin in 2016



## 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.



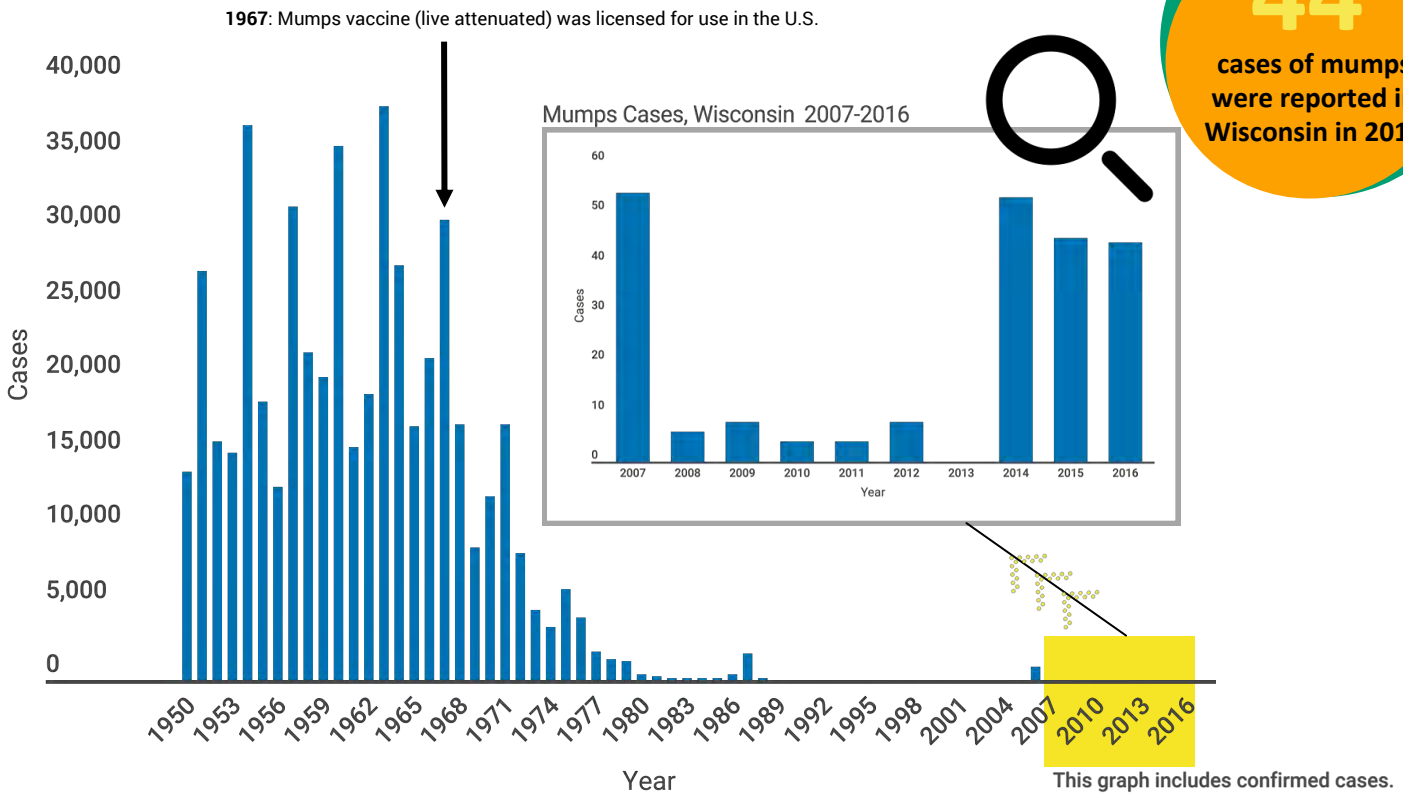
## Vaccines

Two conjugate vaccines protect against serogroups A, C, W-135, and Y (MenACWY). Two additional vaccines protect against serogroup B (MenB).

# I I.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 through 15 months of age, and the second dose at 4 through 6 years of age.

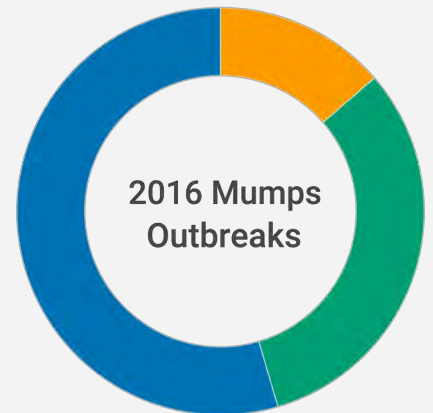
Mumps Cases, Wisconsin 1950-2016



**44**  
cases of mumps  
were reported in  
Wisconsin in 2016

## 2016 CASE BREAKDOWN

- 44 confirmed mumps cases were reported among Wisconsin residents in 10 counties.
- Two of the 44 cases were hospitalized.
- 20 of the 44 cases (45%) were associated with two outbreaks:
  - Outbreak #1 included six cases in the Milwaukee area.
  - Outbreak #2 occurred among 14 UW-Platteville students and others in the community.

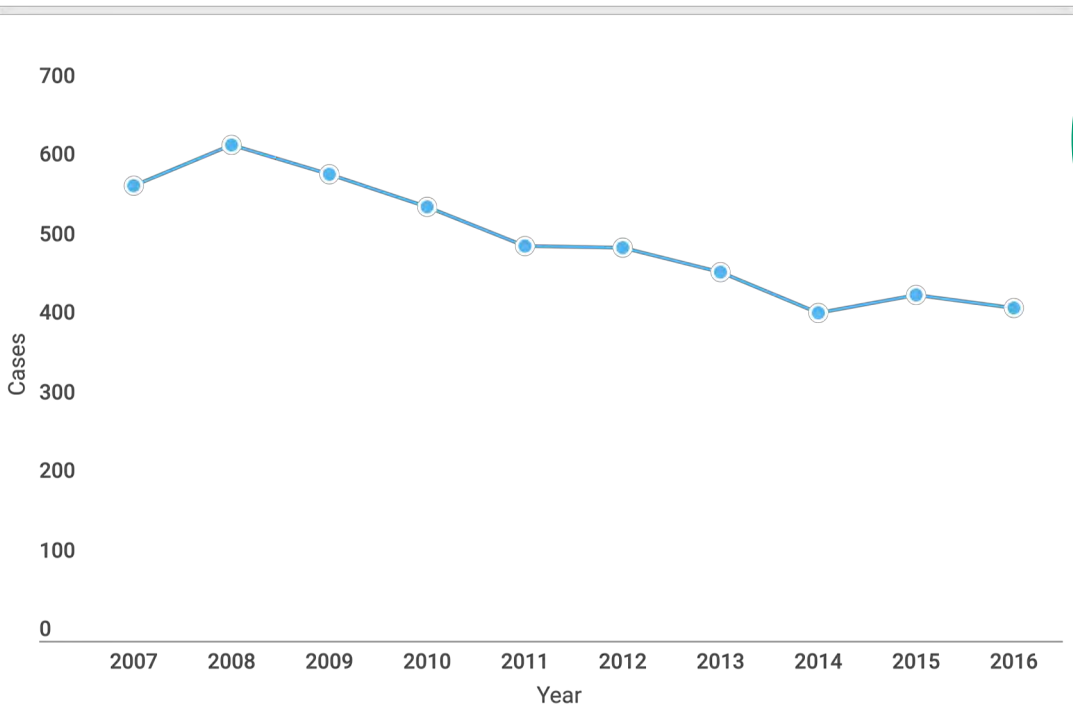


- Milwaukee area outbreak
- Case not associated with an outbreak
- UW- Platteville student and community outbreak

# I.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.

Streptococcus pneumoniae Invasive Disease Cases, Wisconsin 2007-2016



**422**  
cases of *Streptococcus pneumoniae* invasive disease were reported in Wisconsin in 2016



## Vaccines

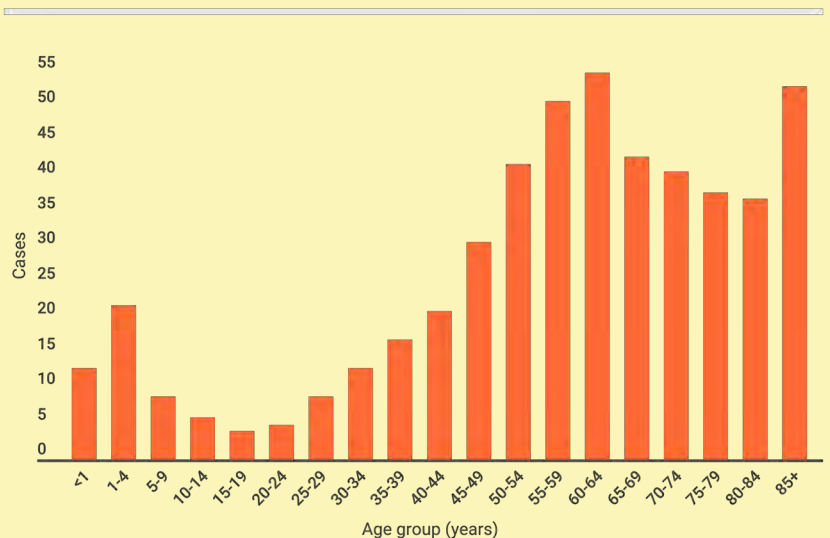
There are two vaccines for *Streptococcus pneumoniae*. Children under 5 years of age and adults over the age of 65 are routinely recommended to receive this vaccine.

## Time of year



The lowest number of cases of *Streptococcus pneumoniae* occur during June through September.

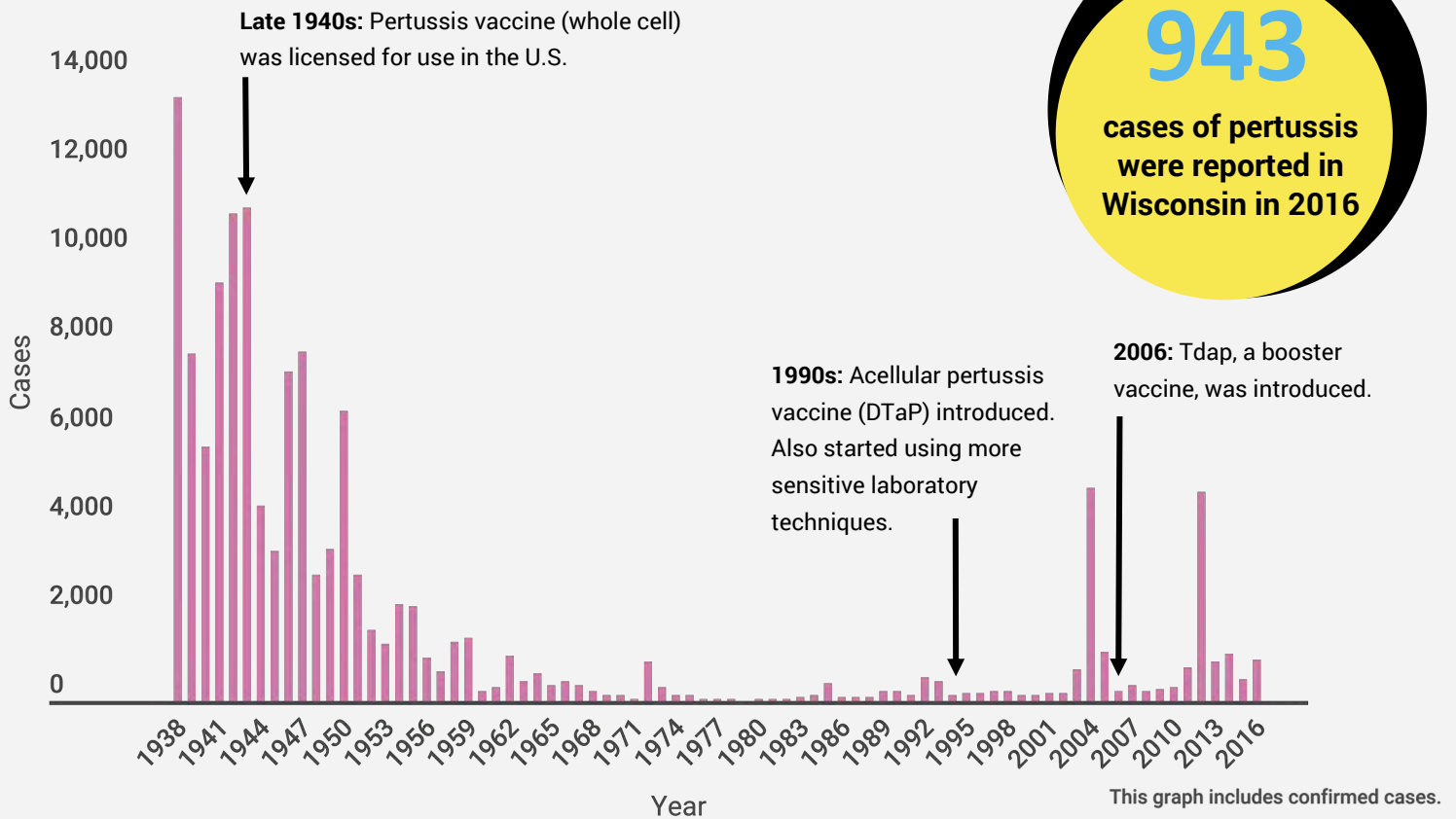
Streptococcus pneumoniae Invasive Disease Cases, Wisconsin 2007-2016



# I I.5 | PERTUSSIS (WHOOPING COUGH)

**Pertussis** is a serious bacterial respiratory illness caused by the bacterium *Bordetella pertussis*. Pertussis can infect persons 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,” and vomiting and exhaustion after coughing fits. People with pertussis usually spread the disease to another person by coughing or sneezing, or when spending a lot of time near one another when they share breathing space. 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 2007-2016



## 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

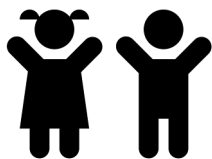
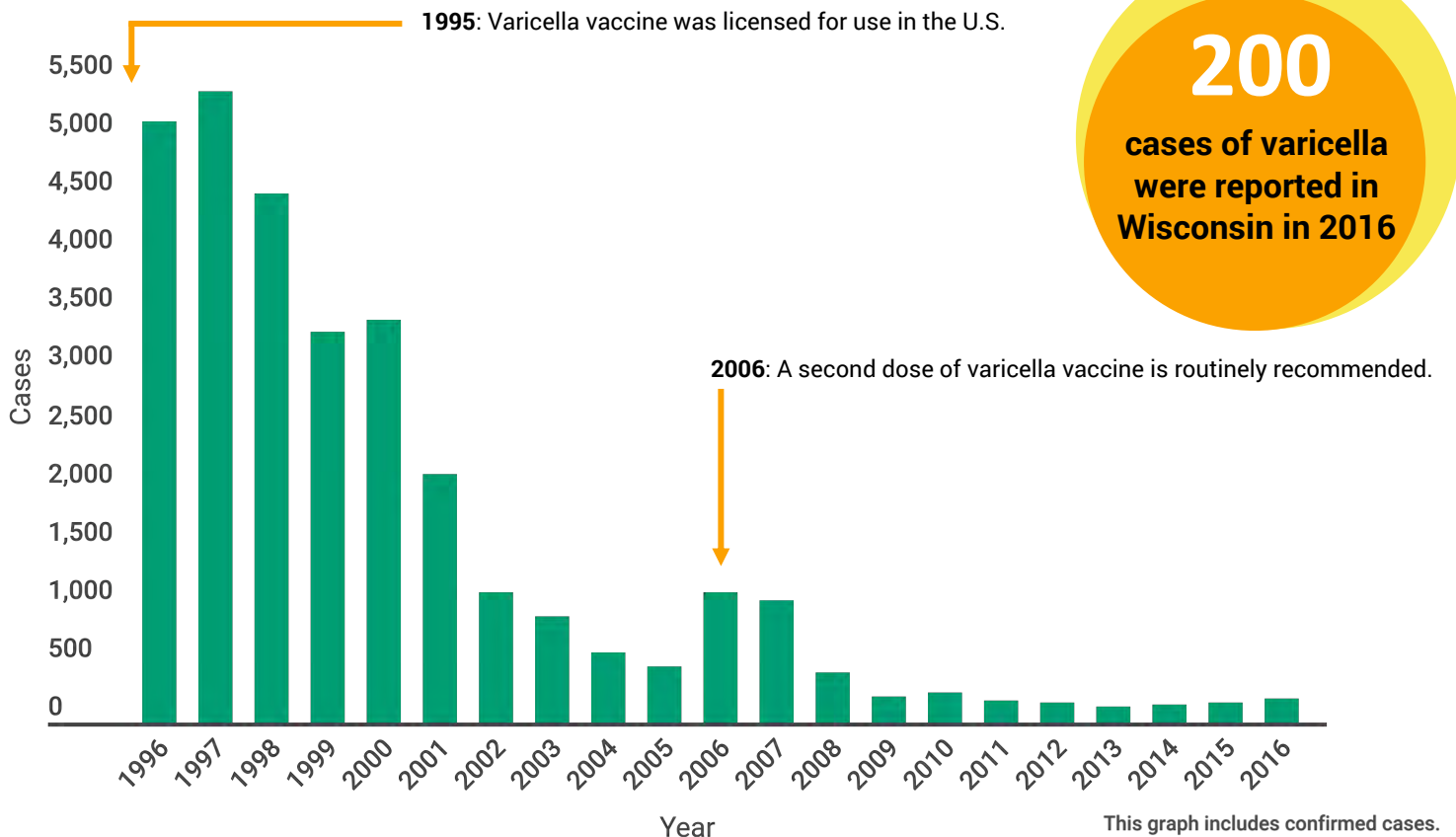
**Getting family members vaccinated against pertussis provides babies with a cocoon of protection until they're old enough to get the pertussis vaccine themselves.**



# I I.6 | 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 stomach, 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 1996-2016



## Percentage vaccinated

Of all Wisconsin children who turned 6 years old in 2016, 78% were up to date on their varicella vaccination, or had chickenpox in the past and were immune.



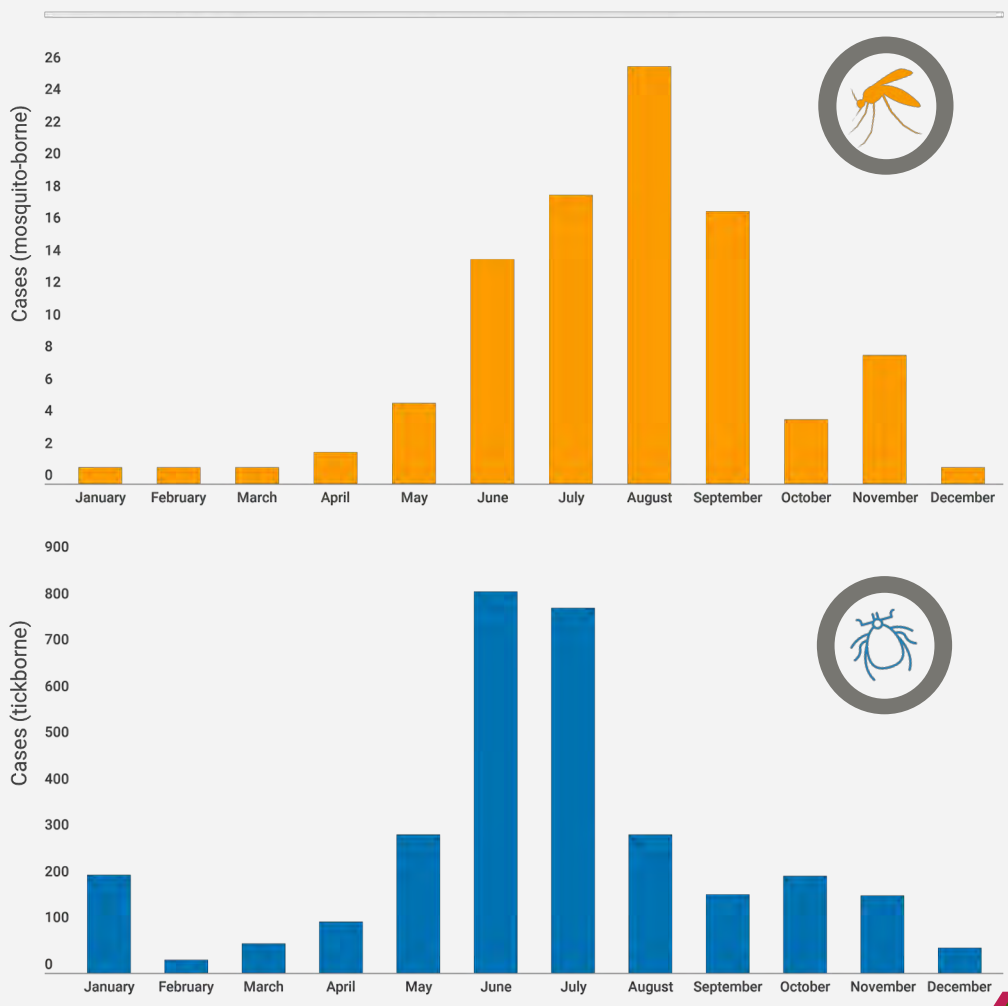
## Chickenpox parties

Chickenpox parties are held to intentionally expose a child with chickenpox to other children, in hopes that they will get the disease. However, chickenpox can cause serious complications. The best way to prevent it is to vaccinate children on time.

# 12.0 | VECTORBORNE DISEASES

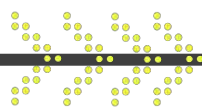
Vectors are organisms that can spread infectious diseases between humans or from animals to humans. Many vectors are bloodsucking insects or arthropods, which consume disease-producing microorganisms during a blood meal from an infected host (human or animal) and later expose a new host to these microorganisms during their next blood meal. Vectorborne diseases in Wisconsin include those spread by ticks and mosquitoes. Some of these diseases have been in Wisconsin for decades, while some have recently emerged or increased, and others are imported into the state only after travel to endemic 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 vectorborne diseases included in this report are: babesiosis, California serogroup viruses, ehrlichiosis/anaplasmosis, Lyme disease, malaria, Powassan virus infection, Rocky Mountain spotted fever, West Nile virus infection, and Zika virus infection.

Mosquito-borne and Tickborne Illnesses by Month, Wisconsin 2016



## Seasonality

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

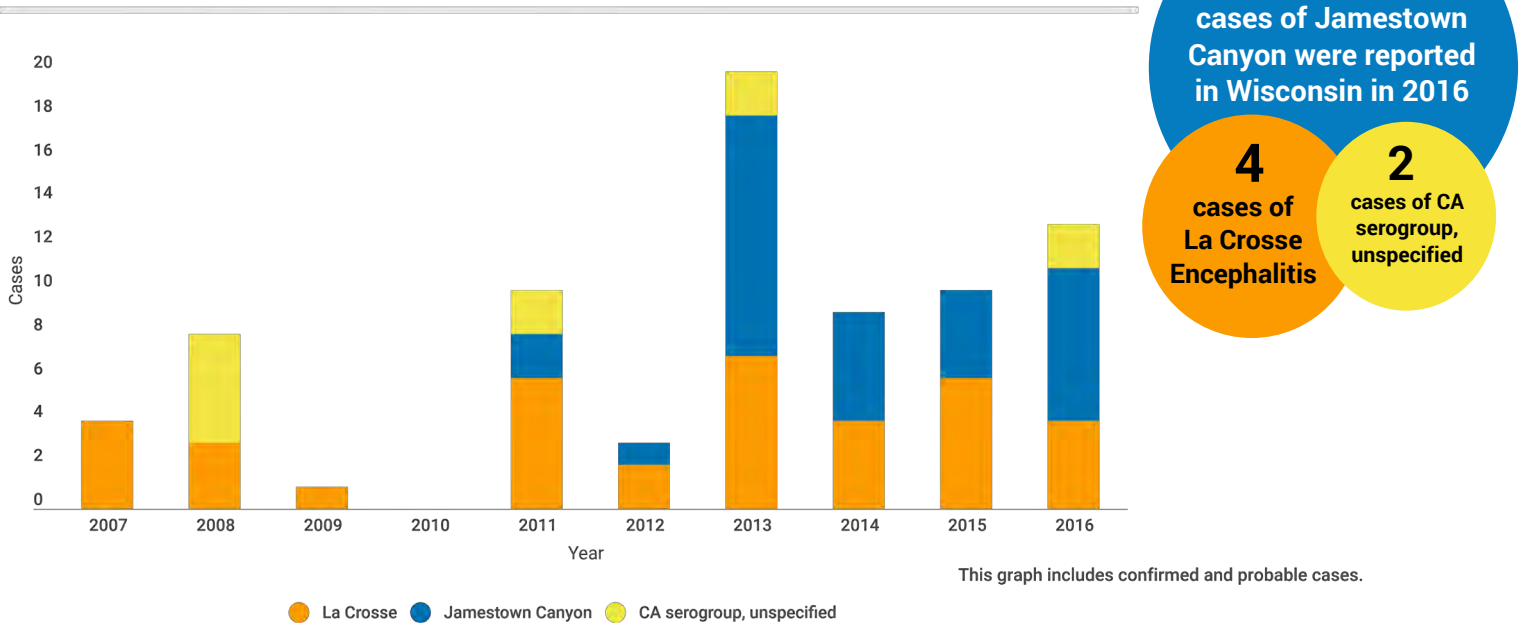


# 12.1 | CALIFORNIA SEROGROUP VIRUSES

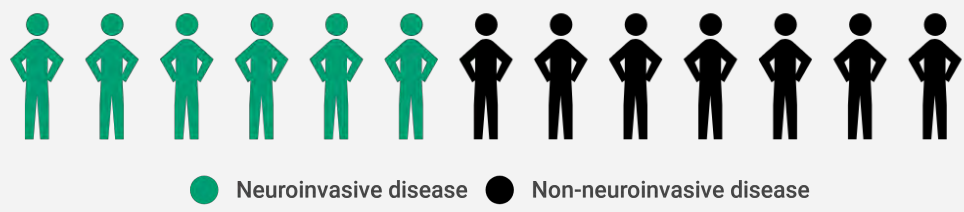
[California serogroup viruses](#), including Jamestown Canyon and La Crosse viruses, are mosquito-borne arboviruses that are reportable in Wisconsin. An arbovirus (arthropod-borne virus) is any virus transmitted by mosquitoes, ticks, or other arthropods. In Wisconsin, these arboviral infections are spread by certain species of *Ochlerotatus* and *Anopheles* mosquitoes. People who are sick with California serogroup viruses may or may not have any symptoms. When present, symptoms may include fever, headache, nausea, vomiting, encephalitis (swelling of the brain), or meningoencephalitis (swelling of the brain and surrounding tissues).

**Wisconsin had 13 reported cases of California serogroup viruses in 2016.**

California Serogroup Virus Cases, Wisconsin 2007-2016



## CASE BREAKDOWN



**NEUROINVASIVE DISEASE.** There were six cases of California serogroup virus neuroinvasive disease in 2016. Neuroinvasive disease typically includes a fever with altered mental status, meningitis, encephalitis, acute flaccid paralysis, or other signs of neurological dysfunction.

**NON-NEUROINVASIVE DISEASE.** There were seven cases of California serogroup virus non-neuroinvasive disease in 2016. Non-neuroinvasive disease typically includes a fever with less severe symptoms including a stiff neck, headache, muscle aches, or rash.

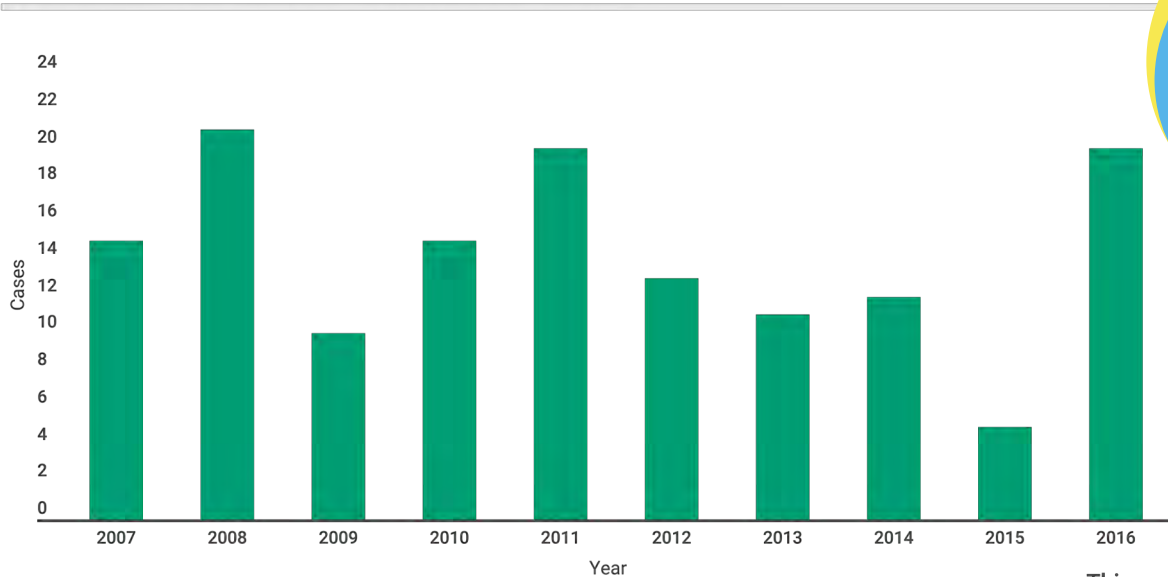
# 12.2 | MALARIA

**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 2007 and 2016. All were reported in people who traveled to a malaria-endemic country.

Travel-associated Malaria Cases, Wisconsin 2007-2016



**20**  
cases of malaria  
were reported in  
Wisconsin in  
2016

This graph includes confirmed cases.



## Travel destination

In 2016, Wisconsin residents got malaria in Central Africa (4), East Africa (6), Western Africa (6), and Central America (4).



## Endemic areas

In 2015, 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.

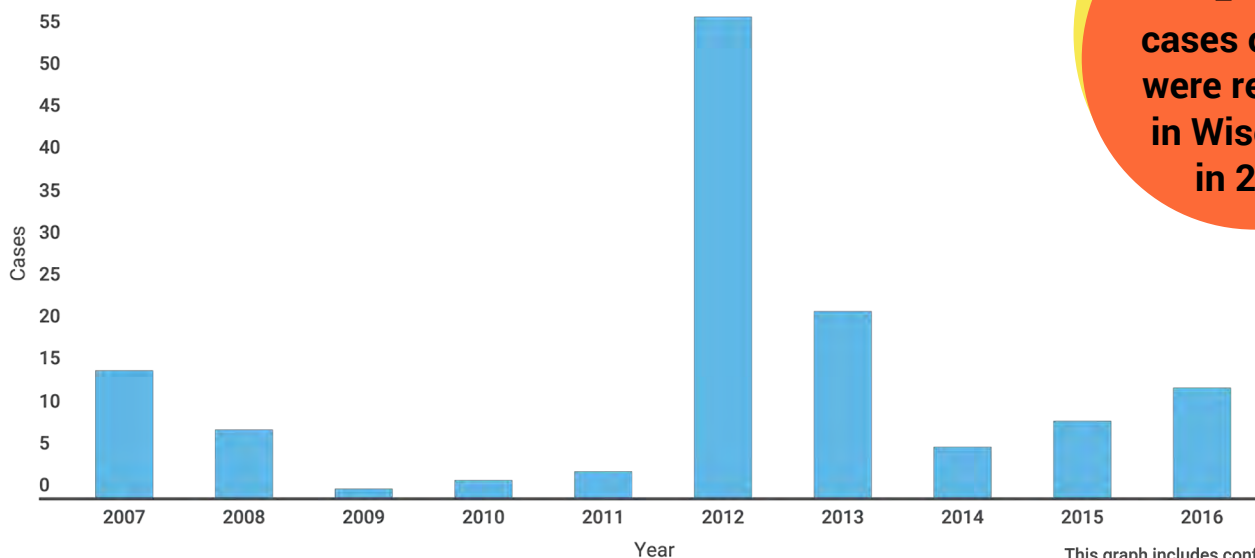
# I 2.3 | WEST NILE VIRUS INFECTION

[West Nile virus \(WNV\)](#) is an arbovirus that is transmitted by the bite of an infected 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 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 2007-2016



**13**  
cases of WNV  
were reported  
in Wisconsin  
in 2016

This graph includes confirmed and probable cases.



## 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 in August and September.**

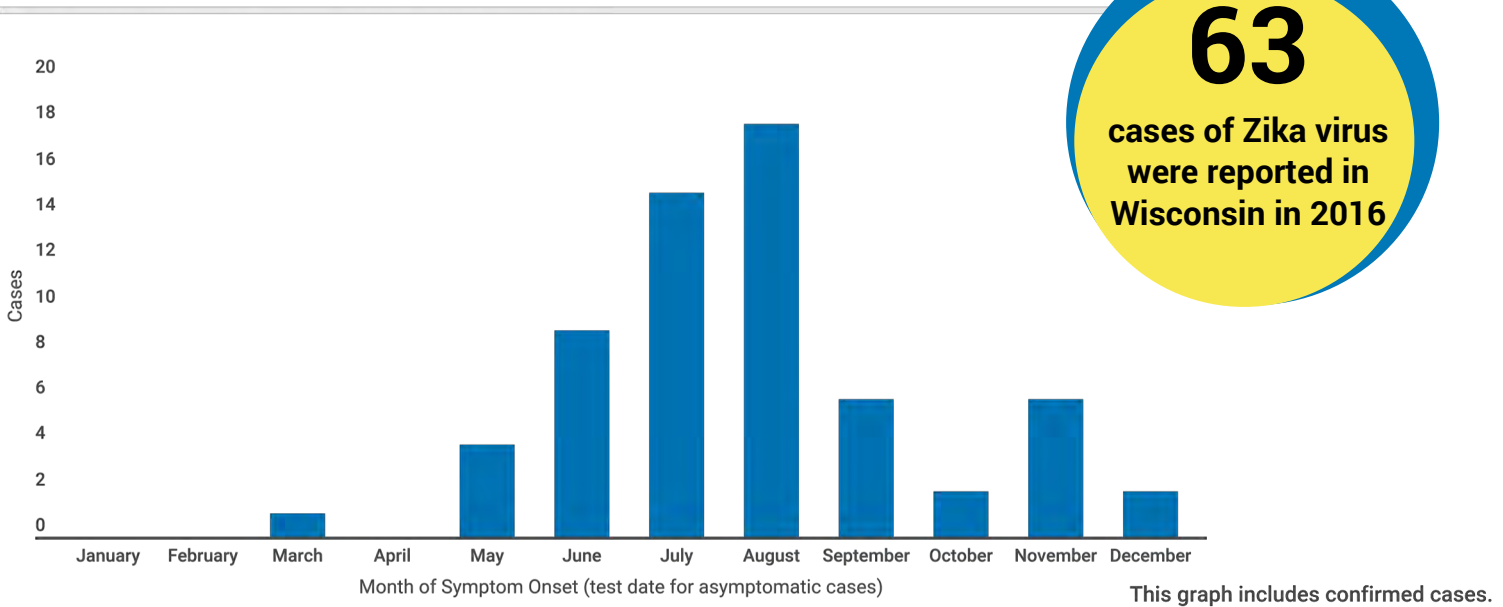
# 12.4 | ZIKA VIRUS

[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 his or her 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.

Travel-associated Zika Virus Cases, Wisconsin 2016



## Travel exposure

In 2016, Wisconsin travelers who tested positive for Zika reported exposures from 14 different countries outside the U.S. as well as Miami, Florida.



## Zika and pregnancy

Zika can be passed from a pregnant woman to her baby anytime during pregnancy. Approximately 1 in 12 Zika-infected moms have babies with birth defects.



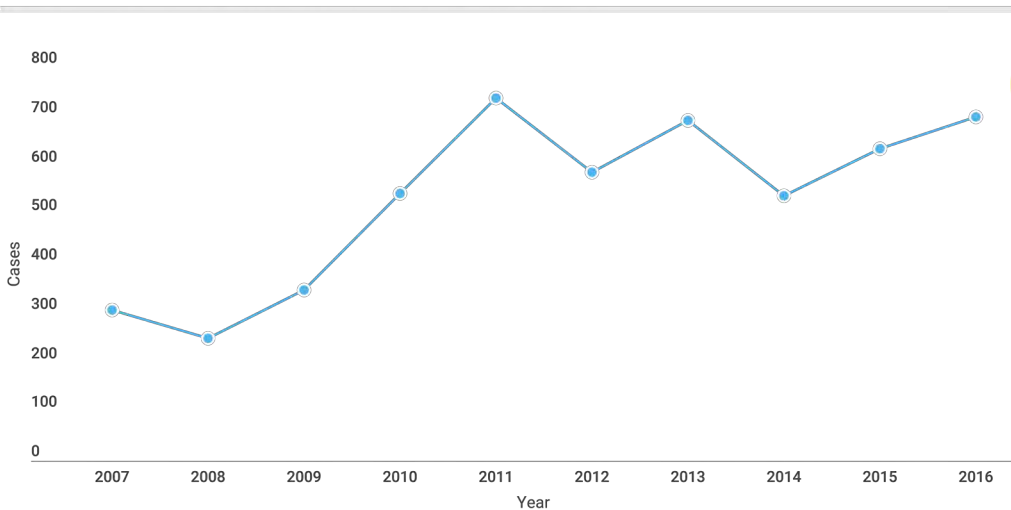
## Aedes mosquito

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

# 12.5 | ANAPLASMOSIS & EHRLICHIOSIS

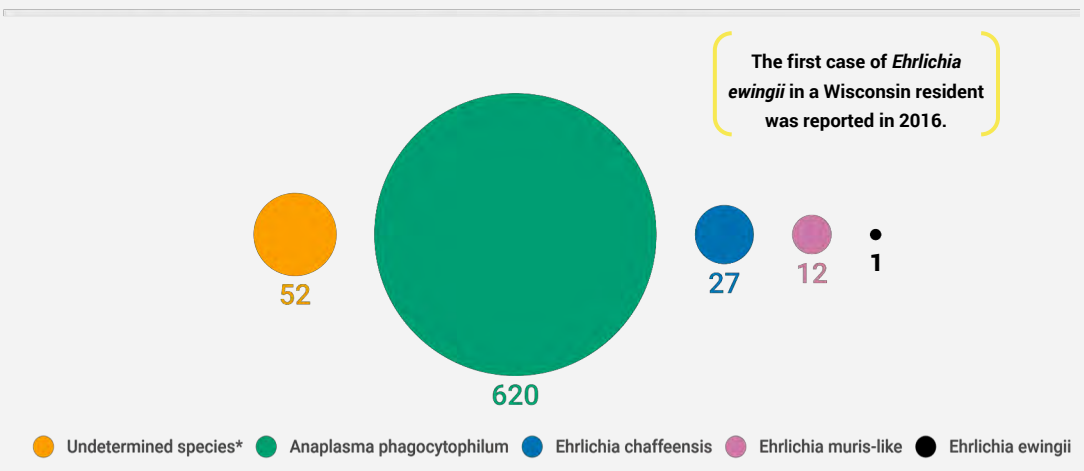
[Anaplasmosis and ehrlichiosis](#) are similar diseases caused by two different groups of bacteria called *Anaplasma* and *Ehrlichia*. In Wisconsin, both anaplasmosis and ehrlichiosis are spread by the bite of an infected *Ixodes scapularis* tick (also known as the black-legged or deer tick). Ehrlichiosis 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 flu-like 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.

Ehrlichiosis and Anaplasmosis Cases, Wisconsin 2007-2016



**700**  
cases of ehrlichiosis and anaplasmosis were reported in Wisconsin in 2016

Ehrlichiosis and Anaplasmosis Cases by Species, Wisconsin 2016



\**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.

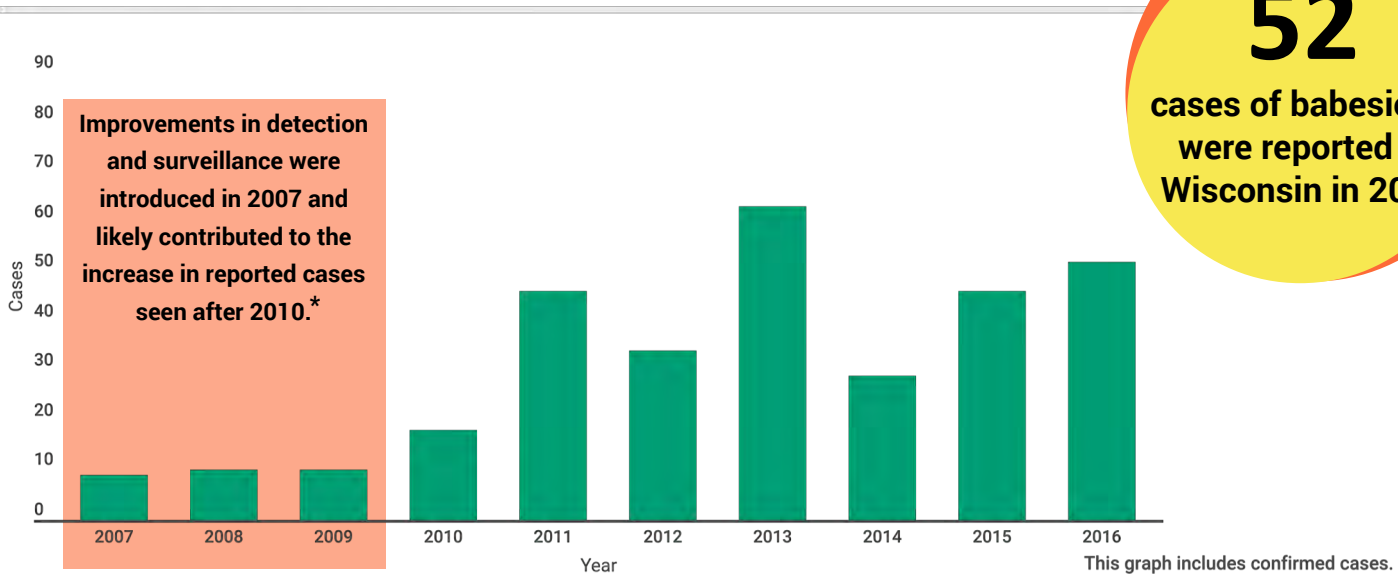
## *Ehrlichia*

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

# 12.6 | BABESIOSIS

[Babesiosis](#) is a tickborne 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. Anyone can get babesiosis, but it is more severe in the elderly and in those who have a weak immune system. The illness can range from relatively mild to life threatening. *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 2007-2016



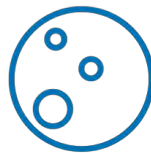
\*Over time, the range of the black-legged tick has expanded, leading to more cases in Wisconsin. In addition, automatic electronic lab reporting and increasing use of polymerase chain reaction (PCR) testing for diagnosis began in 2007. These two factors magnified the increase in babesiosis cases seen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

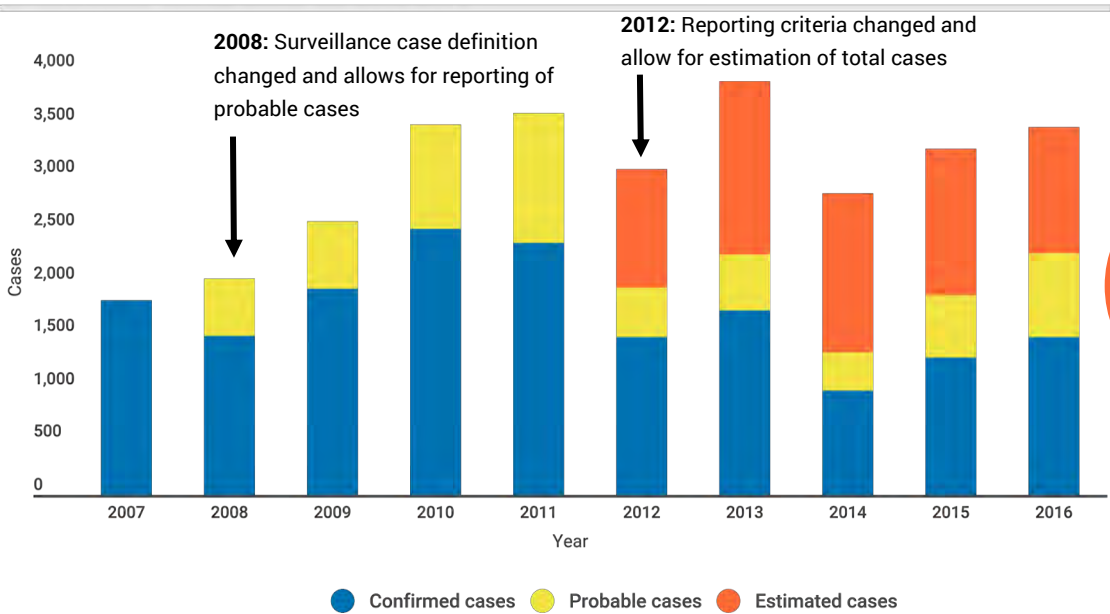
Wisconsin data show an increase in geographic range and number of babesiosis cases reported in recent years.



# 12.7 | LYME DISEASE

[Lyme disease](#) is an illness caused by the bacterium, *Borrelia burgdorferi*. It is spread to humans by the *Ixodes scapularis* tick (also known as the black-legged or deer tick). Anyone can get Lyme disease, but people who spend time 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 3,470 reported cases of Lyme disease in 2016.**

Lyme Disease Cases, Wisconsin 2007-2016



**1,491**  
confirmed cases of Lyme disease were reported in Wisconsin in 2016

**1,188**  
estimated cases

**791**  
probable cases



## Ages affected

24% of confirmed and probable Lyme disease cases in 2016 were in children and youth less than 20 years old.



## Case estimation

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



## All counties

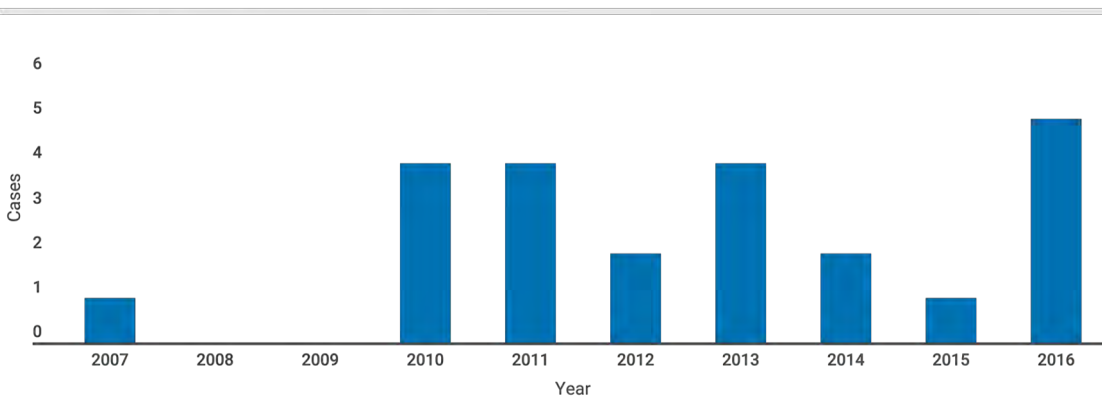
Lyme disease was reported in every county in Wisconsin in 2016.

# 12.8 | POWASSAN VIRUS INFECTION

[Powassan virus \(POWV\) infection](#) is a rare tickborne arbovirus infection, transmitted by the bite of infected deer or blacklegged tick (*Ixodes scapularis*), the same tick that causes most other tickborne diseases in Wisconsin, including Lyme disease. An arbovirus (arthropod-borne virus) is any virus transmitted by mosquitoes, ticks, or other arthropods. POWV is the only tickborne arbovirus that occurs in Wisconsin because all other tickborne diseases are caused by bacteria and parasites. In North America, POWV has been documented in several tick species (*Ixodes spp.*, *Dermacentor andersoni*) and 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 can 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 8–34 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 2007-2016



**5**  
cases of Powassan virus were reported in Wisconsin in 2016

This graph includes confirmed and probable cases.



2003 

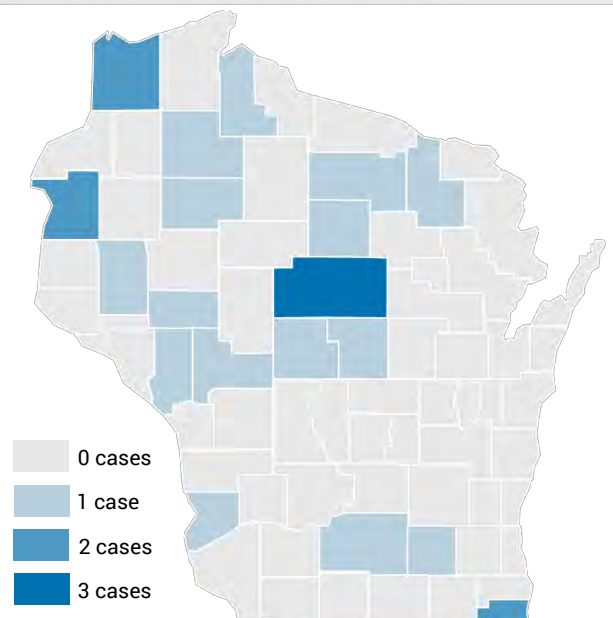
The first case of Powassan virus infection in Wisconsin was identified in 2003.

$\Sigma$  Total cases

Since 2003, a total of 25 Powassan virus cases have been reported in Wisconsin.



Powassan Virus Cases, Wisconsin 2003-2016

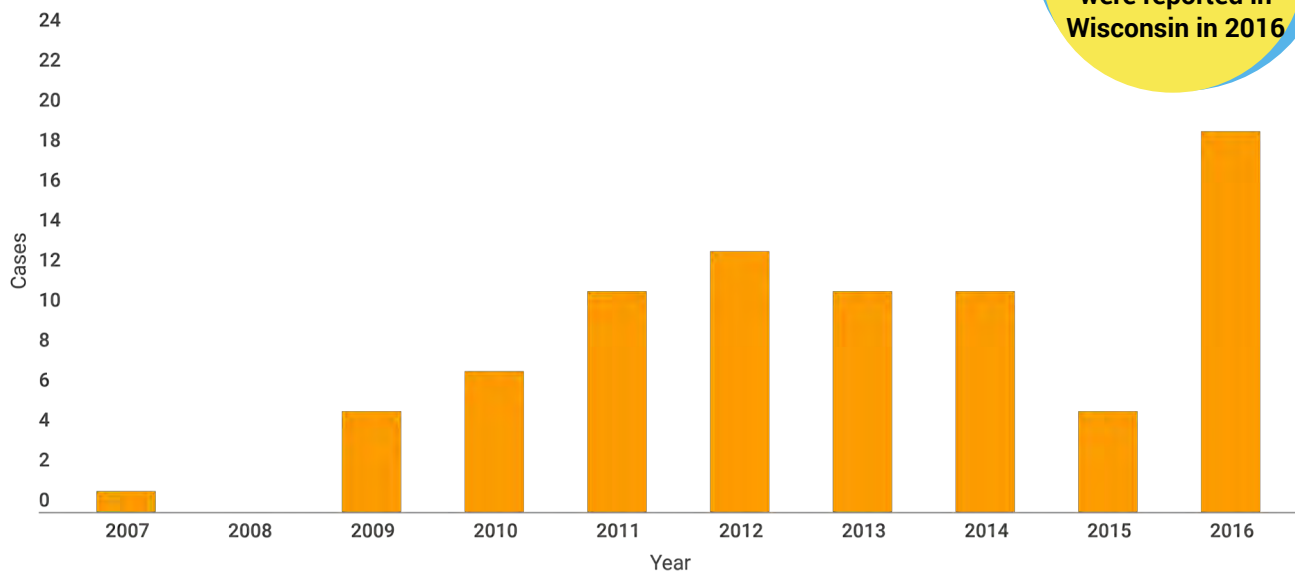


This map shows the county of residence for cases and may not reflect county of exposure.

# 12.9 | ROCKY MOUNTAIN SPOTTED FEVER

[Rocky Mountain spotted fever \(RMSF\)](#) belongs to the spotted fever rickettsial group of tickborne 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. Clinical laboratory findings may include thrombocytopenia, lymphopenia, leucopenia, and elevated liver enzymes.

Rocky Mountain Spotted Fever Cases, Wisconsin 2007-2016



**19**  
cases of RMSF  
were reported in  
Wisconsin in 2016

This graph includes confirmed and probable cases.



## Location

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



## Travel

In 2016, of the 19 cases reported in Wisconsin, 11 had not traveled out of state in the 30 days before they became sick.






## Antibiotics

Serious complications 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
 <b>How is it spread?</b>	<ul style="list-style-type: none"> <li>Consuming contaminated food or water</li> <li>Exposure to stool</li> <li>Injection drug use</li> <li>Sexual contact</li> </ul>	<ul style="list-style-type: none"> <li>Exposure to infected blood</li> <li>From mother to child during birth</li> <li>Injection drug use</li> <li>Sexual contact</li> </ul>	<ul style="list-style-type: none"> <li>Exposure to infected blood</li> <li>From mother to child during birth</li> <li>Injection drug use</li> <li>Sexual contact</li> </ul>	<ul style="list-style-type: none"> <li>Consuming contaminated food or water</li> <li>Exposure to stool</li> <li>From mother to child during birth</li> </ul>
 <b>Can it be passed from mother to baby?</b>	NO	YES	YES	YES
 <b>Is a vaccine available?</b>	YES	YES	NO	NO

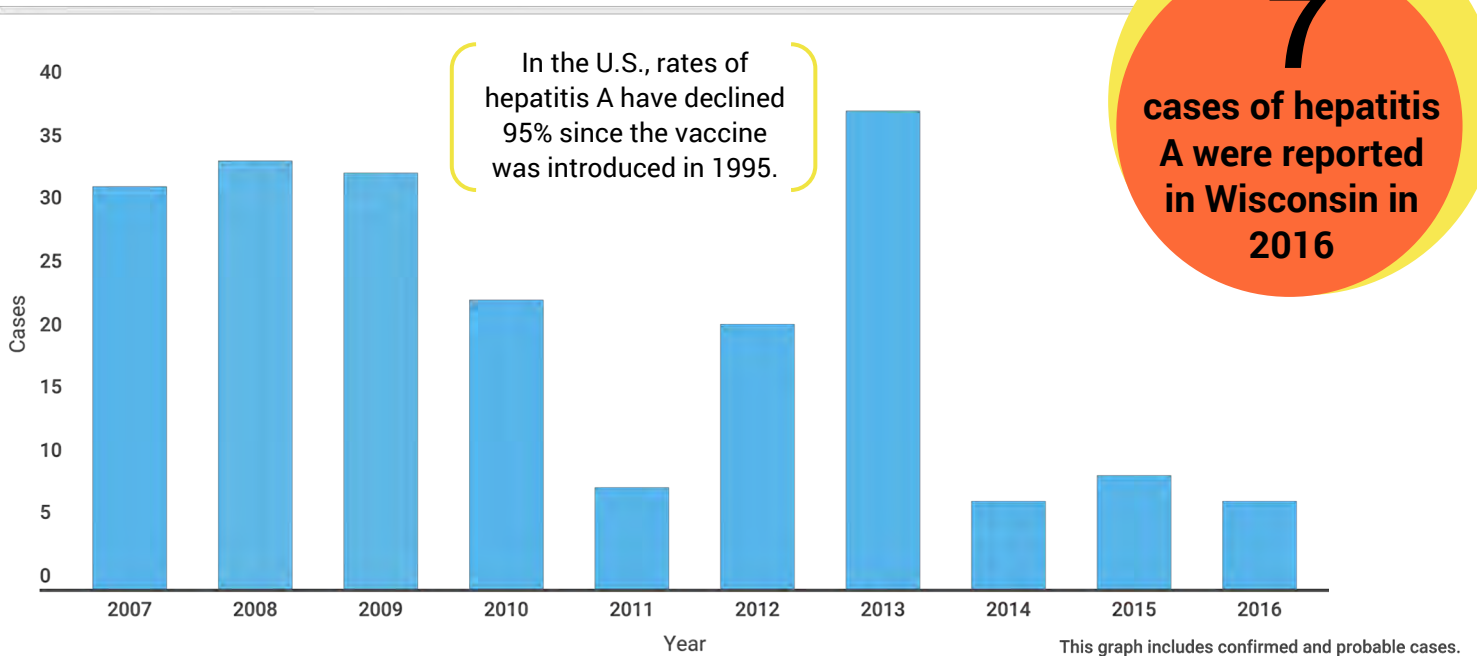


# 13.1 | HEPATITIS A

[Hepatitis A](#) (formerly known as infectious hepatitis) is a liver disease caused by the hepatitis A virus. The disease is not uncommon; 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 2007-2016



## RISK FACTORS



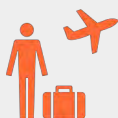
### Contaminated food or water

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 spreading 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.



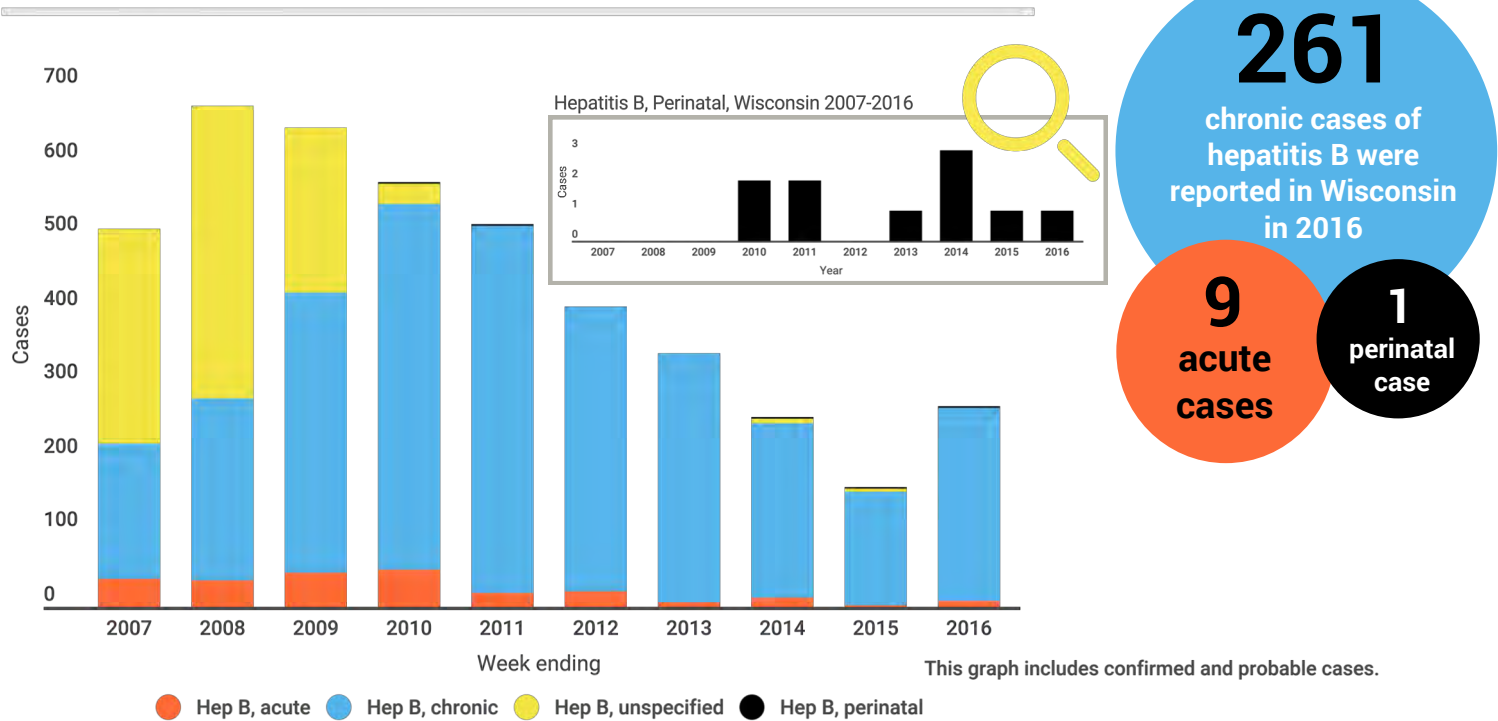
### Drug use

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 2007-2016



## 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

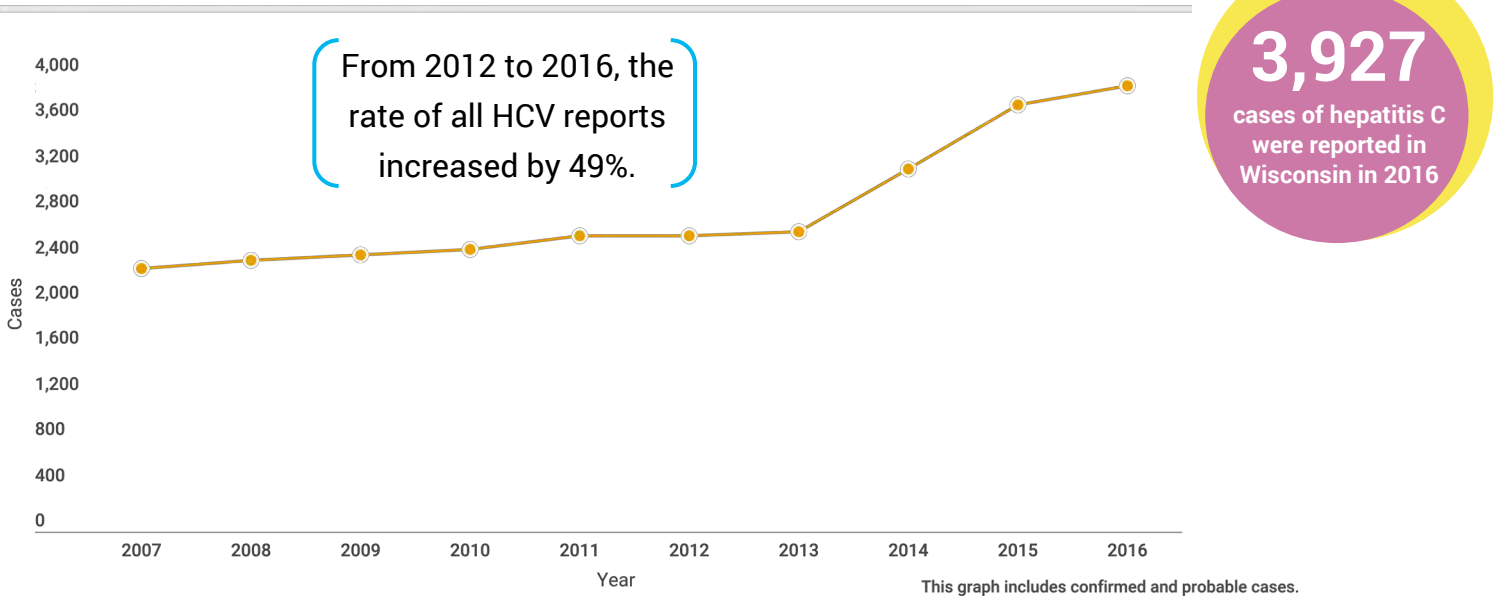
Post-vaccination serologic testing should be completed among infants born to hepatitis B-infected women 1–2 months following hepatitis B vaccine series completion, generally at age 9–12 months.

# I 3.3 | HEPATITIS C

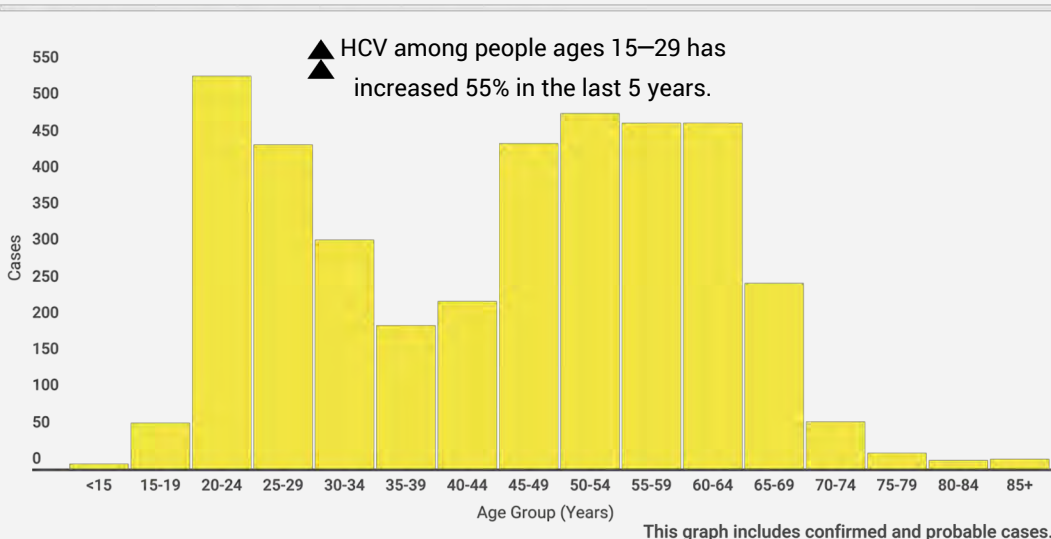
[Hepatitis C](#) is a contagious liver disease caused by the hepatitis C virus (HCV). HCV is spread primarily by exposure to human blood from an infected person. It can also be spread sexually or from an infected mother to her infant. Today, most people become infected with HCV by sharing contaminated syringes or other equipment used to inject drugs. 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.

Approximately 20%–30% 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. Of persons infected with HCV, about 15% will develop cirrhosis over a period of 20 to 30 years, and 5% will die from the consequences of long-term infection (liver cancer or cirrhosis). Hepatitis C is the leading cause of cirrhosis and the most common reason for liver transplantation in the U.S.

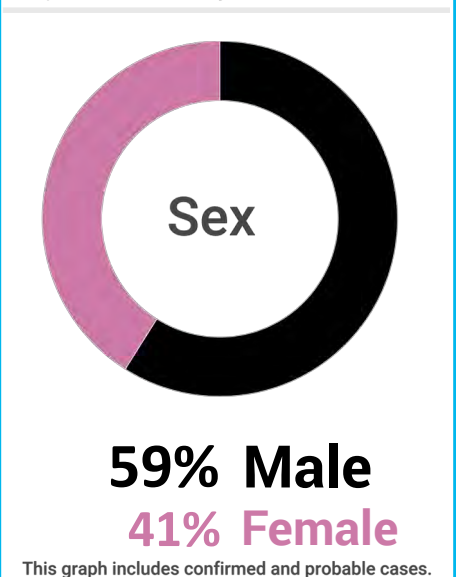
Hepatitis C Cases, Wisconsin 2007-2016



Hepatitis C Cases By Age Group, Wisconsin 2007-2016



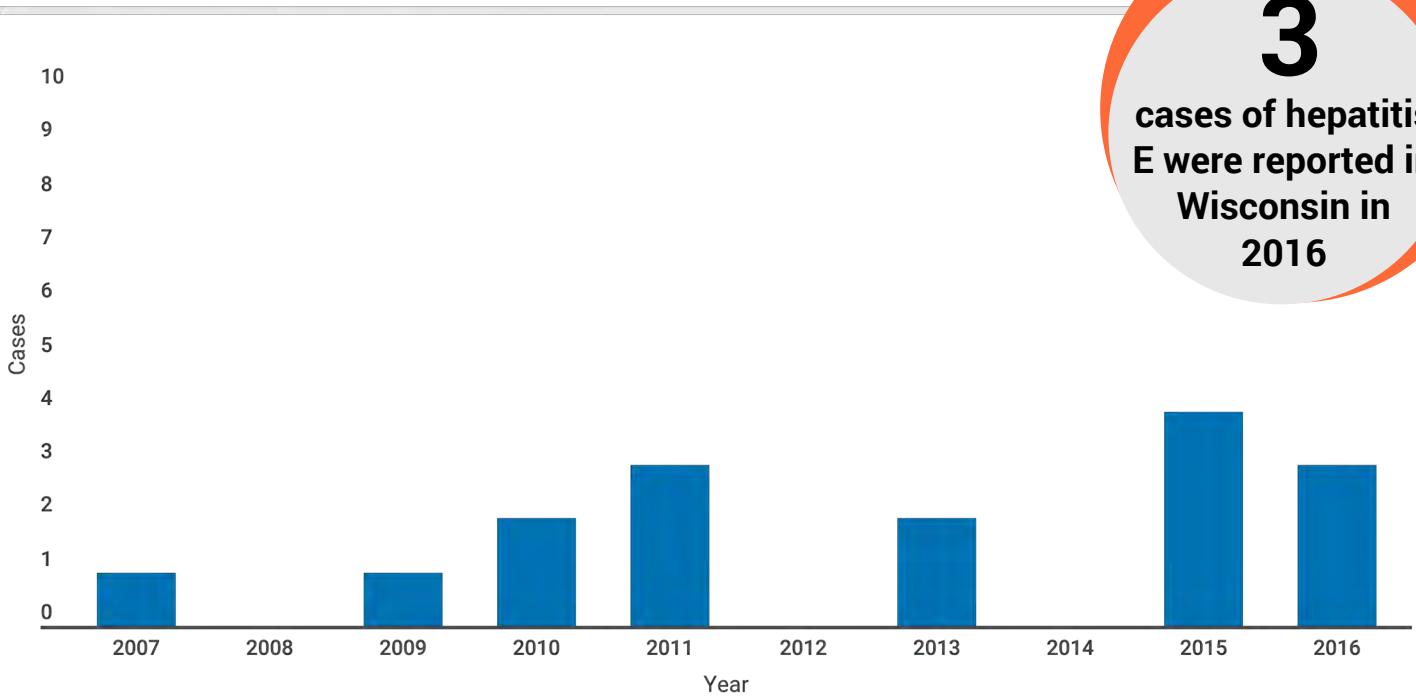
Hepatitis C Cases By Sex, Wisconsin 2016



# 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 fecal matter (poop), even in microscopic amounts. Outbreaks are usually associated with contaminated water supplies in countries with poor sanitation. There is currently no FDA-approved vaccine for Hepatitis E.

Hepatitis E Cases, Wisconsin 2007-2016



**3**  
cases of hepatitis E were reported in Wisconsin in 2016



## 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.**



# I 4.0 | ZOO NOTIC 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, lymphocytic choriomeningitis virus infection (LCMV), leptospirosis, Q fever, toxoplasmosis, and tularemia.

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. **WHAT FACTORS CONTRIBUTE TO THIS?**



## 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 immune compromised 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.

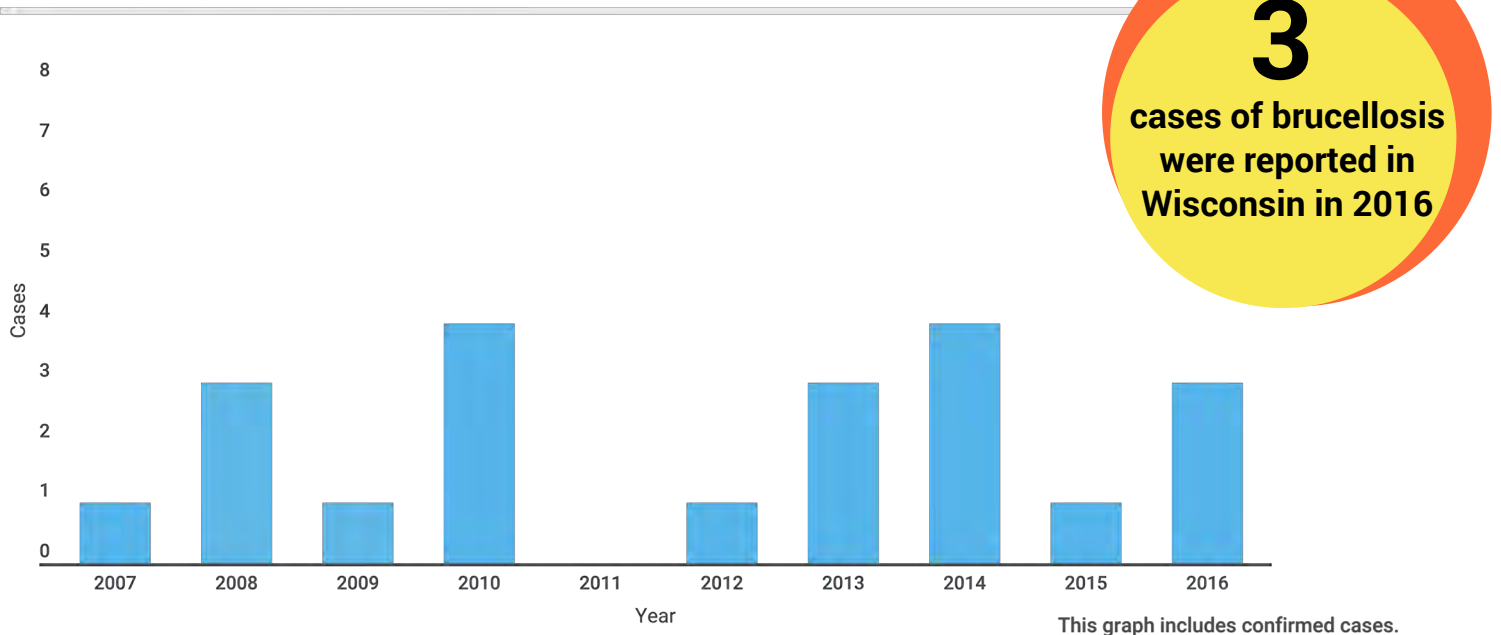


# 14.1 | BRUCELLOSIS

[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 2007-2016



## RISK FACTORS



### Unpasteurized dairy products

consumed through eating or drinking.



### Animal exposures

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



### Occupations

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



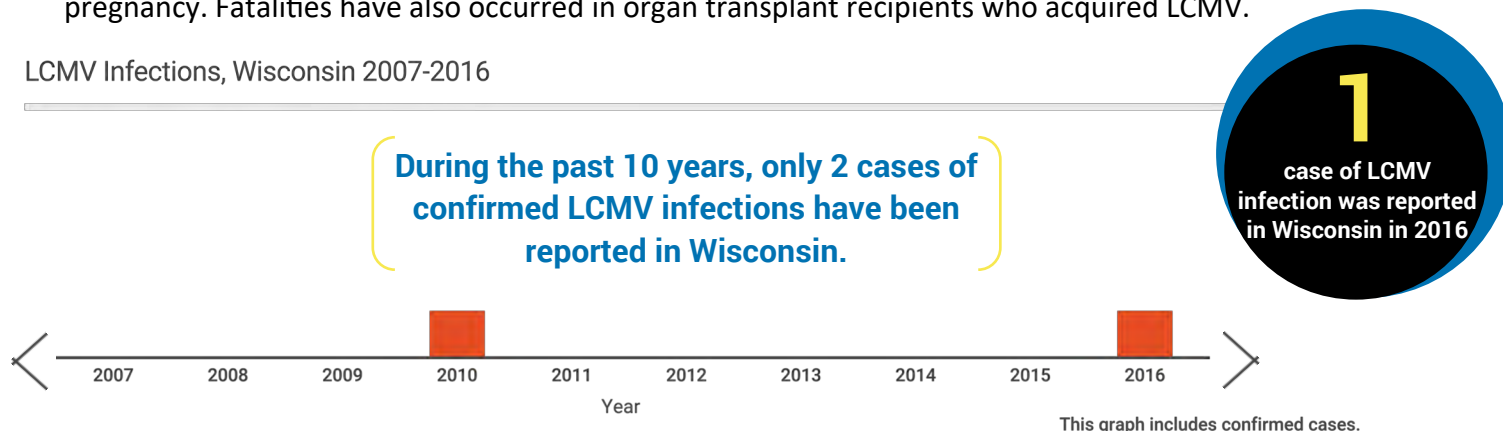
### Travel to certain countries

that do not have effective public health and domestic animal health programs.

## 4.2 | LYMPHOCYTIC CHORIOMENINGITIS INFECTION

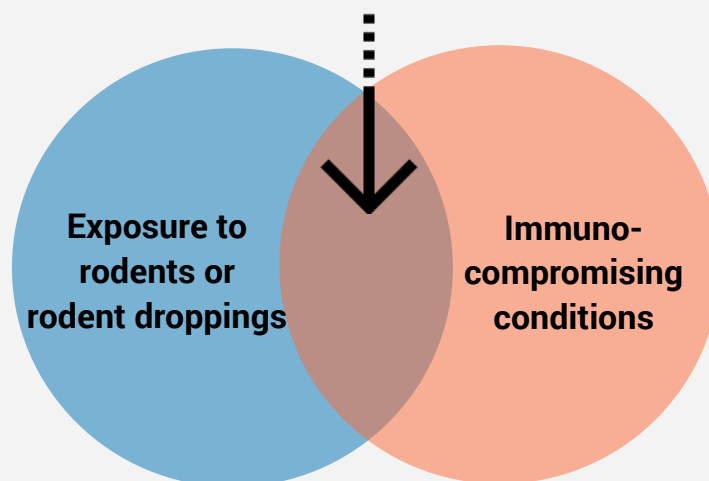
[Lymphocytic choriomeningitis virus \(LCMV\)](#) is a virus primarily carried by house mice, but other rodents, such as hamsters and guinea pigs, can also harbor the virus. LCMV rarely infects humans, and most people with normal immune systems who are exposed to the virus do not become ill. Symptoms of LCMV infection are similar to those of influenza or viral meningitis and include fever, stiff neck, lack of appetite, muscle aches, headache, nausea, and vomiting. The symptoms may be much more severe in people with a weakened immune system and in pregnant women. Severe fetal abnormalities can result from LCMV infection during pregnancy. Fatalities have also occurred in organ transplant recipients who acquired LCMV.

LCMV Infections, Wisconsin 2007-2016



### WHO IS AT RISK FOR LCMV?

People at high risk for illness due to LCMV infections have both exposure to rodents and are immunocompromised.



## 14.3 | LEPTOSPIROSIS

[Leptospirosis](#) is a zoonotic disease with worldwide distribution but it is 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, contaminating 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.

Leptospirosis Cases, Wisconsin 2007-2016



### 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 mine, in a sewer, in a slaughterhouse, or with animals; fish workers; 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 swimming, wading, kayaking, and rafting in contaminated lakes and rivers, as well as ingesting untreated surface water.

## HOW CAN YOU PREVENT LEPTOSPIROSIS?

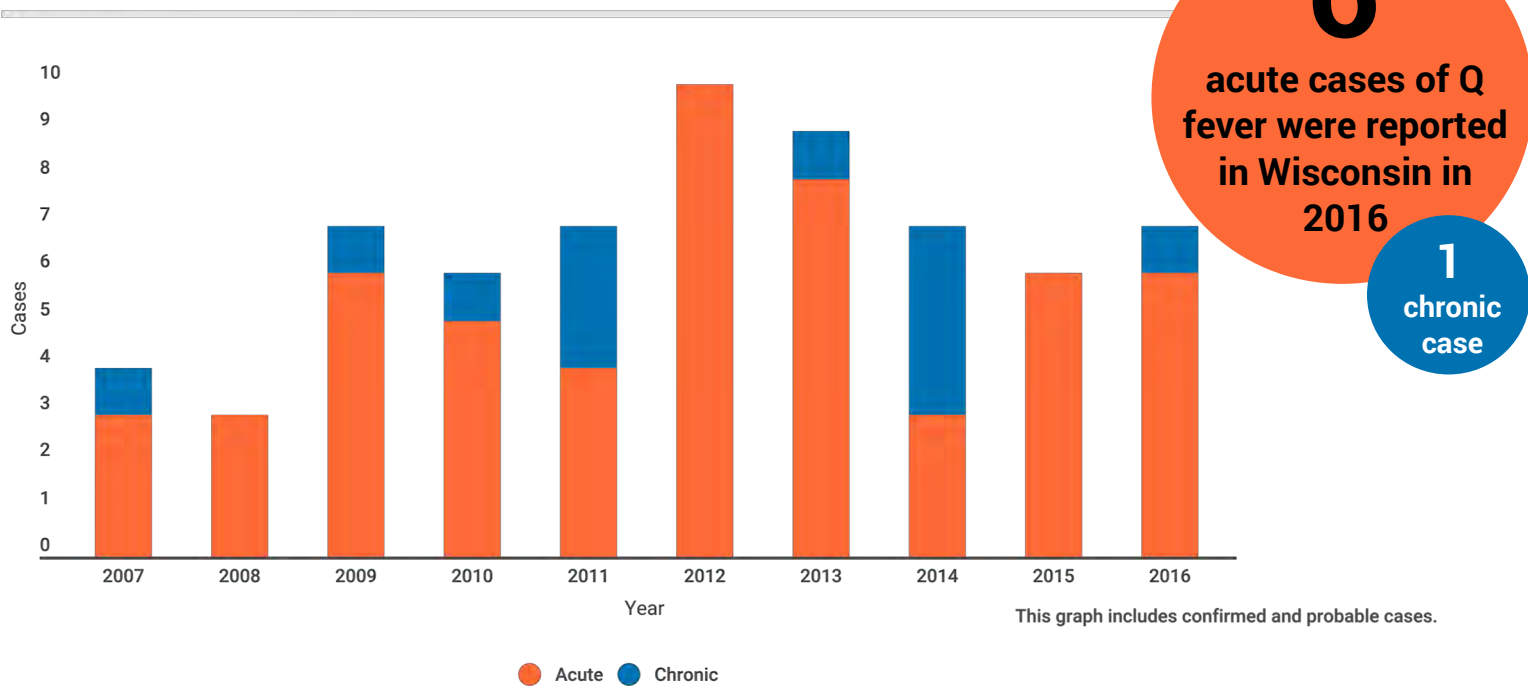


- Do not swim or wade in water that might be heavily contaminated with animal waste (e.g., floodwaters or murky lake water after a heavy rain).
- Wear protective clothing or footwear if you are exposed to water or soil that might contain animal urine.
- Eliminate rodent infestations around your home.

# I 4.4 | 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 (maternity pen, stall, 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. Other less common modes of transmission include ingestion of unpasteurized milk and dairy products, and tick bites. 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. **There were seven reported cases of Q fever in Wisconsin in 2016.**

Q Fever Cases, Wisconsin 2007-2016



## 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.

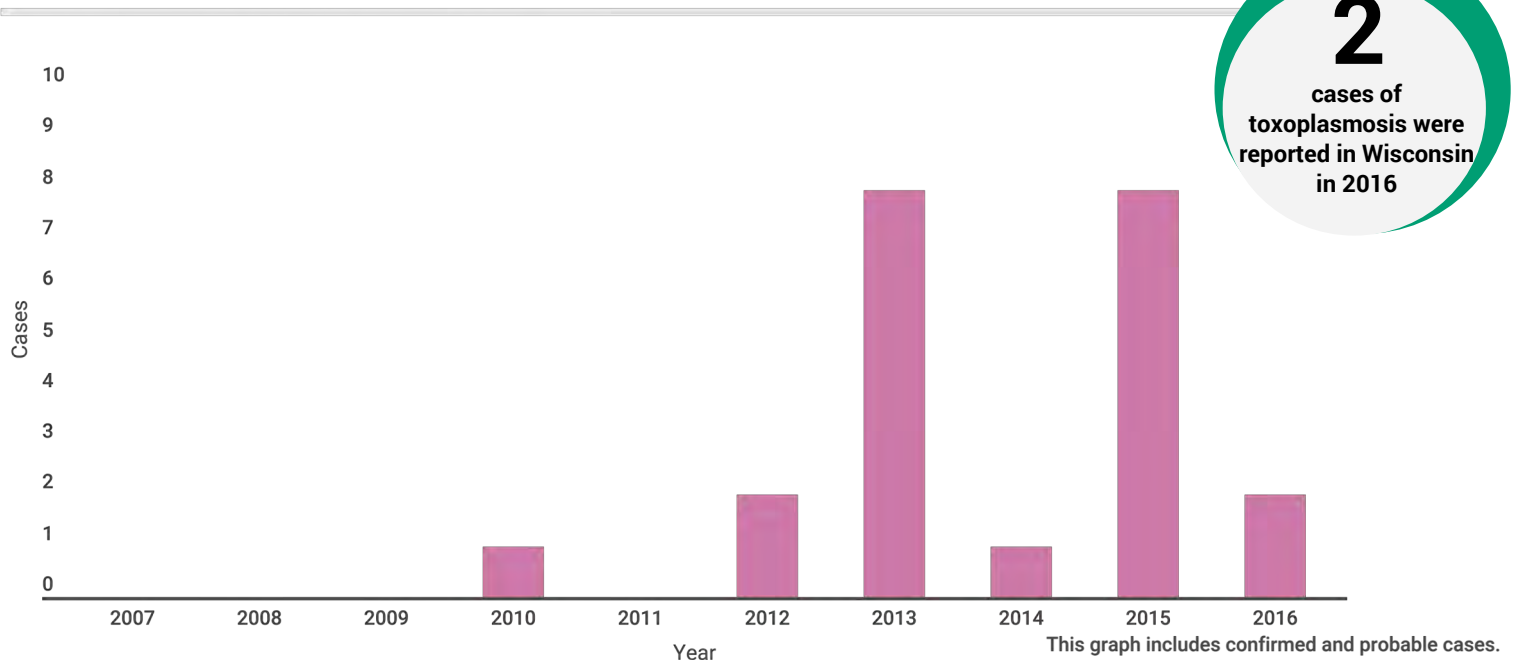


**Consuming raw milk**  
products, including raw sheep, goat, or cow milk.

# 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. Then it 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 2007-2016



## 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°) 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:

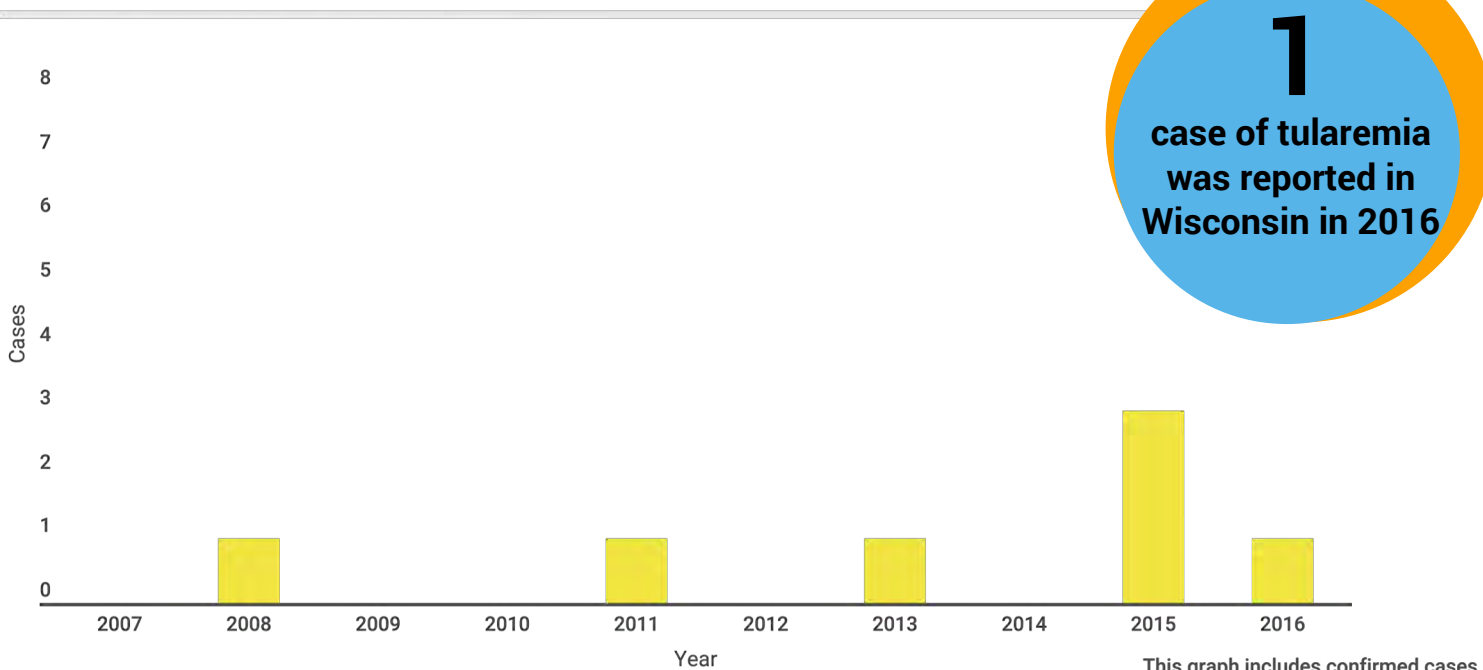
- Change the litter box daily if you own a cat. **Do not change the litter box if you are pregnant or immune compromised.**
- Do not drink untreated drinking water.
- Wear gloves when gardening.
- Keep outdoor sandboxes covered.

# 14.6 | TULAREMIA

[Tularemia](#), a disease that can affect both animals and humans, is caused by the bacterium, *Francisella tularensis*. Although many wild animals are infected (hares, rabbits, squirrels, muskrats, beavers, deer), occasionally certain domestic animals can be infected (sheep and cats). The rabbit is the species most often involved in disease outbreaks. The bacteria can also be transmitted by ticks and deerflies. Tularemia in humans is relatively rare in Wisconsin, averaging less than one case per year since 1980.

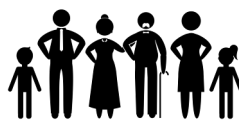
Hunters, trappers, or other people who spend a great deal of time outdoors are at a greater risk of exposure to tularemia due to their contact with wild game, ticks, and biting flies. People can also become infected after being scratched or bitten by an infected cat or drinking contaminated surface water. The symptoms of tularemia depend on how a person became infected, i.e., how the bacteria entered the body. Signs and symptoms can include skin lesions, swollen lymph nodes, throat infection, stomach pain, diarrhea, vomiting, fever, and pneumonia.

Tularemia Cases, Wisconsin 2007-2016



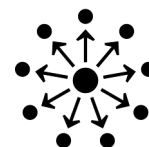
## Cases by sex

Tularemia is more common in males, possibly because they have more outdoor exposure. In the past 10 years, 6 of the 7 cases were in males.



## Cases by age

Anyone can get tularemia, but it is most common in children and older males. In the last 10 years, all cases in Wisconsin have been among people ages 45-85 years old.



## Mode of transmission

Tularemia can be spread by the bites of deer flies and ticks (wood, dog, and lone star), as well as handling/skinning infected animals.

# 15.0 | OTHER DISEASES

Two reportable diseases with cases in 2016 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 2016 are not included in this report.

## Reportable diseases with zero cases reported in 2016

### Category 1 (must be reported immediately)

Anthrax

Botulism

Cholera

Diphtheria

Hantavirus infection

Measles

Plague

Poliovirus infection

Rabies (human)

Ricin toxin

Rubella

Severe Acute Respiratory Syndrome-associated Coronavirus (SARS-CoV) infection

Smallpox

Vancomycin-intermediate *Staphylococcus aureus* (VISA) infection

Vancomycin-resistant *Staphylococcus aureus* (VRSA) infection

Yellow Fever

### Category 2 (must be reported within 72 hours)

Chancroid

Leprosy (Hansen's Disease)

Mycobacterial disease (nontuberculosis)

Psittacosis

Rheumatic fever

Tetanus

Toxic Shock Syndrome

Infant methemoglobinemia

Lead intoxication

Trichinosis

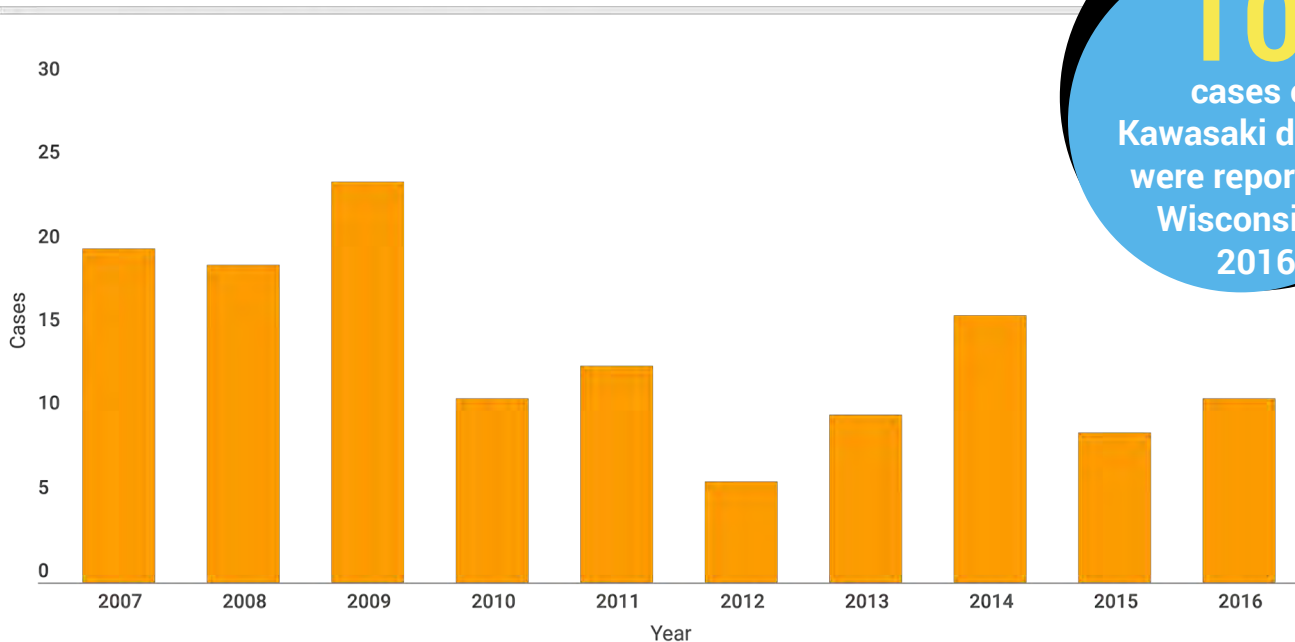




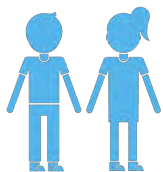
# 15.1 | KAWASAKI DISEASE

[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 trunk. 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 acquired heart disease. Antibiotics do not work against KD. There are no known measures that can be taken to prevent KD.

Kawasaki Disease Cases, Wisconsin 2007-2016



**10**  
cases of  
Kawasaki disease  
were reported in  
Wisconsin in  
2016



## Ages affected

Over the past 10 years, 96% of KD cases reported in Wisconsin have been in children less than 15 years old.



## KD in Japan

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



## Acquired heart disease

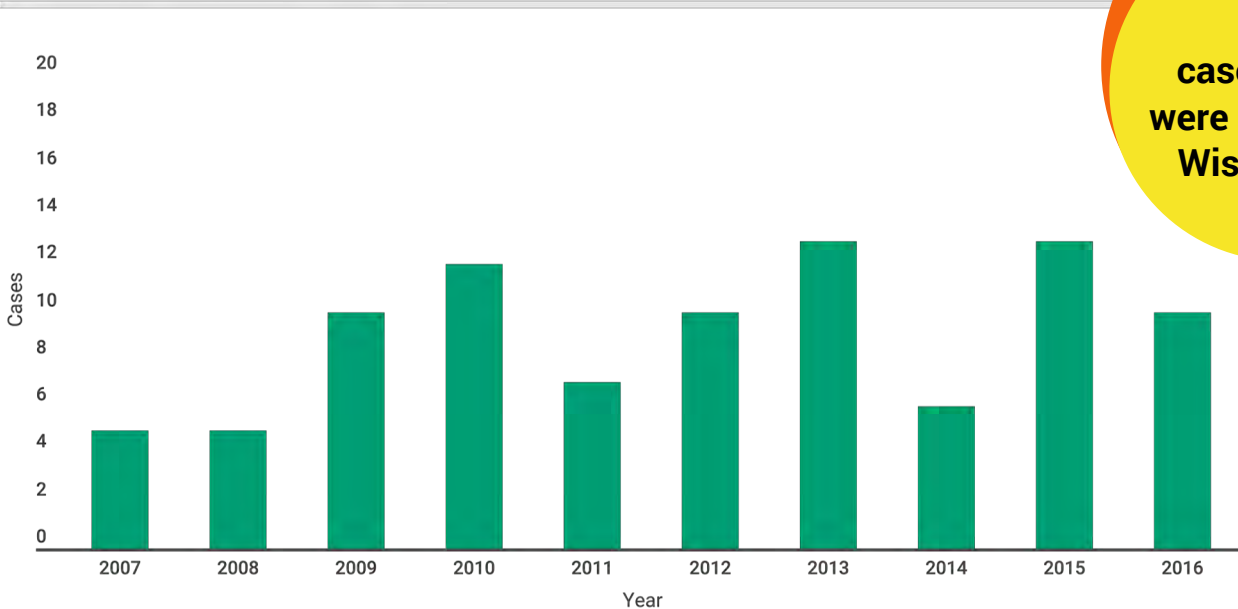
KD is a leading cause of acquired heart disease in the U.S.

# 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 a type of TSE. 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/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 2007-2016



**10**  
cases of TSE  
were reported in  
Wisconsin in  
2016

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



**>50 years of age**

In 2016, 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  
1 West Wilson Street Room 272  
Madison, Wisconsin 53703**