Indiana State Department of Health

Epidemiology Resource Center

ANNUAL REPORT OF INFECTIOUS DISEASES 2018

NOTES

All incidence rates throughout the report are calculated based per 100,000 population according to the 2018 U.S. Census Bureau's population estimates.

Case counts for diseases/conditions other than arboviral and tickborne diseases with counties reporting fewer than five disease cases are not included to protect the confidentiality of cases.

Rates based on fewer than 20 reported disease cases are considered statistically unstable.

Reports on HIV/AIDS, sexually transmitted infections and tuberculosis are published separately.

Counts and rates for the 2018 annual report are based on case definitions matching the National Notifiable Diseases list, which can be found at https://wwwn.cdc.gov/nndss/conditions/. Because changes are made to case definitions, the annual report counts and rates are not comparable to previous years.

REFERENCES

American Academy of Pediatrics. In: Pickering LK, Baker CJ, Long SS, McMillan JA, eds. *Red Book: 2012 Report of the Committee on Infectious Diseases.* 29th ed. Elk Grove Village, IL: American Academy of Pediatrics, 2012.

Centers for Disease Control and Prevention. *CDC Yellow Book 2018: Health Information for International Travel*. New York: Oxford University Press; 2017.

Centers for Disease Control and Prevention. *Manual for the Surveillance of Vaccine-Preventable Diseases.* Centers for Disease Control and Prevention, Atlanta, GA, 2008.

Centers for Disease Control and Prevention. *Epidemiology and Prevention of Vaccine-Preventable Diseases*. Hamborsky J, Kroger A, Wolfe S, eds. 13th ed. Washington, DC: Public Health Foundation, 2015.

Heyman, D.L. *Control of Communicable Diseases Manual*, 20th ed. American Public Health Association, 2015.

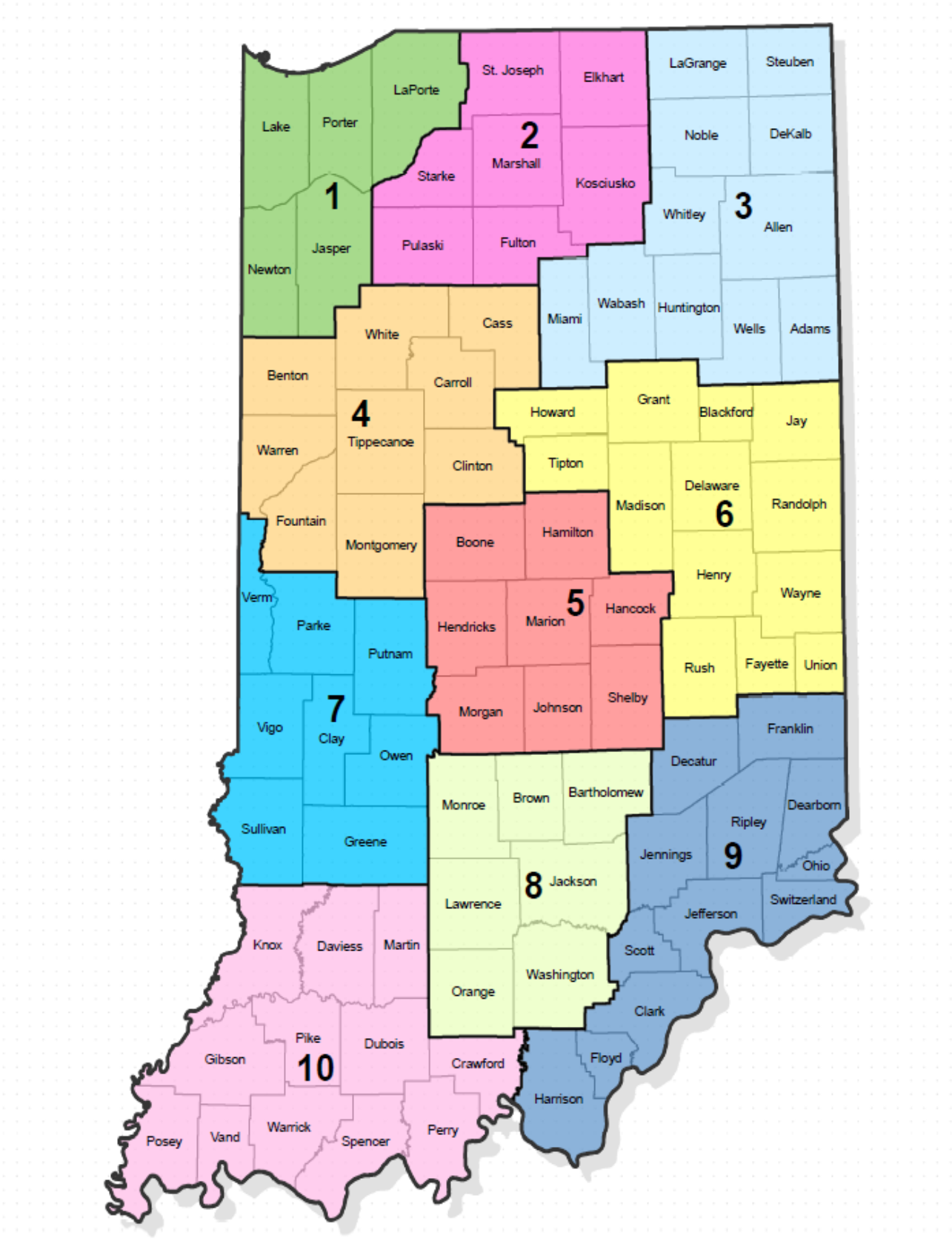
WEBSITES

www.cdc.gov

www.fda.gov

www.who.int

FIELD EPIDEMIOLOGY DISTRICTS



INDIANA POPULATION ESTIMATES, 2018

Year	Population
2014	6,593,182
2015	6,610,596
2016	6,634,007
2017	6,666,818
2018	6,691,878

Gender	2017 Population	2018 Population
Female	3,379,723	3,391,576
Male	3,287,095	3,300,302
Race	2017 Population	2018 Population
White	5,690,929	5,694,468
Black	649,813	658,729
Other	326,076	338,681
Ethnicity	2017 Population	2018 Population
Non-Hispanic	6,200,365	6,216,641
Hispanic	466,453	475,237
Total	6,666,818	6,691,878

Age	2017 Population	2018 Population
< 1	82,498	80,539
1-4	338,678	338,005
5-9	431,782	430,106
10-19	903,720	904,243
20-29	926,233	930,073
30-39	838,813	844,497
40-49	816,232	815,370
50-59	888,541	871,660
60-69	759,489	772,889
70-79	431,014	450,969
80 +	249,818	253,527
Total	6,666,818	6,691,878

Note: Population data are based on the U.S. Census Bureau's population estimates for July 1, 2018

INDIANA POPULATION ESTIMATES, 2018

POPULATION BY COUNTY					
	2017	2018		2017	2018
Adams	35,491	35,636	Lawrence	45,666	45,668
Allen	372,877	375,351	Madison	129,498	129,641
Bartholomew	82,040	82,753	Marion	950,082	954,670
Benton	8,613	8,653	Marshall	46,498	46,248
Blackford	11,976	11,930	Martin	10,215	10,217
Boone	65,875	66,999	Miami	35,845	35,567
Brown	15,035	15,234	Monroe	146,986	146,917
Carroll	20,039	20,127	Montgomery	38,525	38,346
Cass	37,994	37,955	Morgan	69,713	70,116
Clark	116,973	117,360	Newton	14,130	14,011
Clay	26,198	26,170	Noble	47,452	47,532
Clinton	32,317	32,250	Ohio	5,828	5,844
Crawford	10,566	10,558	Orange	19,426	19,489
Daviess	33,113	33,147	Owen	20,839	20,845
Dearborn	49,741	49,568	Parke	16,886	16,927
Decatur	26,737	26,794	Perry	19,081	19,102
DeKalb	42,836	43,226	Pike	12,365	12,410
Delaware	115,184	114,772	Porter	168,404	169,594
Dubois	42,558	42,565	Posey	25,595	25,540
Elkhart	205,032	205,560	Pulaski	12,534	12,469
Fayette	23,209	23,047	Putnam	37,702	37,779
Floyd	77,071	77,781	Randolph	24,922	24,851
Fountain	16,505	16,351	Ripley	28,442	28,523
Franklin	22,619	22,736	Rush	16,645	16,663
Fulton	20,059	20,092	Scott	23,870	23,878
Gibson	33,576	33,452	Shelby	44,395	44,593
Grant	66,491	65,936	Spencer	20,394	20,327
Greene	32,177	32,006	St. Joseph	270,434	270,771
Hamilton	323,747	330,086	Starke	22,893	22,935
Hancock	74,985	76,351	Steuben	34,484	34,586
Harrison	39,898	40,350	Sullivan	20,746	20,690
Hendricks	163,685	167,009	Switzerland	10,696	10,717
Henry	48,476	48,271	Tippecanoe	190,587	193,048
Howard	82,363	82,366	Tipton	15,128	15,128
Huntington	36,337	36,240	Union	7,200	7,037
Jackson	43,884	44,111	Vanderburgh	181,616	180,974
Jasper	33,447	33,370	Vermillion	15,505	15,479
Jay	20,945	20,764	Vigo	107,516	107,386
Jefferson	32,089	32,208	Wabash	31,443	31,280
Jennings	27,626	27,611	Warren	8,201	8,263
Johnson	153,897	156,225	Warrick	62,530	62,567
Knox	37,508	36,895	Washington	27,827	27,943
Kosciusko	79,206	79,344	Wayne	66,185	65,936
LaGrange	39,303	39,330	Wells	27,984	28,206
Lake	485,640	484,411	White	24,182	24,133
LaPorte	110,029	110,007	Whitley	33,756	34,074

Note: Population data are based on the U.S. Census Bureau's population estimates for July 1, 2018

LIST OF NOTIFIABLE DISEASES

REPORTABLE COMMUNICABLE DISEASES AND CONDITIONS FOR HEALTH CARE PROVIDERS, HOSPITALS AND LABORATORIES (410 IAC 1-2.5-75 & 76)*

Requires immediate notification on suspicion:

- Anthrax
- Arboviral diseases
- Botulism
- Brucellosis
- Chikungunya virus
- Cholera
- Dengue
- Diphtheria
- Eastern equine encephalitis (EEE)
- Hantavirus pulmonary syndrome (HPS)
- Hemolytic uremic syndrome (HUS)
- Hepatitis A, viral
- Hepatitis B, viral, pregnant woman or perinatal
- Hepatitis E, viral
- Japanese encephalitis
- La Crosse encephalitis
- Measles
- Meningococcal disease▲
- Plague
- Poliomyelitis
- Powassan virus
- Q Fever
- Rabies in humans or animals
- Rubella
- Rubella congenital syndrome
- Shiga toxin-producing *E. coli* (STEC) ▲
- Shigellosis▲
- Smallpox
- St. Louis encephalitis
- Tularemia
- Typhoid and Paratyphoid fever▲
- West Nile Virus (WNV)
- Western equine encephalitis (WEE)
- Yellow fever

Report within 24 hours:

- Animal Bites
- *Haemophilus influenzae*, invasive▲
- Mumps
- Novel influenza A
- Pertussis

Report within 72 hours or as noted:

- Anaplasmosis
- Babesiosis
- Campylobacteriosis
- *Carbapenemase-producing Carbapenem-resistant Enterobacteriaceae* (CP-CRE) ▲
- Coccidioidomycosis
- Cryptosporidiosis
- Cyclosporiasis
- Cysticercosis
- Ehrlichiosis
- Giardiasis
- Hansen's disease (leprosy)
- Hepatitis B, viral
- Hepatitis C, viral, acute (within 5 days)
- Hepatitis D, viral
- Hepatitis, viral, unspecified
- Histoplasmosis
- Influenza-associated death
- Legionellosis
- Leptospirosis
- Listeriosis▲
- Lyme disease
- Malaria
- Psittacosis
- Rabies, postexposure treatment
- Rocky Mountain spotted fever
- Salmonellosis, non-typhoidal▲
- *Staphylococcus aureus*, vancomycin resistance level of MIC ≥ 8 µg/mL or severe in a previously healthy person▲
- *Streptococcus pneumoniae,* invasive▲
- *Streptococcus*, Group A, invasive▲
- Tetanus
- Toxic shock syndrome
- Trichinosis
- Typhus, endemic
- Varicella
- Vibriosis
- Yersiniosis

▲Requires additional testing including antimicrobial susceptibility or further confirmation and subtyping

**Note: Does not include HIV/AIDS, sexually transmitted diseases (STDs) or tuberculosis*

FOODBORNE & WATERBORNE DISEASES & CONDITIONS

INCLUDES: Botulism, Campylobacteriosis, Cholera, Cryptosporidiosis, Cyclosporiasis, *Escherichia coli* (Shiga-toxin producing), Giardiasis, Hemolytic Uremic Syndrome, Hepatitis A, Hepatitis E, Legionellosis, Leptospirosis, Listeriosis, Salmonellosis, Shigellosis, Typhoid Fever, Vibriosis, Yersiniosis

FOODBORNE & WATERBORNE DISEASE PREVENTION

Measures that would decrease transmission and likelihood of enteric diseases include:

- Practice good hygiene:
  - Thoroughly wash hands with soap and water after using the restroom; after assisting someone with diarrhea and/or vomiting; after cleaning soiled areas; after swimming; before, during and after food preparation; and after exposure to raw meat products.
  - Wash hands, kitchen work surfaces, and utensils with soap and warm water **immediately** after contact with raw meat or poultry.
  - Wash hands with soap after handling reptiles, birds and baby chicks and after contact with pet feces.
  - Clean food preparation work surfaces, equipment and utensils with soap and water before, during and after food preparation, especially after contamination with raw meat products.
- Separate raw and cooked foods:
  - Avoid cross-contamination by keeping uncooked meat products separate from produce, ready-to-eat foods and cooked foods.
  - Use separate equipment and utensils for handling raw foods, especially for marinades or barbecue sauce.
- Maintain safe food temperatures:
  - Ensure proper temperatures are maintained during refrigeration (<40°F), freezing (<2°F), holding (keep food hot or at room temperature for no longer than two hours) and chilling (chill immediately and separate into smaller containers if needed).
  - Thoroughly cook all food items to United States Department of Agriculture (USDA)-recommended safe minimum internal temperatures:
    - 145°F – beef, pork, veal and lamb (steaks, chops or roasts); ham (fresh or smoked); fish; and shellfish.
    - 160°F – ground meats and eggs.
    - 165°F – all poultry, leftovers and casseroles.
    - Reheat cooked hams packaged in USDA-inspected plants to 140°F and all others to 165°F.
- Eat safe foods and drink safe water:
  - Do not eat undercooked meat or uncooked shellfish or fish, including ceviche.
  - Do not eat foods past the expiration date.
  - Do not eat unpasteurized dairy products and fruit juices, including apple cider. It is illegal to sell unpasteurized dairy products in Indiana.
  - Wash all produce before eating raw or cooking.
  - Use treated water for washing, cooking and drinking.
  - Test your well if:
    - Members of your family or others who use the same water are becoming ill,
    - The well is located at the bottom of a hill, is considered shallow, or where animals graze
- Handle animals safely:
  - Wash hands after contact with livestock, petting zoos, pets (including reptiles and amphibians), especially if they are suffering from diarrhea, and after contact with pet food/treats.
  - Keep pets out of food-preparation areas.
  - Have pets checked for parasites by your veterinarian, especially if they have diarrhea.
  - Do not clean pet or reptile cages in the kitchen sink or bathtub.
  - Do not allow reptiles to roam the house or to be kept in daycare facilities or classrooms.
  - Children younger than five years of age, pregnant women and persons with weakened immune systems should not handle reptiles.

- Travel safely outside the U.S.:
  - Drink bottled beverages and water, even when brushing teeth.
  - Do not eat uncooked fruits or vegetables unless you peel them yourself.
  - Do not eat foods or beverages from street vendors.
  - Do not consume local water or ice.
- Protect others:
  - Persons with diarrhea and/or vomiting should not provide health care services for others and should limit direct contact with others as much as possible.
  - Persons with diarrhea and/or vomiting should not attend a daycare facility or school.
  - Persons with diarrhea and/or vomiting shall be excluded from employment involving food handling (Indiana Retail Food Establishment Sanitation Requirements, 410 IAC 7-24-122).
  - Do not change diapers near recreational water.
  - Do not go swimming or use hot tubs if you have diarrhea and for at least two weeks after diarrhea stops.
- Exercise caution with infants and other high-risk individuals:
  - Be particularly careful with foods prepared for infants, the elderly and the immunocompromised.
  - Avoid contact between reptiles (e.g., turtles, iguanas, other lizards and snakes) and infants or immunocompromised persons. Do not wash cages or tanks in a sink or bathtub.
  - Do not handle raw poultry or meat and an infant (e.g., feed, change diaper) at the same time.

Disease-specific Prevention

- Botulism
  - Foodborne:
    - Properly process and prepare all home-canned foods. Instructions for safe home canning are available from county extension services or from the USDA.
    - Boil home-canned foods for 10 minutes before eating. The bacterial toxin is destroyed by heat.
    - Never eat foods from cans or jars that are bulging, discolored, have a bad taste or smell or have swollen lids or caps.
    - If stored overnight, remove aluminum foil from leftover potatoes before refrigerating. Potatoes that have been baked while wrapped in aluminum foil should be kept hot until they are eaten or refrigerated.
    - Refrigerate oils that contain garlic or herbs.
  - Intestinal (including infants):
    - Honey should not be fed to babies younger than 12 months of age. Honey can contain spores of the bacteria, which can easily grow in infants.
  - Wound care:
    - Carefully clean and disinfect all cuts and wounds.
- Hepatitis A
  - Two-dose vaccination is available and is required for all incoming kindergarten students in Indiana. Vaccination is recommended for persons at increased risk for infection, including:
    - Persons with chronic liver disease or clotting factor disorders
    - Men who have sex with men
    - Injecting drug users
    - Persons traveling to or working in countries where hepatitis A infection is endemic
    - Persons who work with hepatitis A virus in a research setting
    - Children who live in communities with consistently elevated rates of infection
- Typhoid fever
  - A vaccine is available for typhoid fever and is recommended for people traveling to endemic area.

CAMPYLOBACTERIOSIS

2018 CASE TOTAL: 1,119
2017 CASE TOTAL: 1,148

2018 INCIDENCE RATE: 16.7 per 100,000
2017 INCIDENCE RATE: 17.2 per 100,000

CAMPYLOBACTERIOSIS is a diarrheal disease caused by *Campylobacter* bacteria, which live in the intestines of many animals, including birds, farm animals, dogs and cats. There are more than 20 types of *Campylobacter* bacteria, but *Campylobacter jejuni* most commonly causes illness. Campylobacteriosis is one of the most commonly reported causes of diarrheal illness in humans.

People can become infected with *Campylobacter* in many ways. The most common exposures are foodborne (e.g., consuming undercooked poultry or unpasteurized dairy products), waterborne (e.g., swallowing untreated water from lakes or streams), person-to-person contact and contact with infected animals (primarily puppies, kittens and livestock).

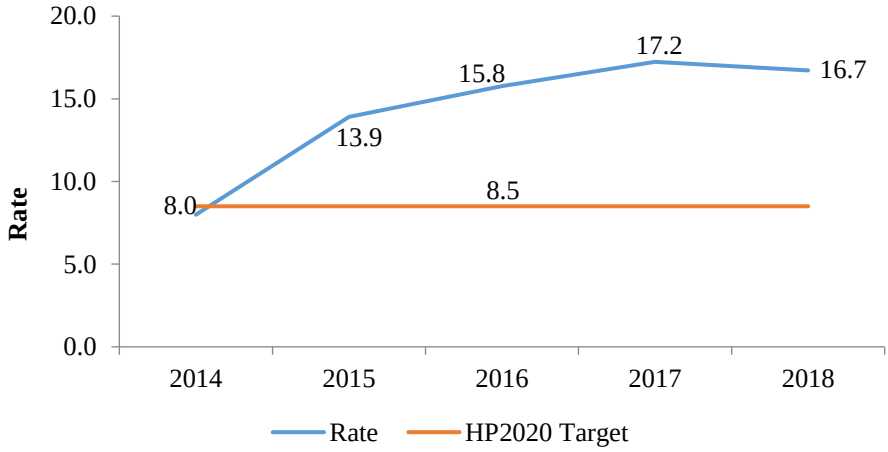
CLINICAL AND PUBLIC HEALTH SIGNIFICANCE

Typical symptoms include diarrhea, stomach cramps and fever. Symptoms usually appear two to five days after exposure, with a range of one to 10 days. For most people, *Campylobacter* causes symptoms that usually last no longer than one week, and they recover within five to seven days without medical treatment. Because diarrhea can cause dehydration, an infected person should drink plenty of fluids. No specific treatment is generally recommended; however, antibiotics may be used to treat persons with severe cases.

HEALTHY PEOPLE 2020 GOAL

The Healthy People 2020 Goal for campylobacteriosis is 8.5 cases per 100,000 population per year. The only year Indiana met this goal for the five-year period, 2014-2018, was 2014 (Figure 1). The rate increase from 2014 to 2018 may be due in part to the increased adoption of culture-independent diagnostic tests (CIDTs) that have resulted in the increased detection of probable cases.

Figure 1: Campylobacteriosis Rates by Year – Indiana, 2014-2018[*+]



EPIDEMIOLOGY

In 2018, 1,119 cases of campylobacteriosis were reported in Indiana, for a rate of 16.7 cases per 100,000 population (Table 1). Females (17.0) and males (16.4) were at similar risk. The rate of those who identified as white (13.9) was greater than the rate among those who identified as black (5.0) and other races (11.8); however, 254 cases did not report race data.

[*]All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.

[+] Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

Table 1: Campylobacteriosis Case Rates by Race and Sex, Indiana, 2018[*+]

	Cases	Rate	2014-2018 Total
Race			
White	792	13.9	3,346
Black	33	5.0	145
Other	41	11.8	165
Unknown	254	-	1105
Sex			
Male	540	16.4	2,398
Female	576	17.0	2,355
Unknown	3	-	8
Total	1,119		4,761

Figure 2 shows reported cases by year for 2014-2018.

Figure 2: Campylobacteriosis Cases by Year – Indiana, 2014-2018

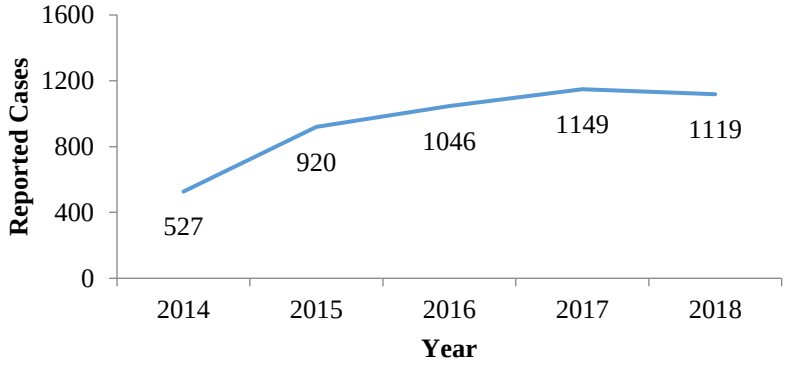
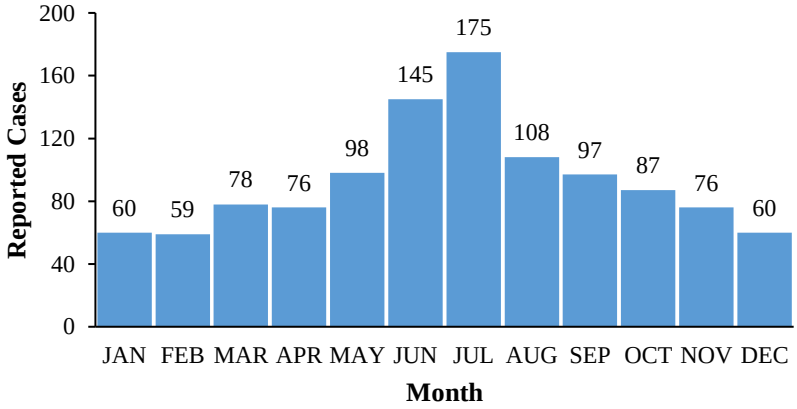


Figure 3 shows cases per month for 2018. Incidence of disease was greatest during the summer months.

Figure 3: Campylobacteriosis Cases by Month – Indiana, 2018



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As shown in Figure 4, age-specific rates in 2018 were greatest for adult age groups 70-79 (26.4) and 80+ (26.0), followed by infants younger than one year of age (24.8).

Figure 4: Campylobacteriosis Incidence Rates by Age Group – Indiana, 2018*+

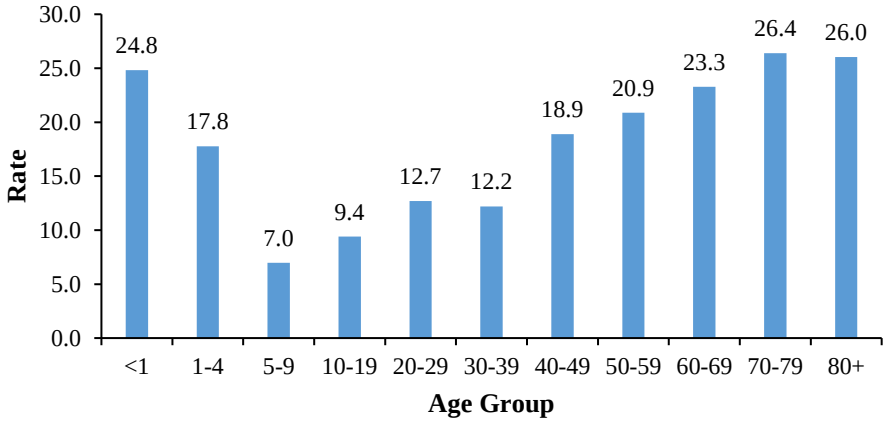

Figure 5 shows counties reporting five or more cases of campylobacteriosis in 2018. The incidence rate was highest among the following counties reporting five or more cases: Fulton (94.6) and Daviess (84.5) counties.

LEARN MORE

https://www.cdc.gov/foodsafety/diseases/campylobacter/index.html

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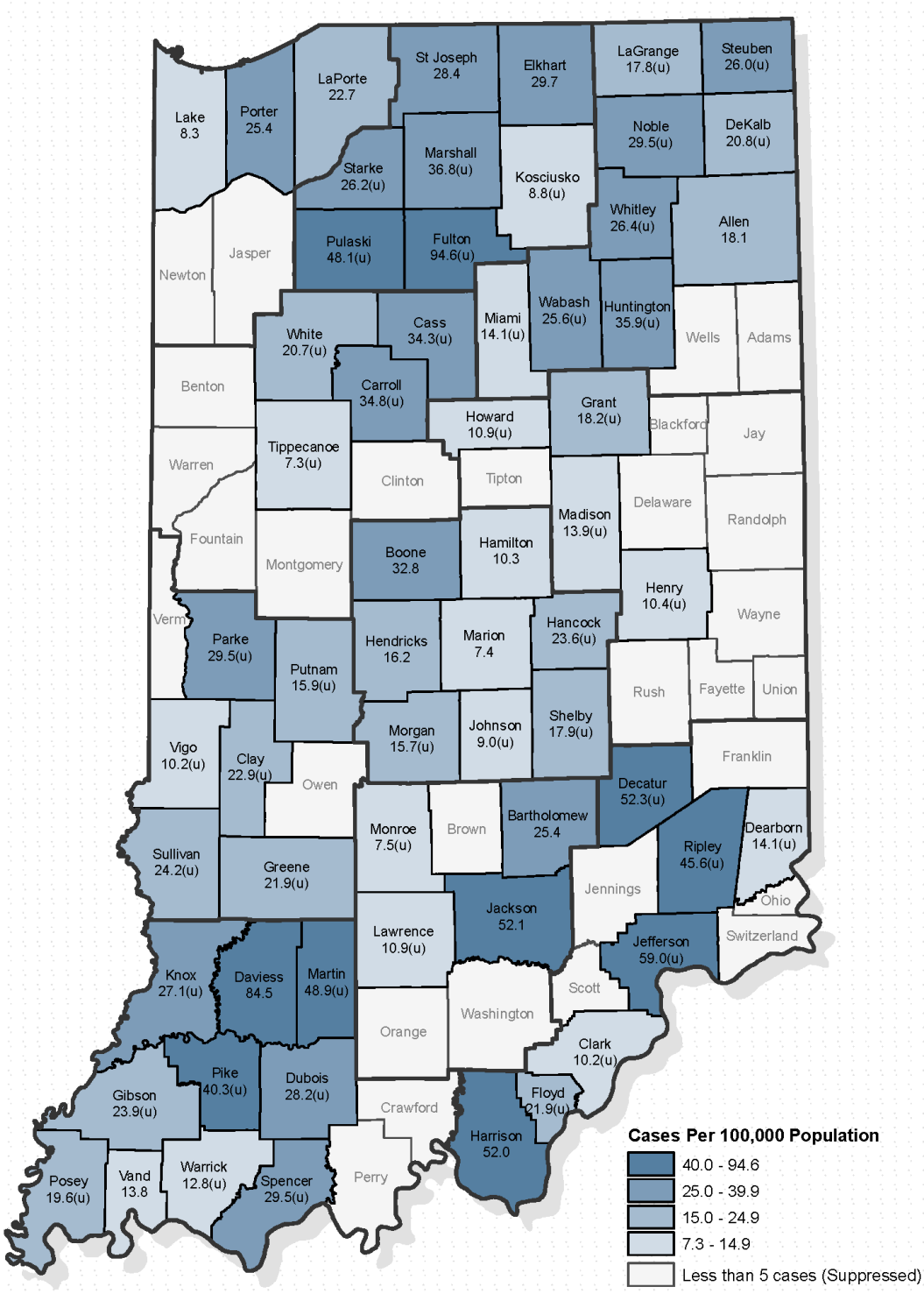
Figure 5: Campylobacteriosis Incidence Rates by County – Indiana, 2018*+



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CRYPTOSPORIDIOSIS

2018 CASE TOTAL: 325
2017 CASE TOTAL: 223

2018 INCIDENCE RATE: 4.9 per 100,000
2017 INCIDENCE RATE: 3.3 per 100,000

CRYPTOSPORIDIOSIS is a contagious disease caused by the microscopic parasites *Cryptosporidium hominis* and *Cryptosporidium parvum*, which can live in the intestines of humans, cattle and other mammals, poultry, fish and reptiles. Healthy people recover without medical intervention, but cryptosporidiosis can be very serious or life-threatening to people with weakened immune systems, especially those with HIV. The parasite is protected by an outer shell (cyst) that allows it to survive outside the body and in the environment for long periods of time. Concentrations of chlorine used in routine water treatment do not kill *Cryptosporidium* cysts.

People become infected with *Cryptosporidium* by ingesting feces from an infected animal or person (fecal-oral route). Risk factors associated with cryptosporidiosis include:

- Swallowing contaminated water from natural bodies of water such as lakes, rivers or streams
- Swallowing treated, but unfiltered, contaminated drinking or recreational water (such as pools or hot tubs)
- Eating food (most commonly produce) contaminated with stool from infected animals or humans
- Consuming unpasteurized dairy products or unpasteurized juices
- Not washing hands after contact with farm animals, particularly at petting zoos or fair venues.
- Not washing hands after contact with stool from a contaminated surface such as diapers/linens or toys
- Engaging in sexual activity that involves contact with stool

The most common sources of *Cryptosporidium* outbreaks are contaminated drinking water, recreational water parks, pools, lakes and contaminated beverages. *Cryptosporidium* outbreaks linked to swimming have doubled since 2014 in the U.S., and there has been an increase in outbreaks related to animals in farms and petting zoos.

CLINICAL AND PUBLIC HEALTH SIGNIFICANCE

Symptoms of cryptosporidiosis can include watery diarrhea, stomach cramps, upset stomach, slight fever, weight loss and vomiting (more common in children). Symptoms usually begin seven days (range of 1-12 days) after a person becomes infected. In healthy people, symptoms usually last two to three weeks. However, it is common for symptoms to fade and then return. This relapse of illness can continue for up to 30 days.

Some people with cryptosporidiosis may not have any symptoms, but they can still pass the disease to others. After infection, people can shed *Cryptosporidium* in their stool for months. People with weakened immune systems might not be able to clear the infection, which can lead to prolonged disease and even death without proper medical intervention. A previous infection with *Cryptosporidium* does not provide immunity against reinfection.

Antiparasitic drugs are available for treatment, and over-the-counter medications can ease symptoms. Because diarrhea can cause dehydration, an infected person should drink plenty of fluids.

EPIDEMIOLOGY

In 2018, 325 cases of cryptosporidiosis were reported in Indiana, for a rate of 4.9 cases per 100,000 population (Table 1). In 2018, males (4.2) and females (5.4) were at similar risk of *Cryptosporidium.* Those who identified as white (4.2) or other races (4.7) were at greater risk than those who identified as black (2.3).

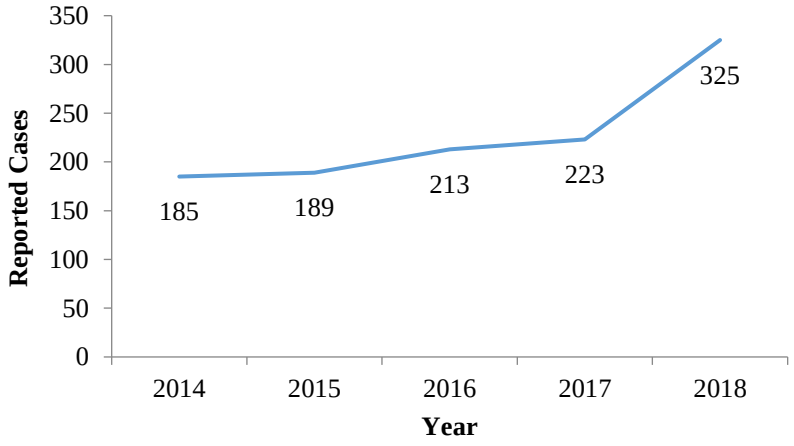
*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.
+ Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

Table 1: Cryptosporidiosis Case Rates by Race and Sex – Indiana, 2018[*+]

	Cases	Rate	2014 - 2018 Total
Race			
White	241	4.2	847
Black	15	2.3	63
Other	16	4.7	37
Unknown	53	-	188
Sex			
Male	139	4.2	533
Female	184	5.4	600
Unknown	2	-	2
Total	325		1,135

Figure 1 shows the number of reported cases each year for 2014-2018. From 2014 to 2018, an average of 227 cases of cryptosporidiosis were reported in Indiana each year.

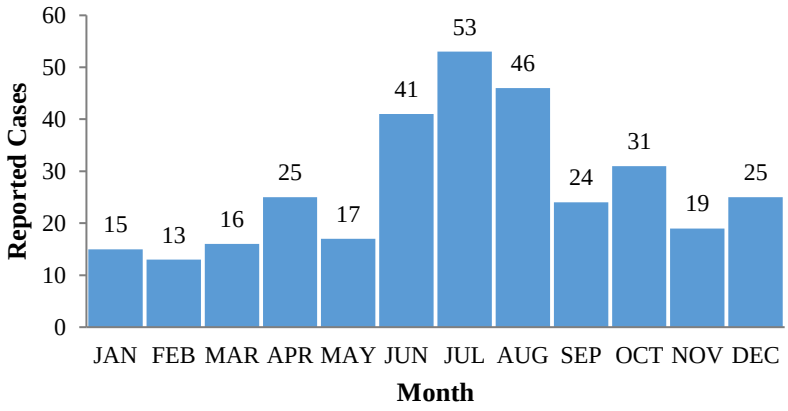
Figure 1: Cryptosporidiosis Cases by Year – Indiana, 2014-2018



Disease incidence was greatest in the (Figure 2).

Figure 2: Cryptosporidiosis Cases by Month – Indiana, 2018

[*]All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.
[+] Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.



As shown in Figure 3, the highest age-specific rates (6.2) were dispersed across several distinct age groups including those aged less than 1 year, 20-29 years, and 70-79 years.

Figure 3: Cryptosporidiosis Incidence Rates by Age Group – Indiana, 2018*+

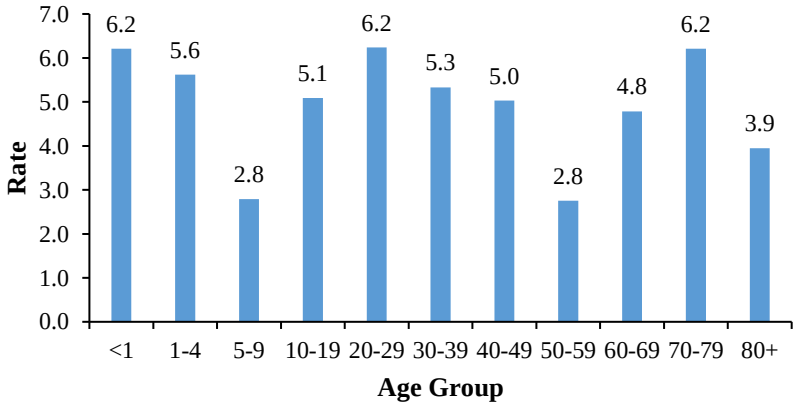


Figure 4 shows counties reporting five or more cases of cryptosporidiosis. The incidence rates were highest among the following counties reporting five or more cases: Fulton (22.9), DeKalb (23.1), Posey (19.6), Marshall (19.5) and Jackson (18.1).

LEARN MORE

http://www.cdc.gov/crypto/

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+ Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

Figure 4: Cryptosporidiosis Incidence Rates by County – Indiana, 2018[*+]

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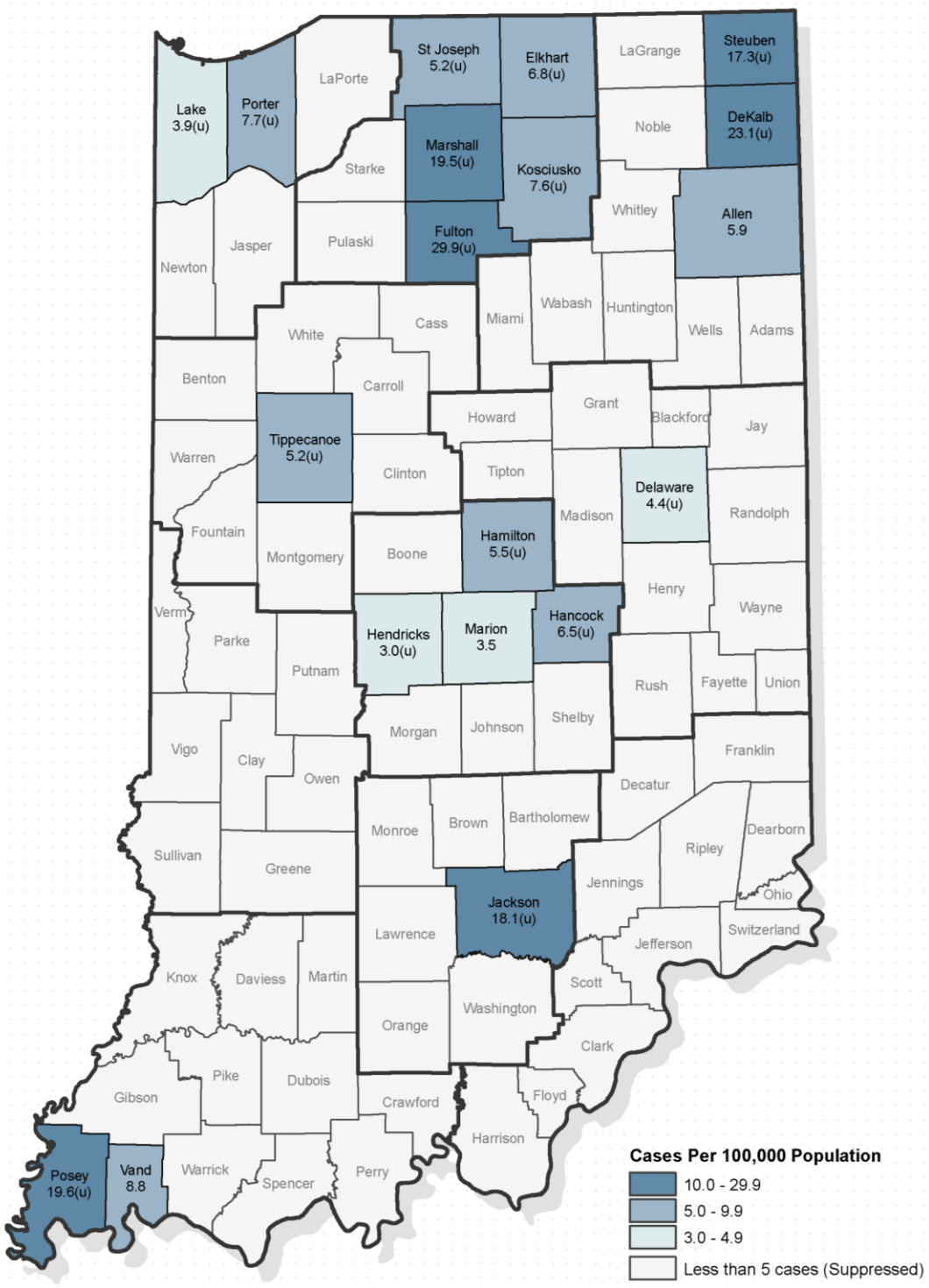
[+] Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

CRYPTOSPORIDIOSIS



*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.

+ Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

CYCLOSPORIASIS

2018 CASE TOTAL: 79
2017 CASE TOTAL: 4

2018 INCIDENCE RATE: 1.2 per 100,000
2017 INCIDENCE RATE: 0.1 per 100,000

Cyclosporiasis is an illness caused by a microscopic parasite. It is commonly spread by eating or drinking contaminated foods. It can survive outside the body and in the environment for a long amount of time. Anyone can become ill, but young children, senior adults, pregnant women, and immune suppressed individuals (such as patients on cancer drugs and with organ transplants) are at high risk for illness.

In general, cyclosporiasis can be prevented by:

- Washing hands properly
- Separate raw and cooked foods
- Wash all produce before cooking or eating raw
- Avoid drinking untreated water
- Do not change diapers near swimming pools lakes, ponds, creeks, hot tubs, and other water sources.
- Travel safely while outside the United States:
  - Drink bottled drinks and water, even when brushing teeth.
  - Do not eat uncooked fruits or vegetables unless you peel them yourself.
  - Do not eat foods or drinks from street vendors.
  - Do not drink or eat local water or ice.

CLINICAL AND PUBLIC HEALTH SIGNIFICANCE

Symptoms usually begin one week after exposure and may last a few days to a month. Symptoms include: watery diarrhea, loss of appetite, increased gas, stomach cramps, nausea, vomiting, fatigue, and weight loss. A person with diarrhea that lasts ≥24 hours should consult a doctor. The doctor may collect a stool sample to test for cyclosporiasis. Medication can help. Since diarrhea can cause dehydration, a person with cyclosporiasis should also drink plenty of fluids.

EPIDEMIOLOGY

In 2018, 79 cases of cyclosporiasis were reported in Indiana, for a rate of 1.2 cases per 100,000 population (Table 1). In 2018, males (1.1) and females (1.2) were at similar risk of Cyclosporiasis. Those who identified as white (1.1) or other races (1.5) were at greater risk than those who identified as black (0.3); however, 7 cases did not report race data.

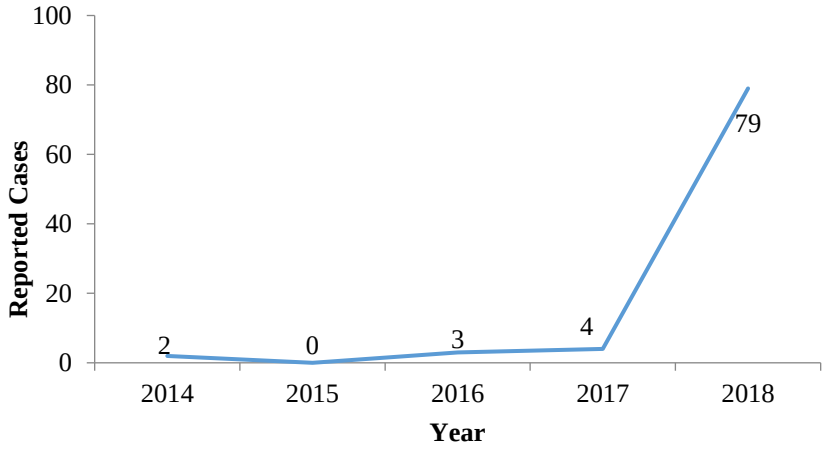
Table 1: Cyclosporiasis Case Rates by Race and Sex – Indiana, 2018[*+]

	Cases	Rate	2014 - 2018 Total
Race			
White	65	1.1	71
Black	2	0.3	2
Other	5	1.5	5
Unknown	7	-	10
Sex			
Male	37	1.1	42
Female	42	1.2	46
Unknown	0	-	0
Total	79		88

[*]All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.
[+] Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

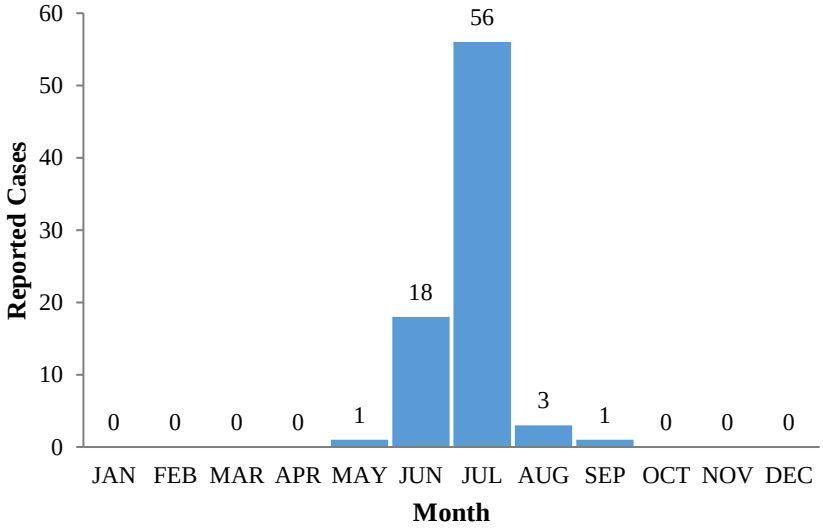
Figure 1 shows the number of reported cases each year for 2014-2018. The number of cases increased significantly in 2018 from previous years. Only 9 cases were reported between 2014 and 2017 compared to 79 in 2018.

Figure 1: Cyclosporiasis Cases by Year – Indiana, 2014-2018



Disease incidence was greatest in the summer, spiking during July (Figure 2).

Figure 2: Cyclosporiasis Cases by Month – Indiana, 2018

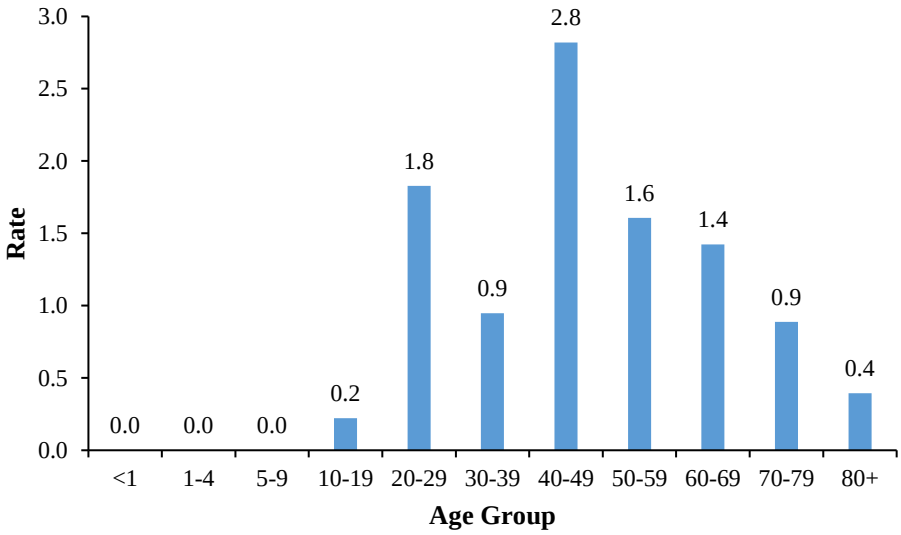


*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.

+ Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

As shown in Figure 3, the highest age-specific rates (2.8) were for those aged 40 to 49.

Figure 3, Cyclosporiasis Incidence Rates by Age Group – Indiana, 2018*+



LEARN MORE

http://www.cdc.gov/cyclosporiasis/

*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.

+ Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

ESCHERICHIA COLI, SHIGA TOXIN-PRODUCING

2018 CASE TOTAL: 248
2017 CASE TOTAL: 118

2018 INCIDENCE RATE: 3.7 per 100,000
2017 INCIDENCE RATE: 1.8 per 100,000

ESCHERICHIA COLI is a bacterium that lives in the intestines of most healthy warm-blooded animals, including humans. There are hundreds of strains of *E. coli*, and most are harmless. However, several types of *E. coli*, such as O157 and other Shiga toxin-producing strains, can cause severe and contagious illness in humans. Shiga toxins are potent toxins made by some strains of *E. coli* that damage body cells and tissues. The most severe clinical manifestation of Shiga toxin-producing *E. coli* (STEC) infection is hemolytic uremic syndrome (HUS).

People become infected with STEC by ingesting feces from an infected animal or person (fecal-oral route). There are many ways to become infected with STEC:

- Eating contaminated foods:
  - Undercooked beef products, particularly ground beef
  - Unpasteurized milk and fruit juices, including apple cider
  - Unwashed raw fruits, vegetables or herbs that have been contaminated by feces, raw meats, fertilizers or untreated water
  - Untreated water, such as from lakes or streams
- Having direct contact with the stool of infected cattle, livestock or animals at petting zoos
- Having contact with an infected person's stool:
  - Not washing hands after contact with stool from a contaminated surface or diaper/linen and ingesting the bacteria
  - Engaging in sexual activity that involves contact with stool

The most common sources of STEC outbreaks are inadequately cooked hamburgers, contaminated produce (such as melons, lettuce, spinach, coleslaw, apple cider and alfalfa sprouts) and unpasteurized milk. Persons who work in certain occupations, such as food handlers, daycare providers and health care providers, have a greater risk of transmitting infection to others.

CLINICAL AND PUBLIC HEALTH SIGNIFICANCE

Symptoms of STEC infection include diarrhea (bloody or non-bloody), abdominal cramps and little to no fever. Symptoms usually begin three to four days (range of two to 10 days) after exposure and last for approximately five to 10 days. Some people may have only mild diarrhea or no symptoms at all. The bacteria can be passed in the stool for up to three weeks after symptoms have stopped. Most people recover from infection without medical treatment. The use of antibiotics or over-the-counter antidiarrheal agents is not recommended, as the use of these can lead to greater likelihood of developing HUS.

Approximately 6 percent of people infected with STEC (O157 and other Shiga toxin-producing strains) develop HUS. This condition is very serious and can lead to kidney failure and death. Children younger than five years of age and the elderly are more likely to develop HUS. HUS may require hospitalization and extensive medical care and may even be fatal.

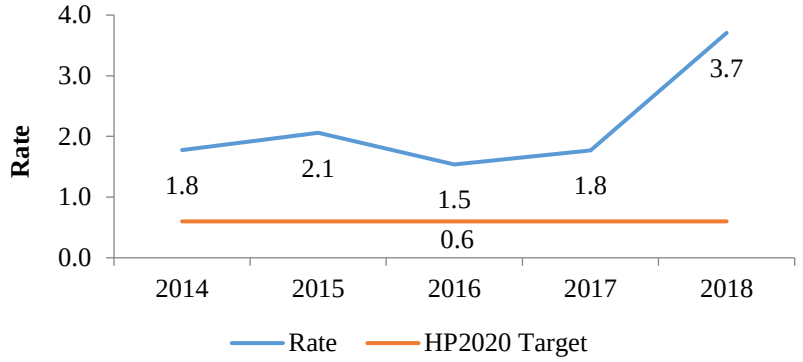
HEALTHY PEOPLE 2020 GOAL

The Healthy People 2020 Goal for Shiga toxin-producing *Escherichia coli* O157 is 0.6 cases per 100,000 population per year. Indiana has not met this goal from 2014 to 2018 (Figure 1). Since 2004, several national outbreaks of STEC have occurred, validating the need for continuous education on effective control measures and enhanced food safety systems.

*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates as of July 1, 2018, based on Census 2019 data estimates.

+ Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

Figure 1: Shiga Toxin-producing *E. coli* Rates by Year – Indiana, 2014-2018*+



EPIDEMIOLOGY

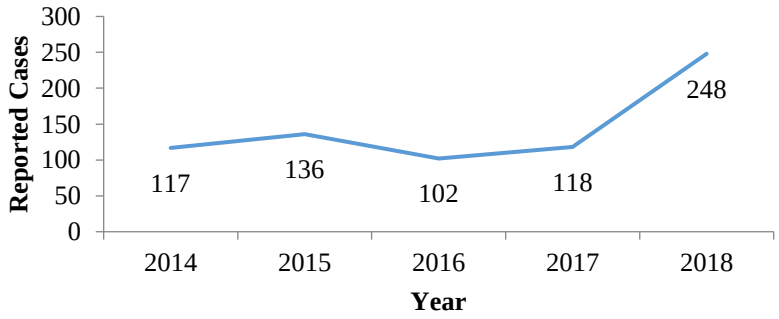
In 2018, 248 cases of Shiga toxin-producing *E. coli* infection were reported in Indiana, for a rate of 3.7 cases per 100,000 population (Table 1). The rate is more than double the reported 2017 rate (1.8). Females (4.5) were more likely to be reported than males (2.9). Those who identified as white (2.8) or other races (2.7) were at greater risk than those who identified as black (0.8); however, 77 cases did not report race data.

Table 1: Shiga Toxin-producing *E. coli* Case Rates by Race and Sex – Indiana, 2018*+

	Cases	Rate	2014-2018 Total
Race			
White	157	2.8	443
Black	5	0.8	22
Other	9	2.7	34
Unknown	77	-	222
Sex			
Male	97	2.9	311
Female	151	4.5	409
Unknown	0	-	1
Total	248		721

Figure 2 shows the number of reported cases per year for 2014-2018.

Figure 2: Shiga Toxin-producing *E. coli* Cases by Year –Indiana, 2014-2018

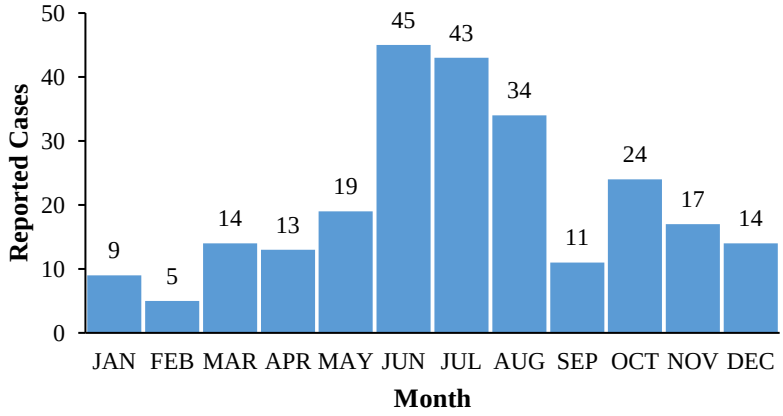


*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates as of July 1, 2018, based on Census 2019 data estimates.

+ Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

Figure 3 shows the number of cases per month in Indiana for 2018. Incidence of disease was greatest during the summer months, with June having the highest number of reported cases (45).

Figure 3: Shiga Toxin-producing *E. coli* Cases by Month – Indiana, 2018



As shown in Figure 4, age-specific rates in 2018 were highest among infants under 1 year of age (8.7), followed by preschoolers aged 1-4 years (6.5).

Figure 4: Shiga Toxin-producing *E. coli* Incidence Rates by Age Group – Indiana, 2018*+

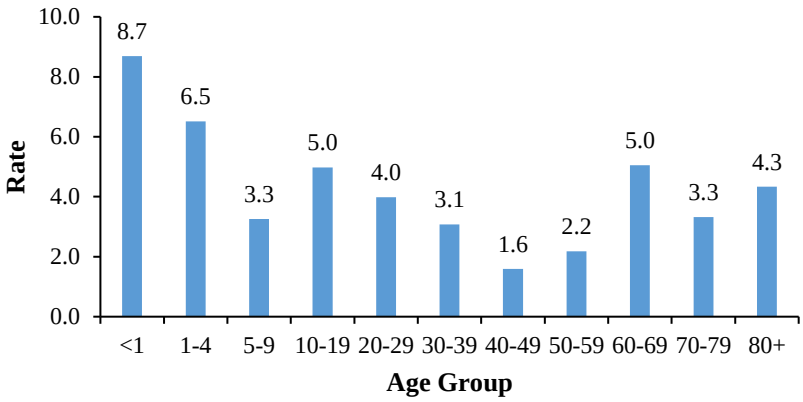


Table 2 shows the four counties with the highest disease incidence rates of Shiga toxin-producing *E. coli* in 2018. The incidence rates were highest among Ripley (17.5) and Cass (13.2) counties.

Table 2: Shiga Toxin-producing *E. coli* Rates by County – Indiana, 2018*+

County	Cases	Rate
Ripley	5	17.5
Cass	5	13.2
Boone	8	11.9
Warrick	7	11.2

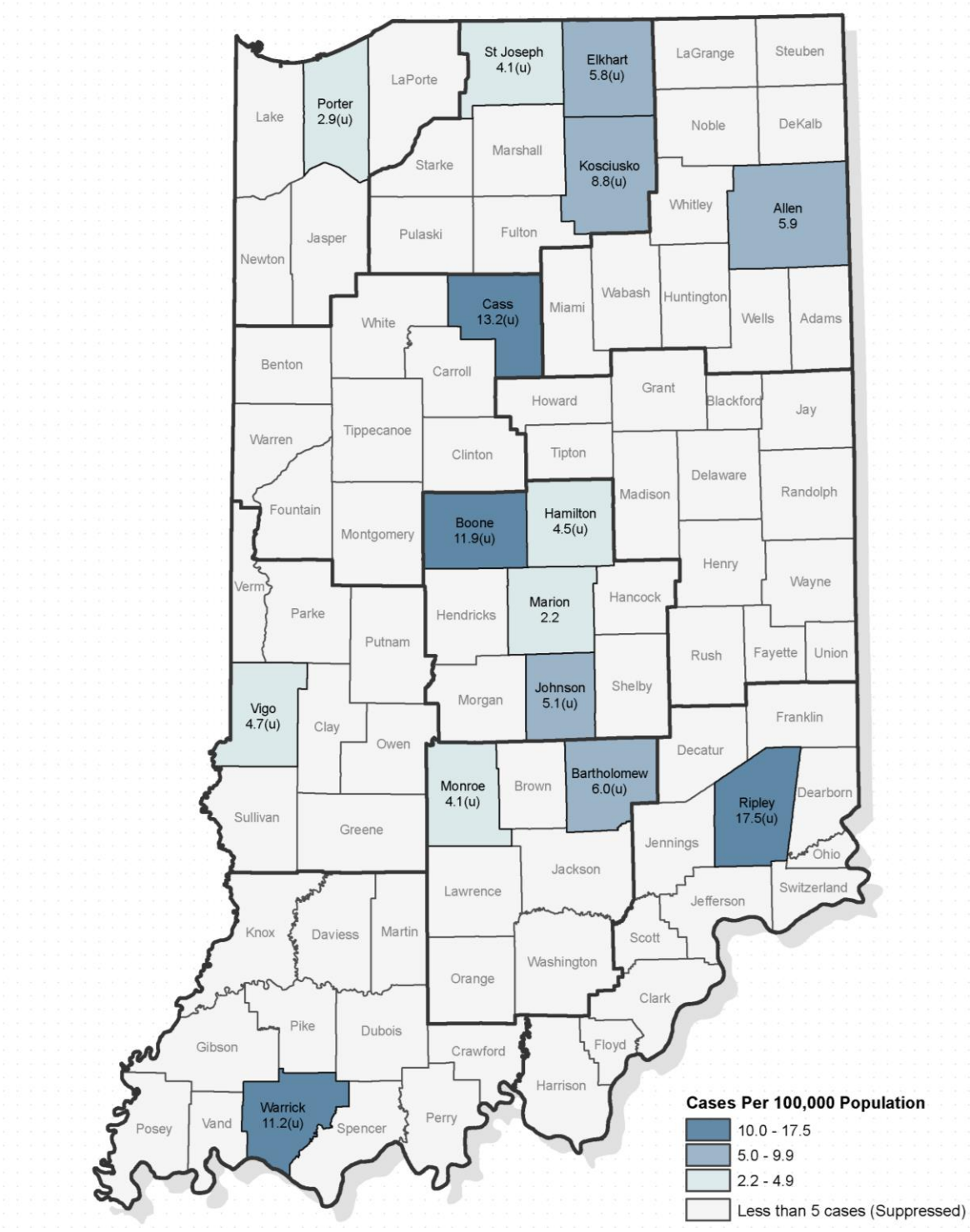
LEARN MORE

http://www.cdc.gov/ecoli/

*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates as of July 1, 2018, based on Census 2019 data estimates.

+ Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

Figure 5: Shiga Toxin-Producing *E. coli* Incidence Rates by County – Indiana, 2018*+



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+ Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

GIARDIASIS

2018 CASE TOTAL: 224
2017 CASE TOTAL: 192

2018 INCIDENCE RATE: 3.3 per 100,000
2017 INCIDENCE RATE: 2.9 per 100,000

GIARDIASIS is a contagious disease caused by the *Giardia* parasite, most commonly *Giardia lamblia*, which is found in the intestines of many animals. *Giardia* is the most common intestinal parasite infection in the U.S. and is a leading cause of waterborne disease. The parasite is protected by an outer shell (cyst), which allows it to survive outside the body and in the environment for long periods of time. Concentrations of chlorine used in routine water treatment do not kill *Giardia* cysts.

Giardia is passed in the stool, and people become infected by ingesting feces from an infected animal or person (fecal-oral route). Giardiasis can occur in several ways:

- Having contact with an infected person's stool:
  - Not washing hands after contact with stool from a contaminated surface or diaper/linen and ingesting the bacteria
  - Having sex that involves contact with stool
- Swallowing untreated water from lakes or streams
- Swallowing treated but unfiltered drinking or recreational water
- Direct contact with the stool of infected cattle, livestock and animals from petting zoos

Giardiasis is more common in children than adults. Large community outbreaks have occurred from drinking treated but unfiltered water. Smaller outbreaks have resulted from contaminated food, person-to-person transmission in daycare facilities and contaminated recreational waters.

CLINICAL AND PUBLIC HEALTH SIGNIFICANCE

Symptoms of giardiasis can include diarrhea, gas, greasy stools, bloating, stomach cramps, nausea and weight loss. Symptoms usually begin within 7-10 days (range of 3-25 days) after exposure and last from two to six weeks. Infected people may carry *Giardia* in their bodies for weeks or months without symptoms and unknowingly infect others. Although medications are available to treat giardiasis, they are not needed if the person does not have diarrhea. Over-the-counter drugs might relieve symptoms but will not get rid of the parasite.

EPIDEMIOLOGY

In 2018, 224 cases of giardiasis were reported in Indiana, for a rate of 3.3 cases per 100,000 population (Table 1). Males (4.4) were at greater risk of giardiasis than females (2.4). The rate for those who identified as other races (5.0) was higher than that for those who identified as white (2.4) and those who identified as black (2.7); however, 51 cases (22.8 percent) did not report race data.

*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.

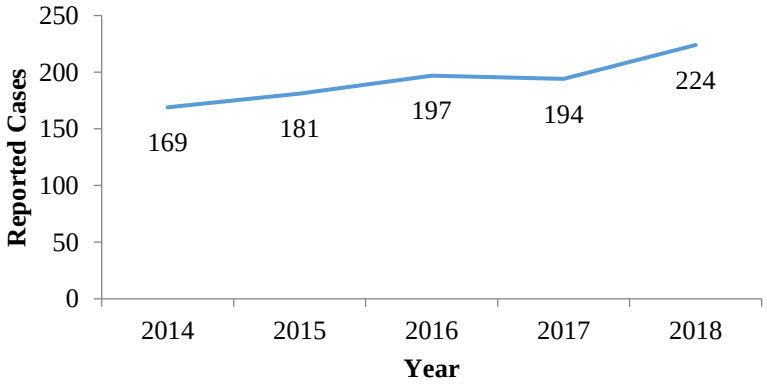
+ Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

Table 1: Giardiasis Case Rates by Race and Sex, Indiana, 2018*+

	Cases	Rate	2014-2018 Total
Race			
White	138	2.4	594
Black	18	2.7	80
Other	17	5.0	74
Unknown	51	-	217
Sex			
Male	144	4.4	586
Female	80	2.4	379
Unknown	0	-	0
Total	224		965

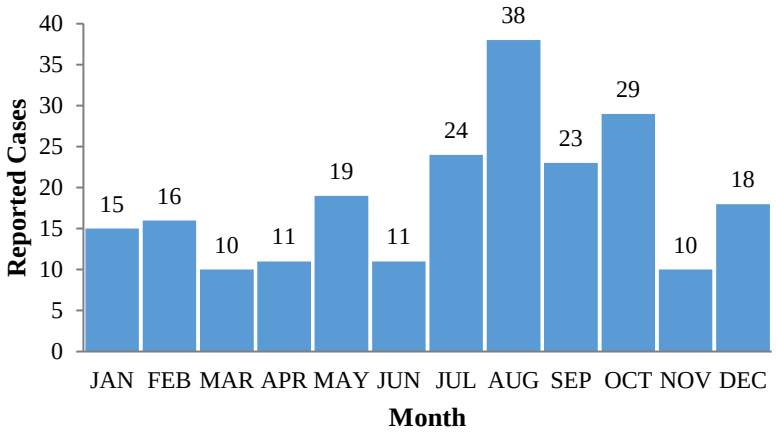
Figure 1 shows the number of reported cases each year for 2014-2018. During that time period, an average of 193 cases of giardiasis were reported in Indiana each year.

Figure 1: Giardiasis Cases by Year – Indiana, 2014-2018



Disease incidence was greatest during summer through early autumn. (Figure 2).

Figure 2: Giardiasis Cases by Month – Indiana, 2018*+



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+ Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

As shown in Figure 3, age-specific rates were greatest for children ages 1-4 (5.9) and adults aged 80+ (5.5).

Figure 3: Giardiasis Incidence Rates by Age Group – Indiana, 2018*+

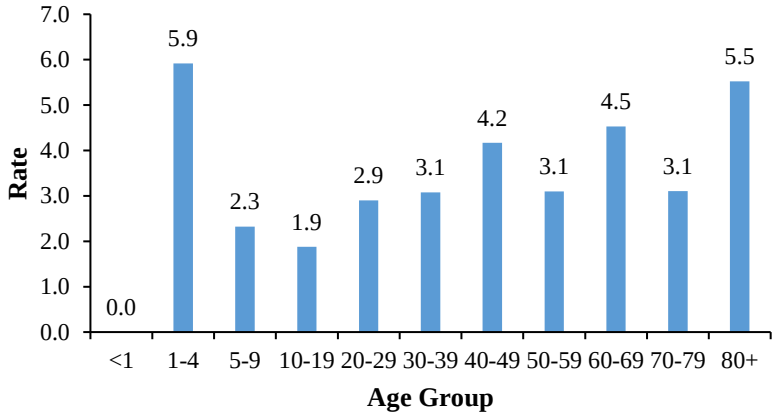


Table 2 shows the five counties with the highest disease incidence rates. The incidence rates were highest among the following counties reporting five or more cases: Huntington (13.8), Jackson (11.3), Noble (10.5), Allen (7.7) and Kosciusko (6.3).

Table 2: Giardiasis Incidence Rates by County – Indiana, 2018*+

County	Cases	Rate
Huntington	5	13.8
Jackson	5	11.3
Noble	5	10.5
Allen	29	7.7
Kosciusko	5	6.3

LEARN MORE

http://www.cdc.gov/parasites/giardia/index.html

*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.

+ Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

HEPATITIS A

2018 CASE TOTAL: 964
2017 CASE TOTAL: 21

2018 INCIDENCE RATE: 14.4 per 100,000
2017 INCIDENCE RATE: 0.3 per 100,000

HEPATITIS A is an inflammation of the liver caused by the hepatitis A virus (HAV). Humans are the normal reservoir for HAV, and people become infected with HAV by coming in contact with the stool of an infected person (fecal-oral route). For this reason, the virus is easily spread in areas where there are poor sanitary conditions or where good personal hygiene is not practiced. Persons are at risk for hepatitis A infection if they have:

- Exposure to contaminated food or water, such as:
  - Consuming untreated water
  - Consuming food prepared by an infected person
  - Consuming raw produce or raw shellfish (e.g., oysters)
  - Traveling to countries where hepatitis A is common and where there is limited clean water or proper sewage disposal
- Exposure to the stool or blood of an infected person who is a:
  - Household member or sexual partner (men who have sex with men are at higher risk)
  - Child or staff member of a daycare center (including centers for the disabled)
  - Resident or staff member of a health care center
  - Person who injects drugs

CLINICAL AND PUBLIC HEALTH SIGNIFICANCE

An acute hepatitis A case is characterized by positive immunoglobulin M (IgM) antibody to hepatitis A virus (anti-HAV) and an acute illness with a) discrete onset of symptoms and b) jaundice or elevated serum aminotransferase levels. Symptoms of hepatitis A usually occur suddenly and may include diarrhea, nausea, vomiting, tiredness, stomach pain, fever, dark urine, pale or clay-colored stool, loss of appetite and sometimes jaundice. People are most contagious from about two weeks before symptoms begin until two weeks after. Some people, especially children, may have no symptoms but can still spread the virus to others.

Symptoms usually begin 28 days (range of 15-50 days) after exposure and usually last less than two months. About 10 percent to 15 percent of symptomatic people can recover and become ill again (relapse) for as long as six months. However, people will eventually recover, and hepatitis A infection has no long-term carrier state. Death from hepatitis A is rare and more common in adults over 50.

There is no specific treatment for hepatitis A other than treating symptoms. People who have had hepatitis A develop lifelong immunity and cannot get hepatitis A again.

Post-exposure prophylaxis with hepatitis A vaccine or hepatitis A immune globulin is effective if received within two weeks of exposure. Indications for prophylaxis may include people who consumed food or beverages contaminated with HAV, household or sexual contacts of someone infected with HAV, children and staff members in the same daycare room as an infected case and residents and staff members in a health care center who have direct contact with someone infected.

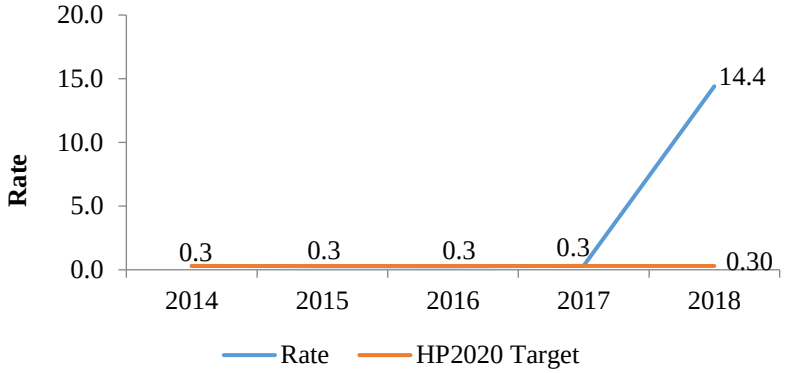
HEALTHY PEOPLE 2020 GOAL

The Healthy People 2020 Goal for hepatitis A is 0.3 cases per 100,000 population per year. Indiana rates were level with this goal each year from 2014 to 2017. Indiana was part of a multi-state outbreak which significantly increased the number of cases during 2018 (Figure 1).

*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.

+ Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

Figure 1: Hepatitis A Rates by Year – Indiana, 2018*+



EPIDEMIOLOGY

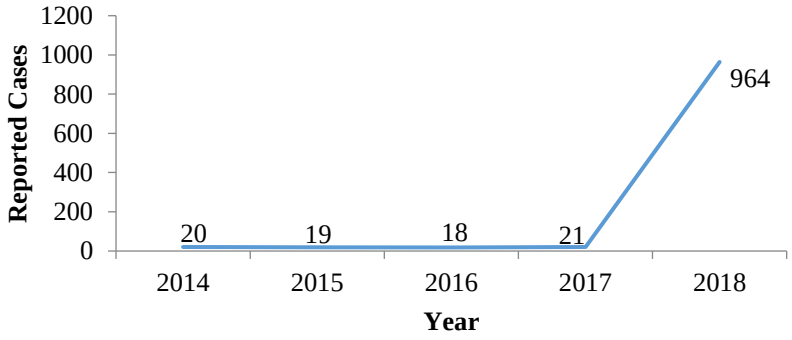
In 2018, 964 cases of hepatitis A were reported in Indiana for a rate of 14.4 cases per 100,000 population (Table 1). Most of the cases were associated with a multi-state outbreak that began in November 2017. Males (17.4) were more likely to be reported than females (11.5). The rate for those identifying as white (13.9) or other races (16.8) were at greater risk than those identifying as black (3.3).

Table 1: Hepatitis A Case Rates by Race and Sex – Indiana, 2018*+

	Cases	Rate	2013-2017 Total
Race			
White	790	13.9	839
Black	22	3.3	27
Other	57	16.8	68
Unknown	95	-	108
Sex			
Male	574	17.4	609
Female	390	11.5	433
Unknown	0	-	0
Total	964		1,042

Figure 2 shows the number of reported cases per year for 2014-2018. Most of the cases during the reporting period occurred during 2018 (92.5 percent).

Figure 2: Hepatitis A Cases by Year – Indiana 2014-2018



*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.

+ Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

Monthly incidence of disease increased throughout the year as the multi-state outbreak worsened. The greatest number of cases were reported during December (Figure 3).

Figure 3: Hepatitis A Cases by Month – Indiana, 2018

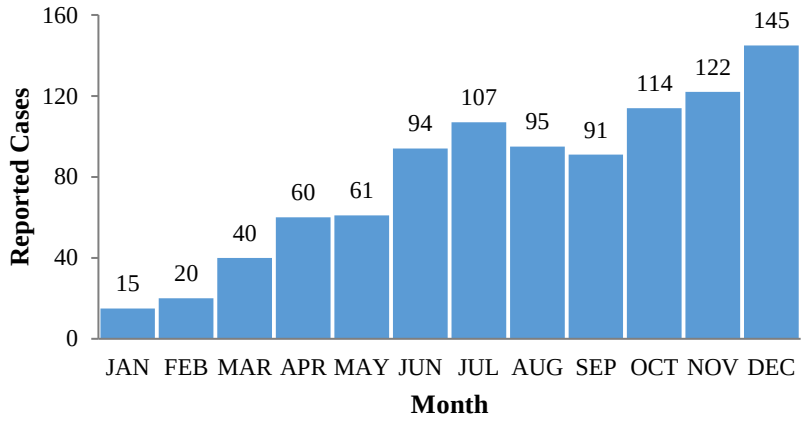
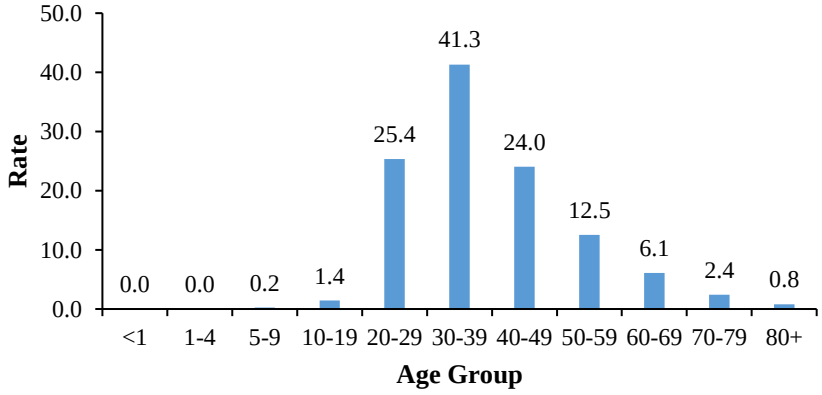


Figure 4 shows that age-specific rates were greatest for adults aged 30-39 years (41.3).

Figure 4: Hepatitis A Incidence Rates by Age Group – Indiana, 2018[*+]



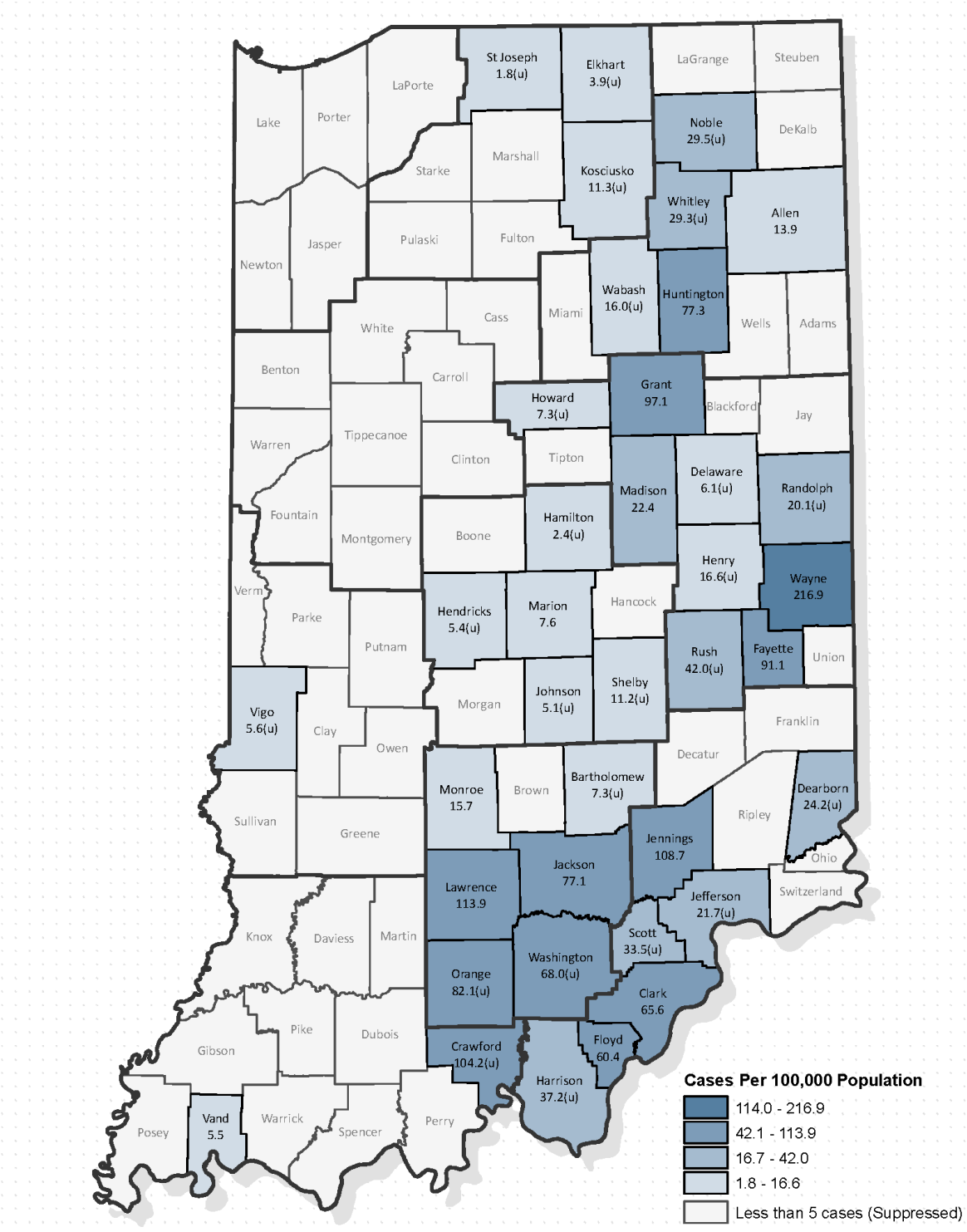
LEARN MORE

http://www.cdc.gov/hepatitis/index.htm

[*]All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.

[+] Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

Figure 5: Hepatitis A Incidence Rates by County – Indiana, 2018*+



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+ Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

LEGIONELLOSIS

2018 CASE TOTAL: 249
2017 CASE TOTAL: 198

2018 INCIDENCE RATE: 3.7 per 100,000
2017 INCIDENCE RATE: 3.0 per 100,000

LEGIONELLOSIS is a respiratory infection caused by *Legionella* bacteria, most commonly *Legionella pneumophila*. These bacteria are transmitted by contaminated water aerosols, which are then inhaled. *Legionella* can be found in natural and building water systems and the environment, in sources such as creeks, ponds and potting soil. The bacteria are prevalent in warm, stagnant water, such as that found in most plumbing systems, hot water tanks, cooling towers and evaporative condensers.

People most at risk of developing Legionnaires' disease are:

- Adults age 50 and older
- Current or former smokers
- People with chronic lung disease (like emphysema)
- People with weakened immune systems from diseases such as cancer, diabetes or kidney failure
- People who take drugs that suppress (weaken) the immune system (such as organ transplant recipients or those receiving chemotherapy)

CLINICAL AND PUBLIC HEALTH SIGNIFICANCE

Legionnaires' disease is a severe infection, most commonly characterized by pneumonia. Other symptoms include high fever, cough, chills, muscle aches and headache. Symptoms usually begin about 2-14 days after exposure. Chest X-rays are needed to confirm the presence of pneumonia, and other tests can be performed on sputum (phlegm), as well as blood and urine, to find evidence of the bacteria in the body.

A milder infection caused by the same type of *Legionella* bacteria is Pontiac Fever. The symptoms of Pontiac Fever usually last for two to five days and also can include fever, headaches and muscle aches; however, there is no pneumonia. Symptoms resolve on their own without treatment and without causing further problems. *Legionella* bacteria are not spread from person to person. Pontiac Fever and Legionnaires' disease may both be called "Legionellosis."

Outbreaks occur when two or more people become ill in the same place at about the same time or when two definite or possible nosocomial cases are identified. A definite nosocomial case is a laboratory-confirmed case who has spent 10 days or more continuously in a health care facility. A possible nosocomial case is a laboratory case that occurs two to nine days after discharge from a health care facility. Hospitals and large facilities have complex water systems, and many people in hospitals and long-term care facilities already have illnesses that increase their risk for *Legionella* infection.

The investigation focuses on environmental sources for the exposure in the health care facility for nosocomial cases or places of common exposure for those infections not associated with a health care facility. Active surveillance for additional cases occurs.

Other outbreaks have been linked to aerosol sources in the community, cruise ships and hotels, with the most likely sources being whirlpool spas, cooling towers (air-conditioning units from large buildings) and water used for drinking and bathing.

Legionnaires' disease can be treated with antibiotics. Supportive therapy may be needed to aid breathing function. There is no vaccine for Legionellosis.

*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.

+ Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

EPIDEMIOLOGY

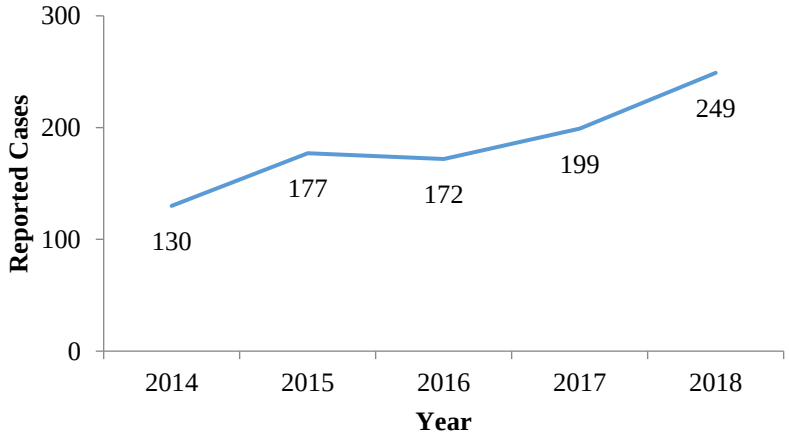
In 2018, 249 confirmed cases of Legionellosis were reported in Indiana (Table 1), for a case rate of 3.7 per 100,000. Males (4.6) were at a higher risk for Legionellosis than females (2.9). Those who identified as black (6.8) were at higher risk for Legionellosis than those who identified as white (2.8) or other races (3.0).

Table 1: Legionellosis Case Rates by Race and Sex – Indiana, 2018*+

	Cases	Rate	2014-2018 Total
Race			
White	161	2.8	647
Black	45	6.8	149
Other	10	3.0	19
Unknown	33	-	112
Sex			
Male	150	4.6	550
Female	99	2.9	376
Unknown	0	-	1
Total	249		927

Figure 1 shows the number of cases by year for 2014-2018.

Figure 1: Legionellosis Cases by Year – Indiana, 2014-2018

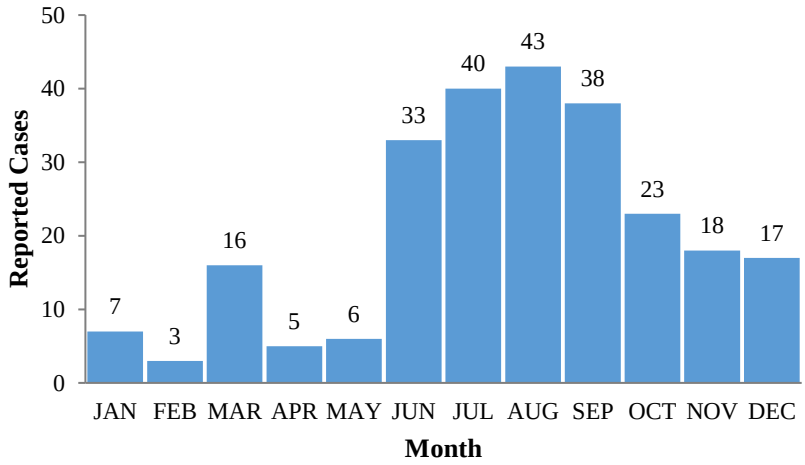


Incidence of Legionellosis typically climbs in the summer. Figure 2 indicates an increased incidence during summer into autumn of 2018.

*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.

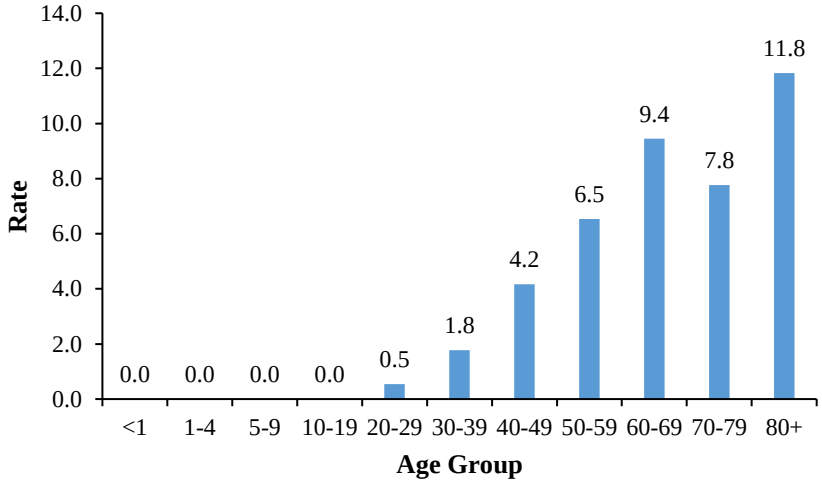
+ Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

Figure 2: Legionellosis Cases by Month – Indiana, 2018



As seen in Figure 3, cases of Legionellosis were reported most frequently in adults aged 80+ (11.8).

Figure 3: Legionellosis Incidence Rates by Age Group – Indiana, 2018*+



Incidence rates were highest among the following counties reporting five or more cases: Shelby (13.5), Porter (8.3), Delaware (7.0), Allen (6.9) and LaPorte (6.4) (Table 2).

Table 2: Legionellosis Incidence Rates by County – Indiana, 2018*+

County	Cases	Rate
Shelby	6	13.5
Porter	14	8.3
Delaware	8	7.0
Allen	26	6.9
LaPorte	7	6.4

LEARN MORE

http://www.cdc.gov/legionella/patient_facts.htm

*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.

+ Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

LISTERIOSIS

2018 CASE TOTAL: 17
2017 CASE TOTAL: 17

2018 INCIDENCE RATE: 0.3 per 100,000
2017 INCIDENCE RATE: 0.3 per 100,000

LISTERIOSIS is an infectious disease caused by *Listeria monocytogenes* bacteria. These bacteria are found in soil, untreated water and the intestines of some animals. These animals are not sick but can pass the bacteria into the soil through manure. Most often, people get listeriosis by eating food contaminated with *Listeria* bacteria. *Listeria* is killed by pasteurization and cooking. However, in certain ready-to-eat foods, such as luncheon meats, contamination may occur after cooking but before packaging. Raw produce may become contaminated by contact with soil or manure. Unlike other bacteria found in food, *Listeria* can multiply in food even while refrigerated and frozen. Foods at high risk for listeriosis include raw vegetables, uncooked meats and seafood, ready-to-eat meats, soft cheeses and unpasteurized dairy products. The only way listeriosis can be spread from person to person is from mother to baby during pregnancy. It cannot be spread by other person-to-person contact.

Outbreaks of listeriosis have been attributed to unpasteurized dairy products, soft cheeses, raw fruits and vegetables, and ready-to-eat meats.

CLINICAL AND PUBLIC HEALTH SIGNIFICANCE

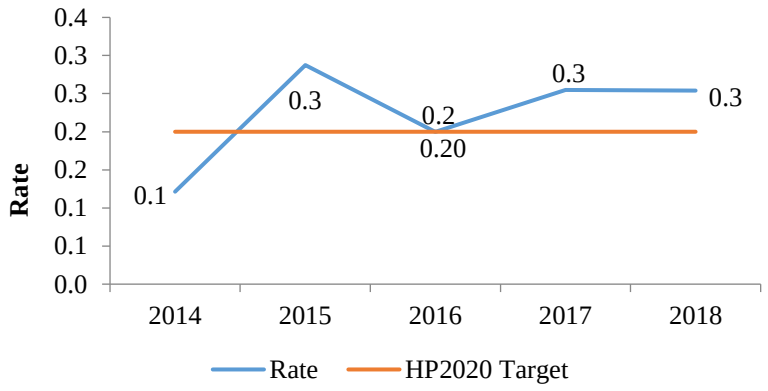
Symptoms of listeriosis include fever, headache, muscle aches, nausea, vomiting, abdominal cramps and diarrhea. Symptoms usually begin 21 days (range of 3-70 days) after exposure. Duration of symptoms depends on the health of the infected person; symptoms can last several days or several weeks. Healthy people usually do not have any symptoms or may have a mild illness. Illness can be very serious in pregnant women, newborns, the elderly and persons with weakened immune systems. In these persons, *Listeria* may cause invasive conditions such as bacteremia and meningitis.

Pregnant women are about 20 times more likely than other healthy adults to get listeriosis. About one-third of listeriosis cases occur during pregnancy. Infected pregnant women may experience only a mild, flu-like illness; however, infections during pregnancy can lead to miscarriage or stillbirth, premature delivery or infection of the newborn. If infection occurs when a woman is pregnant, antibiotics given promptly often can prevent infection of the baby. Antibiotics are available to treat the infection in all persons, regardless of age.

HEALTHY PEOPLE 2020 GOAL

The Healthy People 2020 Goal for listeriosis is 0.2 cases per 100,000 population. During the five-year reporting period of 2014-2018, Indiana met the Healthy People 2020 goal in 2014 and 2016 (Figure 1). The rate of cases in 2015, 2017, and 2018 were slightly greater than the goal.

Figure 1: Listeriosis Rates by Year – Indiana, 2014-2018*+



*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.

+ Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

EPIDEMIOLOGY

In 2018, 17 cases of listeriosis were reported in Indiana, for a rate of 0.3 cases per 100,000 population (Table 1).

Table 1: Listeriosis Case Rates by Race and Sex – Indiana, 2018[*+]

	Cases	Rate	2014-2018 Total
Race			
White	10	0.2	56
Black	0	-	0
Other	4	1.2	7
Unknown	3	-	13
Sex			
Male	3	0.2	30
Female	10	0.3	46
Unknown	0	-	0
Total	17		76

Figure 2 shows reported listeriosis cases by year for 2014-2018.

Figure 2: Listeriosis Cases by Year – Indiana, 2014-2018

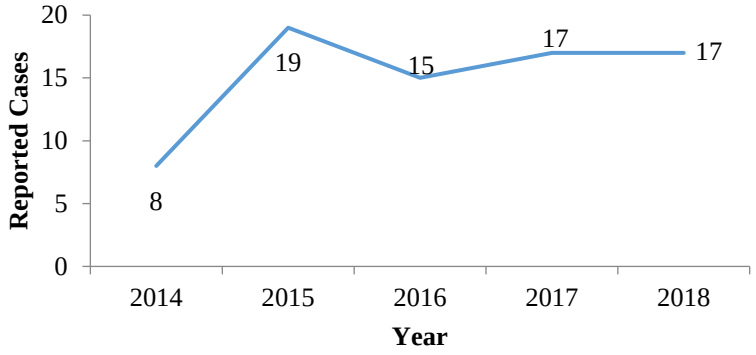
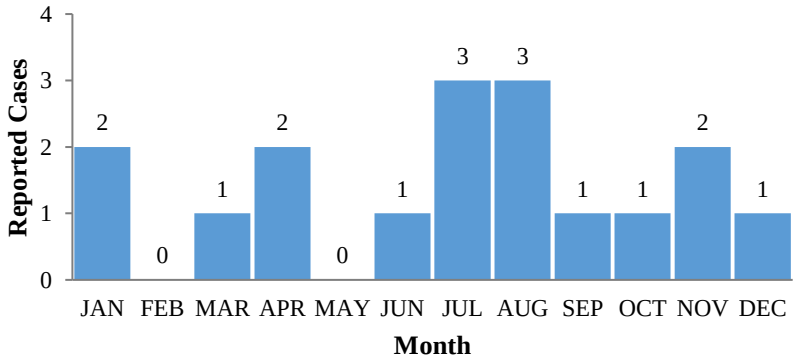


Figure 3 shows the number of listeriosis cases by month for 2018. Incidence of disease was highest in July (3) and August (3).

Figure 3: Listeriosis Cases by Month – Indiana, 2018

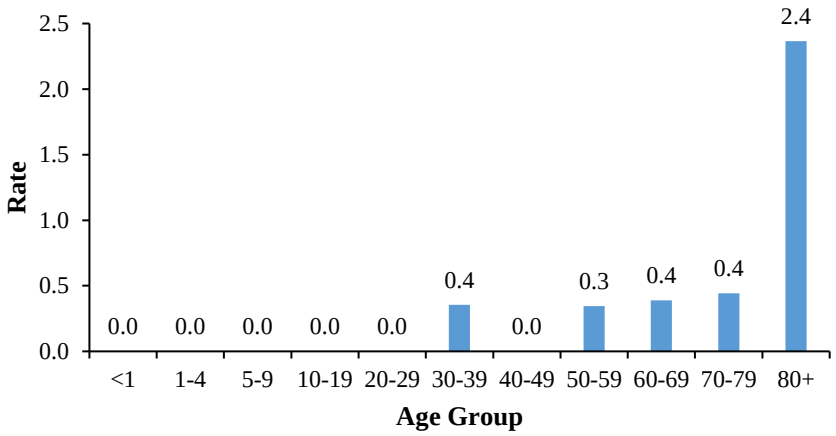


[*]All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.

[+] Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

As shown in Figure 4, age-specific rates in 2018 were greatest for adults aged 80+ (2.4)

Figure 4: Listeriosis Incidence Rates by Age Group – Indiana, 2018*+



In 2018, no counties had a total case count greater than five.

LEARN MORE

http://www.cdc.gov/listeria/index.html
http://www.fda.gov/Food/FoodSafety/FoodborneIllness/FoodborneIllnessFoodbornePathogensNaturalToxins/BadBugBook/ucm070064.htm

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+ Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

SALMONELLOSIS

2018 CASE TOTAL: 799
2017 CASE TOTAL: 740

2018 INCIDENCE RATE: 11.9 per 100,000
2017 INCIDENCE RATE: 11.1 per 100,000

SALMONELLOSIS is a contagious disease caused by *Salmonella* bacteria, which are found in the intestines of many healthy animals, including poultry, farm animals (e.g., cattle, pigs, chicks, ducklings), domestic animals (e.g., dogs, cats, birds), wild birds, reptiles and amphibians. There are thousands of types of *Salmonella* bacteria, most of which can infect humans. People become infected with *Salmonella* by ingesting feces from an infected animal or person (fecal-oral route).

Historically, widespread salmonellosis outbreaks have been linked to the consumption of eggs, poultry, ground beef, tomatoes, leafy greens, melons and commercially processed foods. Contact with live animals, such as poultry or reptiles, or dried pet food/treats also have been associated with widespread salmonellosis outbreaks. Persons who work in certain occupations (food handlers, daycare providers and health care providers) have a greater risk of transmitting infection to others.

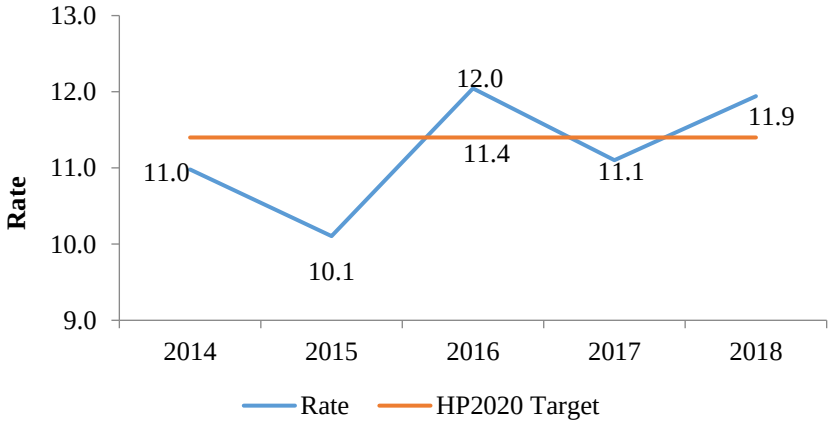
CLINICAL AND PUBLIC HEALTH SIGNIFICANCE

Symptoms of salmonellosis may include diarrhea, stomach cramps, fever, nausea or vomiting. Symptoms usually begin 12-36 hours (range of 6-72 hours) after exposure. Infected people may carry *Salmonella* in their bodies for weeks or months without symptoms and unknowingly infect others. Rarely, *Salmonella* can enter the blood stream and infect organs such as the heart and lungs and bones. Death from salmonellosis is rare. Children under age five, the elderly and people with weakened immune systems are at the greatest risk for severe complications. Most people recover within five to seven days without medical treatment, but antibiotics are available if indicated. Because diarrhea can cause dehydration, an infected person should drink plenty of fluids. There is no vaccine for salmonellosis.

HEALTHY PEOPLE 2020 GOAL

The Healthy People 2020 Goal for salmonellosis is 11.4 cases per 100,000 population per year. Indiana rates in 2018 and 2016 were slightly greater than the goal (Figure 1).

Figure 1: Salmonellosis Rates by Year – Indiana, 2014-2018*+



EPIDEMIOLOGY

In 2018, 799 cases of salmonellosis were reported in Indiana, for a rate of 11.9 cases per 100,000 population (Table 1). Females (12.8) were more likely to be reported with salmonellosis than males (11.1). The rate of those who identified as other races (10.6) or white (9.5) were greater than the rate for those who identified as black (6.1).

*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.

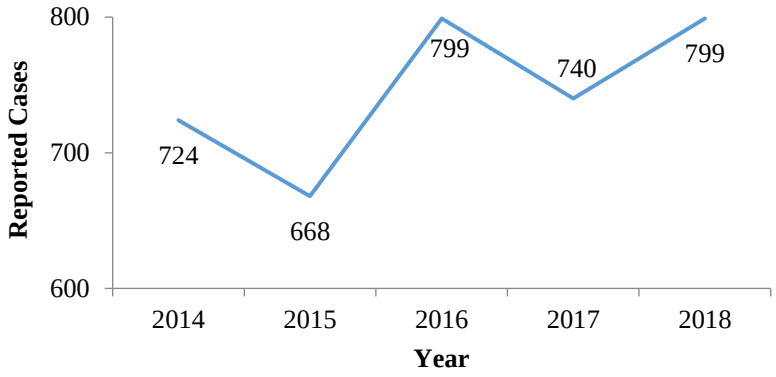
+ Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

Table 1: Salmonellosis Case Rates by Race and Sex – Indiana, 2018[*+]

	Cases	Rate	2014 - 2018 Total
Race			
White	540	9.5	2,427
Black	40	6.1	228
Other	36	10.6	183
Unknown	183	-	892
Sex			
Male	365	11.1	1,676
Female	433	12.8	2,049
Unknown	1	-	5
Total	799		3,730

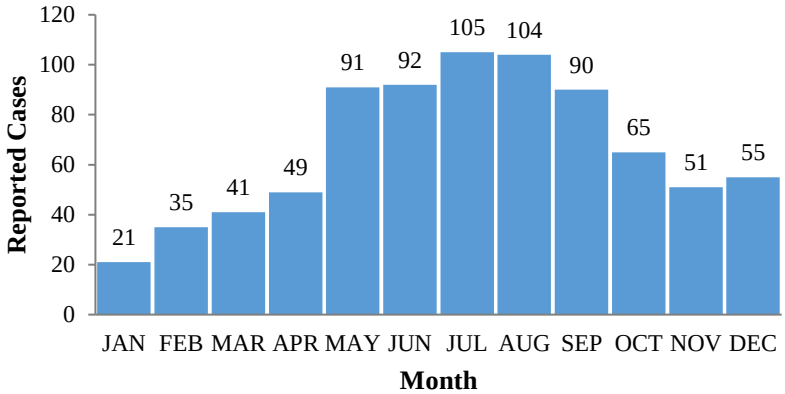
Figure 2 shows the number of reported cases for 2014-2018.

Figure 2: Salmonellosis Cases by Year – Indiana, 2014-2018



The incidence of salmonellosis was greatest during the summer months of 2018, peaking in July with 105 cases (Figure 3).

Figure 3: Salmonellosis Cases by Month – Indiana, 2018

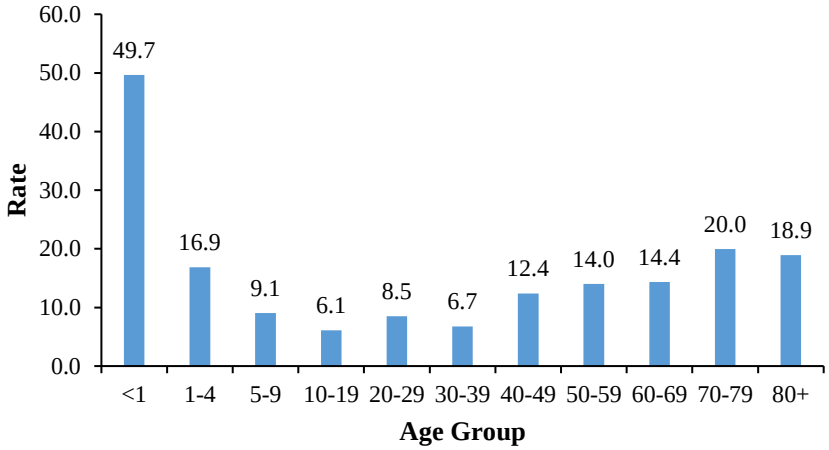


[*]All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.

[+] Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

Figure 4 shows age-specific rates in 2018 were greatest among infants younger than one year of age (49.7).

Figure 4: Salmonellosis Incidence Rates by Age Group – Indiana, 2018*+



More than 2,500 different *Salmonella* serotypes exist and differ in somatic and flagellar antigens. Table 2 shows the top three *Salmonella* serotypes in Indiana from the 760 isolates of *Salmonella* species identified in 2018.

Table 2: Top Three Reported Serotypes for Salmonellosis Cases – Indiana, 2018

Serotype	Number	Percent
Enteritidis	121	15.9%
Typhimurium	97	12.8%
Newport	55	7.2%

Figure 5 shows Indiana counties reporting five or more cases. The following counties had the highest incidence rates of salmonellosis in 2018: Pike (56.4), Posey (47.0), Daviess (42.2), and Gibson (41.9).

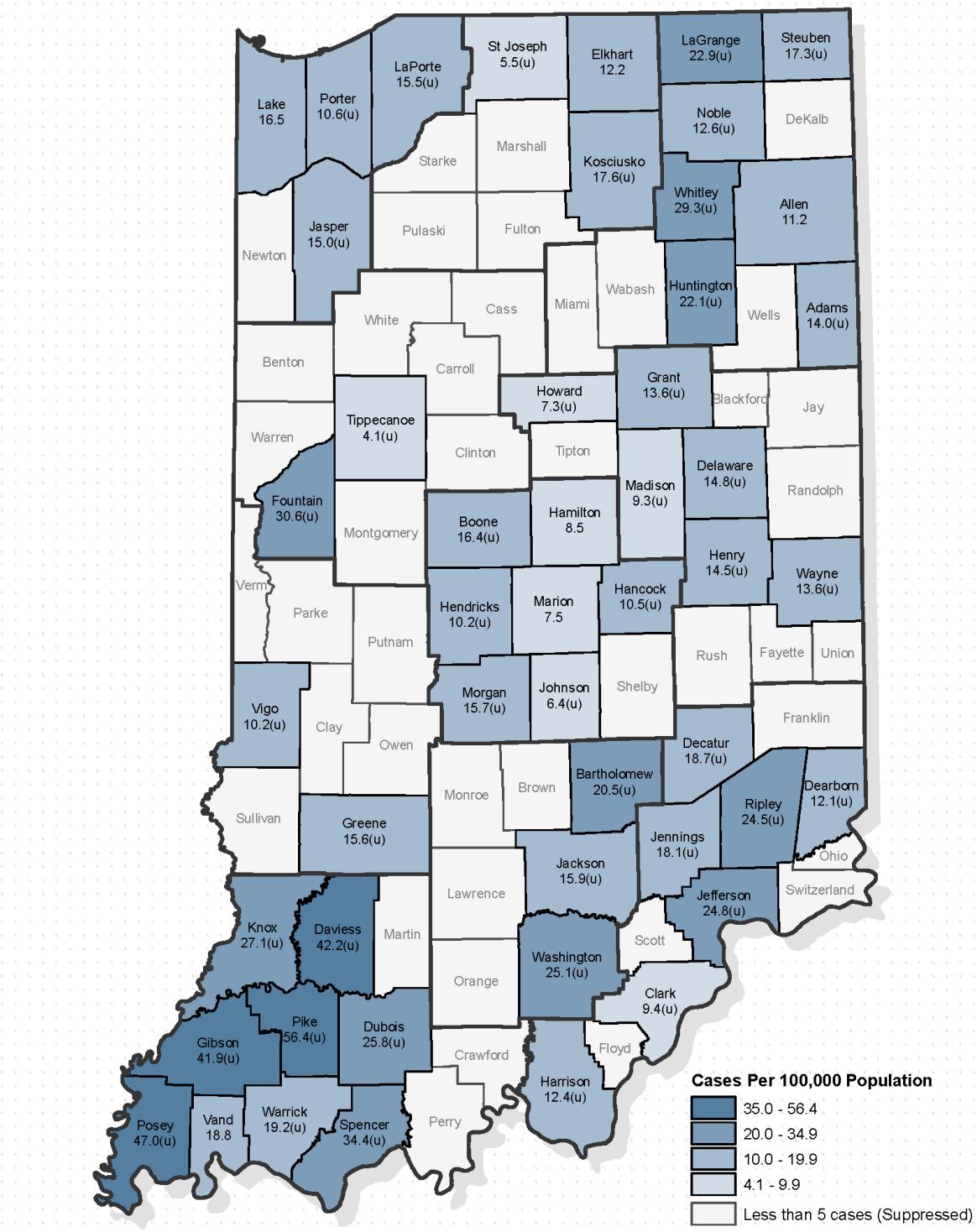
LEARN MORE

http://www.cdc.gov/salmonella/

*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.

+ Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

Figure 5: Salmonellosis Incidence Rates by County – Indiana, 2018*+



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+ Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

SHIGELLOSIS

2018 CASE TOTAL: 175
2017 CASE TOTAL: 153

2018 INCIDENCE RATE: 2.6 per 100,000
2017 INCIDENCE RATE: 2.3 per 100,000

SHIGELLOSIS is a contagious diarrheal illness caused by *Shigella* bacteria. *Shigella* bacteria are found only in humans. There are four species of *Shigella* bacteria: *sonnei*, *flexneri*, *boydii* and *dysenteriae*. *Shigella sonnei* is the most common species identified in the U.S. and Indiana; other species are most often associated with travel to endemic countries. *Shigella* is easily passed from person to person. Shigellosis can be very serious in infants, elderly individuals and people with weakened immune systems.

People become infected with *Shigella* by having contact with stool from an infected person (fecal-oral route). Infection may be transmitted in several ways:

- Consuming food or beverages prepared by an infected person
- Hand-to-mouth exposure to the stool or vomit of an infected person, such as:
  - Handling or cleaning up stool or vomit
  - Touching a contaminated surface or object
  - Having close contact with an ill household member
  - Engaging in sexual activity that involves contact with stool

CLINICAL AND PUBLIC HEALTH SIGNIFICANCE

Symptoms of shigellosis include diarrhea, sudden stomach pain, cramps and fever. Symptoms usually begin 24-72 hours (range of 12 hours to five days) after exposure and last about four to seven days. Some people may have no symptoms but can still spread the infection to others. Antibiotics are recommended only for the treatment of severe infections of shigellosis or treatment of persons who have underlying immunosuppressive conditions. Some strains of *Shigella* bacteria are resistant to certain antibiotics.

EPIDEMIOLOGY

In 2018, 175 cases of shigellosis were reported in Indiana, for a case rate of 2.6 cases per 100,000 population (Table 1). Males (2.5) and females (2.7) reported similar rates. The rate of illness among those who identified as black (3.3) was greater than the rate among those who identified as other races (3.0) and white (1.9); however, 35 cases did not report race data.

Table 1: Shigellosis Case Rates by Race and Sex – Indiana, 2018[*+]

	Cases	Rate	2014-2018 Total
Race			
White	108	1.9	1,098
Black	22	3.3	742
Other	10	3.0	109
Unknown	35	-	310
Sex			
Male	83	2.5	1,233
Female	92	2.7	1,025
Unknown	0	-	1
Total	175		2,259

[*]All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.

[+] Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

Figure 1 shows the number of reported cases per year for 2014-2018. The number of shigellosis cases in 2014 (1,362) was much higher than is typically seen (average of 224cases per year from 2015-2018) due to a large outbreak in Indiana.

Figure 1: Shigellosis Cases by Year – Indiana, 2014-2018

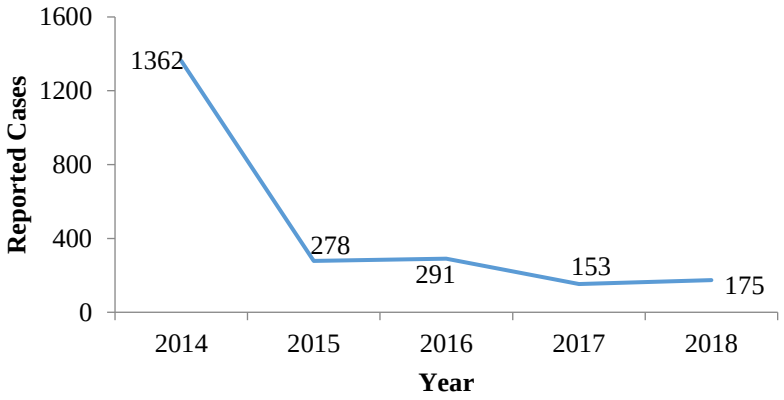
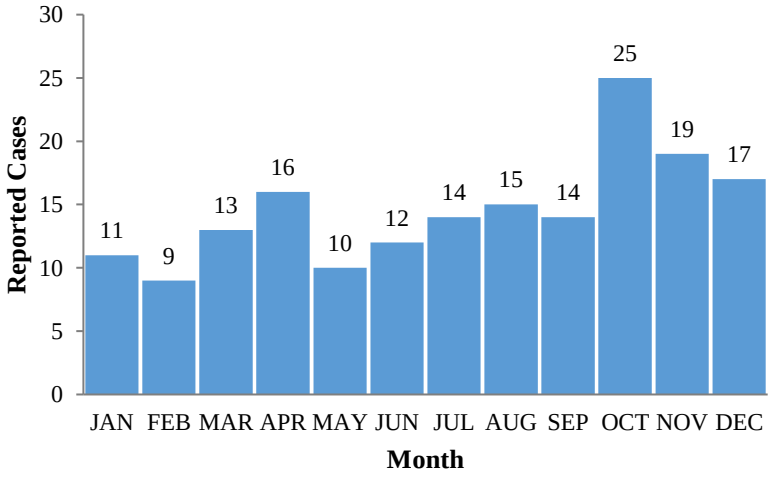


Figure 2 shows the number of cases per month in Indiana for 2018. Incidence of disease was highest in October (25).

Figure 2: Shigellosis Cases by Month – Indiana, 2018



As shown in Figure 3, age-specific rates were highest among preschoolers ages 1-4 years (5.9) and adults between the ages of 30 and 39 (3.7).

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Figure 3: Shigellosis Incidence Rates by Age Group – Indiana, 2018*+

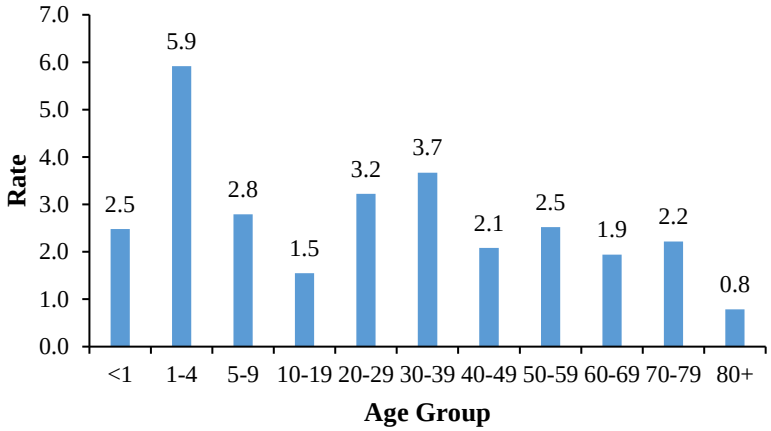


Table 2 shows the top five Indiana counties reporting five or more cases. The incidence rate was significantly highest in Bartholomew County (58.0).

Table 2: Shigellosis Incidence Rates by County – Indiana, 2018*+

County	Cases	Rate
Bartholomew	48	58.0
Marion	36	3.8
Allen	14	3.7
Elkhart	7	3.4
Vanderburgh	6	3.3

LEARN MORE

http://www.cdc.gov/nczved/divisions/dfbmd/diseases/shigellosis/

*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.

+ Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

INVASIVE & VACCINE PREVENTABLE DISEASES & CONDITIONS

INCLUDES: Diphtheria, Hansen's Disease (Leprosy), Invasive *Haemophilus influenzae*, Measles, Meningococcal Disease, Mumps, Pertussis, Pneumococcal Invasive Disease, Polio, Rubella, Smallpox, Streptococcus, Group A (Invasive), Tetanus, Toxic Shock Syndrome, Varicella

INVASIVE & VACCINE PREVENTABLE DISEASE PREVENTION

Diphtheria
The typical series of vaccinations (for children seven years old and younger) is five doses given at two, four and six months; 15-18 months of age; and four to six years of age. Unvaccinated adults and children age seven years and older require three vaccinations. Both adults and children should receive boosters (Td vaccine) every 10 years following completion of the primary series. It is recommended that one dose of Td be replaced with Tdap vaccine to protect against pertussis. Prior to routine vaccination, as many as 200,000 cases of diphtheria, responsible for as many as 15,000 deaths, occurred each year in the U.S.

Hansen's Disease (Leprosy)
Hansen's disease is caused by the bacteria *Mycobacterim leprae.* The mode of transmission is uncertain, but the bacteria are thought to be spread through the contact with respiratory droplets of infected persons. Hansen's disease is not highly transmissible, and it is estimated that 95 percent of the world's population is naturally immune to the bacteria. A genetic study at the National Hansen's Disease Program reports that armadillos may be a source of infection in the southern U.S. The program states that the risk of transmission from animals to humans is low, but animals should be handled with proper precautions. Persons at greatest risk for the disease include household contacts of a case. Most cases in the U.S. occur in immigrants and refugees who acquired the disease in their native country.

Invasive Haemophilus Influenzae
Haemophilus influenzae type B (Hib) vaccine is recommended for all infants at two, four and six months and 12-15 months of age. The Hib vaccine often is combined with other routine vaccinations, which may require adjusted dosing. Because vaccine is available to protect only against Hib, serotyping all *H. influenzae* isolates from patients (especially from children younger than five years of age) with invasive disease is necessary to monitor the effectiveness of the vaccination program and national progress toward Hib elimination. Serotype information also is needed to measure the sensitivity of the surveillance system and to detect the emergence of invasive disease caused by types of *H. influenzae* other than type B.

Meningococcal Disease
It is recommended that all children be vaccinated with meningococcal conjugate vaccine (MCV4) at entry to sixth grade (11-12 years of age). The Centers for Disease Control and Prevention (CDC) recommends that all teens also receive a booster dose of MCV4 at age 16 years. For those who receive the first dose at age 13-15 years, a one-time booster dose should be administered, preferably at age 16-18 years, before the peak in increased risk. Adolescents who receive their first dose of MCV4 at or after age 16 years do not need a booster dose. Vaccination also is recommended for other at-risk populations, and education on the importance of receiving the vaccine is a primary strategy for reducing incidence of the disease. Revaccination for individuals who remain at high risk is recommended.

Two quadrivalent vaccines (Menactra © and Menveo ©) are currently available to protect against meningococcal disease serogroups A, C, Y, and W-135. Two serogroup B meningococcal disease (MenB) vaccines are also licensed in the U.S.: Trumenba© and Bexsero©. Previously, the MenB vaccines were recommended only for high-risk groups; however, the Advisory Committee on Immunization Practices (ACIP) expanded the recommendation to include individuals aged 10-25 years who may be at increased risk for MenB infection. Adolescents and young adults aged 16 to 23 years not at increased risk may also receive MenB vaccine at their healthcare provider's clinical discretion.

Measles, Mumps, Rubella
Two doses of measles, mumps and rubella (MMR) vaccine typically prevent infection. Children receive the first dose of MMR at 12 months of age and the second dose of MMR at four to six years of age following the routine schedule. All adults should receive at least one dose of MMR vaccine, but two doses at least 28 days apart are recommended for health care workers, international travelers and adults enrolled in secondary education. Infants traveling to endemic areas can receive a dose of MMR as early as six months of age but also should receive routine vaccination again at 12-15 months and four to six years.

Pertussis
The DTaP vaccine is licensed to be administered at two, four and six months and 15-18 months of age, with an additional dose administered between four to six years of age. The DTaP vaccine should not be administered to persons over seven years of age. It is recommended that adults who have not received Tdap should receive a single dose of Tdap to protect against pertussis and reduce the likelihood of transmission. A single dose of Tdap can be given instead of Td (tetanus and diphtheria) vaccine. In addition, pregnant women should receive a dose during every pregnancy (preferably between 27 and 36 weeks gestation).

Pneumococcal Invasive Disease
The current pneumococcal conjugate vaccine for administration to children younger than five years of age and for adults over the age of 65 is a 13-valent pneumococcal conjugate vaccine (PCV13). The vaccine contains capsular polysaccharides from 13 *S. pneumoniae* serotypes that are known to cause the majority of bacteremia, meningitis and otitis media associated with invasive pneumococcal infections. The 23-valent polysaccharide vaccine (PPSV23) is licensed for routine use in adults age 65 and older and may be used in other individuals with certain risk factors.

Polio
Poliomyelitis (polio) is a viral disease that infects the intestinal tract and was responsible for significant morbidity and mortality worldwide prior to vaccination efforts. Although transmission of wild poliovirus has been interrupted in most of the world, polio transmission has never been interrupted in two countries: Afghanistan and Pakistan. Further spread of the illness into other unvaccinated groups is possible due to international travel. Inactivated polio vaccine (IPV) is recommended in four doses given at two months, four months, six to 18 months, and four to six years of age for children. Oral polio vaccine (OPV) is used in some countries around the world but has not been used in the U.S. since 2000.

Smallpox
Past use of smallpox in bioweapons programs and recent political instability in some areas of the world have led political and scientific leaders to consider the possibility that smallpox virus could be utilized as a Category A biological weapon. Therefore, extensive national and state plans have been adopted in the event that variola virus is released. In 2003, a national effort was made to vaccinate a corps of medical responders to provide care for initial cases in the event of a smallpox virus release. Routine vaccination of the public was discontinued in 1972 after smallpox was declared eradicated in the U.S.

Streptococcus, Group A (Invasive)
There is no vaccine to protect against Group A Streptococcal (GAS) infection, but the risk of infection can be reduced by good personal hygiene. Proper handwashing is one of the best ways to prevent GAS infections. All wounds should be kept clean and watched for signs of redness, swelling, drainage and pain at the site. A person with signs of an infected wound, especially if fever is present, should seek medical attention immediately. Health care providers may recommend that people who are exposed to someone with invasive disease or those who are identified as carriers in outbreak situations take antibiotics to prevent the spread of infection.

Toxic Shock Syndrome
Toxic shock syndrome (TSS) can be caused by many kinds of bacteria, though it is most commonly caused by *Streptococcus* or *Staphylococcus* bacteria. The risk of menstrual TSS can be reduced by avoiding the use of highly absorbent vaginal tampons or using tampons intermittently. Thorough cleaning and drainage of wounds or removal of wound packing also may decrease the risk of infection.

Varicella
Vaccines are available to protect individuals from acquiring varicella. Another benefit is that those who are vaccinated with varicella vaccine are less likely to develop shingles later in life than those who acquire varicella disease. Some children and adults who receive one or even two doses of the vaccine might have a mild case of varicella disease known as “breakthrough” varicella, which is still infectious. The introduction of varicella vaccine has dramatically reduced the incidence of varicella disease, outbreaks, hospitalizations, and deaths in the United States. Because some individuals may choose not to vaccinate, however, the incidence of varicella infections has reached a plateau, and outbreaks remain common in schools and other residential facilities.

2018 CASE TOTAL: 167
2017 CASE TOTAL: 160

2018 INCIDENCE RATE: 2.5 per 100,000
2017 INCIDENCE RATE: 2.4 per 100,000

INVASIVE *HAEMOPHILUS INFLUENZAE* (*H. INFLUENZAE*) is a disease caused by a bacterium of the same name. It can be typeable (encapsulated) or nontypeable (non-encapsulated). The encapsulated form has been classified into serotypes A through F. Humans are the natural host, and asymptomatic colonization is common, particularly with nontypeable or non-type b strains.

CLINICAL AND PUBLIC HEALTH SIGNIFICANCE

H. influenzae can cause a number of invasive infections, including bacteremia/sepsis, meningitis, pneumonia, epiglottitis, arthritis and cellulitis. Symptoms of *H. influenzae* usually begin suddenly and can include fever, vomiting, lethargy and meningeal irritation with bulging fontanelle (soft spot) in infants or stiff neck and back in older children. As the infection progresses, stupor or coma can occur.

Infections caused by the bacterium are commonly treated with antibiotics. Susceptibility tests can assist in the selection of appropriate treatment. Prevention of infection through immunization is the most effective way to reduce transmission of *H. influenzae* serotype B (Hib), which prior to routine immunization, accounted for 95 percent of all cases of invasive *H. influenzae*.

HEALTHY PEOPLE 2020 GOAL

The Healthy People 2020 Goal for Hib disease is 0.3 cases per 100,000 children under five years of age. In 2018, four cases of Hib disease occurred in Indiana in children younger than five years of age for whom isolates were submitted for testing – a rate of 1.0.

EPIDEMIOLOGY

In 2018, 167 cases of invasive *H. influenzae* (all types) disease were reported in Indiana. Males (2.2) and females (2.8) had similar rates of invasive *H. influenzae* disease (Table 1).

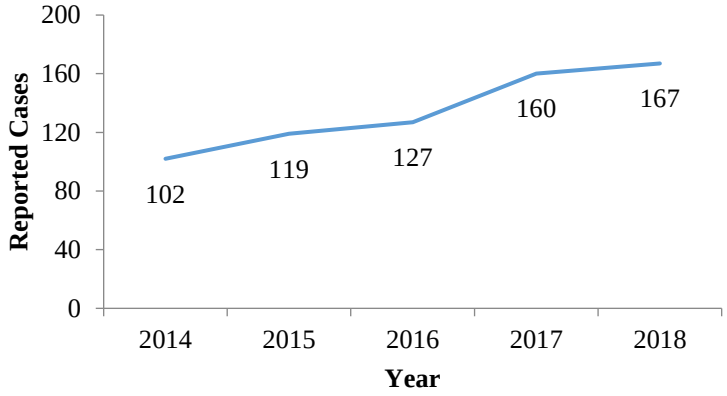
Table 1: Invasive Haemophilus Influenzae Case Rates by Race and Sex – Indiana, 2018[*+]

	Cases	Rate	2014-2018 Total
Race			
White	119	2.1	512
Black	16	2.4	55
Other	6	1.8	22
Unknown	26	-	86
Sex			
Male	73	2.2	309
Female	94	2.8	366
Unknown	0	-	0
Total	167		675

Figure 1 shows reported cases of *H. influenzae* for the five-year period 2014-2018.

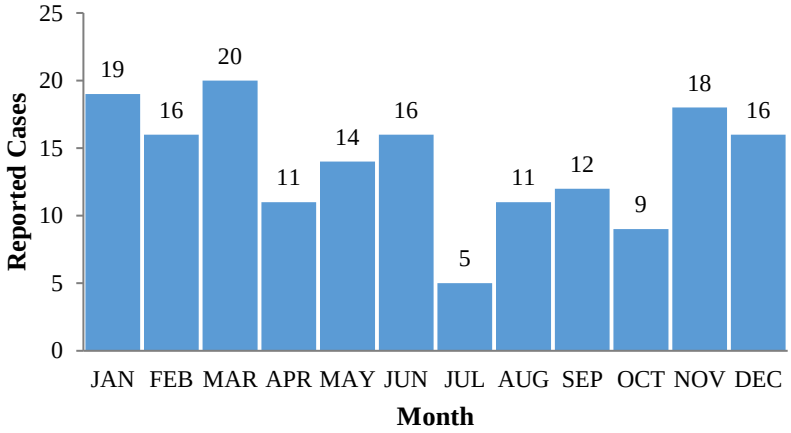
[*]All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.
[+] Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

Figure 1: Invasive Haemophilus Influenzae Cases by Year – Indiana, 2014-2018



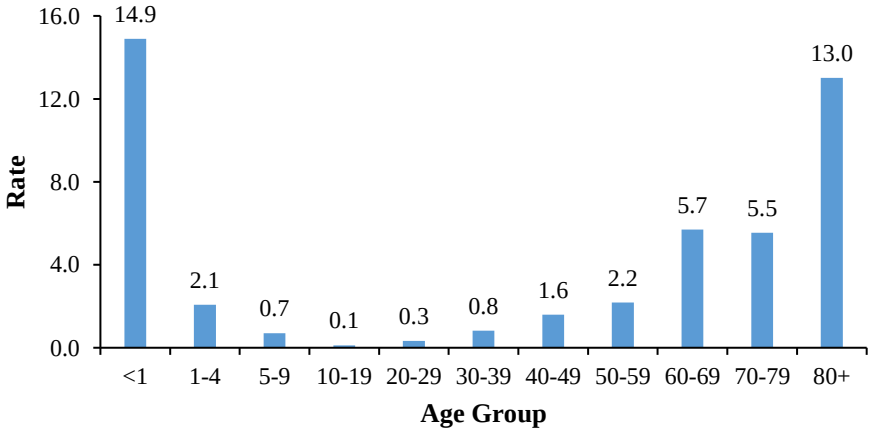
H. influenzae occurred throughout the year in 2018, with the highest number of cases occurring in March and January (Figure 2).

Figure 2: Invasive Haemophilus Influenzae Cases by Month – Indiana, 2018



Age-specific rates were greatest for infants younger than one year (14.9) and adults aged 80 years and older (13.0). Figure 3 shows *H. influenzae* incidence by age group.

Figure 3: Invasive Haemophilus Influenzae Incidence Rates by Age Group – Indiana, 2018*+



*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.

+ Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

Nine counties reported five or more cases of *H. influenzae*. The highest rates occurred in Grant (7.6), Madison (6.2), and Bartholomew (6.0). Of the 167 cases reported in 2018, 142 (85.0 percent) were serotyped. Table 2 provides a breakdown of *H. influenzae* cases by serotype.

Table 2: Percent of Reported *Haemophilus influenzae* Cases by Serotype – Indiana, 2018

Type	Number	Percent
a	18	10.8%
b	13	7.8%
d	5	3.0%
e	4	2.4%
f	21	12.8%
Nontypeable	81	48.5%
Not Tested/Unknown	25	15.0%
Total	167	100.0%

LEARN MORE

http://www.cdc.gov/hi-disease/index.html
https://www.cdc.gov/vaccines/vpd/hib/index.html

*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.

+ Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

MENINGOCOCCAL DISEASE

2018 CASE TOTAL: 9
2017 CASE TOTAL: 14

2018 INCIDENCE RATE: 0.1 per 100,000
2017 INCIDENCE RATE: 0.2 per 100,000

MENINGOCOCCAL DISEASE is a life-threatening infection that occurs when *Neisseria meningitidis* bacteria invade a site in the body that is normally sterile, such as the blood or cerebral spinal fluid (CSF). The bacteria are transmitted from person to person through direct contact with nose and throat secretions of an infected person. The definition of a confirmed case of meningococcal disease is the isolation of the organism or detection of *N. meningitidis* nucleic acid by PCR from a sterile body site or from purpuric lesions. It is estimated that 5-20 percent of the population may be colonized with the bacteria in the nasopharynx but have no symptoms of infection. Therefore, nasopharynx carriage is common, but invasive disease is rare. Invasive disease most commonly occurs as meningitis (inflammation of the meninges—the lining of the brain) or meningococcemia (meningococcal sepsis). Meningococcal infections often begin with a sudden onset of fever, headache, stiff neck, rash, photophobia, nausea and vomiting. Prompt antibiotic therapy can reduce the risk of long-term effects and improve survival. Even with antibiotic treatment, case fatality rates for meningococcal disease are estimated at 10 to 15 percent. Meningococcemia is the most severe form of the infection and is fatal in up to 40 percent of cases. According to the Centers for Disease Control and Prevention (CDC), outbreaks of meningococcal disease are rare, and only about two or three of every 100 cases are related to outbreaks.

CLINICAL AND PUBLIC HEALTH SIGNIFICANCE

Certain segments of the population are at increased risk for the disease due to risk factors of the individual or in the environment. These groups include:

- College students living in dormitories
- Persons working in or attending child care facilities
- Microbiologists who work with *N. meningitidis* isolates
- U.S. military recruits
- Persons who travel to or reside in countries where meningococcal disease is endemic, especially if there will be prolonged contact with the local population
- Persons who have certain immune system disorders
- Persons who do not have a functional spleen

Increased hospital, provider and laboratory awareness of the condition may improve clinical outcomes. Immediate recognition and treatment of suspected cases is crucial. Suspected cases should be treated prior to lab confirmation. Health care providers must immediately report suspected, probable and confirmed cases to the patient's local health department to ensure proper control measures can be implemented to prevent secondary cases. Individuals with direct exposure to the respiratory droplets of a case are at greater risk for contracting the disease within the few days following symptom onset. Antibiotic prophylaxis is recommended for all high-risk close contacts and should be administered as soon as possible.

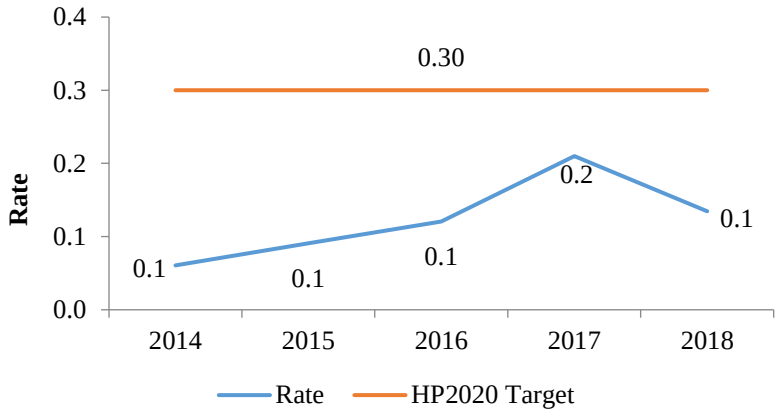
HEALTHY PEOPLE 2020 GOAL

The Healthy People 2020 Goal for meningococcal disease is an incidence of 0.3 cases per 100,000 population per year. Indiana met the Healthy People 2020 Goal for 2018 (Figure 1).

*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.

+ Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

Figure 1: Meningococcal Invasive Disease Rate by Year – Indiana, 2014-2018*+



EPIDEMIOLOGY

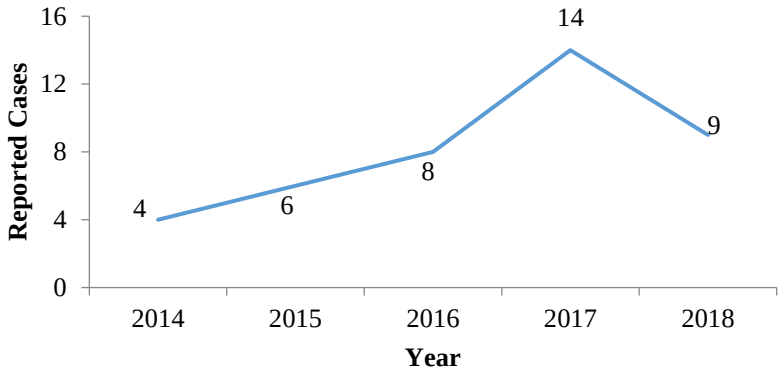
In 2018, nine confirmed and probable cases of invasive meningococcal disease (Table 1) were reported.

Table 1: Meningococcal Case Rates by Race and Sex – Indiana, 2018*+

	Cases	Rate	2014-2018 Total
Race			
White	7	0.1	30
Black	0	-	5
Other	0	-	1
Unknown	2	-	5
Sex			
Male	5	0.2	18
Female	4	0.1	23
Unknown	0	-	0
Total	9		41

Indiana has experienced an upward trend in meningococcal disease cases from 2014 to 2018. Figure 2 displays the number of cases by year for the previous five years.

Figure 2: Meningococcal Invasive Disease Cases by Year – Indiana, 2014-2018

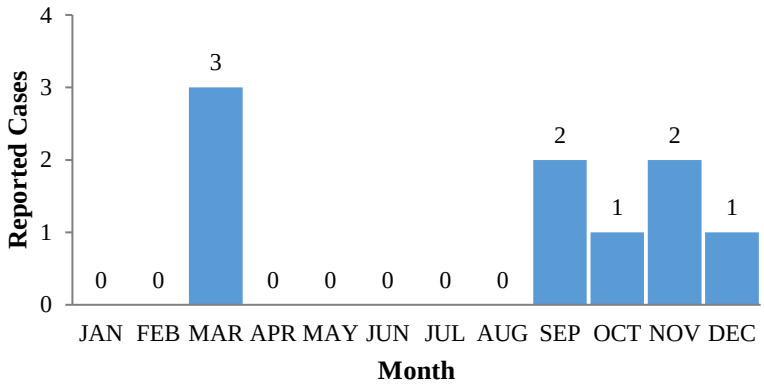


*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.

+ Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

There is some seasonality to meningococcal disease. Case rates in the U.S. are highest during the late winter and early spring. Figure 3 demonstrates the Indiana trend with the number of cases by month. In 2018, the highest number of cases occurred in March.

Figure 3: Meningococcal Invasive Disease Cases by Month – Indiana, 2018



Nine counties reported confirmed or suspected cases during 2018. None of the counties reported five or more cases.

In the U.S., *Neisseria meningitidis* serogroups B, C and Y are most frequently associated with invasive disease. The Indiana Communicable Disease Reporting Rule, 410 IAC 1-2.5, requires laboratories to submit isolates from invasive sites to the ISDH Laboratory for confirmation, serogrouping and molecular typing at the CDC (quarterly or more quickly, if requested). Polymerase chain reaction (PCR) testing also can be performed at the CDC or a reference laboratory on specimens, if requested.

In 2018, serogroup B accounted for 66.7 percent of Indiana cases. Serogroup B had the highest proportion (70.7 percent) of cases from 2014 to 2018. Table 2 gives the total numbers for Indiana serogroups for the past five years.

Table 2: *Neisseria meningitidis* Serogroups – Indiana, 2014-2018

Serogroup	2014	2015	2016	2017	2018	Total
A	-	-	-	-	-	-
B	4 (100%)	5 (83.3%)	5 (62.5%)	9 (64.3%)	6 (66.7%)	29 (70.7%)
C	-	-	1 (12.5%)	-	2 (22.2%)	3 (7.3%)
Y	-	-	2 (25%)	1 (7.1%)	-	3 (7.3%)
W135	-	-	-	1 (7.1%)	-	1 (2.4%)
Z	-	-	-	-	-	-
Nonviable	-	-	-	-	-	-
Unknown	-	1 (16.7%)	-	3 (21.4%)	1 (11.1%)	5 (12.2%)

LEARN MORE

http://www.in.gov/isdh/25455.htm
http://www.cdc.gov/vaccines/hcp/vis/vis-statements/mening.html
https://www.cdc.gov/meningococcal/index.html

*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.
+ Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

MUMPS

2018 CASE TOTAL: 17 **2018 INCIDENCE RATE:** 0.3 per 100,000
2017 CASE TOTAL: 42 **2017 INCIDENCE RATE:** 0.6 per 100,000

MUMPS is an acute viral illness transmitted through airborne transmission or direct contact with infected droplet nuclei or saliva. Humans are the only reservoir for mumps, and most mumps cases are sporadic. Mumps incidence has been historically low since the introduction of a vaccine, but in recent years, outbreaks of mumps in fully vaccinated individuals in highly close-contact settings or communities have been documented. In 2017, Indiana did not have any mumps outbreaks resulting in a significantly lower case count for the year compared to the year prior.

CLINICAL AND PUBLIC HEALTH SIGNIFICANCE

Mumps illness causes parotitis in approximately 30 percent to 40 percent of infected individuals. Swelling of the parotid glands can be unilateral or bilateral when it is present. Other common symptoms of mumps include muscle pain, loss of appetite, malaise, headache and low-grade fever. Up to 30 percent of mumps infections may be asymptomatic. Although mumps can present as a mild disease, it also can lead to severe complications, including hearing loss, encephalitis, pancreatitis, sterility and death.

It is difficult to distinguish mumps from other forms of parotitis. Therefore, appropriate laboratory testing is strongly recommended for all sporadically reported cases. Appropriate testing includes a serum specimen and a viral specimen (buccal swab) collected as early as possible following the onset of parotitis. Although Indiana has a relatively low baseline incidence of mumps cases, health care providers should consider mumps diagnosis and testing when parotitis of two days or longer has occurred.

HEALTHY PEOPLE 2020 GOAL

The Healthy People 2020 Goal for mumps is fewer than 500 cases of U.S.-acquired mumps per year nationwide (0.2 per 100,000 population). Indiana did not meet the Healthy People 2020 Goal in 2018 with 17 U.S.-acquired cases (a rate of 0.3 cases per 100,000 population).

EPIDEMIOLOGY

In 2018, 17 probable or confirmed cases of mumps were reported in Indiana. During the five year period 2014-2018, 382 cases were reported.

Table 1: Mumps Case Rates by Race and Sex – Indiana, 2018

	Cases	Rate	2014-2018 Total
Race			
White	8	0.1	227
Black	0	0.0	41
Other	1	0.3	27
Unknown	8	-	87
Sex			
Male	10	0.3	212
Female	7	0.2	170
Unknown	0	-	0
Total	17		382

*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.

+ Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

Figure 1: Mumps Cases by Year – Indiana, 2014-2018

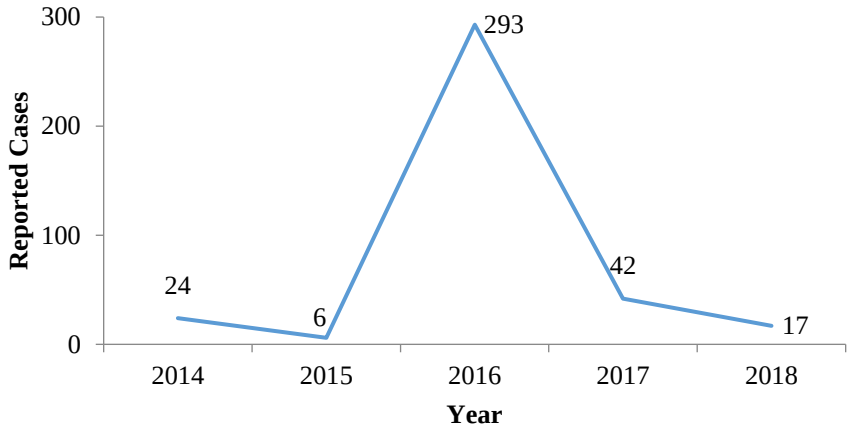


Figure 2: Mumps Cases by Month – Indiana, 2018

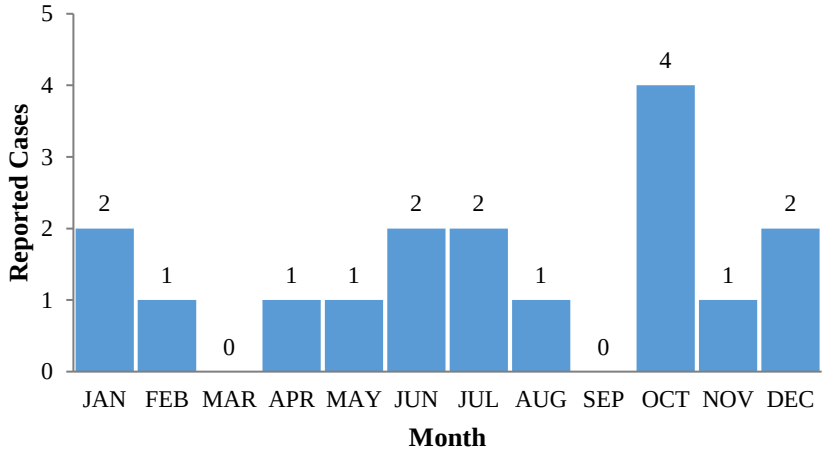
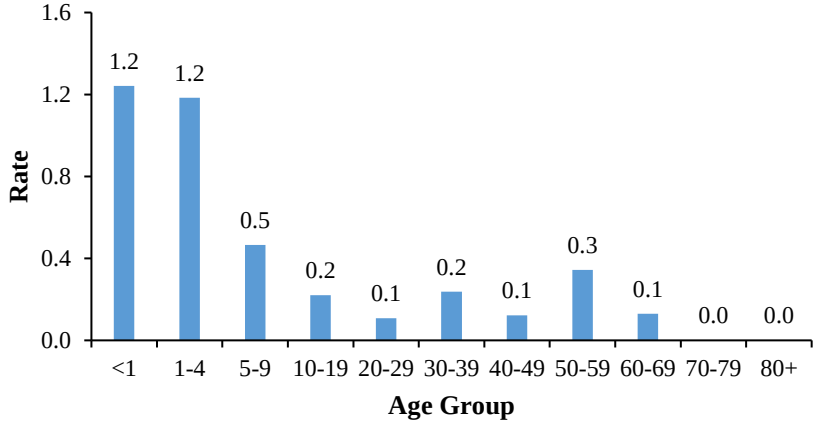


Figure 3: Mumps Cases by Age Group – Indiana, 2018*+



LEARN MORE

https://www.cdc.gov/mumps/
http://www.cdc.gov/vaccines/vpd-vac/mumps/default.htm

*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.
+ Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

PERTUSSIS

2018 CASE TOTAL: 176
2017 CASE TOTAL: 382

2018 INCIDENCE RATE: 2.6 per 100,000
2017 INCIDENCE RATE: 5.7 per 100,000

PERTUSSIS (WHOOPING COUGH) is an acute respiratory disease caused by the toxin-producing bacterium *Bordetella pertussis*. Transmission most commonly occurs through contact with respiratory droplets or airborne droplets of respiratory secretions. Pertussis is highly communicable, with a secondary household attack rate of 80 percent among susceptible persons.

CLINICAL AND PUBLIC HEALTH SIGNIFICANCE

The illness is characterized by early symptoms of coryza (runny nose), sneezing, low-grade fever and mild cough. The cough usually persists and becomes more severe during the second week of illness as the patient experiences bursts, or paroxysms, of numerous, rapid coughs. During these attacks, the patient may become cyanotic and inspiratory "whoop" sound may be heard. Vomiting and exhaustion commonly follow such an episode. Following this paroxysmal phase, which can last 1-10 weeks, a convalescent stage occurs where the coughing spells become less severe and less frequent. Although antibiotics are used to treat pertussis and reduce transmission, they often have little impact on reducing the intensity of the coughing symptoms.

HEALTHY PEOPLE 2020 GOAL

The Healthy People 2020 Goals for pertussis are fewer than 2,500 cases of pertussis nationwide in children under one year of age (63.5 cases per 100,000 population) and fewer than 2,000 cases in adolescents aged 11-18 years (6.0 cases per 100,000 population). Indiana met this goal for both children under one year of age with 35 cases (43.5 cases per 100,000 population) and for adolescents aged 11-18 years with 37 cases (5.1 cases per 100,000 population) in 2018.

EPIDEMIOLOGY

Indiana had 176 reported cases of pertussis in 2018, for a rate of 2.6 cases per 100,000 population. Females (3.1) had a slightly higher incidence rate than males (2.1) (Table 1). The rate of those who identified as white (2.6) was greater than the rate among those who identified as black (0.8) and for other races (0.6).

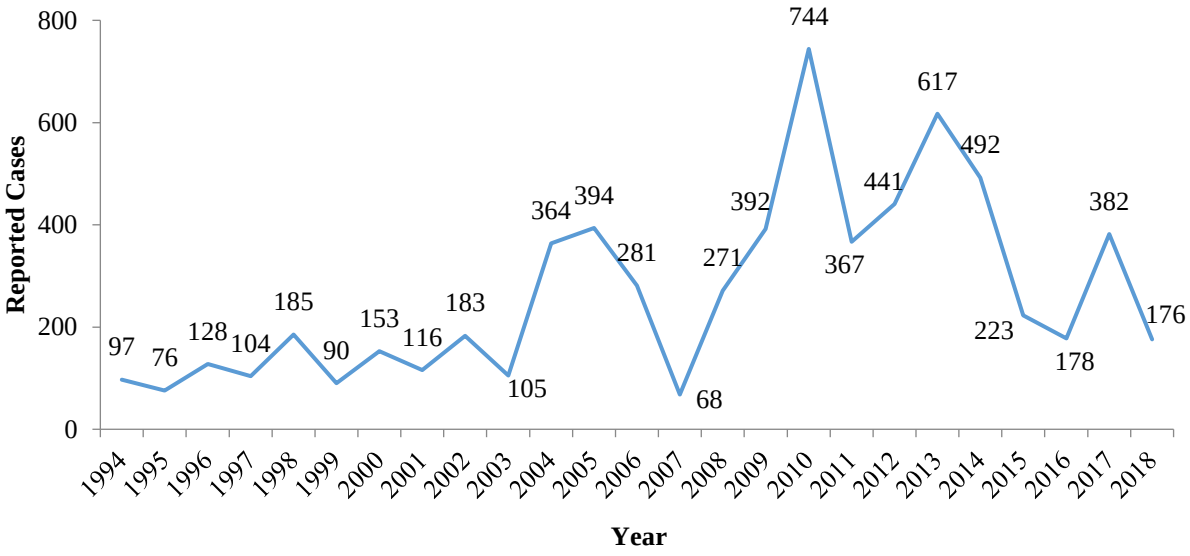
Table 1: Pertussis Case Rates by Race and Sex – Indiana, 2018[*+]

	Cases	Rate	2014-2018 Total
Race			
White	145	2.6	1,055
Black	5	0.8	64
Other	2	0.6	57
Unknown	24	-	275
Sex			
Male	70	2.1	667
Female	106	3.1	780
Unknown	0	-	4
Total	176		1,451

[*]All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.
[+] Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

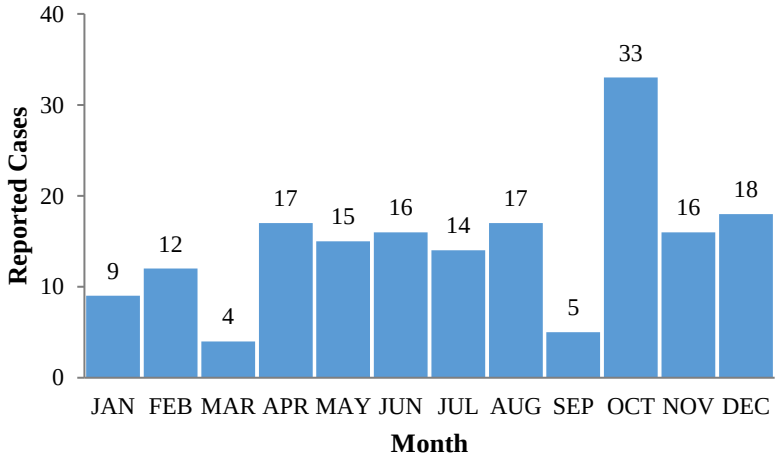
Pertussis incidence, unlike other vaccine-preventable diseases, has increased overall since the 1980s. Pertussis incidence is cyclic, with increases and decreases every three to five years. Figure 1 illustrates this cycle.

Figure 1: Pertussis Cases by Year – Indiana, 1994-2018



In 2018, disease incidence was highest during October; however, pertussis can occur anytime during the year (Figure 2).

Figure 2: Pertussis Cases by Month – Indiana, 2018

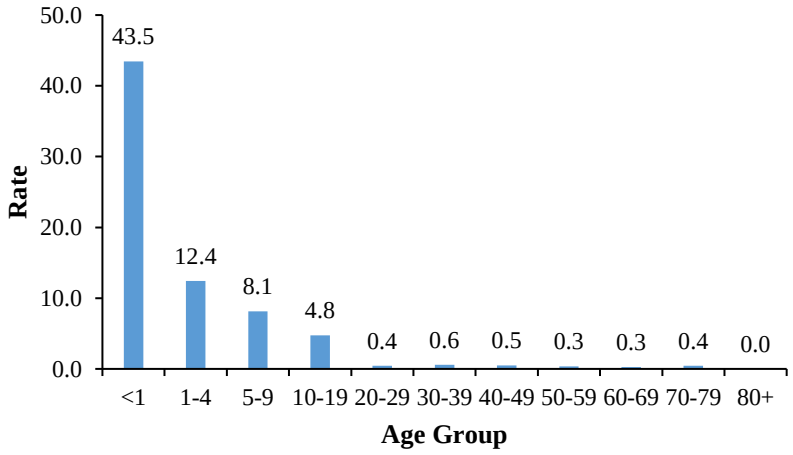


Pertussis is the most frequently reported vaccine-preventable disease among children under five years of age in Indiana. In 2018, 43.8 percent of all cases occurred in children younger than five years of age. Incidence rates were highest for infants younger than one year of age (43.5), followed by children ages 1-4 years (12.4) and children ages 5-9 years (8.1). School aged children, 5-18 years of age, accounted for 43.8 percent of cases in 2018. Figure 3 shows the incidence rates for all age groups.

*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.

+ Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

Figure 3: Pertussis Incidence Rates by Age Group – Indiana, 2018*+



In 2018, 40 counties reported at least one case, and 10 counties reported five or more cases of pertussis. The incidence rates were highest among the following counties reporting five or more cases (Figure 4): Lagrange (109.3), Miami (45.0), Washington (17.9), and Adams (16.8). Some of the rates are based on fewer than 20 counts and should be considered unstable.

Unvaccinated children are at highest risk for severe disease, but appropriately immunized children also can develop illness. Table 2 reflects the vaccination history at time of illness for selected age groups based on the earliest recommended age for vaccination.

Table 2: Vaccination History of Selected Age Groups – Indiana, 2018

Age Group	Total Cases	Unknown	0 Doses	1-2 Doses	3+ Doses
3-11 Months	29	1 (3.4%)	16 (55.2%)	10 (34.5%)	2 (16.9%)
1-4 Years	42	2 (4.8%)	26 (61.9%)	1 (2.4%)	13 (31.0%)
5-9 Years	35	1 (2.9%)	22 (62.9%)	3 (8.6%)	9 (25.7%)
Total (3 mos-9 yrs.)	106	4 (3.8%)	64 (60.4%)	14 (13.2%)	24 (22.6%)

LEARN MORE

http://www.cdc.gov/vaccines/vpd-vac/pertussis/default.htm

*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.

+ Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

PNEUMOCOCCAL DISEASE

2018 CASE TOTAL: 742
2017CASE TOTAL: 774

2018 INCIDENCE RATE: 11.1 per 100,000
2017 INCIDENCE RATE: 11.6 per 100,000

PNEUMOCOCCAL DISEASE is caused by the bacterium *Streptococcus pneumoniae* and the source of significant illness and death in the U.S. Prior to routine vaccination of children and elder adults, this disease represented a large proportion of deaths in young children in the U.S. The major clinical syndromes of pneumococcal disease include pneumonia and otitis media; however, more serious, life-threatening illnesses, such as bacteremia and meningitis, can occur when the bacteria invade a site in the body where bacteria are not normally found. Pneumococcal bacteria, of which there are more than 90 serotypes, are found in the noses and throats of healthy people and are rarely spread through contact with respiratory droplets of an infected person. Only cases of invasive disease (i.e., from normally sterile body sites) are reportable in Indiana.

CLINICAL AND PUBLIC HEALTH SIGNIFICANCE

Symptoms of pneumococcal pneumonia generally include an abrupt onset of fever, chills or rigors, pleuritic chest pain, productive cough, rusty sputum, difficulty breathing, rapid heart rate and fatigue. Pneumococcal bacteremia may present as fever, chills, rigors, sepsis, body aches and pains; pneumococcal meningitis may present as stiff neck, altered mental status, headaches, fever and other symptoms. The treatment for pneumococcal disease is the administration of appropriate antibiotics. Treatment for invasive pneumococcal infections is based on empiric therapy followed by the specific susceptibility of the strain acquired. Strains have been identified that are resistant to penicillin, erythromycin, trimethoprim-sulfamethoxazole and other antimicrobial agents. In some areas, the rates of resistance are as high as 30 percent. It is important for physicians to administer antibiotics cautiously and monitor use closely to prevent increased resistance.

HEALTHY PEOPLE 2020 GOAL

The Healthy People 2020 lists several goals for pneumococcal disease. The Healthy People 2020 goal is 12 cases per 100,000 population for children under age five years and 31 cases per 100,000 population for adults age 65 and older. Indiana met the Healthy People 2020 Goal for children under five years of age in 2018, with an incidence rate of 3.8 cases per 100,000 population. Indiana did not meet the Healthy People 2020 Goal for adults age 65 and older; the incidence rate for this population was 30.2 cases per 100,000 in 2018. Two additional Healthy People 2020 goals examine the rate of penicillin-resistant invasive *Streptococcus pneumoniae*. The Healthy People 2020 goal for penicillin-resistant invasive pneumococcal disease is three cases per 100,000 population for children under age five and two cases of penicillin-resistant cases per 100,000 population for adults age 65 and older. Indiana met the goal, with 2.2 cases per 100,000 children under age five with penicillin-resistant pneumococcal disease but did not meet the goal for adults 65 and older, with 7.9 cases per 100,000 with penicillin-resistant pneumococcal disease in 2017.

EPIDEMIOLOGY

In 2018, 742 cases of pneumococcal disease were reported in Indiana, for a case rate of 11.1 per 100,000 population (Table 1). In 2018, the rate of those who identified as black (14.1) was greater than the rate among those who identified as white (9.5) and other races (12.44).

*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.

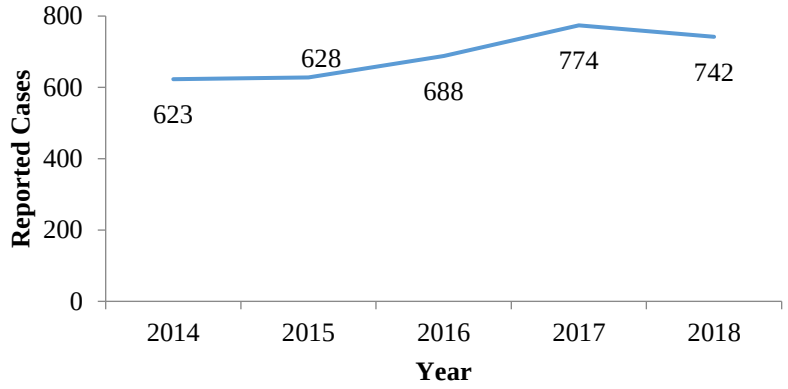
+ Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

Table 1: Pneumococcal Disease Case Rates by Race and Sex – Indiana, 2018[*+]

	Cases	Rate	2014-2018 Total
Race			
White	539	9.5	2,553
Black	93	14.1	365
Other	42	12.4	150
Unknown	68	-	387
Sex			
Male	380	11.5	1,758
Female	362	10.7	1,697
Unknown	0	-	0
Total	742		3,455

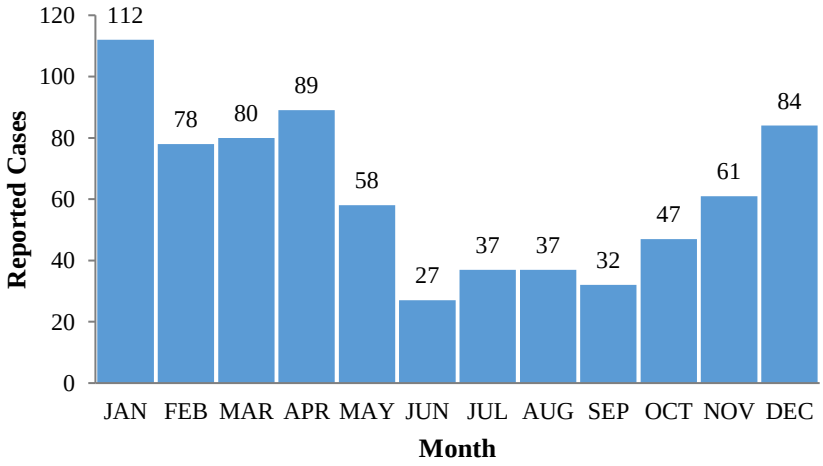
Figure 1 shows the number of reported cases per year for 2014-2018.

Figure 1: Pneumococcal Disease Cases by Year – Indiana, 2014-2018



Disease incidence was greatest during the winter into spring (Figure 2).

Figure 2: Pneumococcal Disease Cases by Month – Indiana, 2018

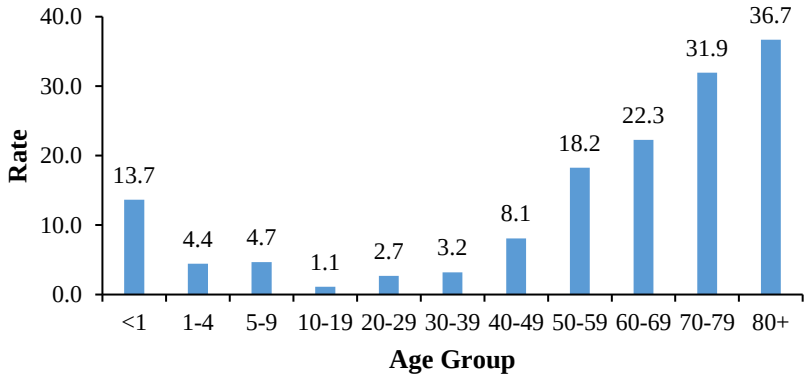


[*]All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.

[+] Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

Incidence of invasive pneumococcal disease varies considerably with age. In 2018, the highest incidence rates were for adults aged 80 and older (36.7 per 100,000 population), followed by adults ages 70-79 (31.9 per 100,000) (Figure 3).

Figure 3: Pneumococcal Disease Incidence Rates by Age Group – Indiana, 2018*+

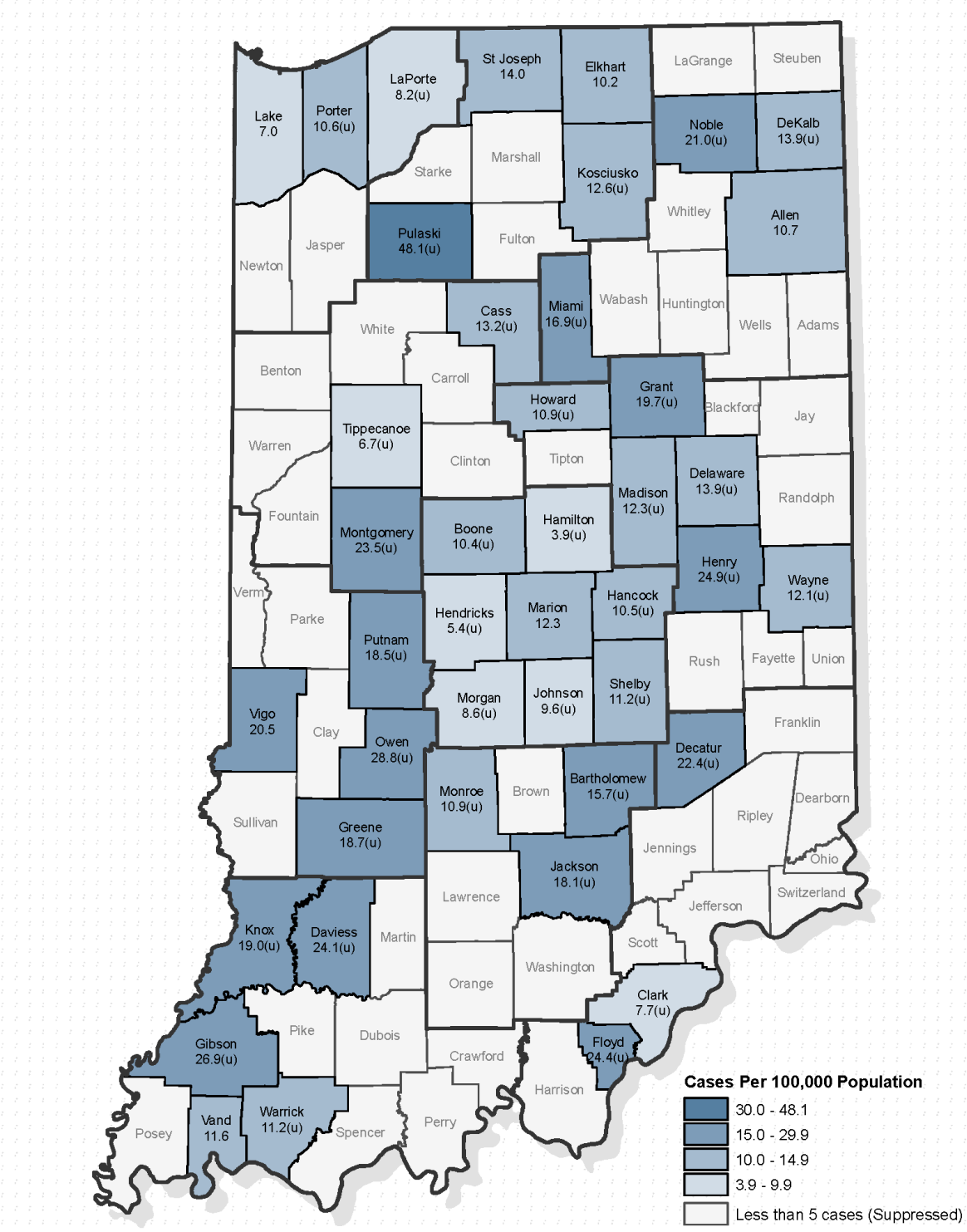


In 2018, 84 counties reported at least one case, and 43 counties reported five or more cases of invasive pneumococcal disease (Figure 4). The incidence rates were highest among the following counties reporting five or more cases: Pulaski (48.1), Owen (28.8) and Gibson (26.9).

*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.

+ Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

Figure 5: Pneumococcal Disease Incidence Rates by County – Indiana, 2018*+



*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.

+ Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

410 IAC 1-2.5 requires laboratories to submit isolates from all invasive cases under age five for serotyping. Of the 26 cases under the age of five, viable isolates from 20 were sent to ISDH for serotyping. 13 isolates were successfully serotyped. Predominant serotypes included Type 10A (7.7 percent), Type 19F (7.7 percent) and Type 23B (7.7 percent) (Figure 6). Serotypes represented in the PCV13 vaccine represented 23.1 percent of cases under age five for whom typing data was available (13). Of these, all cases occurred in children who had not had at least one dose of PCV13 vaccination. The majority of cases in children under five years of age occurred as a result of types not contained in the routine vaccines available for children (Figure 7).

Figure 6: Pneumococcal Serotypes, Children Under Age Five – Indiana, 2018

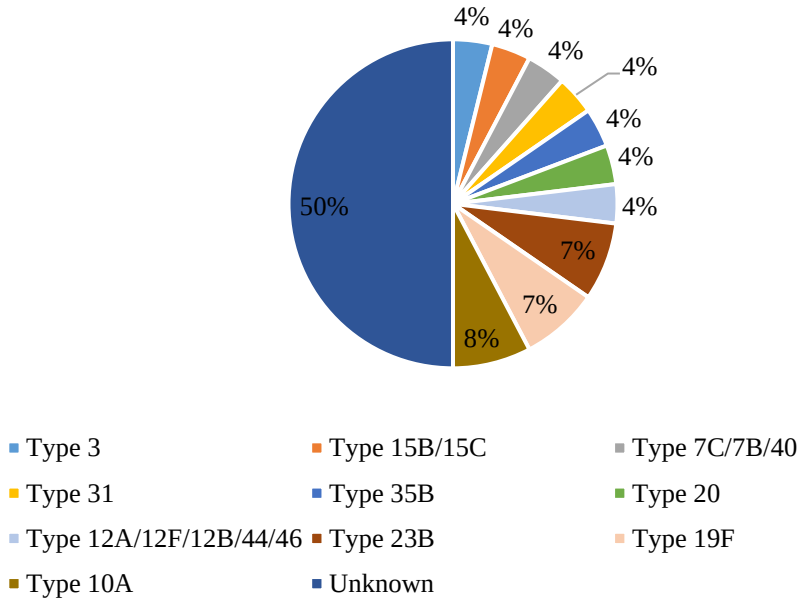
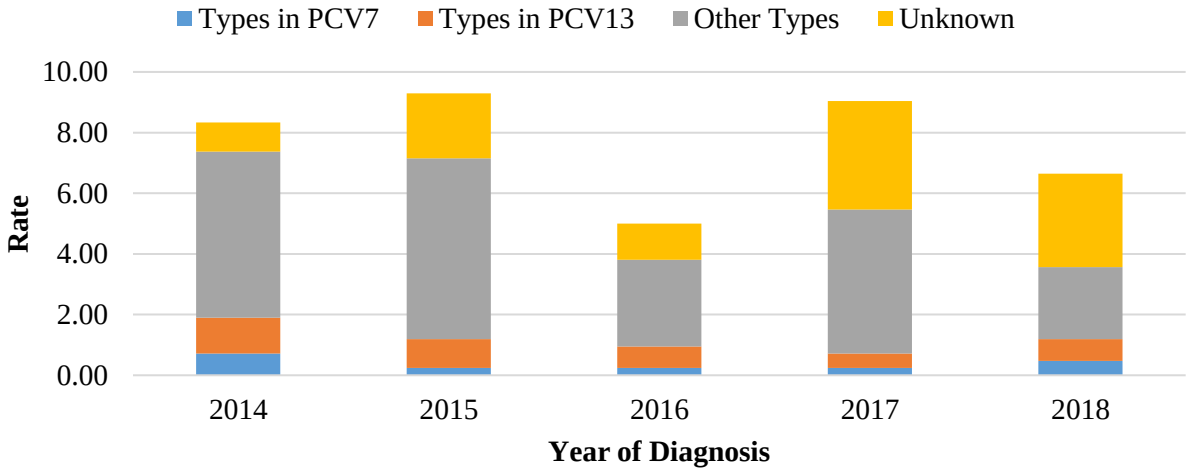


Figure 7: Incidence of Pneumococcal Serotypes, Children Under Age Five by Vaccine Serotype Indiana, 2014-2018

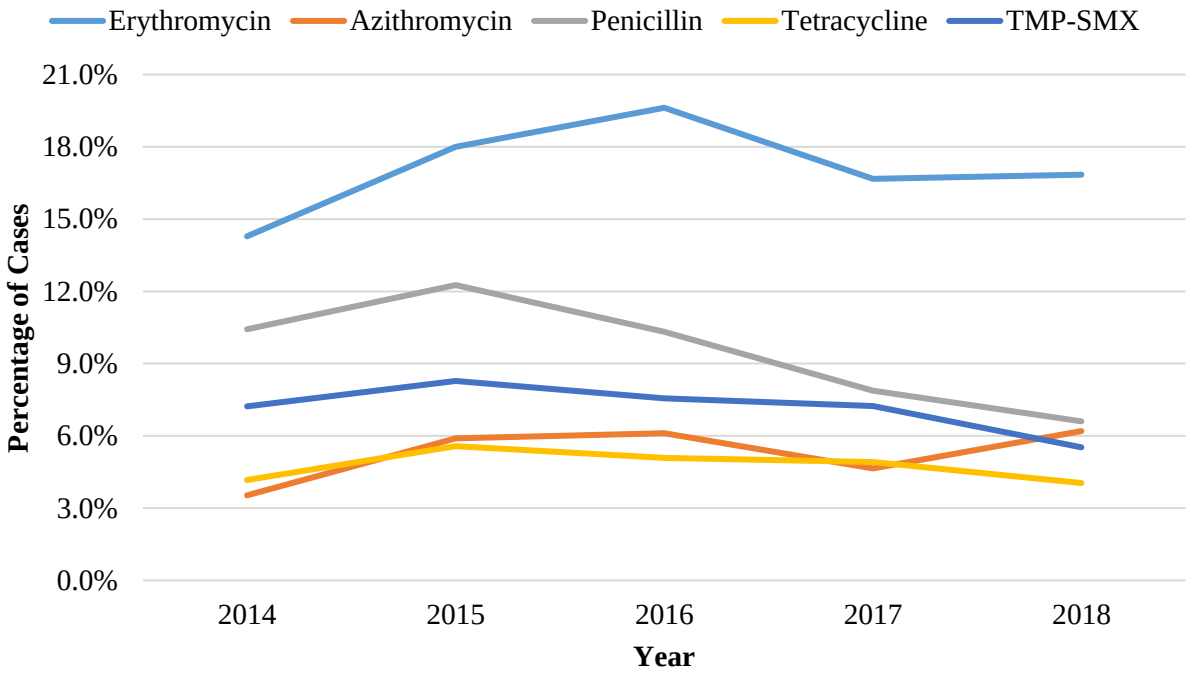


*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.

+ Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

In 2018, 184 (24.8 percent) cases of invasive pneumococcal disease of all ages showed some degree of resistance to at least one antibiotic. Patterns of resistance in pneumococcal bacteria have changed during 2014 to 2018 (Figure 8). Penicillin has decreased from a peak resistance in 2015 of 12.3 percent to 6.6 percent in 2018, Trimethoprim-sulfamethoxazole (TMP-SMX) and Tetracycline are declining slightly as well while Azithromycin has increased in resistance from 3.5 percent in 2014 to 6.2 percent in 2018. Erythromycin resistance remains high and relatively steady.

Figure 8: Antibiotic Nonsusceptibility by Year – Indiana, 2014-2018



LEARN MORE

http://www.cdc.gov/pneumococcal/
http://www.cdc.gov/vaccines/vpd-vac/pneumo/default.htm

*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.

+ Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

STREPTOCOCCUS, GROUP A (INVASIVE)

2018 CASE TOTAL: 282
2017 CASE TOTAL: 244

2018 INCIDENCE RATE: 4.2 per 100,000
2017 INCIDENCE RATE: 3.7 per 100,000

GROUP A STREPTOCOCCAL (GAS) DISEASE is caused by the bacterium *Streptococcus pyogenes* and occurs as many types of illness, including strep throat, scarlet fever, wound infections and impetigo. More serious and life-threatening illnesses such as streptococcal bacteremia/sepsis, streptococcal toxic shock syndrome and necrotizing fasciitis can occur when the bacteria invade a site in the body where bacteria are not normally found, such as the blood or muscle tissue. Necrotizing fasciitis ("the flesh-eating disease") is a rapidly progressive infection that destroys muscle, fat and skin tissue. Streptococcal toxic shock syndrome (STSS) causes septic shock, resulting in a rapid drop in blood pressure and multi-organ failure. The bacteria are transmitted through direct contact with nose and throat secretions of persons who are infected or by touching infected hands. Spread also may occur by contact with infected wounds or sores on the skin, such as chickenpox lesions. Antibiotics are used to treat GAS disease. Only cases of invasive disease are reportable in Indiana.

CLINICAL AND PUBLIC HEALTH SIGNIFICANCE

Symptoms of GAS disease vary depending on the manifestation of the illness. Bacteria spread more easily in crowded settings, such as dormitories, barracks, child care centers, long-term care facilities and correctional facilities. Persons at greatest risk for the disease include:

- Children with chickenpox
- People with suppressed immune systems
- Burn victims
- Elderly people with cellulitis, blood vessel disease or cancer
- People taking steroid treatments or chemotherapy
- Persons who inject drugs

Provisional data from the Centers for Disease Control and Prevention (CDC) Active Bacterial Core Surveillance (ABC) Program estimate national rates of Group A streptococcal invasive disease at 5.8 cases per 100,000 population in 2016.

EPIDEMIOLOGY

In 2018, 282 cases of invasive GAS disease were reported in Indiana for a rate of 4.2 cases per 100,000 (Table 1). Incidence rates for males (4.6) and females (3.8) were similar. Additionally, those who identified as white had a higher rate of invasive GAS (4.0) than those who identified as black (3.2) and other races (2.7). Of these cases, 23 (8.2 percent) had manifestations of STSS.

*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.

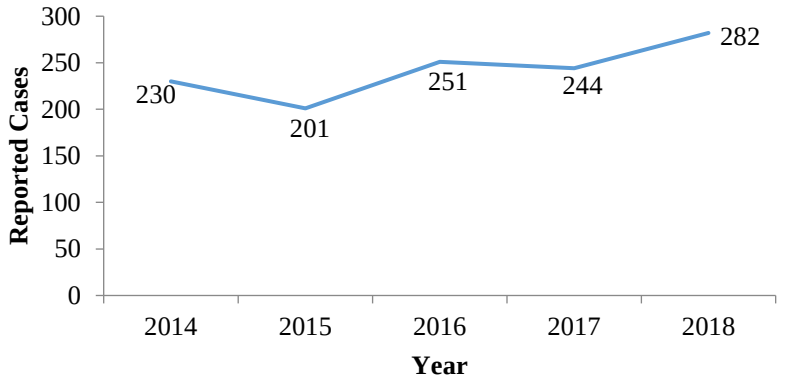
+ Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

Table 1: Group A *Streptococcus* Case Rates by Race and Sex – Indiana, 2018*+

	Cases	Rate	2014-2018 Total
Race			
White	225	4.0	897
Black	21	3.2	133
Other	8	2.7	47
Unknown	28	-	131
Sex			
Male	151	4.6	586
Female	130	3.8	621
Unknown	1	-	1
Total	282		1,208

Figure 1 shows reported cases by year for the five-year reporting period 2014-2018.

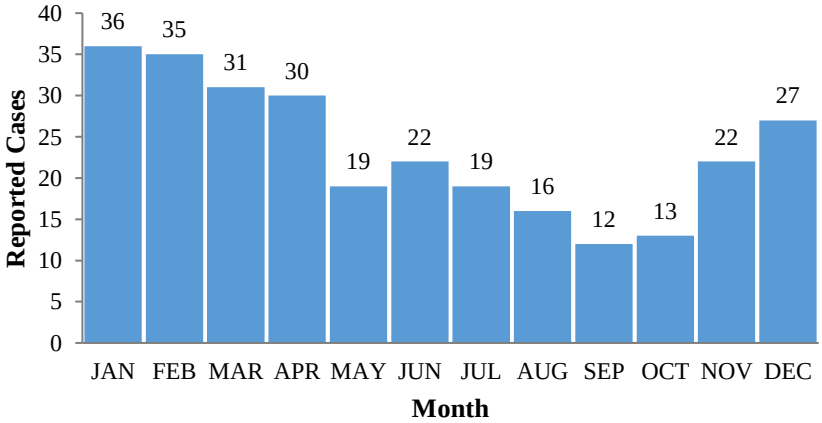
Figure 1: Group A *Streptococcus* Cases by Year – Indiana, 2014-2018□



□Case numbers include Group A *Streptococcus* and Streptococcal Toxic Shock Syndrome

In 2018, the incidence of invasive GAS during winter and early spring, as shown in Figure 2.

Figure 2: Group A *Streptococcus* Cases by Month – Indiana, 2018

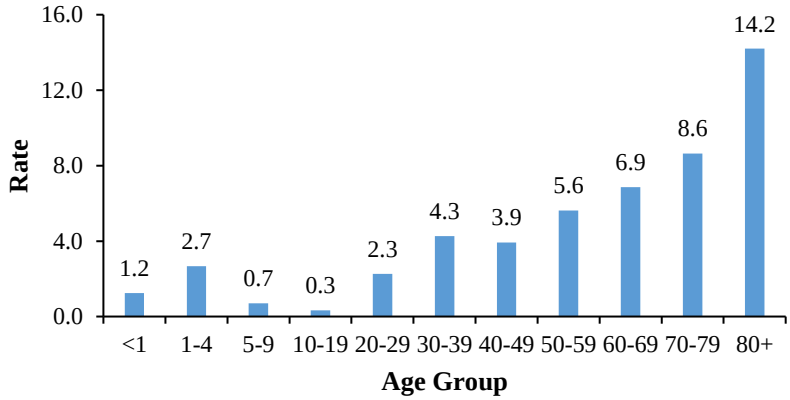


*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.

+ Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

Very young infants and older adults are more likely to suffer from a compromised immune system or have underlying chronic medical conditions, such as diabetes or cancer, which predisposes them to GAS disease. As shown in Figure 3, age-specific incidence rates were greatest for adults over the age of 80 (14.2), followed by adults 70-79 years of age (8.6).

Figure 3: Group A *Streptococcus* Incidence Rates by Age Group – Indiana, 2018*+□



□ Case numbers include Group A Streptococcus and Toxic Shock

Group A *Streptococcus* was reported in 64 counties. Incidence rates for the top five counties reporting five or more cases during the year are listed in Table 2.

Table 2: Group A *Streptococcus* Incidence Rates by County – Indiana, 2018*+

County	Cases	Rate
Miami	8	22.5
Wayne	8	12.1
Grant	12	10.6
Henry	16	10.4
LaPorte	10	9.1

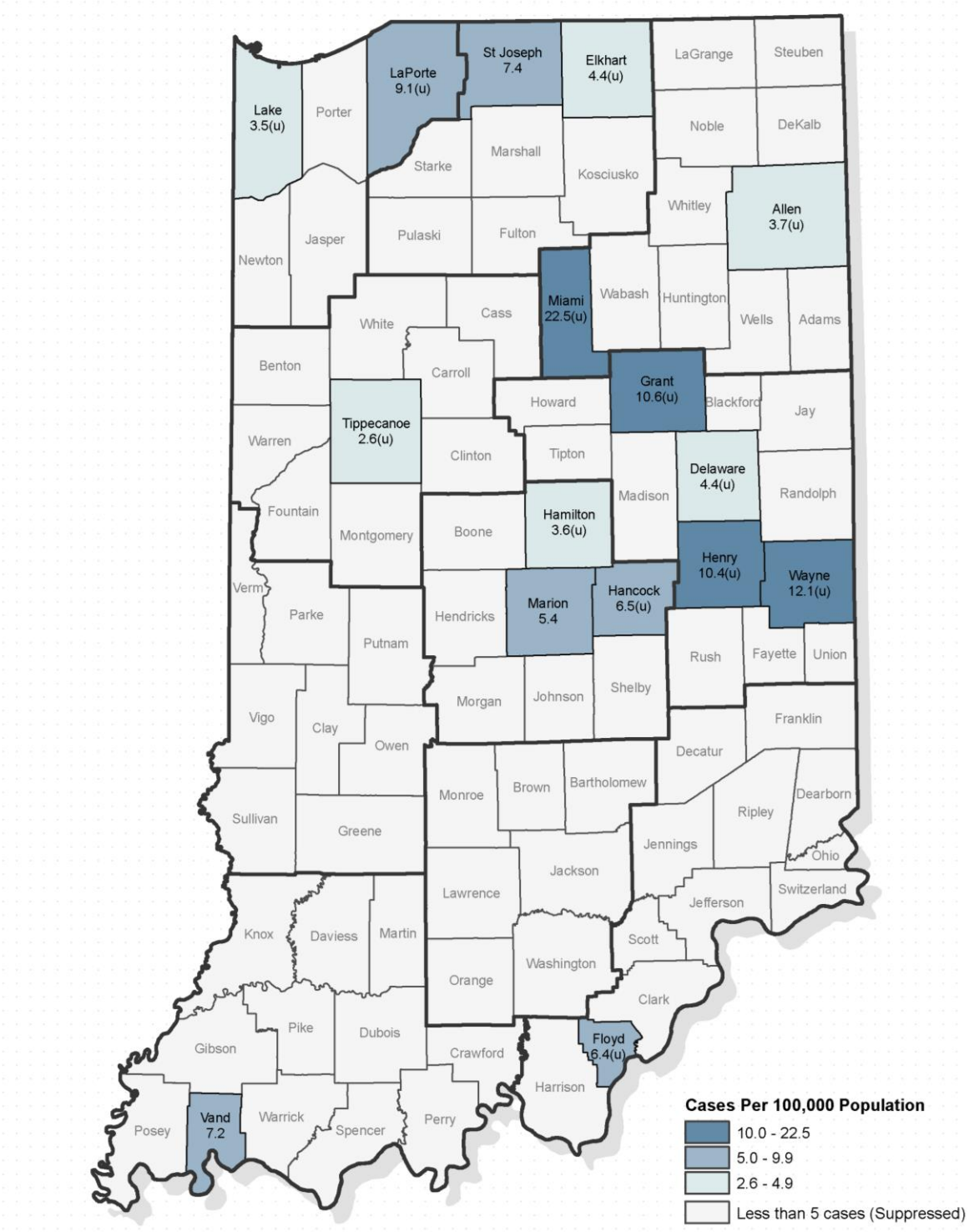
LEARN MORE

https://www.cdc.gov/groupastrep/index.htmlhttps://www.cdc.gov/abcs/reports-findings/survreports/gas16.html

*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.

+ Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

Figure 4: Streptococcus, Group A (Invasive) Incidence Rates by County – Indiana, 2018*+



*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.

+ Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

VARICELLA

2018 CASE TOTAL: 171
2017 CASE TOTAL: 236

2018 INCIDENCE RATE: 2.6 per 100,000
2017 INCIDENCE RATE: 3.5 per 100,000

PRIMARY VARICELLA INFECTION (CHICKENPOX) is caused by varicella-zoster virus, a member of the herpesvirus family. The virus is transmitted from person to person through direct contact with fluid from vesicular lesions or droplet or airborne spread of respiratory secretions. Varicella is commonly considered a childhood illness; however, anyone who does not have a history of varicella or even those who have received two valid doses of the vaccine can become infected. Varicella is typically a mild infection, but it can cause serious complications, including pneumonia, encephalitis, viral meningitis, bacterial skin infections and death.

CLINICAL AND PUBLIC HEALTH SIGNIFICANCE

The varicella rash first appears as flat, red lesions that become itchy, raised and blister-like (vesicles). The lesions are most evident on the trunk and present in several stages of development over several days. Other symptoms of varicella, including fever, abdominal pain, sore throat and headache, may occur before rash onset. Onset of symptoms usually occurs 10-21 days after exposure to an individual with primary varicella infection or exposure to fluid from the rash of an individual with shingles. Hospitalizations and deaths due to varicella still occur in Indiana.

HEALTHY PEOPLE 2020 GOAL

The Healthy People 2020 Goal for varicella is fewer than 100,000 cases nationally for persons younger than 18 years of age. This translates to a rate of 135.6 per 100,000 population. Indiana met this goal in 2018, with 140 cases of varicella reported in children under the age of 18 (rate of 8.0 per 100,000 population).

EPIDEMIOLOGY

In 2018, 171 cases of varicella were reported in Indiana. Six of these cases were hospitalized with no reported deaths. The incidence rate of varicella was 2.6 cases per 100,000 population (Table 1). The rate of varicella disease was higher in other races (5.0) than those who identified as white (1.9) or identified as black (1.7). A slightly higher rate was observed in males (2.9) than in females (2.2). The rate of hospitalizations was 0.1 per 100,000 populations, similar to 2017.

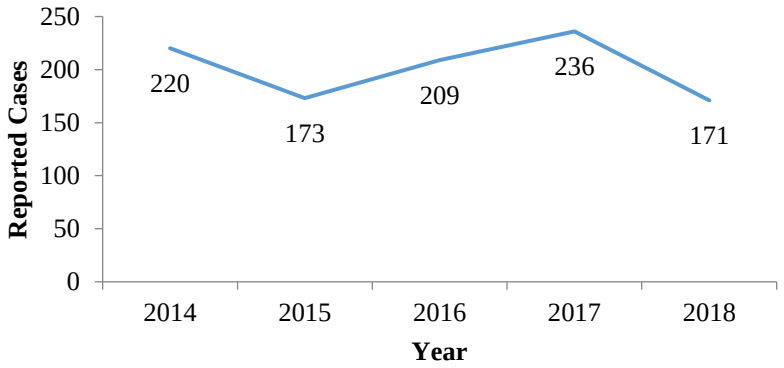
Table 1: Varicella Case Rates by Race and Sex – Indiana, 2018[*+]

	Cases	Rate	2014-2018 Total
Race			
White	110	1.9	664
Black	11	1.7	66
Other	17	5.0	87
Unknown	33	-	192
Sex			
Male	94	2.9	531
Female	76	2.2	475
Unknown	1	-	3
Total	171		1,009

[*]All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.
[+] Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

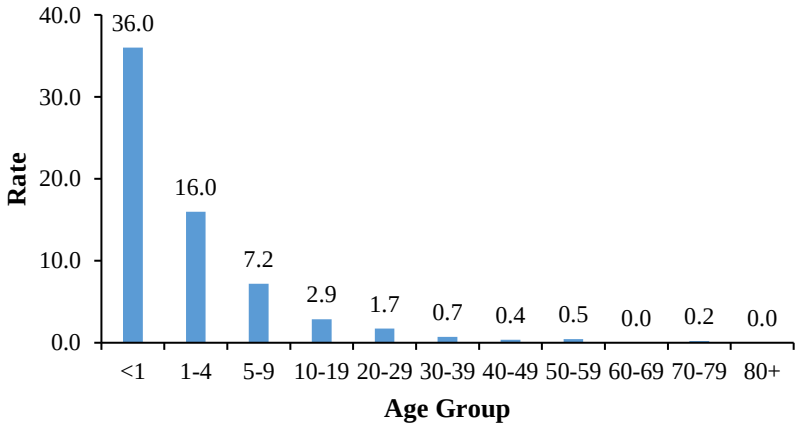
Figure 1 shows total reported varicella cases by year from 2014 to 2018.

Figure 1: Varicella Cases by Year – Indiana, 2014-2018



Incidence of varicella varies considerably with age. In 2018, the highest varicella incidence rate occurred in children under one year old at 36.0 cases per 100,000 population, followed by children ages 1-4 (16.0 per 100,000 population). Few cases of chickenpox were reported in adults over the age of 50 (Figure 2).

Figure 2: Varicella Incidence Rates by Age Group – Indiana, 2018*+



The total number of cases was highest in January and July 2017 (24 and 20 cases, respectively) and lowest in February (8 cases), November (9 cases), and December (10 cases). Historically, the number of cases tended to be higher throughout the fall and spring, corresponding roughly with the timing of the school year. However, with more common year-round schedules for schools and daycares, the number of cases are well distributed throughout the year (Figure 3).

Figure 3: Varicella Case by Month – Indiana, 2018

*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.

+ Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

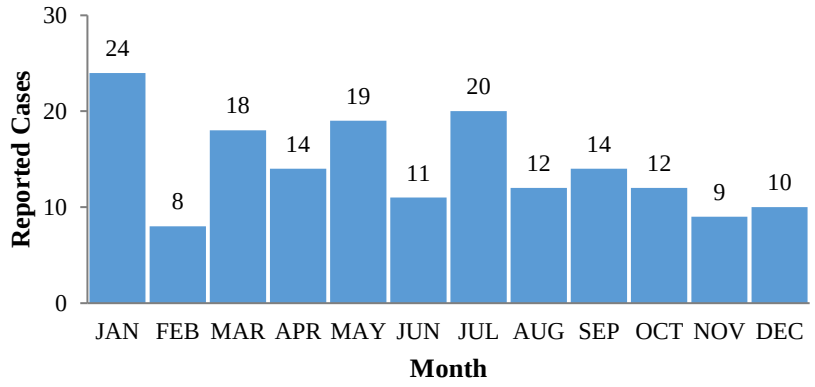
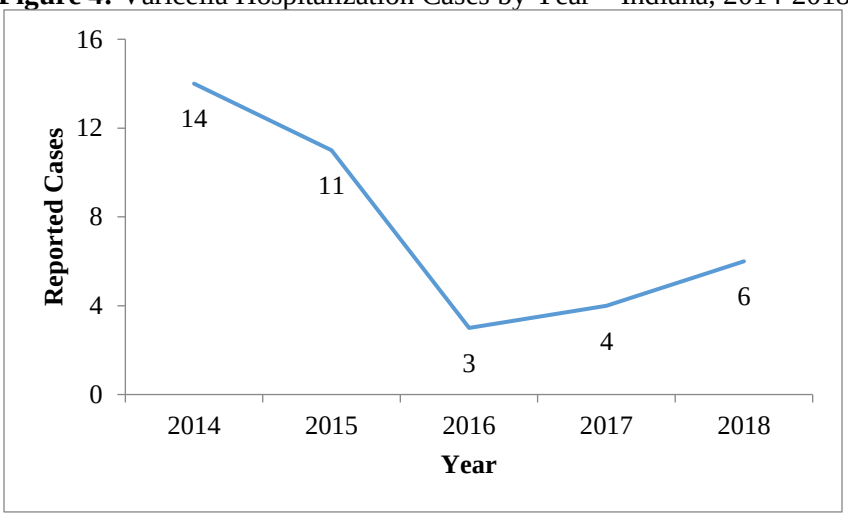


Figure 4 shows reported hospitalized cases by year from 2014 to 2018.

Figure 4: Varicella Hospitalization Cases by Year – Indiana, 2014-2018



In 2018, 51 counties reported at least one case, and 14 counties reported five or more cases of varicella (Figure 5). Among counties reporting five or more cases during the year, incidence rates were highest in Jay (28.9), LaGrange (12.8), Grant (9.1), Boone (9.0), and Kosciusko (8.8) Counties.

LEARN MORE

http://www.cdc.gov/chickenpox/index.html
http://www.cdc.gov/vaccines/vpd-vac/varicella/default.htm

*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.
+ Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

INCLUDES: Carbapenemase-Producing Carbapenem-Resistant *Enterobacteriaceae* (CP-CRE)

ANTIMICROBIAL RESISTANCE PREVENTION

Antimicrobial resistance occurs when organisms are resistant to antimicrobial agents that would usually be utilized for treatment of an infection. Antimicrobial resistance develops when organisms are exposed to antimicrobial agents through clinical therapy and use in the agricultural setting. The overuse, misuse and abuse of antibiotics is the leading factor that contributes to the continued development of antimicrobial resistance.

Antimicrobial resistance can be transmitted from person to person, from resistant organisms that are persistent in the environment or from resistant bacteria that contaminate food. The best way to prevent the development of antimicrobial resistance is through the careful use of antimicrobials.

Patients can ensure careful antimicrobial use by:

- Talking to their health care provider about measures to relieve symptoms without using antibiotics
- Taking prescribed antibiotics exactly as directed by their health care provider, even if the patient starts to feel better
- Never pressuring a health care provider for an antibiotic prescription
- Never saving antibiotics for the next time they are sick
- Never sharing antibiotics with someone else

Health care professionals can help prevent the spread of antimicrobial resistance by:

- Prescribing an antibiotic that targets the bacteria that is most likely causing the infection
- Not treating asymptomatic colonized patients
- Prescribing an antibiotic only when it will benefit the patient

CARBAPENEMASE-PRODUCING CARBAPENEM-RESISTANT *ENTEROBACTERIACEAE*

2018 CASE TOTAL: 368
2017 CASE TOTAL: 293

2018 INCIDENCE RATE: 5.5 per 100,000
2017 INCIDENCE RATE: 4.4 per 100,000

CARBAPENEMASE-PRODUCING CARBAPENEM-RESISTANT *ENTEROBACTERIACEAE* (CP-CRE) is any organism within the *Enterobacteriaceae* family (e.g., *Klebsiella pneumoniae*, *Escherichia coli*, *Enterobacter cloacae* complex) that is resistant to a carbapenem antibiotic through the production of a carbapenemase. Carbapenem antibiotics are a class of antibiotics used to treat serious infections and are often thought of as the last resort for treatment of antimicrobial-resistant organisms. Carbapenemases are enzymes produced by the bacteria that break down carbapenem antibiotics. CP-CRE surveillance includes identifying the production of the five most common carbapenemases globally: *Klebsiella pneumoniae* carbapenemase (KPC), Verona integron-mediated metallo-β-lactamase (VIM), New Delhi metallo-β-lactamase (NDM), Imipenemase (IMP) and Oxacillinase-48-like (OXA-48-like).

CLINICAL AND PUBLIC HEALTH SIGNIFICANCE

Invasive CP-CRE infections have been associated with mortality rates of up to 50 percent. In addition to high mortality rates, CP-CRE infections are often resistant to most and, in some cases, all antibiotics available for treatment. As a result, these infections are difficult to treat. Antibiotics available for treatment tend to be associated with worse side effects and more expensive therapies. CP-CRE tends to be identified among those individuals with extensive health care exposure; however, there is potential for these organisms to be spread within the community.

EPIDEMIOLOGY

CP-CRE became reportable in December 2015, thus annual counts for the full five-year reporting period are unavailable.

In 2018, 368 confirmed cases of CP-CRE were reported in Indiana, for a rate of 5.5 cases per 100,000 population (Table 1). Females (6.3) were slightly more likely to be reported with CP-CRE than males (4.7). The rate of those who identified as black (9.1) was greater than those who identified as white (3.0) or other races (8.3), while 107 cases did not report race data.

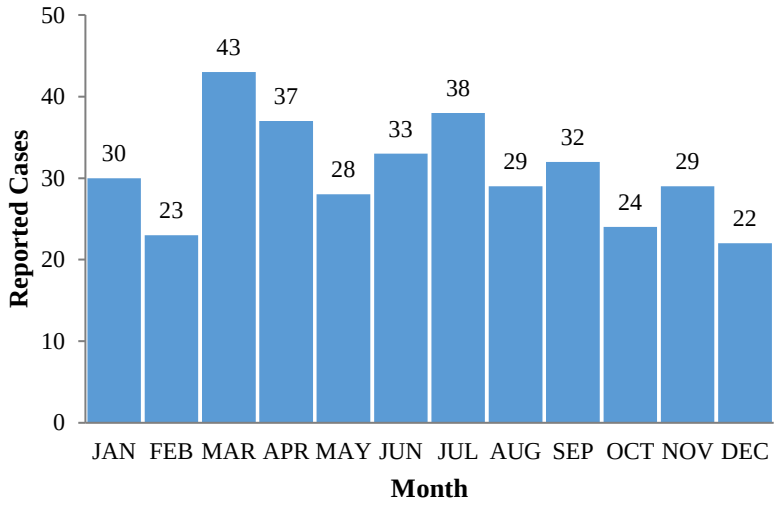
Table 1: CP-CRE Case Rates by Race and Sex – Indiana, 2018[*+]

	Cases	Rate	2014-2018 Total
Race			
White	173	3.0	535
Black	60	9.1	218
Other	28	8.3	79
Unknown	107	-	197
Sex			
Male	156	4.7	447
Female	212	6.3	582
Unknown	0	-	0
Total	368		1,029

[*]All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.
[+] Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

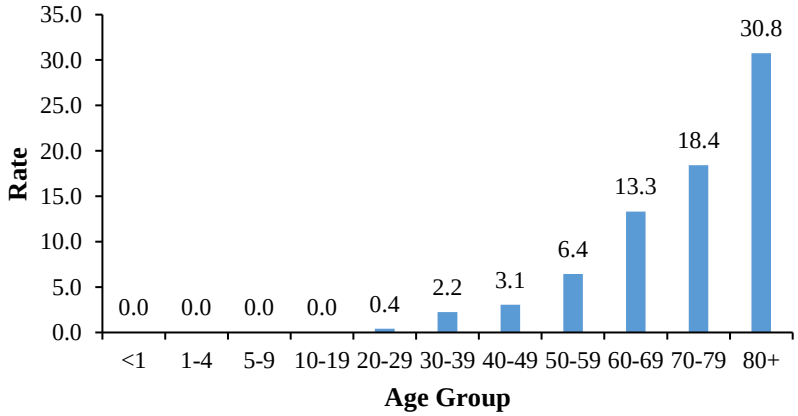
Cases of CP-CRE occurred year-round in 2018. The greatest number of cases occurred in March (Figure 1).

Figure 1: CP-CRE Cases by Month – Indiana, 2018



As shown in Figure 2, age-specific rates progressively increased among the older populations with the highest incidence observed in individuals aged 80 and older (30.8).

Figure 2: CP-CRE Incidence Rates by Age Group – Indiana, 2018*+



In 2018, 12 counties reported at least one CP-CRE case. Among counties reporting five or more cases during the year, incidence rates were highest in Indiana counties reporting five or more cases of CP-CRE. The incidence rate was highest in Clay (42.0), Vigo (32.6), Lake (21.1), Johnson (19.2) and Porter (18.9) counties.

LEARN MORE

Indiana State Department of Health CRE Quick Facts
Centers for Disease Control and Prevention CRE in Health care Settings

*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.
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INCLUDES: Histoplasmosis, Influenza-Associated Deaths

RESPIRATORY DISEASE PREVENTION

Histoplasmosis

It may be difficult to avoid breathing in *Histoplasma* in areas where it's common in the environment, such as areas surrounding the Ohio and Mississippi River valleys. It is important for those with weakened immune systems to avoid doing activities that are known to be associated with getting histoplasmosis, including:

- Disturbing material (digging in soil, excavating, chopping wood) where there are bird or bat droppings
- Cleaning chicken coops
- Cave exploring
- Cleaning, remodeling or demolishing old buildings

Large amounts of bird or bat droppings should be cleaned up by professional companies specializing in hazardous waste removal. Consult the document *Histoplasmosis: Protecting Workers at Risk* before starting a job or an activity where there's a chance of exposure to *Histoplasma*.

Influenza-Associated Deaths

Annual influenza vaccinations are encouraged before the beginning of the flu season to avoid getting infected with influenza. Because influenza viruses change over time, it is important to get vaccinated each year. The vaccine begins to protect you within a few days after you get the flu shot, but it is not fully effective until about 14 days after the shot.

Good respiratory hygiene is important to prevent the spread of influenza:

- Use your elbow or upper arm, instead of your hands, or a tissue to cover your mouth and nose when you cough or sneeze. Immediately throw used tissues into the trash can.
- Try not to touch your eyes, nose or mouth.
- Wash your hands often with soap and water; if soap and water are not available, use an alcohol-based hand rub.
- Avoid close contact with people who are sick.
- If you get the flu, stay home from work, school and social gatherings; take antiviral drugs if your doctor prescribes them.

HISTOPLASMOSIS

2018 CASE TOTAL: 126
2017 CASE TOTAL: 257

2018 INCIDENCE RATE: 1.9 per 100,000
2017 INCIDENCE RATE: 3.9 per 100,000

HISTOPLASMOSIS is caused by *Histoplasma capsulatum*, a saprophytic soil fungus. The primary route of transmission is inhalation of infectious spores made airborne by the disturbance of contaminated soil. The presence of *Histoplasma capsulatum* has been associated with soil enriched with bird feces, especially from blackbirds, starlings, chickens and pigeons. Birds are not carriers of *Histoplasma*, but accumulation of bird feces provides the organic enrichment needed for *Histoplasma* growth. Although birds might not carry *Histoplasma* in their feces, bat guano may contain the organism. Some studies have indicated that different clay minerals in soil can influence growth and activity of bacteria and fungi.

CLINICAL AND PUBLIC HEALTH SIGNIFICANCE

Histoplasmosis is endemic in Indiana, and the Centers for Disease Control and Prevention (CDC) reports that between 60 percent and 90 percent of people who live in areas where *Histoplasma capsulatum* is common in the environment will show evidence of having been exposed to the fungus at some point in their lifetime. In these areas, 10 percent to 25 percent of HIV-infected people will develop disseminated histoplasmosis. Approximately 90 percent of *Histoplasma capsulatum* infections are asymptomatic. Clinically recognized histoplasmosis can be characterized into one of three forms: 1) acute, pulmonary histoplasmosis; 2) disseminated histoplasmosis; and 3) chronic, cavitary histoplasmosis. Symptoms of histoplasmosis cases are flu-like with nonproductive cough, chest pains and difficult breathing (acute, pulmonary histoplasmosis). More severe disease can result in fever, night sweats, weight loss and bloody sputum. Severe cases may result in *Histoplasma* organisms being disseminated to many body organs (disseminated histoplasmosis). Symptoms occur within 3-17 days after exposure to the fungus. Antifungal medication is available for histoplasmosis, although mild infections usually resolve without medication.

People most at risk for developing histoplasmosis include poultry workers, farmers, landscapers, gardeners and those who have contact with bats or bat caves.

EPIDEMIOLOGY

In 2018, 126 confirmed cases of histoplasmosis were reported in Indiana, for an incidence rate of 1.9 cases per 100,000 population (Table 1). Males (2.3) were more likely to be reported with histoplasmosis infection than females (1.4).

Table 1: Histoplasmosis Case Rates by Race and Sex – Indiana, 2018[*+]

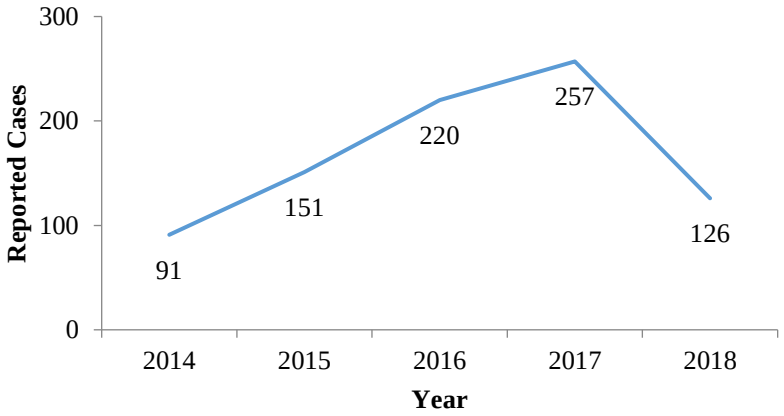
	Cases	Rate	2014-2018 Total
Race			
White	72	3.0	480
Black	15	2.3	71
Other	7	2.1	46
Unknown	32	-	248
Sex			
Male	77	2.3	494
Female	49	1.4	350
Unknown	0	-	1
Total	126		845

[*]All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.

[+] Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

Figure 1 illustrates the number of cases by year for 2014-2018.

Figure 1: Histoplasmosis Cases by Year – Indiana, 2014-2018



Histoplasmosis occurred throughout the year in 2018, with the largest number of cases occurring in January (Figure 2).

Figure 2: Histoplasmosis Cases by Month – Indiana, 2018

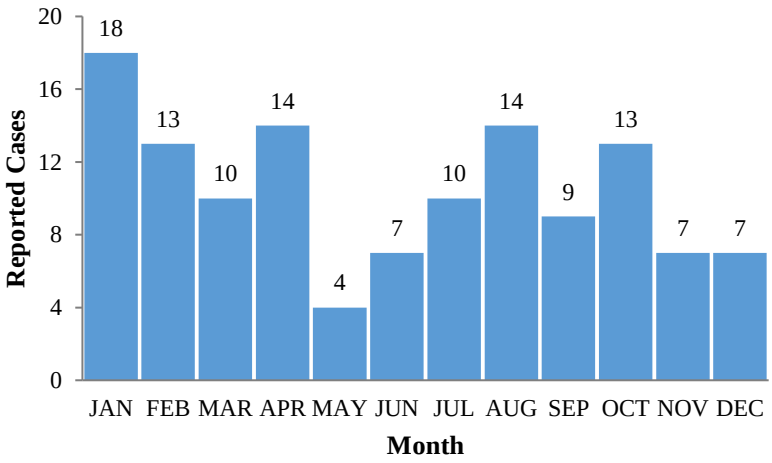
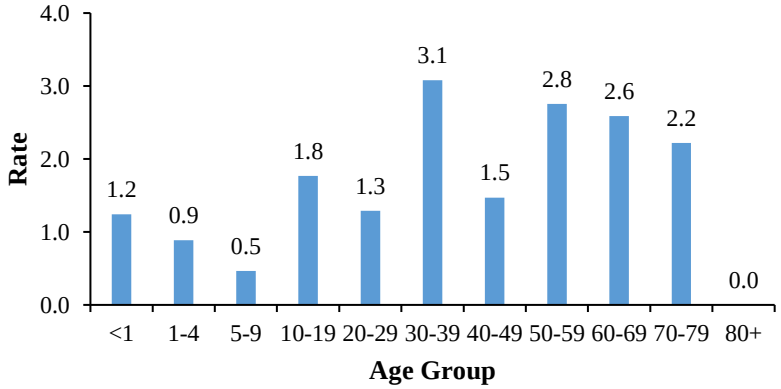


Figure 3 shows the distribution of cases by age group. Age-specific rates were greatest among adults aged 30 to 39 years (3.1) and 50 to 59 years (2.8) closely followed by adults aged 60 to 69 (2.6).

*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.

+ Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

Figure 3: Histoplasmosis Incidence Rates by Age Group – Indiana, 2018*+



In 2018, 44 counties in Indiana reported at least one case of histoplasmosis. Table 2 shows the counties with the highest disease incidence rates of histoplasmosis in 2018. Incidence rates were highest among the following counties reporting five or more cases: Howard (7.3), Hamilton (3.6), Monroe (3.4), Allen (2.9) and Marion (2.2).

Table 2: Histoplasmosis Incidence Rates by County – Indiana, 2018*+

County	Cases	Rate
Howard	6	7.3
Hamilton	12	3.6
Monroe	5	3.4
Allen	11	2.9
Marion	21	2.2

LEARN MORE

http://www.cdc.gov/fungal/diseases/histoplasmosis/index.html
http://www.in.gov/isdh/23254.htm

*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.
+ Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

INFLUENZA-ASSOCIATED DEATHS

2018 CASE TOTAL: 308
2017 CASE TOTAL: 131

2018 INCIDENCE RATE: 4.6 per 100,000
2017 INCIDENCE RATE: 2.0 per 100,000

INFLUENZA-ASSOCIATED DEATH is caused by complications from an influenza virus infection. Influenza, or flu, is an illness caused by influenza viruses that infect the respiratory tract. The illness can be mild to severe and can cause death in some people. Although anyone can become infected with flu, the elderly, young children and anyone with other health problems are at more risk for hospitalizations and complications that can be attributed to influenza-associated deaths.

CLINICAL AND PUBLIC HEALTH SIGNIFICANCE

In the United States, on average, 5 percent to 20 percent of the population gets the flu and more than 200,000 people are hospitalized from seasonal flu-related complications. Some people, such as older people, young children, pregnant women and people with certain health conditions, are at high risk for serious flu complications. These health conditions include:

- Asthma
- Neurological and neurodevelopmental conditions
- Chronic lung disease
- Heart disease
- Blood disorders
- Endocrine disorders (i.e., diabetes)
- Kidney and liver disorders
- Metabolic disorders
- Weakened immune systems due to medication or disease, such as HIV/AIDS
- People younger than 19 years of age receiving long-term aspirin therapy
- People who are morbidly obese

Every year up to 49,000 people die of influenza and its complications. About 90 percent of influenza-associated deaths occur in people aged 65 years and older.

EPIDEMIOLOGY

In 2018, 308 confirmed cases of influenza-associated death were reported in Indiana, for an incidence rate of 4.6 cases per 100,000 population (Table 1). Females (5.1) were slightly more likely to be reported as an influenza-associated death than males (4.1).

Table 1: Influenza-Associated Death Case Rates by Race and Sex – Indiana, 2018[*+]

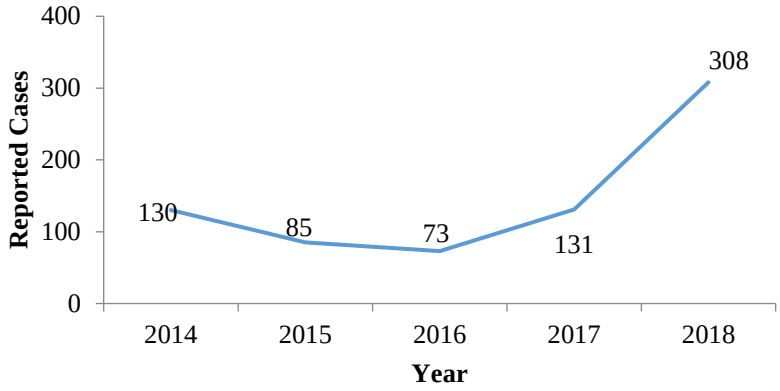
	Cases	Rate	2014-2018 Total
Race			
White	251	4.4	592
Black	21	3.2	54
Other	4	1.2	14
Unknown	32	-	67
Sex			
Male	136	4.1	341
Female	172	5.1	385
Unknown	0	-	1
Total	308		727

[*]All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.

[+] Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

Figure 1 illustrates the number of cases by year for 2014-2018. The number of influenza-associated deaths more than doubled in 2018 compared to 2017.

Figure 1: Influenza-Associated Death Cases by Year – Indiana, 2014-2018



In 2018, influenza-associated deaths occurred throughout the normal flu season months of October through May. The largest number of cases occurred during the month of January. (Figure 2).

Figure 2: Influenza-Associated Death Cases by Month – Indiana, 2018

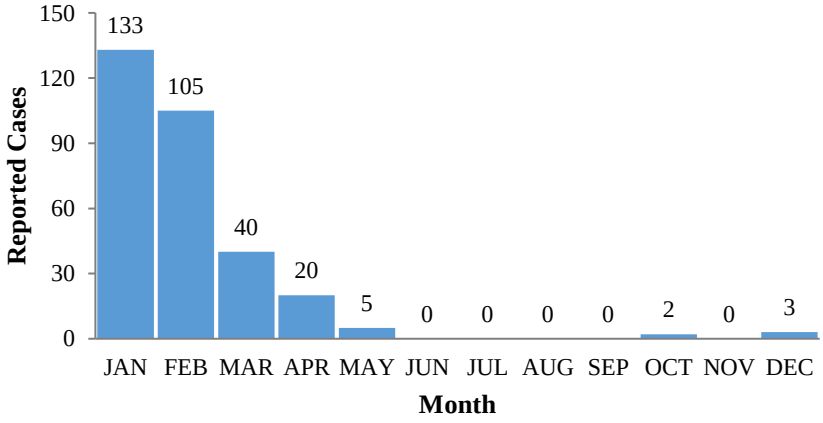
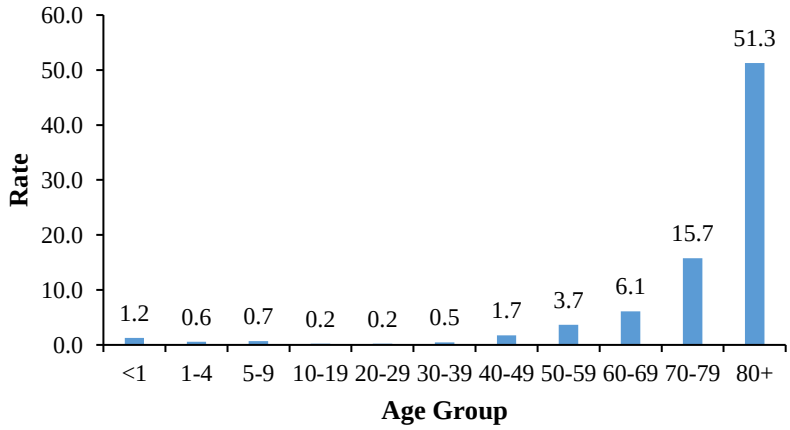


Figure 3 shows the distribution of cases by age group. Age-specific rates were greatest among adults aged 80+ (51.3) closely followed by adults aged 70-79 (15.7).

*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.

+ Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

Figure 3: Influenza-Associated Death Incidence Rates by Age Group – Indiana, 2018*+



In 2018, 69 counties in Indiana reported at least one case of influenza-associated death. Table 2 shows the counties with the highest disease incidence rates of influenza-associated death in 2018. Incidence rates were highest among the following counties reporting five or more cases: Adams (22.4), Grant (15.2), DeKalb (13.9), Morgan (12.8), and Floyd (11.6).

Table 2: Influenza-Associated Death Incidence Rates by County – Indiana, 2018*+

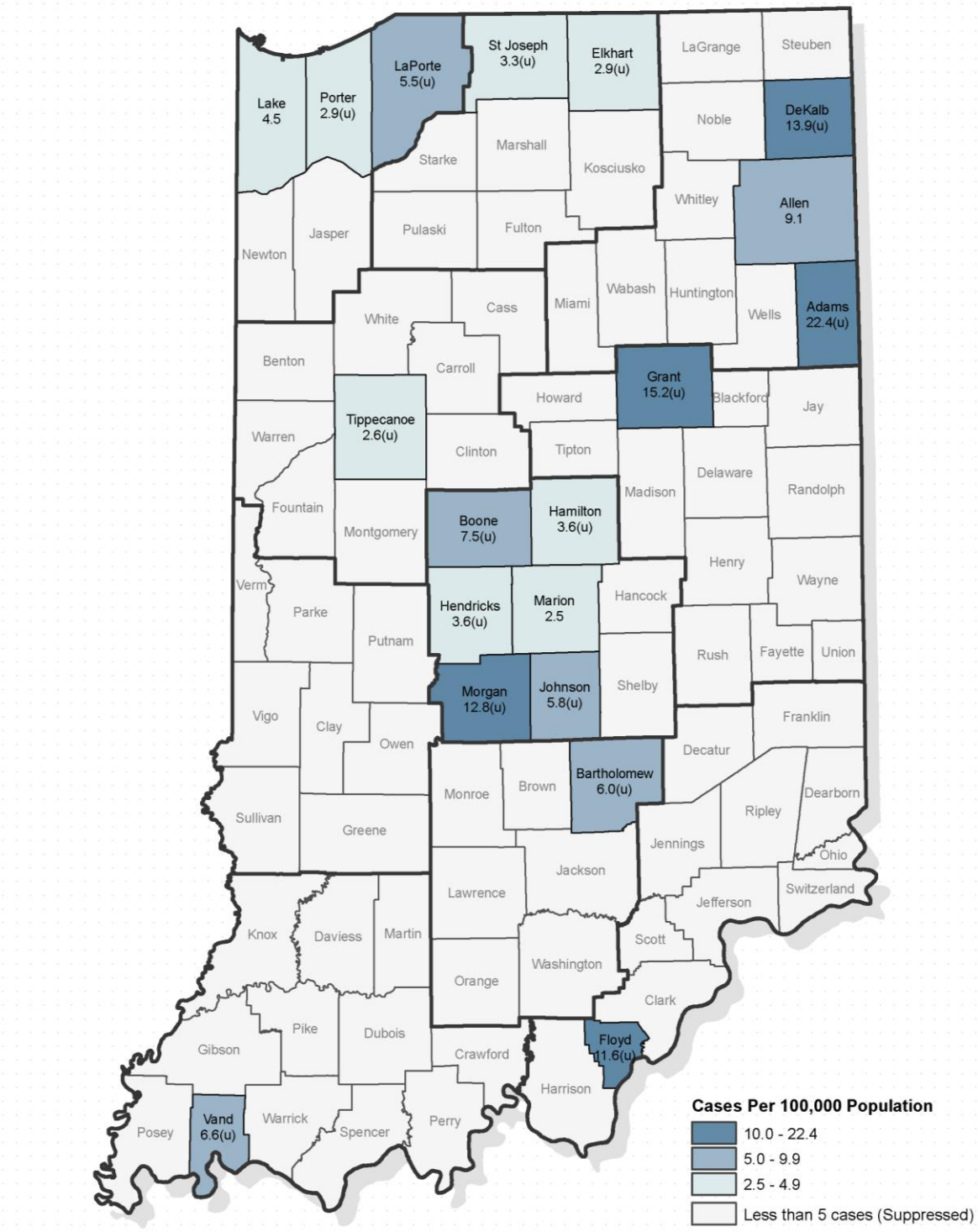
County	Cases	Rate
Adams	8	22.4
Grant	10	15.2
DeKalb	6	13.9
Morgan	9	12.8
Floyd	9	11.6

LEARN MORE

https://www.cdc.gov/flu/about/index.html
http://www.in.gov/isdh/22104.htm
http://www.in.gov/isdh/25462.htm

*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.
+ Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

Figure 4: Influenza-Associated Death Incidence Rates by County – Indiana, 2018*+



*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.

+ Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

VECTORBORNE AND ZOONOTIC DISEASES & CONDITIONS

INCLUDES: Animal Bites, Anthrax, Arboviral Encephalitis, Babesiosis, Brucellosis, Chikungunya, Dengue, Ehrlichiosis, Hantavirus Pulmonary Syndrome, La Crosse Encephalitis, Lyme Disease, Malaria, Plague, Psittacosis, Q Fever, Rabies, Rocky Mountain Spotted Fever, Trichinosis, Tularemia, Typhus, West Nile Virus, Yellow Fever, Zika Virus

VECTOR/ZOONOTIC DISEASE PREVENTION

Animal Bites

While any animal has the potential to bite, most reported bites come from dogs. In general, dog bites can be prevented by adhering to the following guidelines:

- Do not approach an unfamiliar dog.
- Do not scream and/or run from a dog.
- Remain motionless (e.g., "be still like a tree") if approached by an unfamiliar dog.
- If knocked over by a dog, roll into a ball and lie still (e.g., "be still like a log").
- Children should not play with a dog unless supervised by an adult.
- Children should report stray dogs or dogs displaying unusual behavior to an adult.
- Avoid direct eye contact with a dog.
- Do not disturb a dog that is sleeping, eating or caring for puppies.
- Do not pet any dog without allowing the dog to see and sniff you first.

Mosquito Bites

Be vigilant against mosquito bites in warmer months (April–September), when mosquitoes are most active.

Avoid contact with mosquitoes:

- Avoid being outdoors when mosquitoes are active (especially late afternoon, dusk to dawn and early morning).
- Cover exposed skin by wearing a hat, long sleeves and long pants in places where mosquitoes are especially active, such as wooded areas.
- Install or repair screens on windows and doors to keep mosquitoes out of homes or other buildings.

Repel mosquitoes on skin and clothing:

- Apply an EPA-registered insect repellent containing DEET, picaridin, IR3535, oil of lemon eucalyptus or para-menthane-diol to clothes and exposed skin.
- Apply products containing permethrin to clothing and gear, such as boots, pants, socks and tents. Permethrin remains protective through several washings and should not be used on bare skin.

Take steps to control mosquitoes inside and outside your home:

- Use screens on windows and doors. Repair holes in screens to keep mosquitoes outside.
- Once a week, empty and scrub, turn over, cover or throw out any items that hold water, such as tires, buckets, planters, toys, pools, birdbaths, flowerpot saucers and trash containers. Drill holes in the bottom of recycling containers left outdoors.
- Tightly cover water storage containers (buckets, cisterns, rain barrels).
- If you have a septic tank, repair cracks or gaps. Cover open vents or plumbing pipes.
- Keep grass cut short and shrubbery trimmed.
- Clean clogged roof gutters, particularly if leaves tend to plug up the drains.
- Flush ornamental fountains and birdbaths periodically.
- Aerate ornamental pools or stock them with predatory fish.

Tick Bites

Although it is a good idea to take preventative measures against ticks year-round, be extra vigilant in warmer months (April–September) when ticks are most active.

Avoid direct contact with ticks by:

- Avoiding wooded and brushy areas with high grass and leaf litter.
- Walking in the center of trails.
- Wearing a long-sleeved shirt and light-colored pants, with the shirt tucked in at the waist and the pants tucked into socks, while in grassy or wooded areas.

Repel ticks on skin and clothing by:

- Using EPA-registered insect repellent that contains 20 percent or more DEET, picaridin or IR2525 on exposed skin for protection that lasts several hours.
- Applying products containing permethrin to clothing and gear, such as boots, pants, socks and tents. Permethrin remains protective through several washings and should not be used on bare skin.

Find and remove ticks from your body by:

- Bathing or showering as soon as possible after coming indoors (preferably within two hours) to wash off and more easily find ticks that are crawling on you.
- Conducting a full-body tick check using a handheld or full-length mirror to view all parts of your body upon return from tick-infested areas. Parents should check their children for ticks under the arms, in and around the ears, inside the belly button, behind the knees, between the legs, around the waist and especially in the hair.
- Examining gear and pets. Ticks can ride into the home on clothing and pets and then attach to a person later, so carefully examine pets, coats and day packs.
- Tumble drying clothes in a dryer on high heat for 20-30 minutes to kill ticks on dry clothing after you come indoors.
- Ticks can be safely removed by using tweezers to grasp the tick close to the skin and then pulling outward with steady and even pressure. After the tick is removed, the area should be washed thoroughly. The tick should be discarded by submerging it in alcohol, placing it in a sealed bag or container, wrapping it tightly in tape or flushing it down the toilet. Ticks should never be crushed with the fingernails.

ANIMAL BITES

2018 CASE TOTAL: 7,281
2017 CASE TOTAL: 7,621

2018 INCIDENCE RATE: 108.8 per 100,000
2017 INCIDENCE RATE: 113.9 per 100,000

ANIMAL BITES are preventable injuries that also can be associated with the transmission of rabies. Animal bites are reportable to public health authorities to facilitate rabies risk assessment and enable appropriate recommendations for post-exposure prophylaxis. Animal bite reporting also helps local public health professionals assess the need for community-level interventions, including aggressive dog ordinances, spay-neuter services, rabies vaccination clinics, public education campaigns and allocation of resources to animal control agencies and shelters.

CLINICAL AND PUBLIC HEALTH SIGNIFICANCE

Although rabies is rare in Indiana's domestic animals, animal bites remain a common and important public health problem. Animal bites are preventable injuries that cause pain, trauma and infection, loss of function, disfigurement and anxiety.

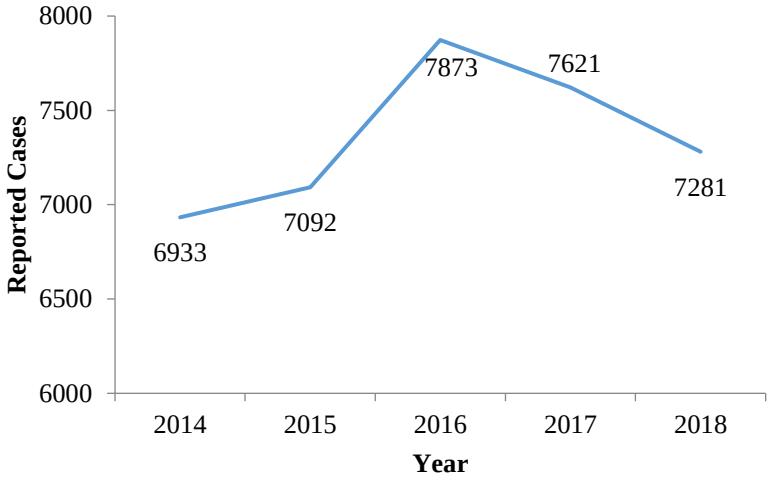
After an animal bite is reported to public health officials, the biting animal will be either quarantined for 10 days to observe for signs of rabies or submitted to the ISDH Rabies Laboratory for diagnostic testing. Post-exposure prophylaxis to prevent rabies may be recommended for the exposed person based on the rabies risk assessment and the outcome of the quarantine or rabies testing.

Any animal has the potential to bite, but most bites come from dogs. According to the Centers for Disease Control and Prevention (CDC), each year approximately 4.5 million Americans are bitten by dogs. Of those who are bitten, 885,000 will seek medical attention and 386,000 of these will require treatment in an emergency department. Half of all animal bites occur in children; the rate of dog bites is highest for children ages 5-9 years. (See the following website for a detailed report: http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5226a1.htm.)

EPIDEMIOLOGY

In the 2018 calendar year, 7,281 animal bite cases were reported in Indiana. This is a decrease from a peak of 7,873 reported animal bites in 2016 (Figure 1).

Figure 1: Animal Bites Cases by Year – Indiana, 2014-2018

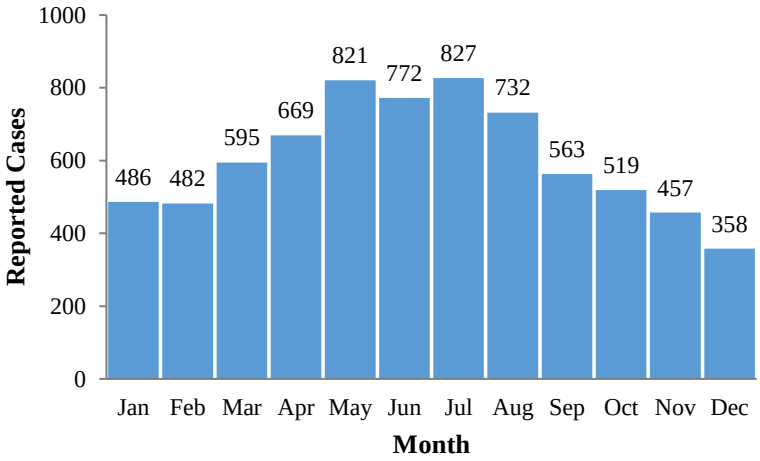


Animal bites occurred at all times of the year but were most common in the spring and summer months (Figure 2).

*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.

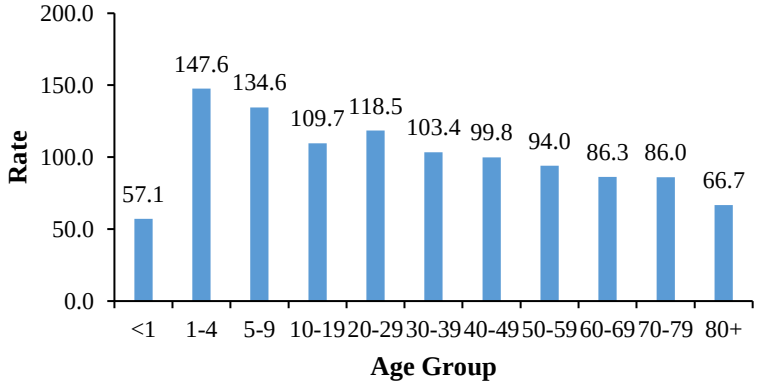
+ Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

Figure 2: Animal Bites Cases by Month – Indiana, 2018



The risk for animal bites was highest among children ages 1-9 years (Figure 3).

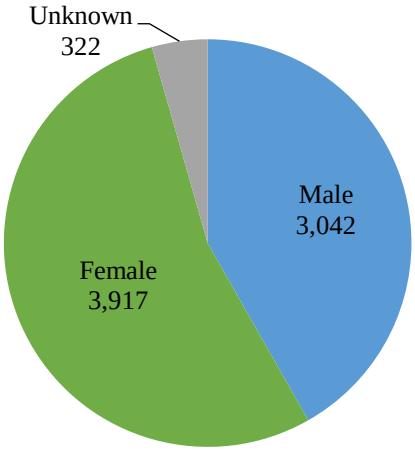
Figure 3: Animal Bites Incidence Rates by Age Group – Indiana, 2018*+□



+Missing age group for 333 cases

There was a slightly higher proportion of female victims (Figure 4).

Figure 4: Animal Bites by Gender of Victim – Indiana, 2018



*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.

+ Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

The majority of biting animals were domestic dogs and cats (Table 1).

Table 1: Animal Bites by Species – Indiana, 2018

Type of Animal	Number	Percent
Dog	5,532	76%
Cat	1,314	18%
Bat	255	3.5%
Raccoon	38	<1%
Squirrel	29	<1%
Other	113	2%
Total	7,281	100%

Substantial proportions of biting dogs and cats were sexually intact (Table 2).

Table 2: Animal Bites by Spay or Neuter Status for Dogs and Cats – Indiana, 2018

	Dogs		Cats		Dogs and Cats	
	Number	Percent	Number	Percent	Number	Percent
Spayed or neutered	1,757	39%	457	10%	2,214	49%
Not spayed or neutered	1,125	25%	202	5%	1,327	30%
Unknown	779	17%	178	4%	957	21%
Total	**3,661**	**81%**	**837**	**19%**	**4,498**	**100%**

Substantial proportions of biting dogs and cats were unvaccinated against rabies (Table 3) or had unknown status for these risk factors.

Table 3: Animal Bites by Rabies Vaccination Status for Dogs and Cats – Indiana, 2018

	Dogs		Cats		Dogs and Cats	
	Number	Percent	Number	Percent	Number	Percent
Vaccinated	2,461	54%	405	9%	2,866	63%
Not vaccinated	637	14%	276	6%	913	20%
Unknown	652	14%	142	3%	794	17%
Total	**3,750**	**82%**	**823**	**18%**	**4,573**	**100%**

LEARN MORE

https://www.cdc.gov/features/dog-bite-prevention/index.html
https://www.avma.org/public/Pages/Dog-Bite-Prevention.aspx

*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.

+ Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

EHRLICHIOSIS

2018 CASE TOTAL: 74
2017 CASE TOTAL: 39

2018 INCIDENCE RATE: 1.1 per 100,000
2017 INCIDENCE RATE: 0.6 per 100,000

EHRLICHIOSIS is a tick-borne disease that has been recognized in the U.S. since the mid-1980s. At least three species of *Ehrlichia* can cause human illness: *Ehrlichia chaffeensis, Ehrlichia ewingii* and a third species provisionally called *Ehrlichia muris*-like (EML). Human monocytic ehrlichiosis (HME) is caused by the bacterium *Ehrlichia chaffeensis* and is transmitted to humans by the lone star tick, *Amblyomma americanum*. The disease occurs mostly in the southeastern and south-central parts of the U.S. Human granulocytic anaplasmosis (HGA), or anaplasmosis (previously known as human granulocytic ehrlichiosis [HGE], is caused by the bacterium *Anaplasma phagocytophilum* and is transmitted to humans by the deer tick, *Ixodes scapularis*. Anaplasmosis is currently classified with ehrlichiosis for reporting purposes.

CLINICAL AND PUBLIC HEALTH SIGNIFICANCE

Symptoms of ehrlichiosis are similar to Rocky Mountain spotted fever and include sudden high fever, headache, chills, muscle aches, nausea, vomiting, diarrhea and tiredness. A rash may be present in up to 60% of children and 30% of adults, but is not present in all cases. Symptoms can range from mild to severe and usually appear 3-16 days after a tick bite. If patients are not treated promptly and appropriately, some people may die. The estimated case fatality rate is 1.8 percent. People with compromised immunity caused by immunosuppressive therapies, HIV infection, or splenectomy are at higher risk for severe disease and death. People at highest risk of getting ehrlichiosis are those who spend time outdoors in tick-infested areas from April until October, when ticks are most active.

There is no vaccine for ehrlichiosis, but the disease can be treated with antibiotics.

EPIDEMIOLOGY

Seventy-four confirmed and probable cases of ehrlichiosis were reported in 2018 in Indiana. From 2014 to 2018, 206 cases of ehrlichiosis were reported in Indiana. Ehrlichiosis can occur in all areas of Indiana, but most cases occur in the southern portion of the state.

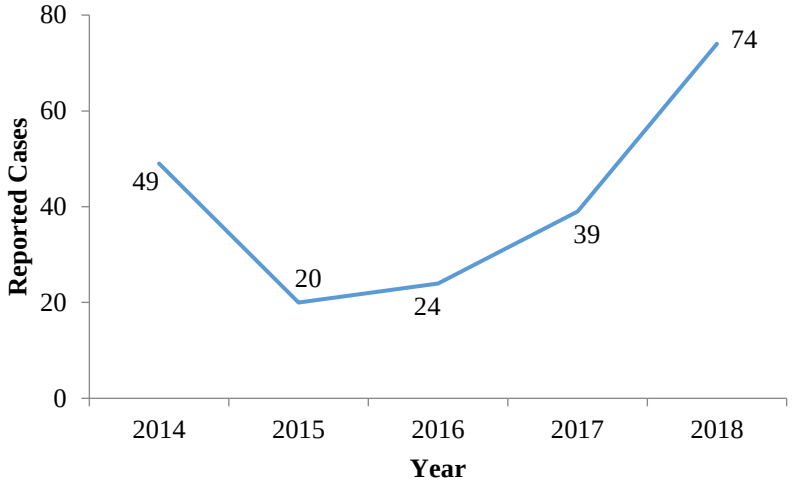
Table 1: Ehrlichiosis Case Rates by Race and Sex – Indiana, 2014-2018[*+]

	Cases	Rate	2014-2018 Total
Race			
White	49	0.9	145
Black	1	0.2	1
Other	0	0.3	1
Unknown	24	-	59
Sex			
Male	43	1.3	123
Female	31	0.9	83
Unknown	0	-	0
Total	74		206

The number of reported cases of ehrlichiosis in Indiana has increased from a low of 20 in 2015 to 74 in 2018. (Figure 1).

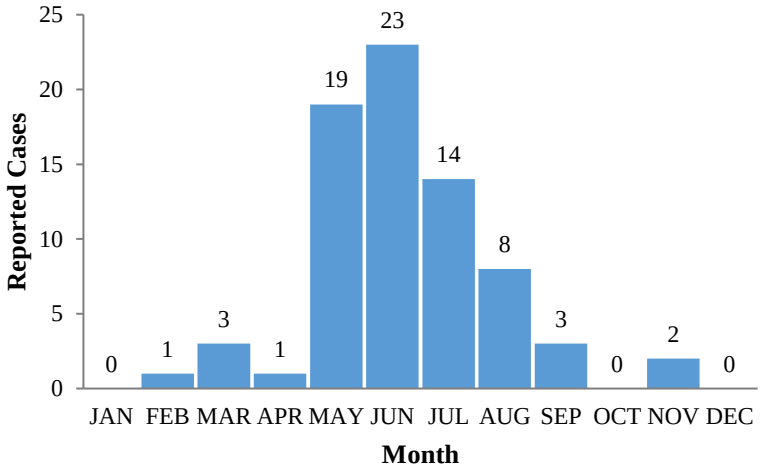
[*]All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.
[+] Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

Figure 1: Ehrlichiosis Cases by Year – Indiana, 2014-2018



Although the disease is most common in the spring and summer months when ticks are active, ehrlichiosis can occur anytime during the year (Figure 2).

Figure 2: Ehrlichiosis Cases by Month – Indiana, 2018



In 2018, 33 counties had at least one case of ehrlichiosis; however, only three counties (Dubois, Clark, and Monroe) had five or more reported cases.

LEARN MORE

http://www.cdc.gov/ehrlichiosis/

*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.

+ Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

LYME DISEASE

2018 CASE TOTAL: 155
2017 CASE TOTAL: 144

2018 INCIDENCE RATE: 2.3 per 100,000
2017 INCIDENCE RATE: 2.2 per 100,000

LYME DISEASE is caused by the bacterium *Borrelia burgdorferi* and is the most commonly diagnosed tick-borne disease in the U.S. It is transmitted by the black-legged tick (or deer tick, *Ixodes scapularis*). Small wild rodents serve as the reservoir species. In most cases, the tick must be attached for 36-48 hours or more before the Lyme disease bacterium can be transmitted.

CLINICAL AND PUBLIC HEALTH SIGNIFICANCE

Symptoms of Lyme disease appear 3-30 days after exposure to the infected tick but generally occur 7-14 days after exposure. Early symptoms can include fever, chills, headache, fatigue, muscle and joint aches, swollen lymph nodes and a "bullseye" skin rash known as erythema migrans. Later symptoms may include arthritis with severe joint pain and swelling, as well as neurologic or cardiologic manifestations. Lyme disease can be successfully treated with antibiotics, especially if treatment is started early. Untreated infections of *Borrelia burgdorferi* can lead to various health problems, including arthritis, neurologic disease, heart disease, meningitis, loss of muscle tone (Bell's palsy) and/or dermatological (skin) conditions.

EPIDEMIOLOGY

In 2018, 155 cases of Lyme disease were reported in Indiana, for a rate of 2.3 cases per 100,000 population. For the five-year reporting period from 2014 to 2018, 706 cases of Lyme disease were reported.

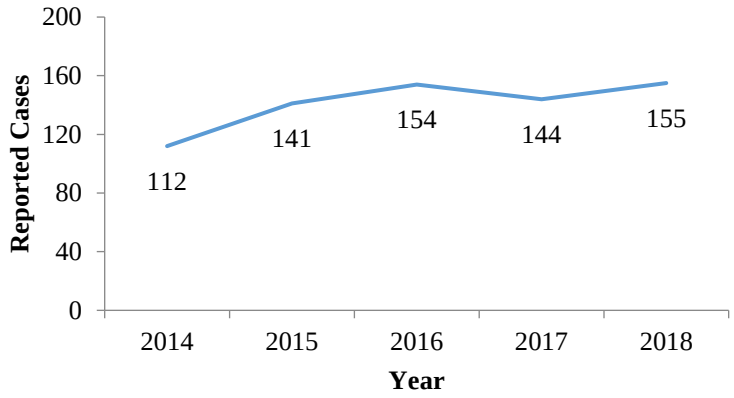
Table 1: Lyme Disease Case Rates by Race and Sex – Indiana, 2014-2018[*+]

	Cases	Rate	2014-2018 Total
Race			
White	91	1.6	413
Black	2	0.3	5
Other	12	3.5	44
Unknown	50	-	244
Sex			
Male	89	2.7	410
Female	66	2.0	296
Unknown	0	-	0
Total	155		706

[*]All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.

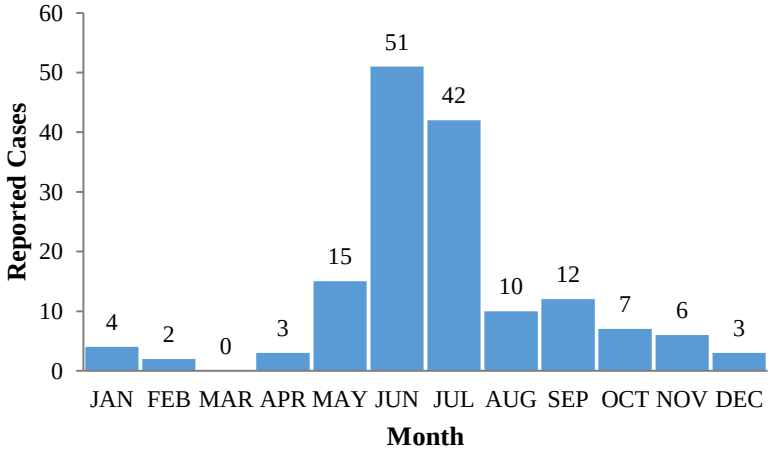
[+] Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

Figure 1: Lyme Disease Cases by Year – Indiana, 2014-2018



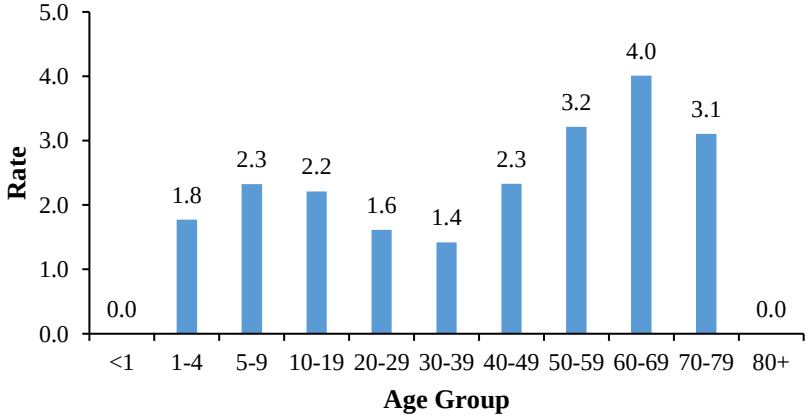
While the disease is most common in the spring and summer months when ticks are active, Lyme disease can occur anytime during the year (Figure 2).

Figure 2: Lyme Disease Cases by Month – Indiana, 2018



Reported cases of Lyme disease in Indiana during 2018 were most common among people aged 60-69, with similar rates of cases in the 50-59 and 70-79 age groups (Figure 3).

Figure 3: Lyme Disease Incidence Rates by Age Group – Indiana, 2018[*+]



[*]All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.

[+] Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

LYME DISEASE

Lyme disease can occur in all areas of Indiana, but most cases occur in the northwest part of the state. People who live in or travel to this part of the state are at increased risk for developing Lyme disease. Figure 4 depicts cases of Lyme disease by county of residence. Figure 5 depicts cases of Lyme disease by the county of likely exposure as determined by public health investigation. This does not include people who reported an unknown county of likely exposure or likely exposure in other states.

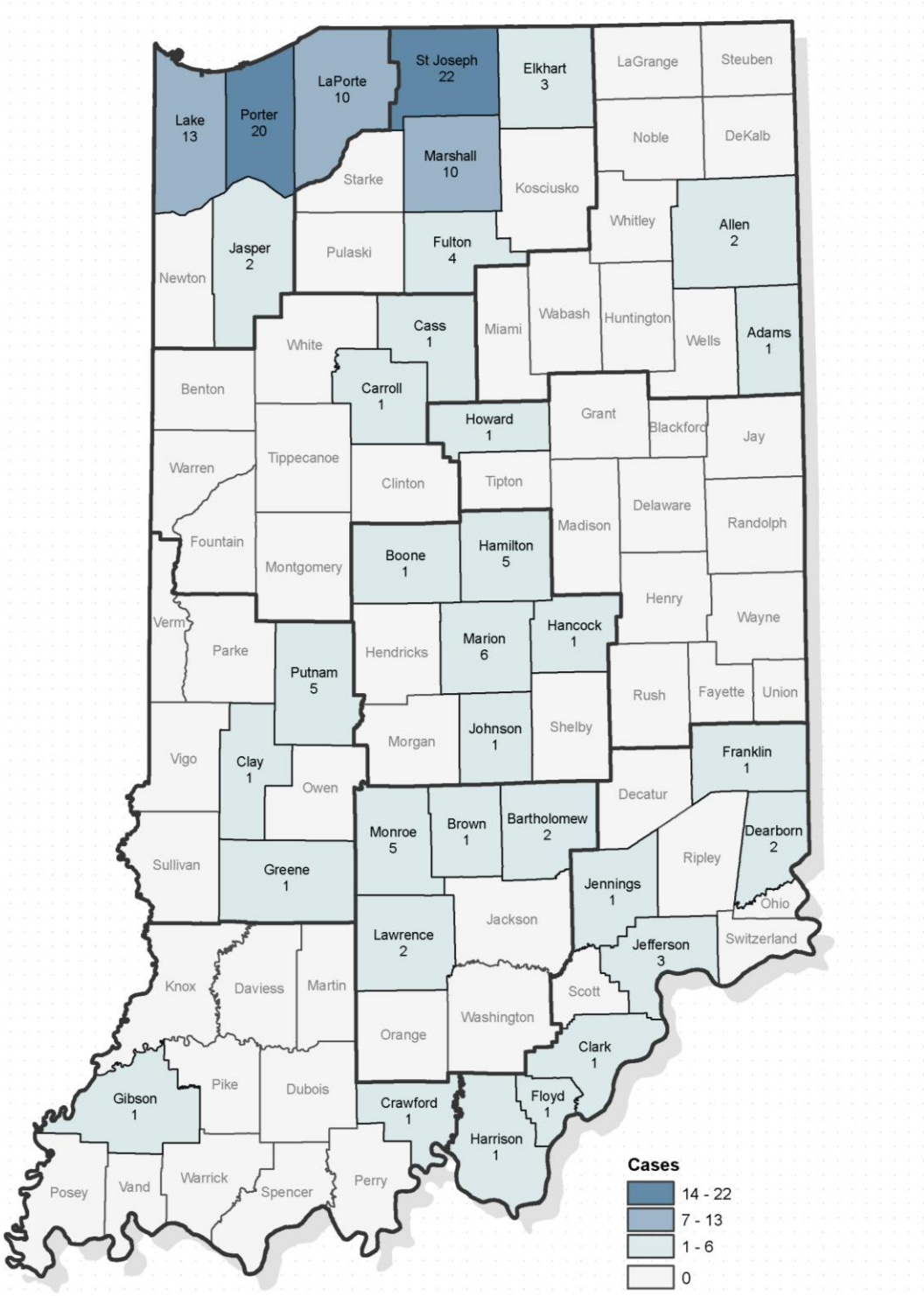
LEARN MORE

http://www.cdc.gov/ncidod/dvbid/lyme/index.htm

*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.

+ Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

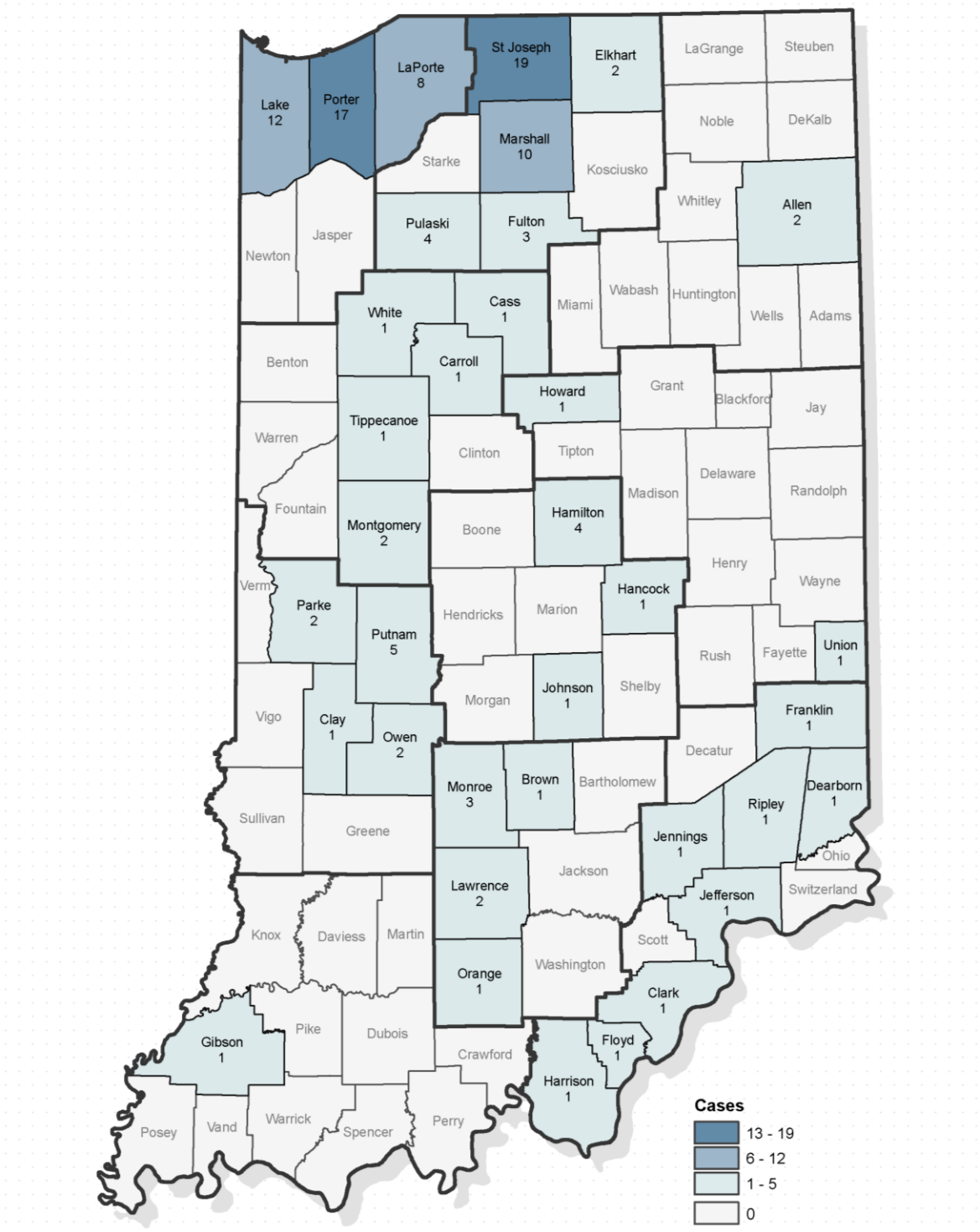
Figure 4: Lyme Disease Counts by County – Indiana, 2018*+



*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.

+ Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

Figure 5: Lyme Disease Counts by County of Likely Exposure – Indiana, 2018*+



*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.

+ Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

MALARIA

2018 CASE TOTAL: 14
2017 CASE TOTAL: 18

2018 INCIDENCE RATE: 0.2 per 100,000
2017 INCIDENCE RATE: 0.3 per 100,000

MALARIA is a serious and sometimes fatal disease caused by one of four *Plasmodium* parasite species (*falciparum, vivax, ovale, malariae*) and transmitted by the bite of an infected female *Anopheles* mosquito. In the U.S., the vast majority of cases are in international travels and immigrants returning from countries where malaria transmission occurs. Malaria risk in specific countries is dependent on various factors that can change rapidly and from year to year, such as local weather conditions, mosquito vector density and prevalence of infection, which can markedly affect local malaria transmission patterns. In general, malaria transmission occurs in large areas of Central and South America, the island of Hispaniola (the Dominican Republic and Haiti), Africa, Asia (including South Asia, Southeast Asia and the Middle East), Eastern Europe and the South Pacific.

CLINICAL AND PUBLIC HEALTH SIGNIFICANCE

Malaria symptoms are similar to influenza and can include fever, chills, headache, body aches and tiredness. The indicative symptoms of malaria are cyclic fevers and chills. Symptoms develop 7-30 days after the infective bite. Antimalarial drugs taken for prophylaxis can delay or prevent malaria symptoms. Delays between exposure and development of symptoms can result in misdiagnosis or delayed diagnosis because of reduced clinical suspicion by the health care provider.

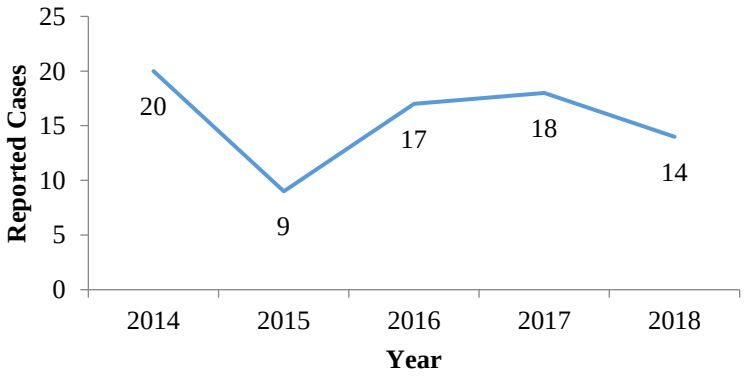
HEALTHY PEOPLE 2020 GOAL

The Healthy People 2020 Goal for malaria is to reduce the number of cases reported in the U.S. to 999. Malaria is one of three diseases that account for a large proportion of illness and disability for international travelers. In 2016, 2,078 new cases of malaria were reported in the U.S. for a rate of 0.6 per 100,000 population.

EPIDEMIOLOGY

In 2018, 14 cases of malaria were reported in Indiana. A total of 78 cases of malaria were reported during the five-year reporting period from 2014 to 2018 (Figure 1). All were acquired outside the U.S. Countries of exposure included Burkina Faso, Chad, Nigeria, Peru, Republic of South Sudan, Sierra Leone, Sudan, Togo, and Uganda.

Figure 1: Malaria Cases by Year – Indiana, 2014-2018



LEARN MORE

http://www.cdc.gov/malaria/

*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.

+ Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

RABIES

2018 CASE TOTAL: 0
2017 CASE TOTAL: 0

2018 INCIDENCE RATE: N/A
2017 INCIDENCE RATE: N/A

RABIES is caused by a virus from the genus *Lyssavirus*. Within the *Lyssavirus* genus, several other viruses have been identified that infect mammalian hosts (animal and human) and cause fatal encephalitis. Rabies virus is the lyssavirus associated with rabies in bats and terrestrial mammals around the world. Other lyssaviruses have been identified in bats in Europe, Africa, Asia and Australia.

Rabies is transmitted from animal to animal through transfer of virus-contaminated saliva by bites or mucous-membrane exposures. In the U.S., rabies virus subtypes have become associated with the mammalian species in which the subtype is generally found. In Indiana, the North Central Skunk virus and numerous bat subtypes of rabies virus have been identified in the past. In 2016, 1,131 animals of various species were tested for rabies in Indiana, and 17 tested positive. All were bats.

CLINICAL AND PUBLIC HEALTH SIGNIFICANCE

In humans, early symptoms of rabies infection are nonspecific but may be similar to influenza (the flu) and can include headache, fever and malaise. As the disease rapidly progresses, symptoms include numbness/tingling at the site of the bite, anxiety, confusion, hallucinations, excessive salivation and difficulty swallowing. The virus infects the central nervous system, resulting in death, often within days of symptom onset. Symptoms usually occur one to three months after exposure.

Rabies post-exposure prophylaxis is available in the form of immunoglobulin and vaccination. Treatment has not been shown to be effective if given after the development of clinical signs; the vaccine must be given before clinical signs develop.

Although anyone can be at risk for rabies, people who work with rabies virus in research laboratories and vaccine production facilities are at the highest risk. Other groups at risk include veterinarians, animal control and wildlife officers, rehabilitation specialists and bat handlers.

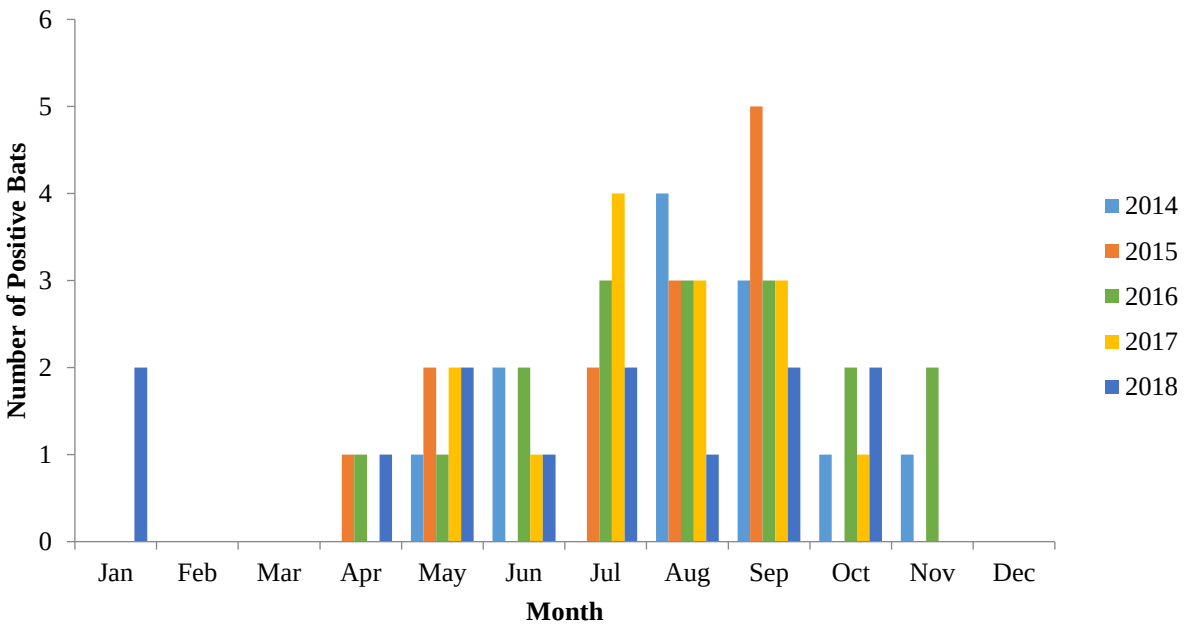
EPIDEMIOLOGY

Rabies is a rare disease of humans in the U.S.; no human cases were reported in Indiana in 2018 or in the five-year reporting period from 2014 to 2018. Since 1990, bats have been the predominant species testing positive for rabies at the ISDH Laboratory (the only Indiana laboratory that performs rabies testing). Bats continued that trend in 2018, being the only animal species found positive: 13 bats tested positive in 2018 and 69 bats tested positive from 2014 to 2018. At least one positive bat was found in each month from April through October. Two positive bats were found in January which is uncommon (see Figure 1). The last domestic animal to be infected was a horse in 2002 that was found to have a bat strain of rabies virus. The most recent human rabies case in Indiana was also infected with a bat strain of the virus.

*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.

+ Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

Figure 1. Rabid Bats by Month of Collection – Indiana, 2014-2018



LEARN MORE

https://www.cdc.gov/rabies/
https://www.avma.org/public/Health/Pages/rabies.aspx

*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.

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ROCKY MOUNTAIN SPOTTED FEVER

2018 CASE TOTAL: 80
2017 CASE TOTAL: 94

2018 INCIDENCE RATE: 1.2 per 100,000
2017 INCIDENCE RATE: 1.4 per 100,000

ROCKY MOUNTAIN SPOTTED FEVER (RMSF) is a serious tick-borne illness caused by the bacterium *Rickettsia rickettsii*. RMSF is transmitted in Indiana by the American dog tick (*Dermacentor variabilis*), which is found in grassy, brushy, and wooded areas throughout the state.

CLINICAL AND PUBLIC HEALTH SIGNIFICANCE

Rocky Mountain spotted fever is the most severe spotted fever rickettsiosis in the United States. The first symptoms of RMSF usually appear 3-12 days after a bite from an infected tick. The illness generally begins with sudden onset of fever and headache. Other signs and symptoms may include nausea, vomiting, abdominal pain, muscle and joint pain, and lack of appetite, followed by a rash. Children with RMSF frequently report experiencing nausea, vomiting, loss of appetite and rash but are less likely to report a headache than adults. Progression of the disease varies greatly. If left untreated, more than 20 percent of cases can be fatal. Early treatment with antibiotics can prevent death and severe illness.

Untreated disease may lead to more severe manifestations that include encephalitis, shock, seizures, gangrene and acute respiratory and renal failure. Patients with a particularly severe infection requiring prolonged hospitalization might have long-term health problems caused by this disease. *Rickettsia rickettsii* infects the endothelial cells that line the blood vessels. The damage that occurs in the blood vessels results in a disease process called "vasculitis," and bleeding or clotting in the brain or other vital organs may occur. Loss of fluid from damaged vessels can result in loss of circulation to the extremities, and damaged fingers, toes or even limbs ultimately might need to be amputated. Patients who suffer this kind of severe vasculitis in the first two weeks of illness also can be left with permanent long-term health problems such as profound neurological deficits or damage to internal organs. Those who do not have this kind of vascular damage in the initial stages of the disease typically recover fully within several days to months.

EPIDEMIOLOGY

In 2018, 80 cases of Rocky Mountain spotted fever were reported in Indiana. During the five-year period from 2014 to 2018, 280 cases of RMSF were reported in Indiana with one reported death in a pediatric patient. RMSF can occur in all areas of Indiana, but most cases occur in the southern portion of the state. Cases are reported by county of residence and may not always reflect the site of tick exposure.

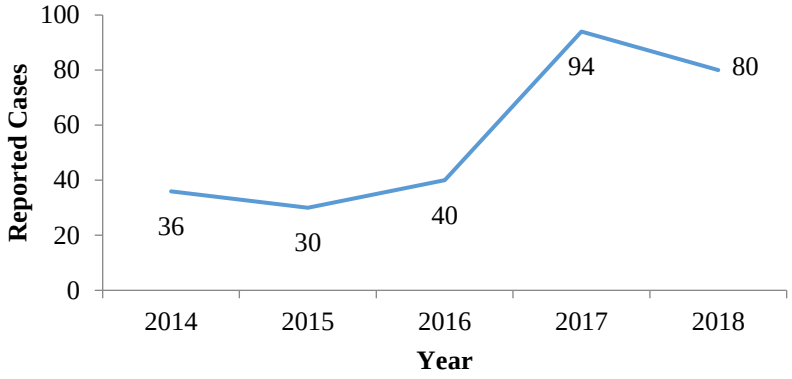
Table 1: Rocky Mountain Spotted Fever Case Rates by Race and Sex – Indiana, 2014-2018[*+]

	Cases	Rate	2014-2018 Total
Race			
White	55	1.0	181
Black	1	0.2	2
Other	2	0.6	7
Unknown	22	-	90
Sex			
Male	51	1.6	182
Female	29	0.9	97
Unknown	0	-	1
Total	80		280

[*]All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.

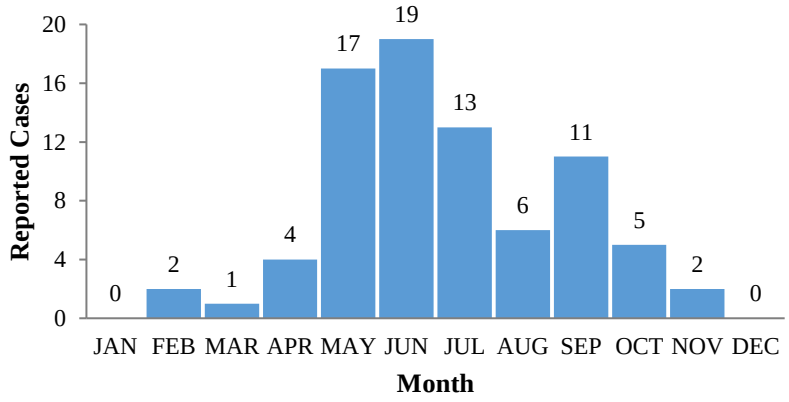
[+] Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

Figure 1: Rocky Mountain Spotted Fever Cases by Year – Indiana, 2014-2018



Although the disease is most common in the spring and summer months when ticks are active, RMSF can occur anytime during the year (Figure 2).

Figure 2: Rocky Mountain Spotted Fever Cases by Month – Indiana, 2018



In 2018, 28 counties reported at least one case of RMSF with Clark County (11), Vanderburgh County (11), Warrick County (7), Dubois County (6), Harrison County (6), and Floyd County (5), and having five cases or more (Figure 3).

LEARN MORE

http://www.cdc.gov/ticks/diseases/rocky_mountain_spotted_fever/

*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.

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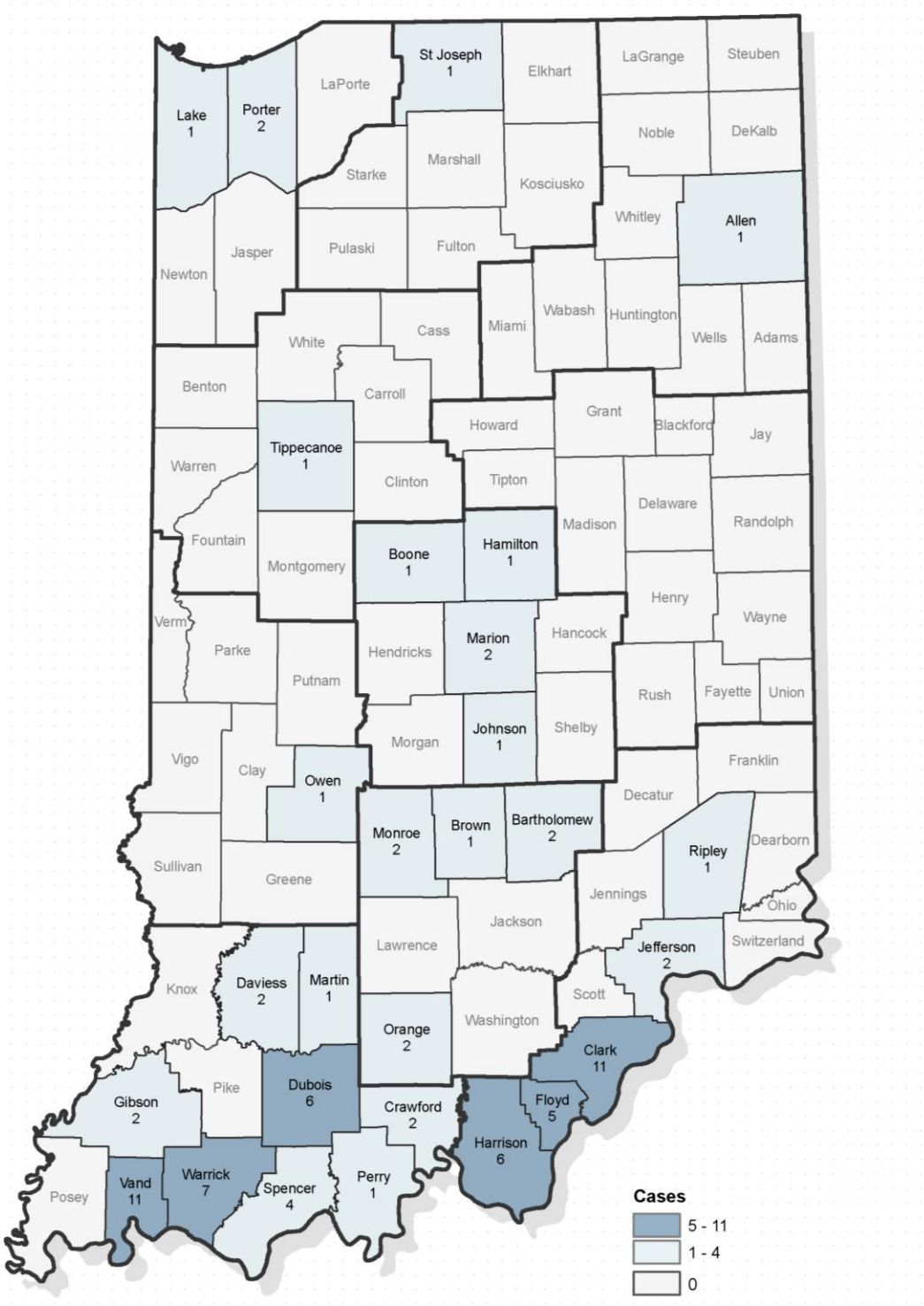
Figure 3: Rocky Mountain Spotted Fever Counts by County – Indiana, 2018*+



*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.

+ Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

2018 CASE TOTAL: 35
2017 CASE TOTAL: 26

2018 INCIDENCE RATE: 0.5 per 100,000
2017 INCIDENCE RATE: 0.4 per 100,000

WEST NILE VIRUS (WNV) is an arthropod-borne virus (arbovirus) most commonly spread by infected mosquitoes. West Nile virus transmission was first detected in North America in 1999 and was first identified in Indiana in 2001. Mosquitoes become infected with WNV when they feed on infected birds. Infected mosquitoes can then spread the virus to humans and other animals. In a very small number of cases, WNV has been spread through blood transfusions; through organ transplants; and from mother to baby during pregnancy, delivery or breastfeeding.

CLINICAL AND PUBLIC HEALTH SIGNIFICANCE

Symptoms of WNV disease include fever, headache, body aches, joint pain and skin rash. Less than 1 percent of people who are infected will develop a serious neurologic illness caused by inflammation of the brain or surrounding tissues. The symptoms of neurologic illness can include headache, high fever, neck stiffness, disorientation, coma, tremors, seizures and paralysis. People over 60 years of age and those with certain medical conditions are at the greatest risk for severe neurologic disease. Most people infected with WNV do not develop any symptoms. Symptoms of WNV usually appear 3-14 days after exposure. There is no specific treatment or vaccine for WNV in humans.

WNV is endemic in Indiana, and virus activity will continue to occur during the mosquito-breeding season in future years. The extent of activity will depend on the weather, presence of mosquito and bird populations for virus amplification, equine vaccination rates and human activities to prevent transmission.

EPIDEMIOLOGY

In 2018, Indiana reported 35 cases of WNV with four deaths. In the five-year reporting period from 2014 to 2018, 110 human cases of WNV, including 12 deaths, were reported (Table 1). Cases of WNV disease occur throughout the state.

Table 1: WNV Human Cases and Deaths – Indiana, 2014-2018

	Cases	Neuroinvasive Disease	Non-Neuroinvasive Disease	Deaths
2018	35	26	9	4
2017	26	18	8	4
2016	18	15	3	1
2015	21	16	5	3
2014	10	9	1	0
Five-year total	110	83	27	12

In 2018, mosquito samples were collected from 92 Indiana counties by state and local health departments; a total of 171,626 mosquitoes divided into 2,734 pools were tested for WNV. In 2018, 688 pools collected from 87 different counties tested positive for WNV (Table 2).

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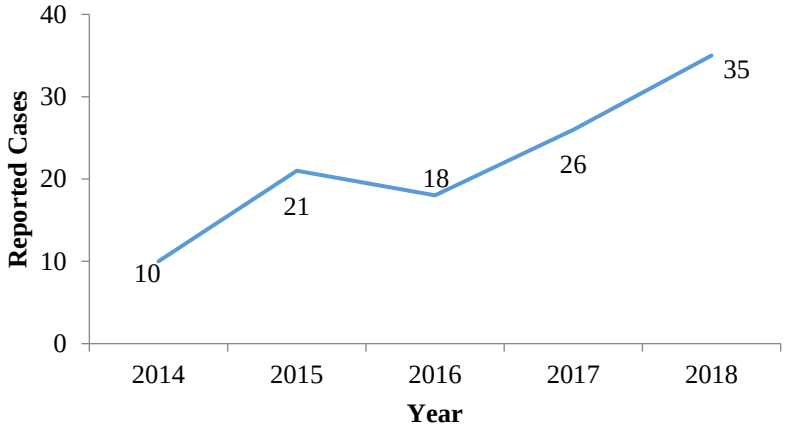
Table 2: WNV Positive Mosquitoes – Indiana, 2018

	2018
Number of mosquitoes collected	171,626
Number of pools tested	2,734
WNV positive pools	688
Percent positivity of pools	25%
Number of counties with WNV-positive mosquitoes	87

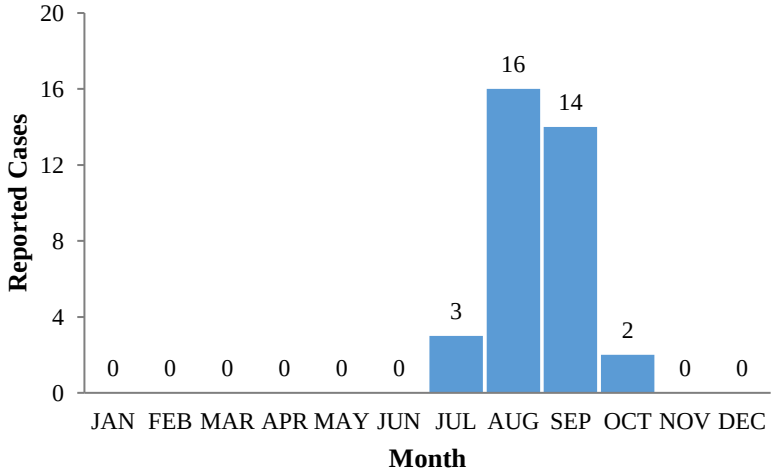
Figure 1 shows reported cases by year from 2014 to 2018.

Figure 1: WNV Cases by Year – Indiana, 2014-2018



Although the disease is most common in the late summer months, WNV disease can occur anytime during the year (Figure 2).

Figure 2: WNV Cases by Month – Indiana, 2018

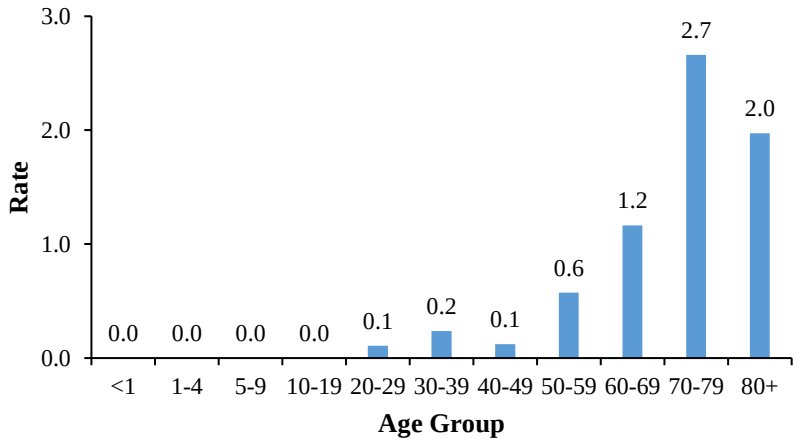


*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.

+ Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

Figure 3 shows the incidence of WNV by age group. People older than age 50 are known to be at higher risk of WNV-associated neuroinvasive disease.

Figure 3: WNV Incidence Rates by Age Group – Indiana, 2018*+



In 2018, 16 counties reported at least one case of WNV with Allen county (5) and Hamilton county (5) having five or more cases.

LEARN MORE

http://www.cdc.gov/ncidod/dvbid/westnile/index.htm

*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.

+ Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

VIRAL HEPATITIS

INCLUDES: Hepatitis A^, Hepatitis B, Hepatitis C, Hepatitis D, Hepatitis E^
^See Enteric Diseases

VIRAL HEPATITIS PREVENTION

Hepatitis B

- Safe and effective vaccines have been available for hepatitis B virus (HBV) since 1981. After three intramuscular doses of hepatitis B vaccine, more than 90 percent of healthy adults and more than 95 percent of infants, children and adolescents will develop adequate immunity. The dosage of vaccine varies with age of the recipient and type of vaccine.
- Since 1991, a comprehensive strategy for the elimination of HBV transmission in the U.S. has included universal vaccination of infants beginning at birth, routine screening of all pregnant women for hepatitis B infection and immunoprophylaxis to infants born to infected women or women of unknown status, routine vaccination of previously unvaccinated children and adolescents and the vaccination of high-risk adults. Hepatitis B vaccination programs addressing each of these priorities will ultimately eliminate domestic hepatitis B transmission.
- In 2017, a new two-dose hepatitis B vaccine was approved by the Food and Drug Administration (FDA). The Advisory Committee on Immunization Practices (ACIP) approved the vaccine as an option for previously unvaccinated or incompletely vaccinated adults 18 years of age or older who have specific risk, or those seeking protection against hepatitis B virus. The vaccine consist of 2 doses administered 1 month apart.
- Control measures used to prevent exposures to blood and body fluids, another mechanism for the transmission of hepatitis B, include the use of universal precautions and disinfection of contaminated equipment. Contacts that have been exposed to blood and body fluids of individuals infected with the hepatitis B virus should be immunized and, when appropriate, given hepatitis B immune globulin (HBIG).

Hepatitis C

- Hepatitis C treatment regimens are much simpler, shorter, and more effective. Prior to the introduction of direct-acting antivirals (DAAs), HCV infection was treated with a combination of pegylated interferon and ribavirin for a duration up to 48 weeks. Studies have shown that DAAs have improved hepatitis C treatment dramatically with cure rates greater than 90%. Treatment can cure each of the most common HCV genotypes, 1-6.
- In 2017, ISDH continued to partner with behavioral health organizations that conduct surveillance and provide testing, consultation and recovery services in a variety of locations (e.g., correctional facilities, drug treatment centers, homeless shelters, etc.). These efforts extend throughout various regions of the state. In 2015, ISDH began planning a rapid hepatitis C (HCV) testing pilot project in response to the HIV/HCV outbreak among injection drug users in Scott County, Indiana. Testing began in 2016, with eight local health departments in southeastern Indiana participating. In efforts to improve testing among two major subpopulations affected by HCV, baby boomers and injection drug users, ISDH expanded the rapid HCV testing project across Indiana with 24 participating organizations, including local health departments, health centers and special population support programs. To improve linkage to care among those infected with HCV, each participating organization identified referral sources in its area to refer HCV-positive patients to for follow-up care and treatment.
- Prevention measures for HBV also are applicable to the control of HCV; however, prophylaxis with immune globulin (IG) is not effective. There is also no vaccine for HCV.

Hepatitis D

- Although there is a vaccine for HBV, there is no vaccine for hepatitis D virus (HDV). Because HDV is dependent on HBV infection, preventing HBV infections will prevent HDV infections. This serious coinfection or superinfection is uncommon in the U.S. but endemic in Asia and South America and results in fulminant liver failure in 1 percent of patients. Of those with a superinfection of hepatitis D, 90 percent will develop chronic HDV and have a poor prognosis with no effective treatment.

HEPATITIS B

2018 CASE TOTAL (ACUTE): 169
2017 CASE TOTAL (ACUTE): 170

2018 INCIDENCE RATE: 2.5 per 100,000
2017 INCIDENCE RATE: 2.5 per 100,000

HEPATITIS B is a disease caused by infection with the Hepatitis B virus (HBV). This serious viral disease of the liver is transmitted through parenteral or mucosal exposure to blood or body fluids of an infected person. Mechanisms for transmission include sexual or household contact with an infected person, injection drug use (IDU), perinatal transmission from mother to infant and nosocomial exposure. Hepatitis B can be either acute or chronic. Acute HBV infection is a short-term illness that occurs within the first six months after someone is exposed to HBV.

Cases are defined as either acute or chronic and are classified using definitions published by the Centers for Disease Control and Prevention (CDC). To ensure that resources are directed towards Indiana residents at greatest risk, surveillance activities focus on acute cases. However, some data is collected regarding chronic cases. Investigations of hepatitis B cases reduce the spread of disease by increasing the number of persons aware of their HBV infection and educating infected individuals.

CLINICAL AND PUBLIC HEALTH SIGNIFICANCE

An acute hepatitis B illness can range in severity from a very mild illness with few or no symptoms, to a serious condition requiring hospitalization, characterized by multiple symptoms such as nausea, anorexia, fever, malaise, headache, myalgia, right upper quadrant abdominal pain, dark urine, skin rash and jaundice.

Populations at high risk for HBV infection include immigrants from areas with endemic rates, infants born to infected mothers, sex partners of infected persons, persons who inject drugs, tattoo recipients, men who have sex with men (MSM) and household contacts of infected persons. Populations at intermediate risk include prisoners, health care workers, heterosexuals with multiple partners, persons with a sexually transmitted disease(s) (including Hepatitis C virus and/or Human Immunodeficiency Virus, HIV) and travelers to regions with intermediate or high rates of hepatitis B (HBsAg+ prevalence of greater than 2 percent).

Individuals with chronic HBV infection may be asymptomatic and unaware of their infection for many years before developing clinical evidence of the illness. Serologic testing identifies infected persons, allowing for treatment and the identification and vaccination of their contacts. These actions contribute significantly to the prevention of secondary infections. The CDC recommends HBsAg testing to identify Hepatitis B infection for all foreign-born persons from countries or regions with an HBV prevalence of 2 percent or greater. To see a world map of Hepatitis B virus prevalence visit, https://wwwnc.cdc.gov/travel/yellowbook/2018/infectious-diseases-related-to-travel/hepatitis-b.

HEALTHY PEOPLE 2020 GOAL

The Healthy People 2020 objective for hepatitis B is to reduce both new and chronic infections: Reduce new infections in adults age 19 years and older to 1.5 cases per 100,000; reduce new infections among persons who inject drugs to 215 cases; and reduce new Hepatitis B infections among MSM to 45 cases.

EPIDEMIOLOGY

In 2018, 169 confirmed cases of acute hepatitis B virus were reported in Indiana (Table 1). The rate for acute cases of hepatitis B has remained steady from 2016 to 2018. It should be noted that the data presented in this report does not include the burden of disease caused by chronic infection with HBV, which certainly remains a substantial public health problem, both nationally and in Indiana, especially with foreign-born individuals.

*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.
+ Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

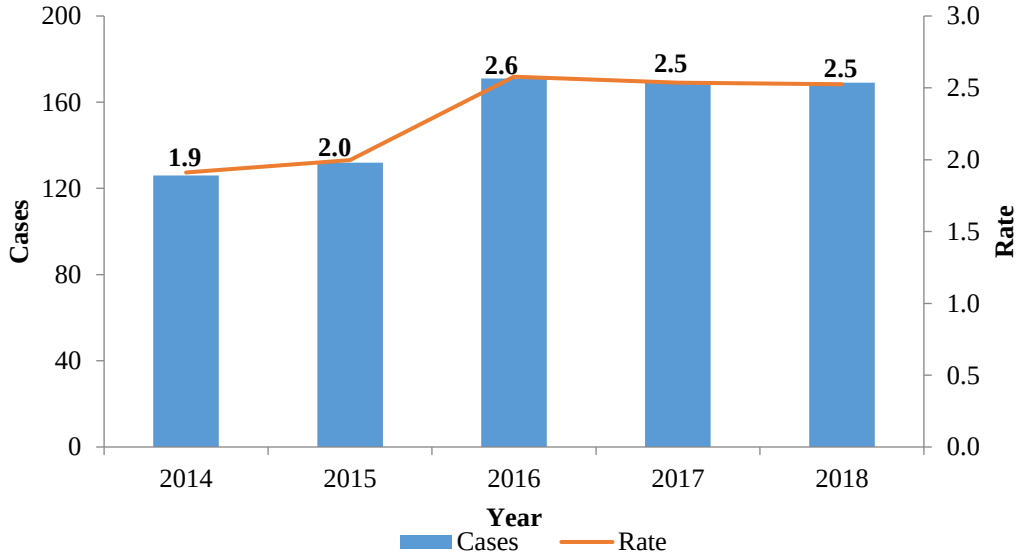
Table 1: Acute Hepatitis B Cases and Rates by Race and Sex – Indiana, 2018*+

	Cases	Rate	2014-2018 Total
Race			
White	143	2.5	571
Black	11	1.7	46
Other	10	3.0	42
Unknown	5	-	109
Sex			
Male	111	3.4	462
Female	58	1.7	306
Unknown	0	-	0
Total	169		768

Table 1 Reported cases and rates per 100,000 population of acute Hepatitis B in 2018 by race and sex and the count of total cases from 2014-2018 by race and sex

Reported cases of acute hepatitis B for the five-year period 2014-2018 is shown in Table 1. The number of reported cases remained stable from 2016 (171) to 2018 (169), but have increased since 2014. This increase can be attributed to the rise in awareness of and need for testing and an increase in IDU in Indiana and nationwide[1]. In 2018, incidence rates were highest among those where non-white and non-black (3.0 per 100,000) and among males (3.4 per 100,000).

Figure 1: Acute Hepatitis B Cases and Incidence Rates by Year – Indiana, 2014-2018



[1] National Institute on Drug Abuse. Drug use and Viral Infections (HIV, Hepatitis), March, 2017. Retrieved from https://www.drugabuse.gov/publications/drugfacts/drug-use-viral-infections-hiv-hepatitis

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+ Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

Figure 1 Reported cases of acute hepatitis B over the five year period 2014-2018

Risk factor percentages in Indiana can be found in Table 2.

Table 2: Acute Hepatitis B Risk Factors – Indiana, 2018

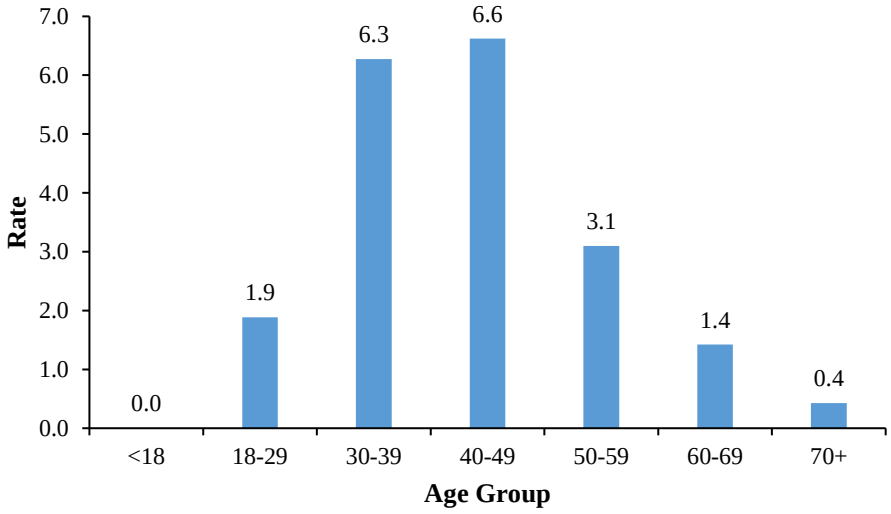
Risk Factors	Number of Cases (Percent)
Injection drug use	65 (38.5%)
Multiple sex partners	10 (6.0%)
Application of a tattoo	14 (8.3%)
Contact of a case	17 (10.1%)
History of dental work	6 (3.5%)
History of surgery	4 (2.4%)
MSM	4 (2.4%)
Medical employment	0 (0.0%)

Note: Cases may report more than one risk factor resulting in a total percentage greater than 100.

The most frequently reported risk factor among acute hepatitis B cases, where risk factor data was collected, was Injection Drug Use (38.5%) followed by having Social Contact with HBV infected person (10.1%). It is important to note that a single case can report having more than one risk factor. Additionally, risk factor information may or may not be reported for a particular case.

Figure 2 shows age –specific incidence rates per 100,000 for acute hepatitis B during 2018. In Indiana, as well as nationally, higher rates of HBV continue among adults, particularly males 30-39 and 40-49 years of age and persons with identified risk factors (e.g., IDU, contacts with those diagnosed with HBV, MSM and persons with multiple sex partners) (Table 2).

Figure 2: Acute Hepatitis B Incidence Rates by Age Group – Indiana, 2014-2018*+



In 2017, 51 Indiana counties reported at least one case of acute hepatitis B. Only 8 counties reported 5 or more cases.

LEARN MORE

ISDH Hepatitis B: http://www.in.gov/isdh/25477.htm
CDC Viral Hepatitis Home Page: https://www.cdc.gov/hepatitis/index.htm
Hepatitis B Foundation: http://www.hepb.org

*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.
+ Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

HEPATITIS C

2018 CASE TOTAL (ACUTE): 359
(CHRONIC): 7,782
2017 CASE TOTAL (ACUTE): 236
(CHRONIC): 8,289

2018 INCIDENCE RATE: 5.4 per 100,000
INCIDENCE RATE: 116.3 per 100,000
2017 INCIDENCE RATE: 3.5 per 100,000
INCIDENCE RATE: 124.3 per 100,000

HEPATITIS C is the leading chronic blood-borne disease in the U.S. and is caused by the hepatitis C virus (HCV). HCV virus is disease of the liver that is spread through exposure to blood or body fluids of infected persons. Mechanisms of transmission include sexual or household contact with an infected person, injection drug use (IDU), and organ transplants, blood transfusions, blood clotting factor concentrates or other medical procedures in the years prior to universal antibody screenings of blood donors.

The number of reported cases is determined by the number of positive HCV tests reported for the first time during a given year. Cases are defined as either acute or chronic and are classified using case definitions published by the Centers for Disease Control and Prevention (CDC). Disease surveillance was conducted on acute and chronic cases. Investigation of hepatitis C cases reduces the spread of disease by increasing the percentage of persons aware of their HCV infection and educating infected individuals.

CLINICAL AND PUBLIC HEALTH SIGNIFICANCE

Hepatitis C illness can range in severity from asymptomatic to very mild illness to a serious condition requiring hospitalization. Acute infection can include symptoms such as abdominal pain, fatigue, fever, joint pain, loss of appetite, dark urine, jaundice, light stool, nausea and/or vomiting. Approximately 15 percent to 20 percent of these acute cases will spontaneously clear the virus and individuals will no longer be considered infected. The remaining infected individuals may be asymptomatic for years.

The burden of HCV in the U.S. is approximately 3.5 million cases, 75 percent of those infected are "Baby Boomers" born from 1945-1965. A significant number of new cases of HCV are reported among younger populations largely due to an increase in injection drug use (IDU). Populations at-risk include baby boomers, injection drug users, prisoners, health care workers, infants with infected mothers, recipients of tattoos and body piercings, men who have sex with men (MSM), those with multiple sexual partners, and persons with sexually transmitted disease(s) (including HBV and/or human immunodeficiency virus). Although no vaccination is currently available for HCV, treatments are available that can eliminate infection.

HEALTHY PEOPLE 2020 GOAL

The Healthy People 2020 objectives for hepatitis C is to reduce the number of new infections to a rate of 0.25 cases per 100,000 population and increase the proportion of persons aware they have hepatitis C infection.

EPIDEMIOLOGY

Acute

In 2018, 359 probable and confirmed cases of acute hepatitis C infection were reported, representing a 52.1 percent increase from 2017 (Table 1). The incidence rate for acute hepatitis C probable and confirmed infections among males was 3.48 cases per 100,000 males, and the incidence rate among females was 3.6 per 100,000 females (Table 1).

Chronic

For chronic hepatitis C infection, 7,782 probable and confirmed cases were reported during 2018 for an incidence rate of 116.3 cases per 100,000 population (Table 1); however, incidence may be higher because reporting of chronic cases is not required.

*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.

+ Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

Table 1: Acute and Chronic Hepatitis C Cases Rate by Race and Sex – Indiana, 2018*+▲

	Acute		Chronic		2014-2018
	Cases	**Rate**	**Cases**	**Rate**	**Total Cases**
Race					
White	319	5.6	4,796	84.2	23,711
Black	13	2.0	544	82.6	2,484
Other	19	5.6	459	135.5	1,690
Unknown	8	-	1,983	-	9,900
Sex					
Male	198	6.0	4,571	138.5	22,504
Female	161	4.8	3,208	94.6	15,263
Unknown	-	-	3	-	18
Total	359	5.4	7,782	116.3	37,785

Table 1 Reported cases and rates per 100,000 population of acute (probable and confirmed) and chronic (probable and confirmed) hepatitis C in 2018 and the count of Total Cases from 2014-2018, by race and sex.

The incidence rate for chronic hepatitis C probable and confirmed infections among males was 138.5 per 100,000 population and the incidence rate among females was 94.6 (Table 1). In 2018, incidence rates for both acute (5.4 per 100,000) and chronic (116.3) cases were highest among those who were non- white and non- black (Table 1).

Figure 1: Hepatitis C Cases and Incidence Rates by Year – Indiana, 2014-2018▲□

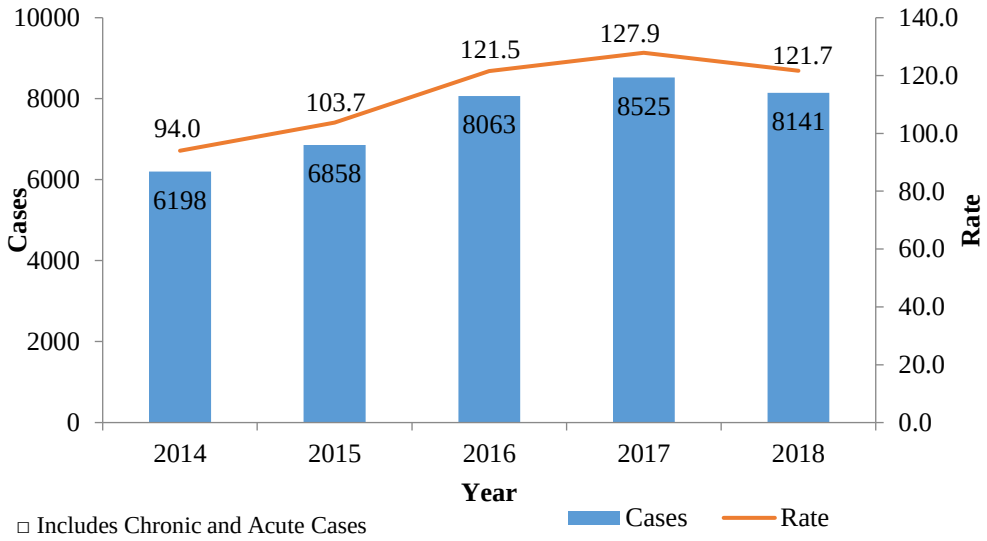


Figure 1 Reported cases of acute (probable and confirmed) and chronic (probable and confirmed) hepatitis C over the five year period from 2013-2018.

*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.

+ Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

Hepatitis C acute and chronic cases have trended upward over the last five years. However, the number of reported cases and rates per 100,000 population decreased in 2018 (Figure 2). The rate of hepatitis C per 100,000 population was 95.7 in 2014 compared to 121.7 in 2018.

Table 2: Acute Hepatitis C Risk Factors – Indiana, 2018

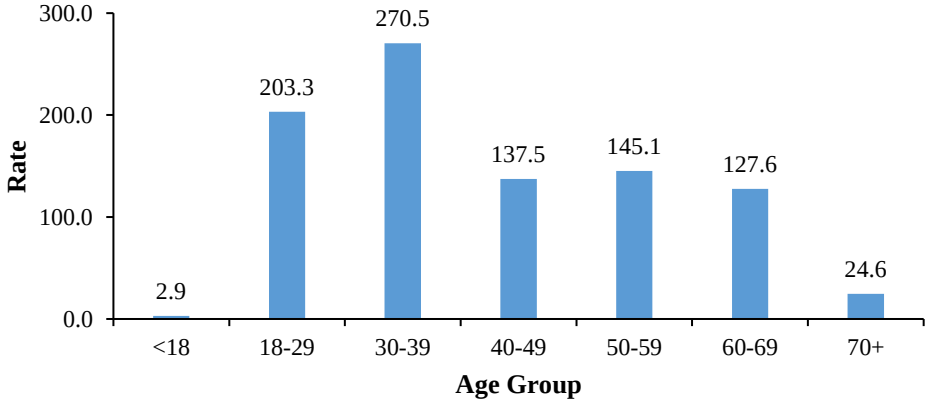
Risk Factor	Number of Cases (%)
Inject drugs not prescribed by doctor	217 (60.4%)
Use street drugs but do not inject	207 (57.7%)
Incarcerated > 24 hours	152 (42.3%)
Social contact with HCV infected person	78 (21.7%)

Note: Cases may report more than one risk factor resulting in a total percentage greater than 100.

Table 2 Most common risk factors identified for acute hepatitis C cases in Indiana in 2018.

Reporting of risk factor information varies from case to case depending on the completeness of the disease investigation. The most commonly reported risk factor for acute hepatitis C was injecting drugs not prescribed by a doctor, followed closely by the use of non-injection use of street drugs (Table 2). This is consistent with the increased number of cases of hepatitis C seen in Indiana and nationally among injection drug users over the last several years.

Figure 2: Hepatitis C Incidence Rates by Age Group – Indiana, 2018▲+□



+Ten cases of hepatitis C with an unknown age □ Includes Chronic and Acute Cases

Figure 2 Age-specific incidence rates for total acute (probable and confirmed) and chronic (probable and confirmed) reported cases of hepatitis C infection during 2018.

The incidence rate of acute and chronic hepatitis C cases is highest among adults under 40 years old. Rates are highest for adults aged 30-39 years (270.5 per 100,000) and 18-29 years (203.3) compared to older adults aged 40-49 years (137.5), 50-59 years (145.1), and 60-69 years (127.6). High incidence rates of hepatitis C among younger adults is attributed to the increase in cases among injection drug users, who are commonly persons aged 20-39 years old.

*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.

+ Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

HEPATITIS C

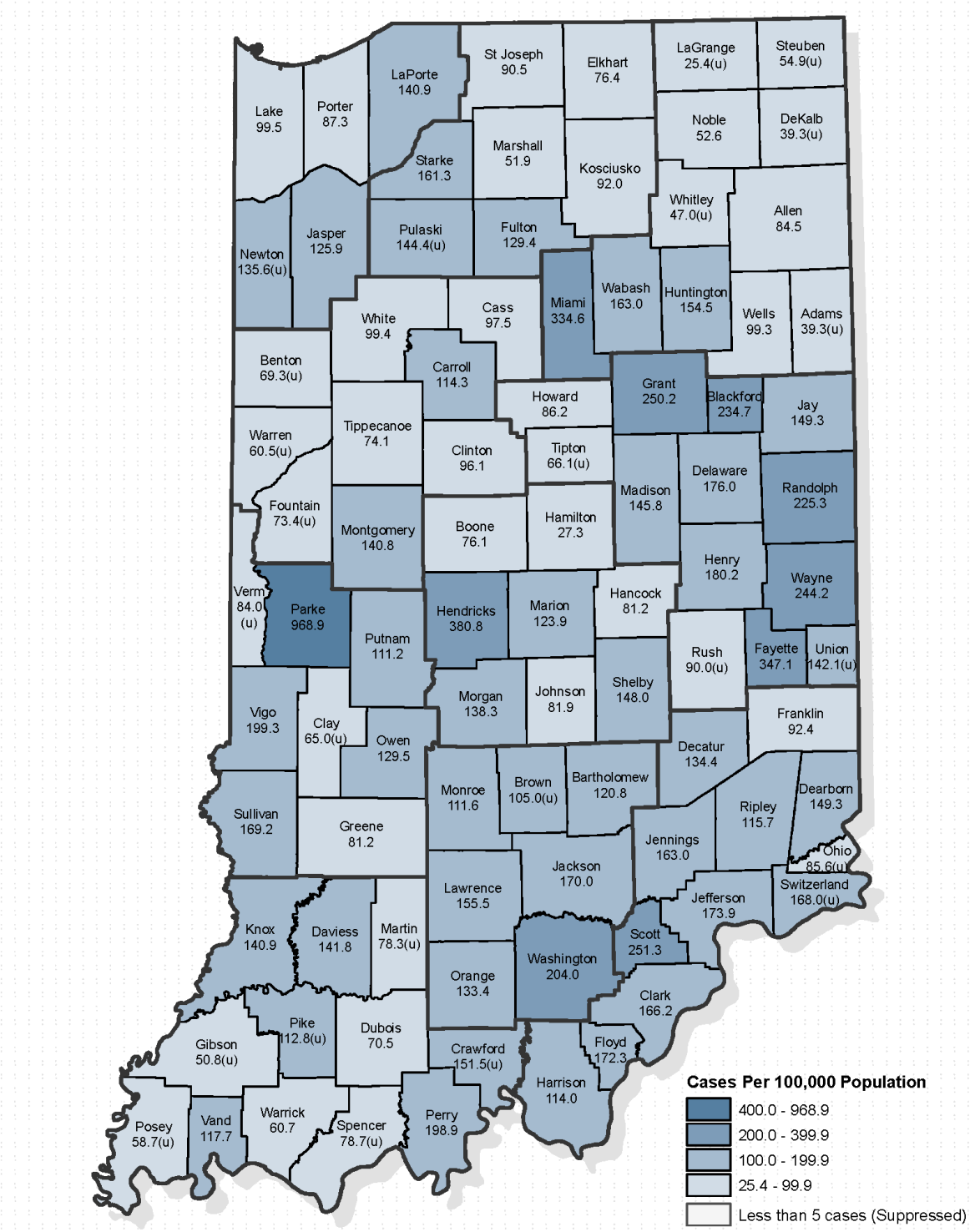
In 2018, there was at least five cases of hepatitis C infection reported in all of Indiana's 92 counties. A state map (Figure 3) depicts the incidence of acute (probable and confirmed) and chronic (probable and confirmed) hepatitis C infections by county per 100,000 population including the Indiana Department of Corrections (IDOC). The larger number of cases seen for Hendricks and Parke counties is due mostly to the locations of Regional Diagnostic Centers for male and female offenders within the IDOC facilities in those counties. Offenders are tested for blood-borne diseases, such as hepatitis C, at these facilities but likely reside in other Indiana counties.

LEARN MORE

ISHD Hepatitis C: http://www.in.gov/isdh/25474.htm
CDC Viral Hepatitis Home Page: https://www.cdc.gov/hepatitis/index.htm
WHO Hepatitis Home Page: http://www.who.int/hepatitis/en/

*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.
+ Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

Figure 3: Hepatitis C Incidence Rates by County – Indiana, 2018*+▲



*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.

+ Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

	2018 Cases	2017	2016	2015	2014	5-Year Total (2014-2018)
Anthrax	0	0	0	0	0	0
Arboviral Encephalitis	0	0	0	0	0	0
Babesiosis	1	1	0	0	0	2
Botulism	1	1	0	0	1	3
Brucellosis	0	0	0	2	0	2
Chikungunya	0	0	2	7	33[1]	42
Cholera	0	1	0	0	0	1
Coccidioidomycosis	7	12	1	2	2	24
Dengue	2	3	8	0	5	18
Dengue, severe	0	0	1	0	0	1
Diphtheria	0	0	0	0	0	0
Hansen's disease (Leprosy)	1	0	0	1	0	2
Hantavirus Pulmonary Syndrome	0	0	1	1	0	2
Hepatitis B, perinatal	0	1	0	0	0	1
Hepatitis D	5	5	7	3	4	24
Hepatitis E	2	1	2	2	1	8
Influenza A, Novel	0	0	0	0	0	0
La Crosse Encephalitis	0	1	0	0	2	3
Leptospirosis	0	0	0	2	1	3
Measles	1	0	1	0	1	3
Plague	0	0	0	0	0	0
Poliomyelitis	0	0	0	0	0	0
Psittacosis	0	0	0	0	0	0
Q Fever	1	4	1	1	2	9
Rubella	0	0	0	0	0	0
Smallpox	0	0	0	0	0	0
Tetanus	1	1	1	0	1	4
Toxic Shock Syndrome (Other than Streptococcal)	2	0	2	2	0	6
Trichinosis	0	0	0	1	1	2
Tularemia	2	2	0	3	2	9
Typhoid Fever	4	8	7	6	5	30
Typhus Fever	0	0	0	0	0	0
Vibriosis	9	7	12	3	6	36
Yellow Fever	0	0	0	0	0	0
Yersiniosis	6	27	13	10	13	69
Zika Virus	0	3	49	1	0	53

[1]This was the first year of reporting. All cases were acquired via foreign travel

[*]All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates for July 1, 2018, based on Census 2019 data estimates.

[+] Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.