Indiana State Department of Health

Epidemiology Resource Center

ANNUAL REPORT OF INFECTIOUS DISEASES
2017

NOTES

All incidence rates throughout the report are calculated based per 100,000 population according to the 2017 U.S. Census Bureau's population estimates gathered on July 10, 2018.

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 2017 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.

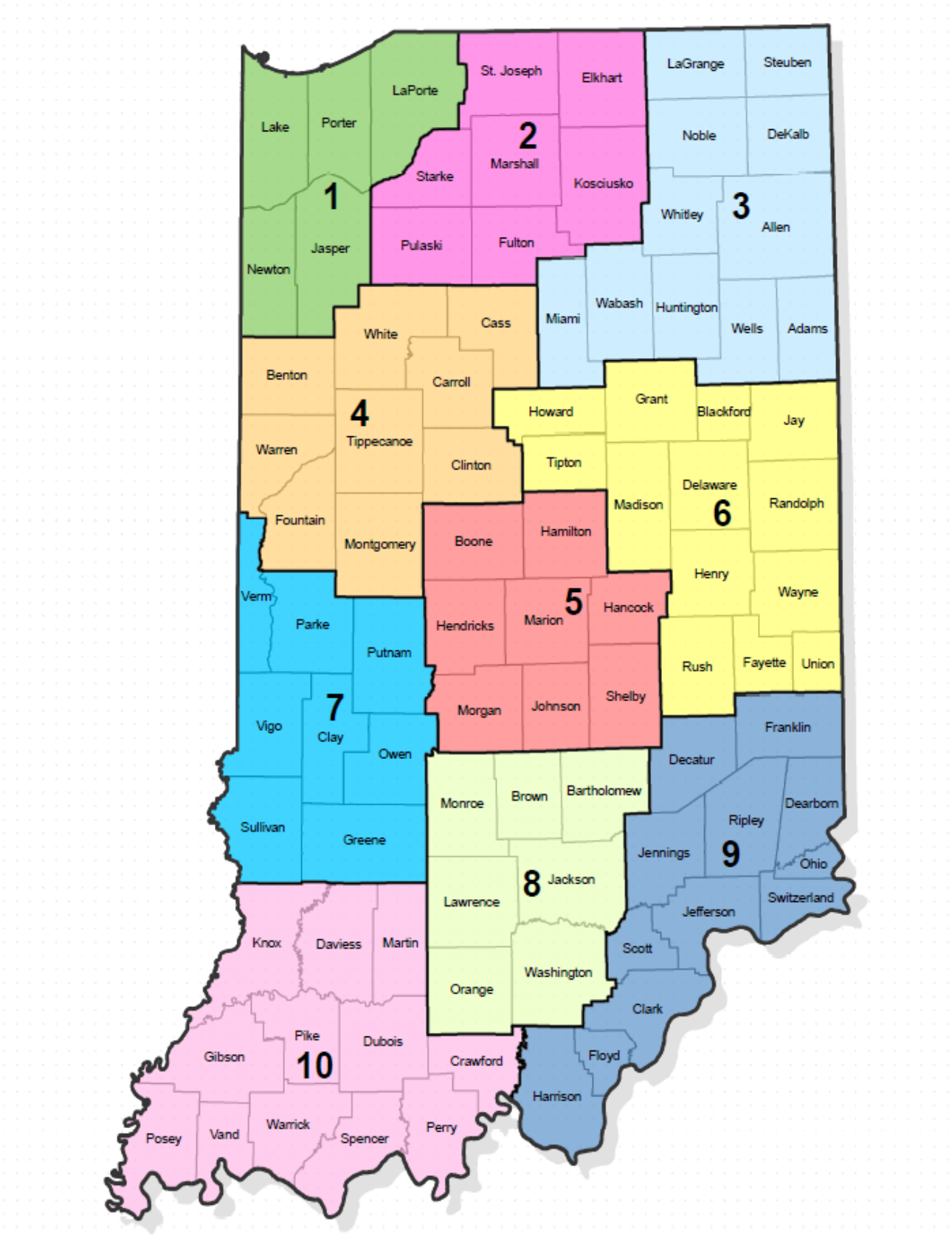
WEBSITES

Centers for Disease Control and Prevention: www.cdc.gov

U.S. Food and Drug Administration: www.fda.gov

World Health Organization: www.who.int

FIELD EPIDEMIOLOGY DISTRICTS



INDIANA POPULATION ESTIMATES, 2017

Year	Population
2013	6,567,484
2014	6,593,182
2015	6,610,596
2016	6,634,007
2017	6,666,818

Gender	2016 Population	2017 Population
Female	3,363,950	3,379,723
Male	3,270,057	3,287,095
Race	**2016 Population**	**2017 Population**
White	5,679,252	5,690,929
Black	641,941	649,813
Other	312,814	326,076
Ethnicity	**2016 Population**	**2017 Population**
Non-Hispanic	6,181,064	6,200,365
Hispanic	452,943	466,453
Total	6,634,007	6,666,818

Age	2016 Population	2017 Population
< 1	82,944	82,498
1-4	337,546	338,678
5-9	434,717	431,782
10-19	901,951	903,720
20-29	918,935	926,233
30-39	834,870	838,813
40-49	819,337	816,232
50-59	902,605	888,541
60-69	749,316	759,489
70-79	404,558	431,014
80 +	247,228	249,818
Total	6,634,007	6,666,818

Note: Population estimates are based on the U.S. Census Bureau's population data as of July 1, 2017, gathered on July 10, 2018.

INDIANA POPULATION ESTIMATES, 2017

Population by County					
	2016	2017		2016	2017
Adams	35,232	35,491	Lawrence	45,575	45,666
Allen	369,972	372,877	Madison	129,325	129,498
Bartholomew	81,873	82,040	Marion	944,034	950,082
Benton	8,655	8,613	Marshall	46,652	46,498
Blackford	12,075	11,976	Martin	10,202	10,215
Boone	64,239	65,875	Miami	36,067	35,845
Brown	15,008	15,035	Monroe	145,692	146,986
Carroll	19,967	20,039	Montgomery	38,323	38,525
Cass	38,013	37,994	Morgan	69,557	69,713
Clark	115,800	116,973	Newton	14,049	14,130
Clay	26,203	26,198	Noble	47,442	47,452
Clinton	32,267	32,317	Ohio	5,888	5,828
Crawford	10,581	10,566	Orange	19,481	19,426
Daviess	32,997	33,113	Owen	20,922	20,839
Dearborn	49,471	49,741	Parke	16,957	16,886
Decatur	26,641	26,737	Perry	19,010	19,081
DeKalb	42,620	42,836	Pike	12,428	12,365
Delaware	115,483	115,184	Porter	167,438	168,404
Dubois	42,456	42,558	Posey	25,632	25,595
Elkhart	204,146	205,032	Pulaski	12,611	12,534
Fayette	23,257	23,209	Putnam	37,265	37,702
Floyd	76,723	77,071	Randolph	25,059	24,922
Fountain	16,477	16,505	Ripley	28,408	28,442
Franklin	22,725	22,619	Rush	16,633	16,645
Fulton	20,137	20,059	Scott	23,707	23,870
Gibson	33,579	33,576	Shelby	44,228	44,395
Grant	66,802	66,491	Spencer	20,493	20,394
Greene	32,223	32,177	St. Joseph	269,613	270,434
Hamilton	316,296	323,747	Starke	22,992	22,893
Hancock	73,781	74,985	Steuben	34,388	34,484
Harrison	39,679	39,898	Sullivan	20,737	20,746
Hendricks	160,336	163,685	Switzerland	10,647	10,696
Henry	48,364	48,476	Tippecanoe	188,674	190,587
Howard	82,339	82,363	Tipton	15,154	15,128
Huntington	36,368	36,337	Union	7,168	7,200
Jackson	43,933	43,884	Vanderburgh	181,775	181,616
Jasper	33,389	33,447	Vermillion	15,611	15,505
Jay	21,040	20,945	Vigo	107,669	107,516
Jefferson	32,249	32,089	Wabash	31,551	31,443
Jennings	27,622	27,626	Warren	8,174	8,201
Johnson	151,543	153,897	Warrick	62,049	62,530
Knox	37,542	37,508	Washington	27,748	27,827
Kosciusko	78,927	79,206	Wayne	66,591	66,185
LaGrange	39,133	39,303	Wells	27,840	27,984
Lake	486,592	485,640	White	24,101	24,182
LaPorte	110,208	110,029	Whitley	33,484	33,756

Note: Population estimates are based on the U.S. Census Bureau's population data as of July 1, 2017, gathered on July 10, 2018.

REPORTABLE COMMUNICABLE DISEASES AND CONDITIONS FOR HEALTHCARE 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 and 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 U.S. 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 United States:
  - 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 healthcare 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
    - Illicit 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

2017 CASE TOTAL: 1,147
2016 CASE TOTAL: 1,044

2017 INCIDENCE RATE: 17.20 per 100,000
2016 INCIDENCE RATE: 15.74 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).

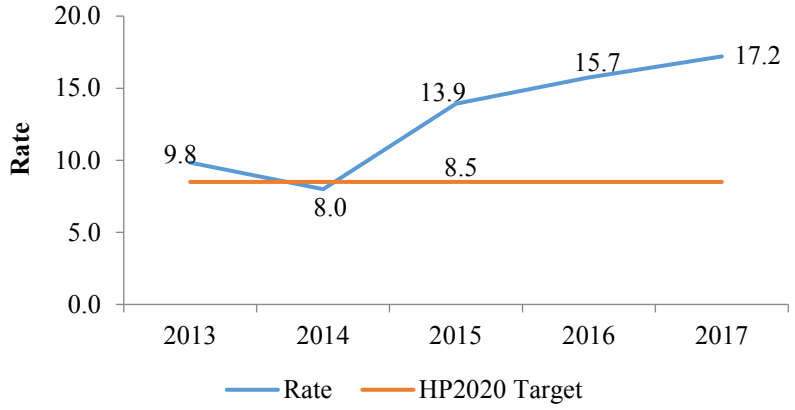
CLINICAL AND PUBLIC HEALTH SIGNIFICANCE

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, 2013-2017, was 2014 (Figure 1). The rate increase from 2014 to 2017 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 shows Campylobacteriosis Rates by Year – Indiana, 2013-2017*+



EPIDEMIOLOGY

In 2017, 1,147 cases of campylobacteriosis were reported in Indiana, for a rate of 17.20 cases per 100,000 population (Table 1). Males (17.43) were more likely to be reported than females (16.89). The rate of those who identified as white (14.02) was greater than the rate among those who identified as black (5.69) and other races (12.57); however, 271 cases did not report race data.

*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates as of July 1, 2017, obtained on July 10, 2018.

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

Table 1: Campylobacteriosis Case Rates by Race and Sex, Indiana, 2017[*+]

	Cases	Rate	2013-2017 Total
Race			
White	798	14.02	3,006
Black	37	5.69	121
Other	41	12.57	136
Unknown	271	-	1021
Sex			
Male	573	17.43	2,200
Female	571	16.89	2,079
Unknown	3	-	5
Total	1,147		4,284

Figure 2 shows reported cases by year for 2013-2017.

Figure 2: Campylobacteriosis Cases by Year – Indiana, 2013-2017

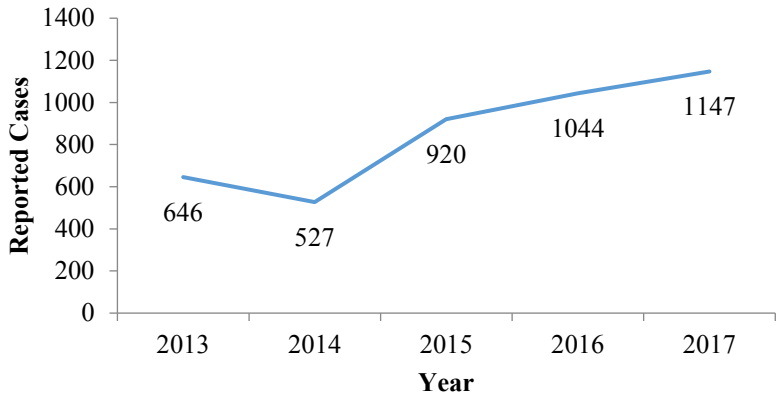
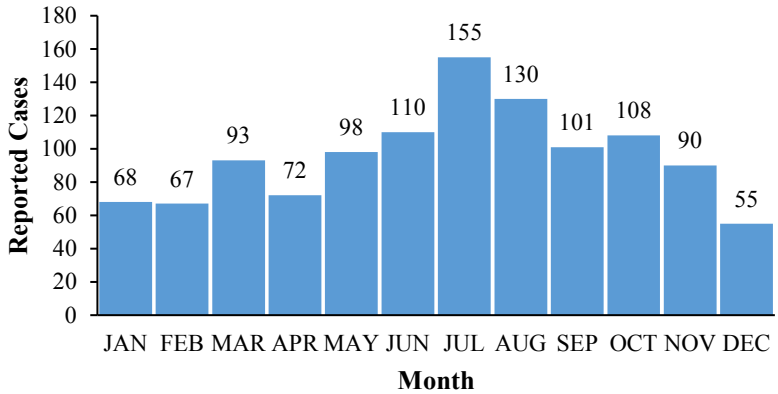


Figure 3 shows cases per month for 2017. Incidence of disease was greatest during the summer months.

Figure 3: Campylobacteriosis Cases by Month – Indiana, 2017



[*]All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates as of July 1, 2017, obtained on July 10, 2018.

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

As shown in Figure 4, age-specific rates in 2017 were greatest for infants younger than 1 year of age (47.3), followed by elderly adults aged 80-plus years (29.6).

Figure 4: Campylobacteriosis Incidence Rates by Age Group – Indiana, 2017*+

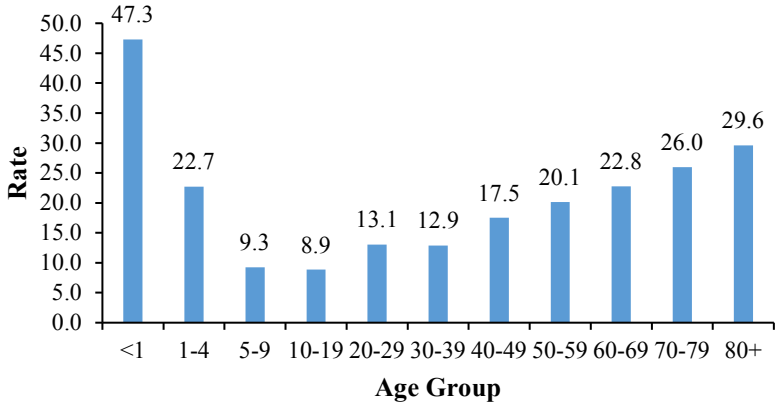


Figure 5 (next page) shows counties reporting five or more cases of campylobacteriosis in 2017. The incidence rate was highest among the following counties reporting five or more cases: Fulton (74.8), Knox (74.7) and Decatur (67.3).

LEARN MORE

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

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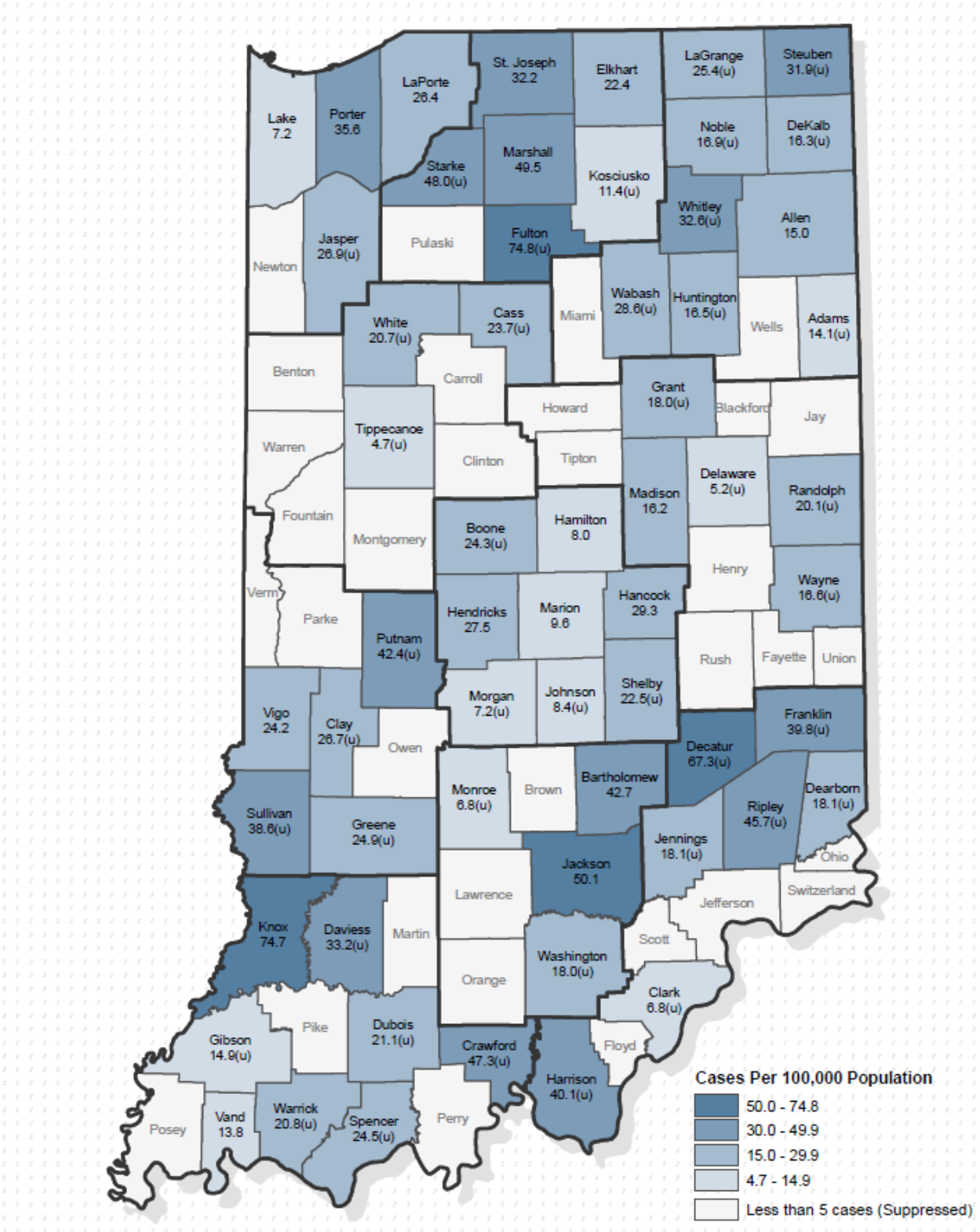
+ Rates based on fewer than 20 occurrences are considered statistically unstable and should not be compared.

Figure 5: Campylobacteriosis Incidence Rates by County – Indiana, 2017*+



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

CRYPTOSPORIDIOSIS

2017 CASE TOTAL: 223
2016 CASE TOTAL: 213

2017 INCIDENCE RATE: 3.34 per 100,000
2016 INCIDENCE RATE: 3.21 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 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 United States, 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 2017, 223 cases of cryptosporidiosis were reported in Indiana, for a rate of 3.34 cases per 100,000 population (Table 1). In 2017, males (3.13) and females (3.55) were at similar risk of *Cryptosporidium*, and those who identified as white (3.04) were at greater risk than those who identified as black (1.69) and other races (1.84).

*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates as of July 1, 2017, obtained on July 10, 2018.

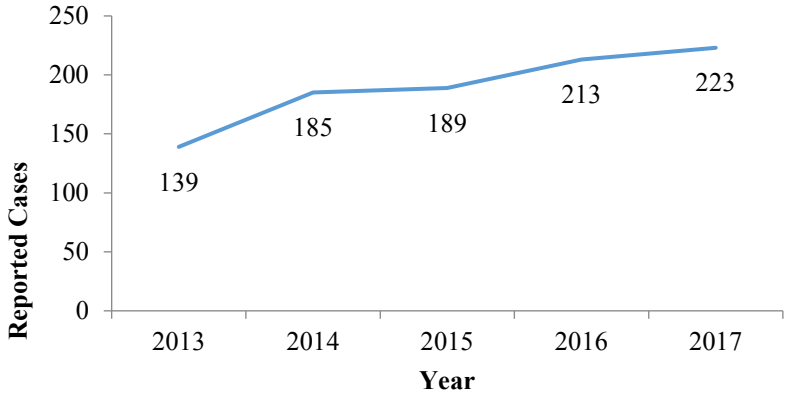
+ Rates based on fewer than 20 occurrences are considered statistically unstable and should not be compared.

Table 1: Cryptosporidiosis Case Rates by Race and Sex – Indiana, 2017[*+]

	Cases	Rate	2013 - 2017 Total
Race			
White	173	3.04	705
Black	11	1.69	54
Other	6	1.84	23
Unknown	33	-	167
Sex			
Male	103	3.13	463
Female	120	3.55	486
Unknown	0	-	0
Total	223		949

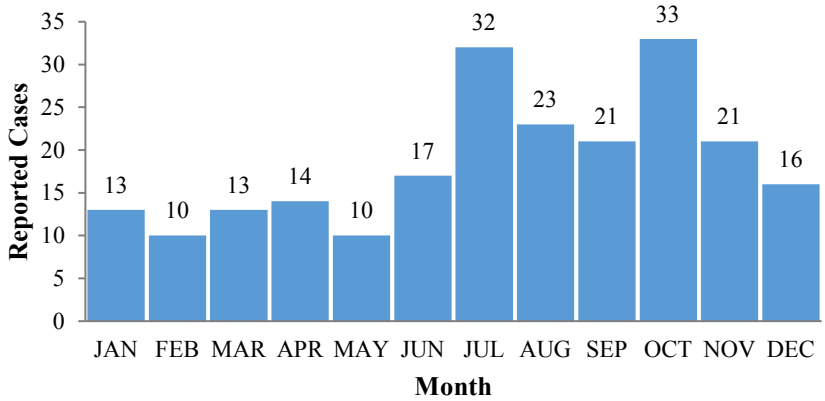
Figure 1 shows the number of reported cases each year for 2013-2017. From 2013 to 2017, an average of 190 cases of cryptosporidiosis were reported in Indiana each year.

Figure 1: Cryptosporidiosis Cases by Year – Indiana, 2013-2017



Disease incidence was greatest in the summer (Figure 2).

Figure 2: Cryptosporidiosis Cases by Month – Indiana, 2017



[*]All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates as of July 1, 2017, obtained on July 10, 2018.

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

As shown in Figure 3, age-specific rates were greatest for children ages 1-4 years (5.0).

Figure 3: Cryptosporidiosis Incidence Rates by Age Group – Indiana, 2017*+

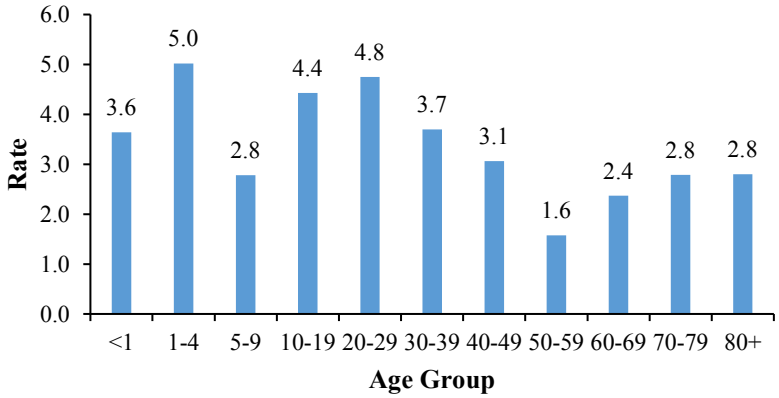


Figure 4 (next page) shows the five counties with the highest disease incidence rates. The incidence rates were highest among the following counties reporting five or more cases: Marshall (21.5), LaGrange (17.8), Whitley (17.8), DeKalb (16.3) and Boone (12.1).

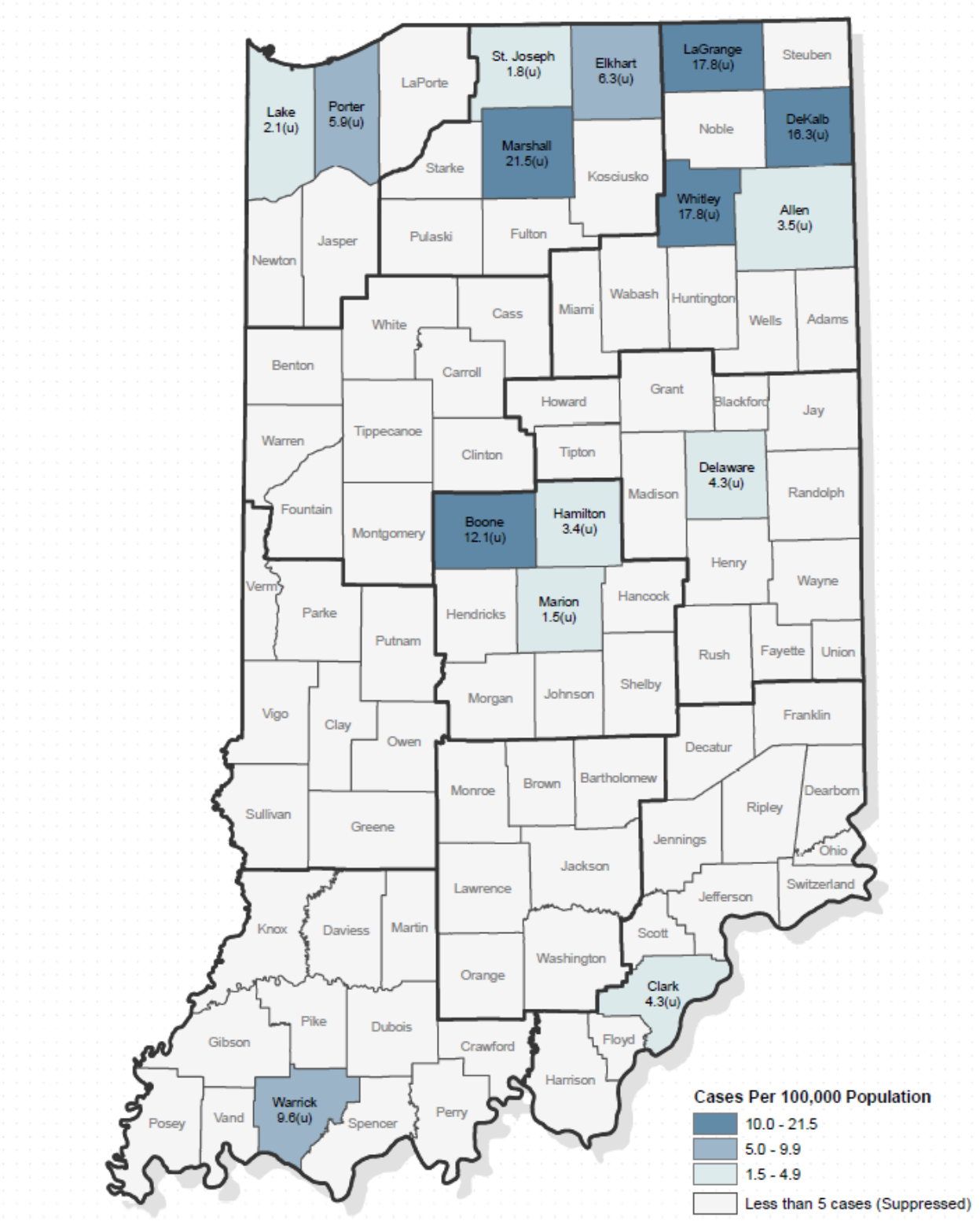
LEARN MORE

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

*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates as of July 1, 2017, obtained on July 10, 2018.

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

Figure 4: Cryptosporidiosis Incidence Rates by County – Indiana, 2017*+



*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates as of July 1, 2017, obtained on July 10, 2018.

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

ESCHERICHIA COLI, SHIGA TOXIN-PRODUCING

2017 CASE TOTAL: 118
2016 CASE TOTAL: 102

2017 INCIDENCE RATE: 1.77 per 100,000
2016 INCIDENCE RATE: 1.52 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 healthcare 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 serious and can lead to kidney failure and death. Children younger than 5 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.

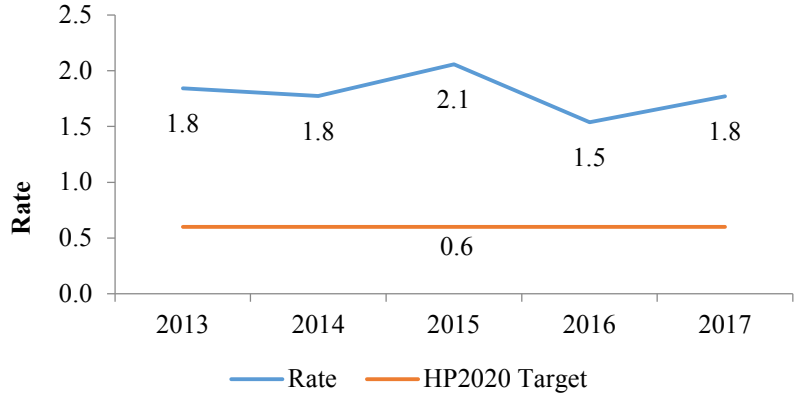
HEALTHY PEOPLE 2020 GOAL

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 2013 to 2017 (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, 2017, obtained on July 10, 2018.

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

Figure 1: Shiga Toxin-producing *E. coli* Rates by Year – Indiana, 2013-2017*+



EPIDEMIOLOGY

In 2017, 118 cases of Shiga toxin-producing *E. coli* infection were reported in Indiana, for a rate of 1.77cases per 100,000 population (Table 1). Females (2.10) were more likely to be reported than males (1.40). The rate of other races (1.84) was greater than the rate of those who identified as white (1.11) or those who identified as black (0.77); however, 44 cases did not report race data.

Table 1: Shiga Toxin-producing *E. coli* Case Rates by Race and Sex – Indiana, 2017*+

	Cases	Rate	2013-2017 Total
Race			
White	63	1.11	369
Black	5	0.77	24
Other	6	1.84	27
Unknown	44	-	174
Sex			
Male	46	1.40	261
Female	71	2.10	331
Unknown	1	-	1
Total	118		593

Figure 2 shows the number of reported cases per year for 2013-2017.

*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates as of July 1, 2017, obtained on July 10, 2018.

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

Figure 2: Shiga Toxin-producing *E. coli* Cases by Year –Indiana, 2013-2017

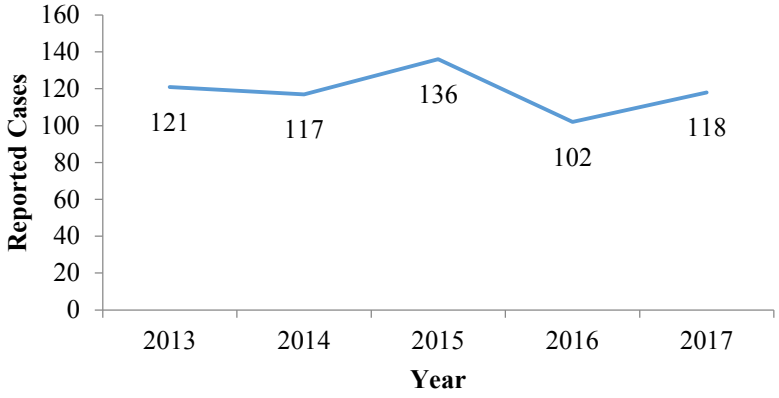
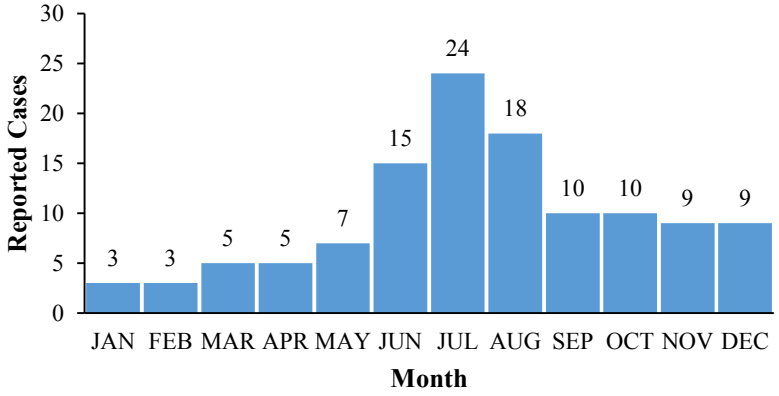


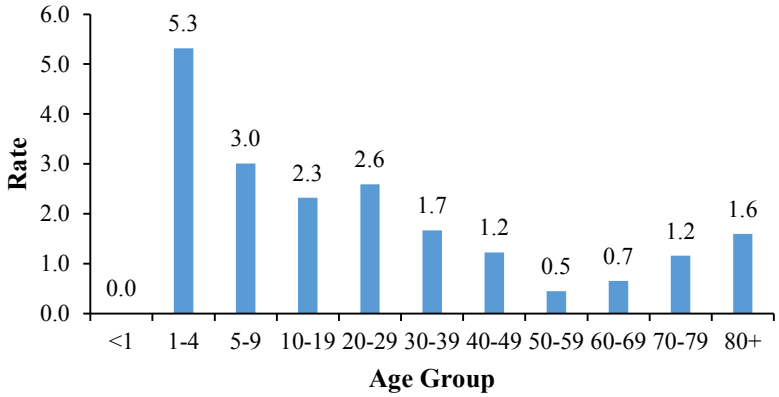
Figure 3 shows the number of cases per month in Indiana for 2017. Incidence of disease was greatest during the summer months, with July having the highest number of reported cases (24).

Figure 3: Shiga Toxin-producing *E. coli* Cases by Month – Indiana, 2017



As shown in Figure 4, age-specific rates in 2017 were highest among preschoolers aged 1-4 years (5.3), followed by children ages 5-9 years (3.0) and adults aged 20-26 years (2.6).

Figure 4: Shiga Toxin-producing *E. coli* Incidence Rates by Age Group – Indiana, 2017[*+]



[*]All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates as of July 1, 2017, obtained on July 10, 2018.

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

Four cases of HUS were reported in 2017.

Table 2 shows the four counties with the highest disease incidence rates of Shiga toxin-producing *E. coli* in 2017. The incidence rates were highest among the following counties: Elkhart (3.9), Hendricks (3.7) and Hamilton (2.5).

Table 2: Shiga Toxin-Producing *E. coli* Rates by County – Indiana, 2017[*+]

County	Cases	Rate
Elkhart	8	3.9
Hendricks	6	3.7
Hamilton	8	2.5
Marion	17	1.8

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, 2017, obtained on July 10, 2018.

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

GIARDIASIS

2017 CASE TOTAL: 192
2016 CASE TOTAL: 197

2017 INCIDENCE RATE: 2.88 per 100,000
2016 INCIDENCE RATE: 2.97 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 United States 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 2017, 192 cases of giardiasis were reported in Indiana, for a rate of 2.88 cases per 100,000 population (Table 1). Males (3.47) were at greater risk of giardiasis than females (2.31). The rate for those who identified as other races (5.83) was higher than that for those who identified as white (2.11) and those who identified as black (2.15); however, 39 cases (20.3 percent) did not report race data.

*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates as of July 1, 2017, obtained on July 10, 2018.

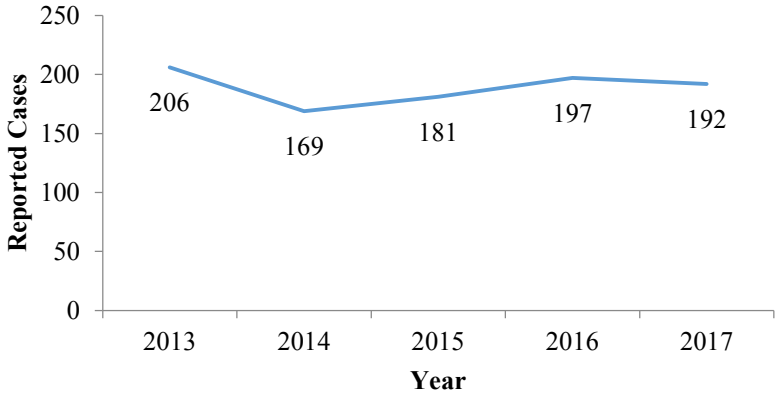
+ Rates based on fewer than 20 occurrences are considered statistically unstable and should not be compared.

Table 1: Giardiasis Case Rates by Race and Sex, Indiana, 2017*+

	Cases	Rate	2013-2017 Total
Race			
White	120	2.11	562
Black	14	2.15	83
Other	19	5.83	89
Unknown	39	-	211
Sex			
Male	114	3.47	552
Female	78	2.31	393
Unknown	0	-	0
Total	192		945

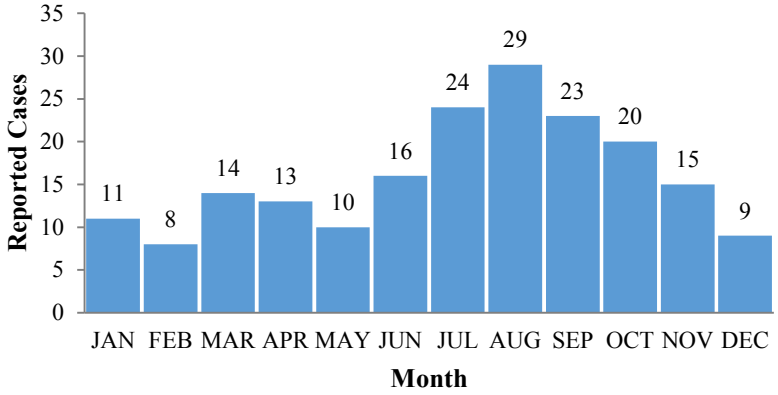
Figure 1 shows the number of reported cases each year for 2013-2017. From 2013 to 2017, an average of 189 cases of giardiasis were reported in Indiana each year.

Figure 1: Giardiasis Cases by Year – Indiana, 2013-2017



Disease incidence was greatest during the summer months (Figure 2).

Figure 2: Giardiasis Cases by Month – Indiana, 2017*+



*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates as of July 1, 2017, obtained on July 10, 2018.

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

As shown in Figure 3, age-specific rates were greatest for children ages 1-4 (4.1), adults ages 60-69 (4.0) and adults ages 20-29 (3.9).

Figure 3: Giardiasis Incidence Rates by Age Group – Indiana, 2017*+

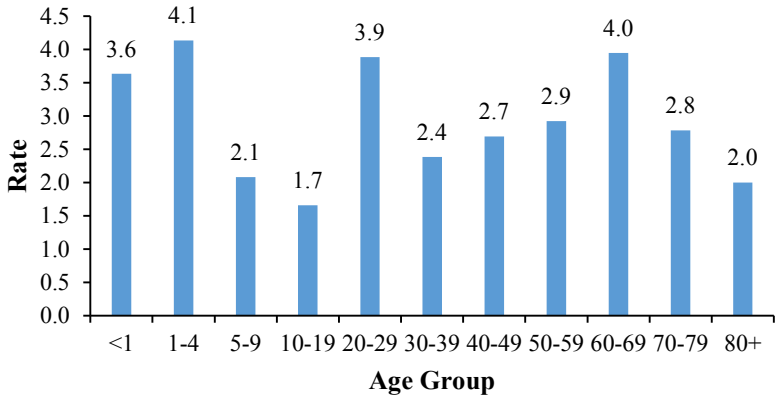


Table 2 shows the five counties with the highest disease incidence rates. The incidence rates were highest among the following counties reporting five or more cases: Putnam (18.6), Jackson (13.7), DeKalb (11.7), Boone (10.6) and St. Joseph (7.0).

Table 2: Giardiasis Incidence Rates by County – Indiana, 2017*+

County	Cases	Rate
Putnam	7	18.6
Jackson	6	13.7
DeKalb	5	11.7
Boone	7	10.6
St. Joseph	19	7.0

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 as of July 1, 2017, obtained on July 10, 2018.

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

HEPATITIS A

2017 CASE TOTAL: 21
2016 CASE TOTAL: 18

2017 INCIDENCE RATE: 0.31 per 100,000
2016 INCIDENCE RATE: 0.27 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 uses illicit 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 fewer 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 older than 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 healthcare center who have direct contact with someone infected.

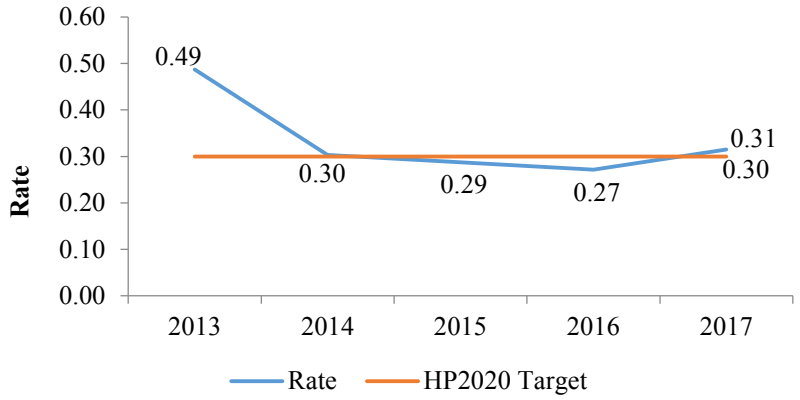
HEALTHY PEOPLE 2020 GOAL

The Healthy People 2020 goal for hepatitis A is 0.3 cases per 100,000 population per year. This goal was met in Indiana in 2014, 2015 and 2016 for the five-year reporting period 2013-2017 (Figure 1).

*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates as of July 1, 2017, obtained on July 10, 2018.

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

Figure 1: Hepatitis A Rates by Year – Indiana, 2017*+



EPIDEMIOLOGY

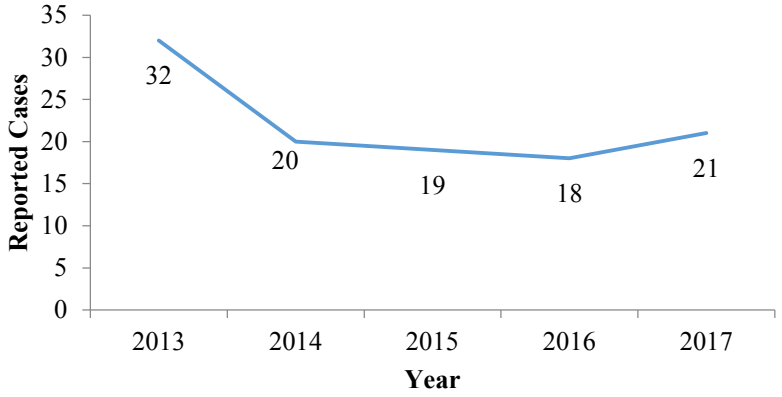
In 2017, 21 cases of hepatitis A were reported in Indiana for a rate of 0.31 cases per 100,000 population (Table 1). Females (0.47) were more likely to be reported than males (0.15). The rate for other races (1.23) was greater than those who identified as white (0.28) or black (0.15).

Table 1: Hepatitis A Case Rates by Race and Sex – Indiana, 2017*+

	Cases	Rate	2013-2017 Total
Race			
White	16	0.28	68
Black	1	0.15	6
Other	4	1.23	14
Unknown	0	-	22
Sex			
Male	5	0.15	50
Female	16	0.47	59
Unknown	0	-	1
Total	21		110

Figure 2 shows the number of reported cases per year for 2013-2017.

Figure 2: Hepatitis A Cases by Year – Indiana 2013-2017



*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates as of July 1, 2017, obtained on July 10, 2018.

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

Incidence of disease was greatest in December (Figure 3).

Figure 3: Hepatitis A Cases by Month – Indiana, 2017

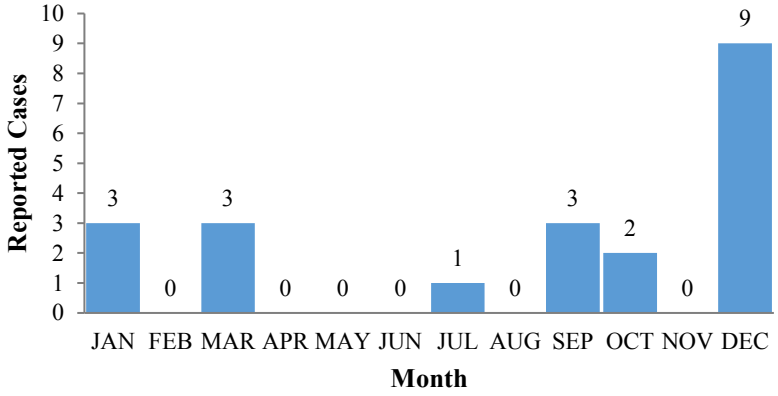
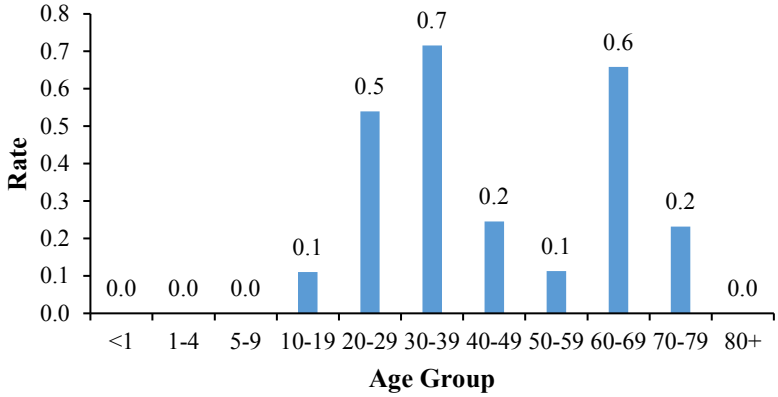


Figure 4 shows that age-specific rates were greatest for adults aged 30-39 years (0.7) and adults aged 60-69 years (0.6).

Figure 4: Hepatitis A Incidence Rates by Age Group – Indiana, 2017[*+]



In 2017, only one county, Clark, had a case count higher than five (seven total).

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 as of July 1, 2017, obtained on July 10, 2018.

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

LEGIONELLOSIS

2017 CASE TOTAL: 198
2016 CASE TOTAL: 172

2017 INCIDENCE RATE: 2.97 per 100,000
2016 INCIDENCE RATE: 2.59 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 healthcare facility. A possible nosocomial case is a laboratory case that occurs two to nine days after discharge from a healthcare 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 healthcare 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 as of July 1, 2017, obtained on July 10, 2018.

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

EPIDEMIOLOGY

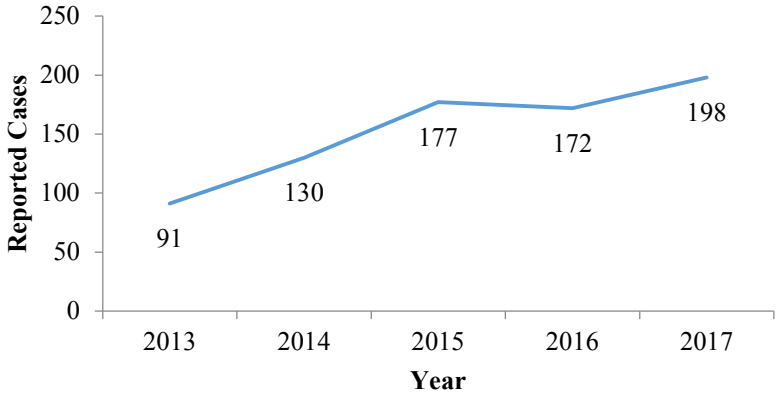
In 2017, 198 confirmed cases of legionellosis were reported in Indiana (Table 1), for a case rate of 2.97 per 100,000. In 2017, males (3.22) were at a higher risk for legionellosis than females (2.69). Those who identified as black (3.85) were at higher risk for legionellosis than those who identified as white (2.55) or other races (1.23).

Table 1: Legionellosis Case Rates by Race and Sex – Indiana, 2017*+

	Cases	Rate	2013-2017 Total
Race			
White	145	2.55	539
Black	25	3.85	117
Other	4	1.23	11
Unknown	24	-	101
Sex			
Male	106	3.22	460
Female	91	2.69	307
Unknown	1	-	1
Total	198		768

Figure 1 shows the number of cases by year for 2013-2017.

Figure 1: Legionellosis Cases by Year – Indiana, 2013-2017

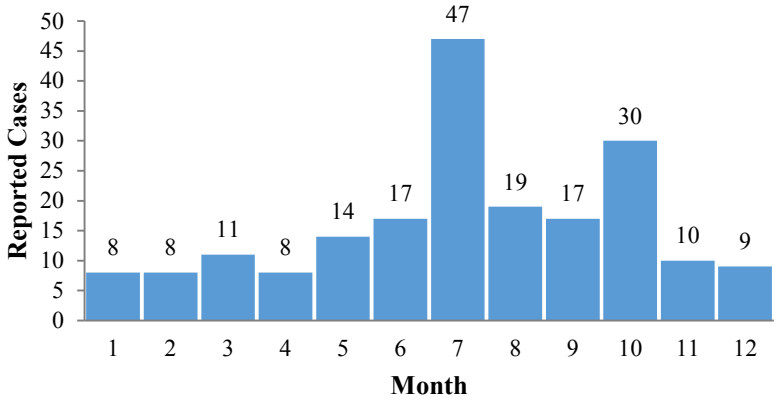


Incidence of legionellosis usually climbs in the summer. Figure 2 indicates an increased incidence in summer and fall 2017.

*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates as of July 1, 2017, obtained on July 10, 2018.

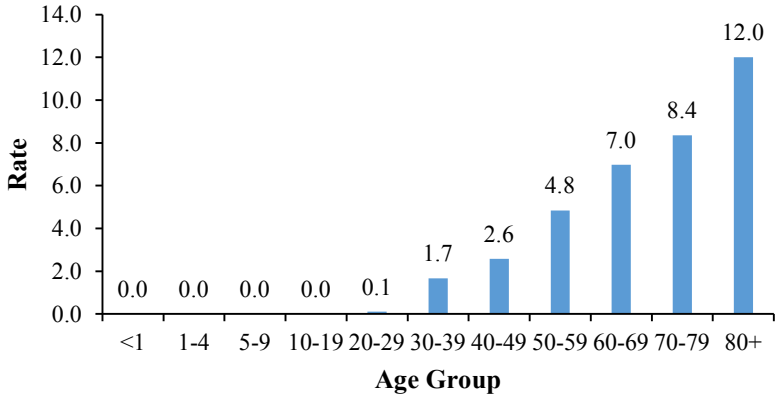
+ Rates based on fewer than 20 occurrences are considered statistically unstable and should not be compared.

Figure 2: Legionellosis Cases by Month – Indiana, 2017



As seen in Figure 3, cases of legionellosis in 2017 were reported most frequently in adults aged 80+ (12.0).

Figure 3: Legionellosis Incidence Rates by Age Group – Indiana, 2017*+



Incidence rates were highest among the following counties reporting five or more cases: St. Joseph (11.1), Elkhart (5.9), LaPorte (5.5), Allen (4.3) and Marion (3.6) (Table 2).

Table 2: Legionellosis Incidence Rates by County – Indiana, 2017*+

County	Cases	Rate
St. Joseph	30	11.1
Elkhart	12	5.9
LaPorte	6	5.5
Allen	16	4.3
Marion	34	3.6

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 as of July 1, 2017, obtained on July 10, 2018.

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

LISTERIOSIS

2017 CASE TOTAL: 17
2016 CASE TOTAL: 15

2017 INCIDENCE RATE: 0.25 per 100,000
2016 INCIDENCE RATE: 0.23 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 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.

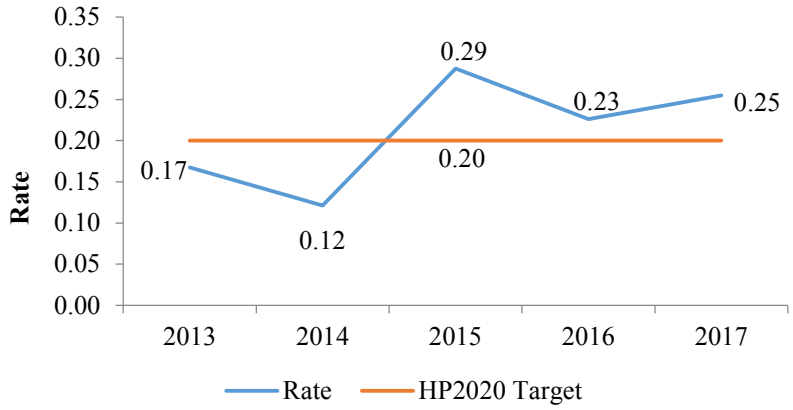
HEALTHY PEOPLE 2020 GOAL

The Healthy People 2020 goal for listeriosis is 0.2 cases per 100,000 population. During the five-year reporting period of 2013-2017, Indiana met the Healthy People 2020 goal in 2013 and 2014 (Figure 1). The cause for the elevated rate of cases in 2015, 2016 and 2017 is unknown.

*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates as of July 1, 2017, obtained on July 10, 2018.

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

Figure 1: Listeriosis Rates by Year – Indiana, 2013-2017*+



EPIDEMIOLOGY

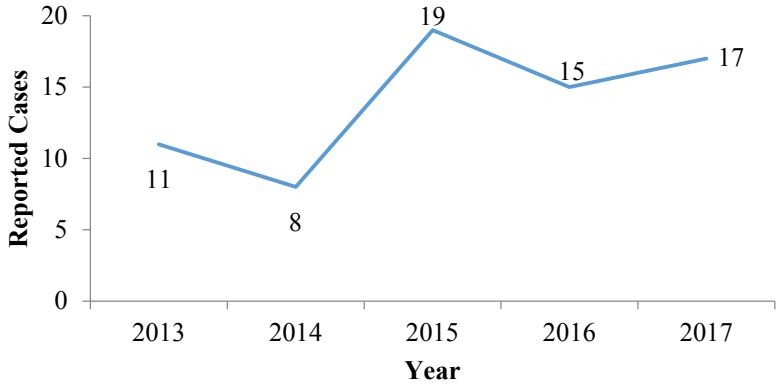
In 2017, 17 cases of listeriosis were reported in Indiana, for a rate of 0.25 cases per 100,000 population (Table 1).

Table 1: Listeriosis Case Rates by Race and Sex – Indiana, 2017*+

	Cases	Rate	2012-2016 Total
Race			
White	12	0.21	54
Black	0	-	0
Other	1	0.31	3
Unknown	4	-	13
Sex			
Male	6	0.18	29
Female	11	0.28	41
Unknown	0	-	0
Total	17		70

Figure 2 shows reported listeriosis cases by year for 2013-2017.

Figure 2: Listeriosis Cases by Year – Indiana, 2013-2017

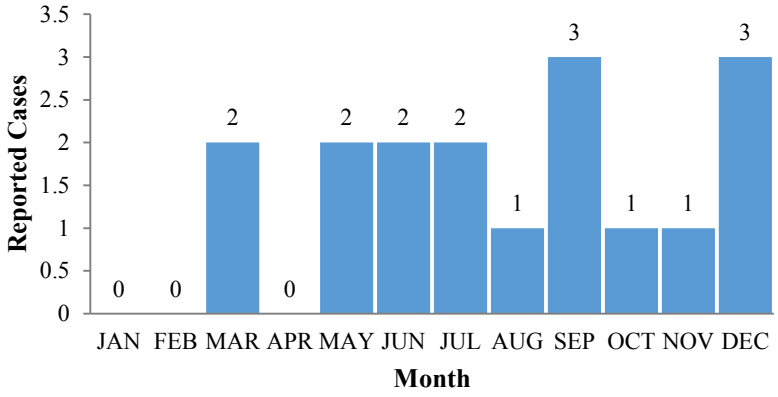


*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates as of July 1, 2017, obtained on July 10, 2018.

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

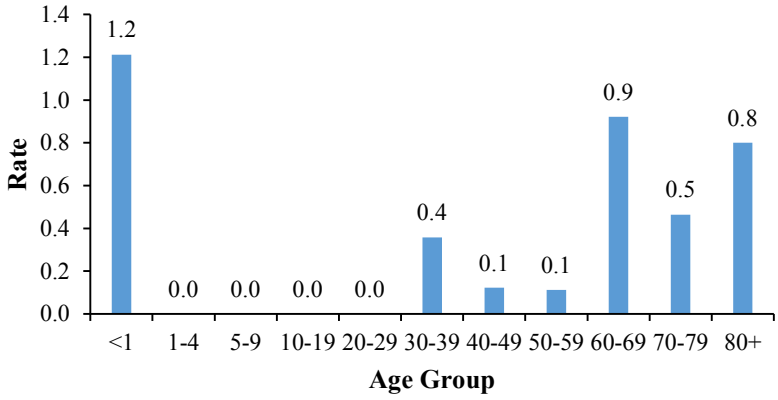
Figure 3 shows the number of listeriosis cases by month for 2017. Incidence of disease was highest in September and December.

Figure 3: Listeriosis Cases by Month – Indiana, 2017



As shown in Figure 4, age-specific rates in 2017 were greatest for infants younger than 1 year of age (1.2) and adults aged 60-69 (0.9).

Figure 4: Listeriosis Incidence Rates by Age Group – Indiana, 2017*+



In 2017, 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

*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates as of July 1, 2017, obtained on July 10, 2018.
+ Rates based on fewer than 20 occurrences are considered statistically unstable and should not be compared.

SALMONELLOSIS

2017 CASE TOTAL: 740
2016 CASE TOTAL: 799

2017 INCIDENCE RATE: 11.10 per 100,000
2016 INCIDENCE RATE: 12.04 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 healthcare providers) have a greater risk of transmitting infection to others.

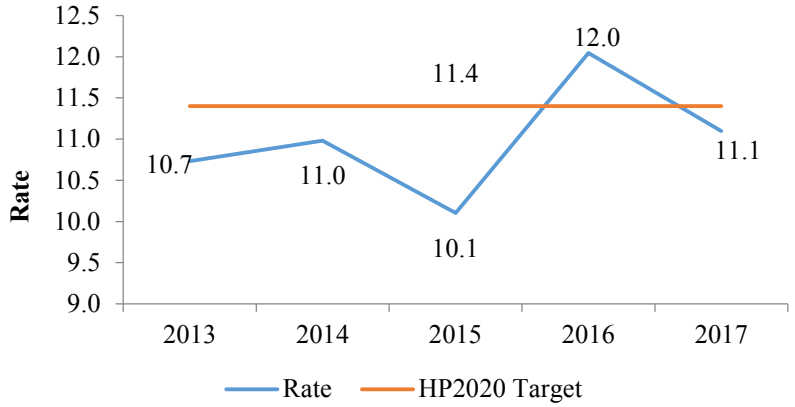
CLINICAL AND PUBLIC HEALTH SIGNIFICANCE

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 younger than age 5, 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. The only year Indiana did not meet this goal during the five-year reporting period 2013-2016 was in 2016 (Figure 1).

Figure 1: Salmonellosis Rates by Year – Indiana, 2013-2017*+



EPIDEMIOLOGY

In 2017, 740 cases of salmonellosis were reported in Indiana, for a rate of 11.10 cases per 100,000 population (Table 1). Females (12.34) were more likely to be reported with salmonellosis than males (9.83). The proportion of other races (13.19) was greater than blacks (6.77) or whites (8.73); however, 156 cases did not report race data.

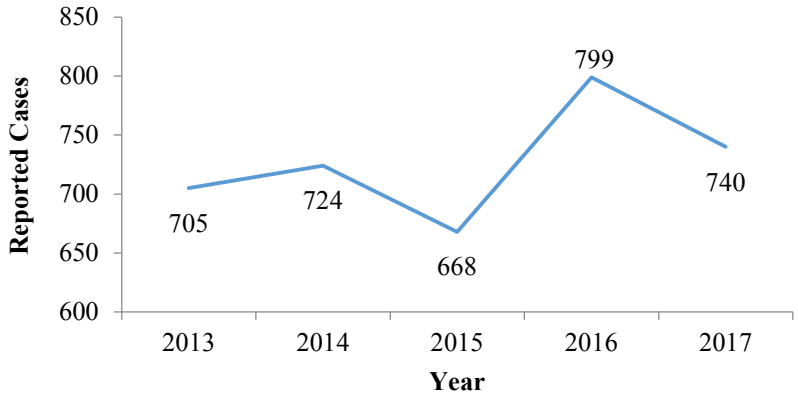
*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates as of July 1, 2017, obtained on July 10, 2018.
+ Rates based on fewer than 20 occurrences are considered statistically unstable and should not be compared.

Table 1: Salmonellosis Case Rates by Race and Sex – Indiana, 2017*+

	Cases	Rate	2013 - 2017 Total
Race			
White	497	8.73	2,335
Black	44	6.77	226
Other	43	13.19	176
Unknown	156	-	899
Sex			
Male	323	9.83	1,631
Female	417	12.34	1,995
Unknown	0	-	10
Total	740		3,636

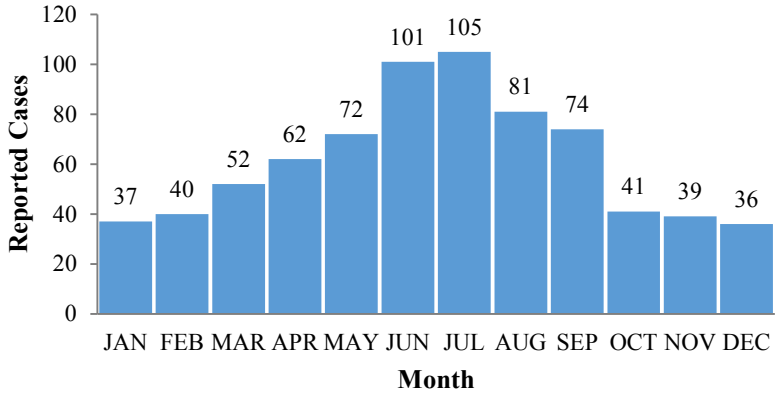
Figure 2 shows the number of reported cases for 2013-2017.

Figure 2: Salmonellosis Cases by Year – Indiana, 2013-2017



The incidence of salmonellosis was greatest during the summer months of 2017, peaking in July with 105 cases (Figure 3).

Figure 3: Salmonellosis Cases by Month – Indiana, 2017

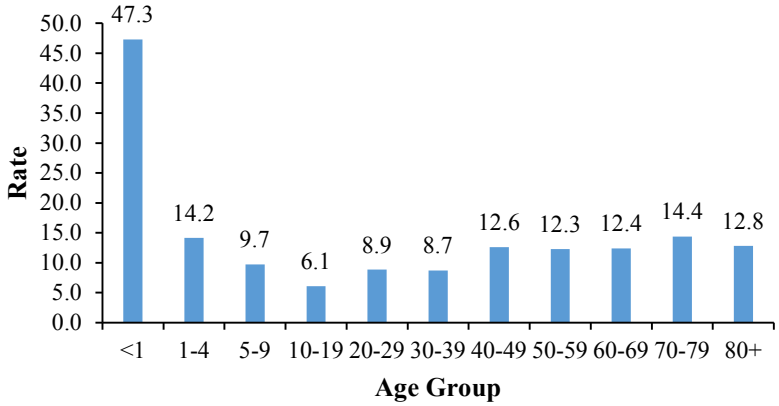


*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates as of July 1, 2017, obtained on July 10, 2018.

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

Figure 4 shows age-specific rates in 2017 were greatest among infants younger than 1 year of age (47.3).

Figure 4: Salmonellosis Incidence Rates by Age Group – Indiana, 2017*+



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 692 isolates of *Salmonella* species identified in 2017.

Table 2: Top Three Reported Serotypes for Salmonellosis Cases – Indiana, 2017

Serotype	Number	Percent
Enteritidis	196	28.32%
Typhimurium	84	12.14%
Newport	46	6.65%

Figure 5 (next page) shows Indiana counties reporting five or more cases. The following counties had the highest incidence rates of salmonellosis in 2017: Pike (40.4), Spencer (34.3), Posey (31.3), Franklin (30.9) and Dubois (30.5).

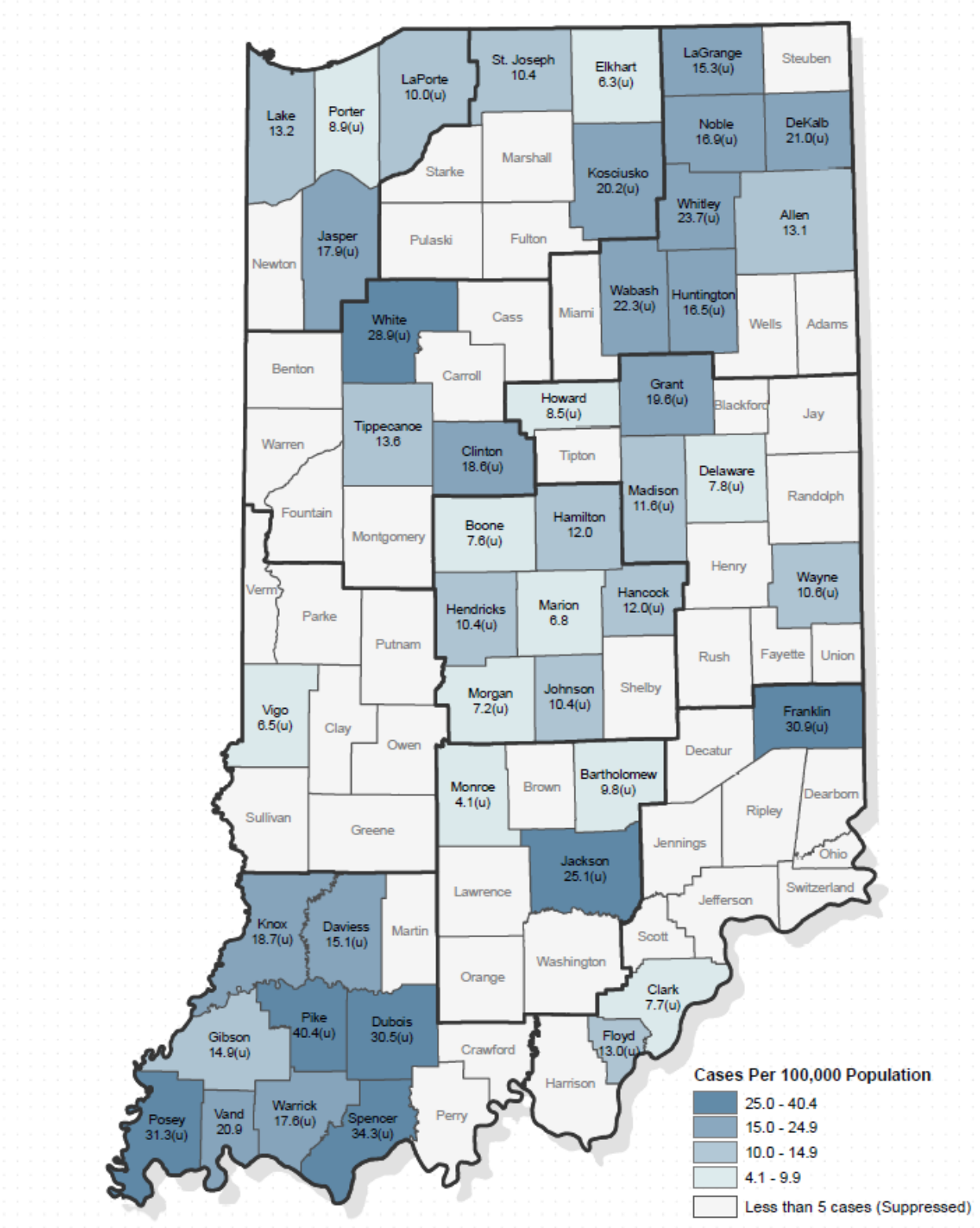
LEARN MORE

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

*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates as of July 1, 2017, obtained on July 10, 2018.

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

Figure 5: Salmonellosis Incidence Rates by County – Indiana, 2017*+



*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates as of July 1, 2017, obtained on July 10, 2018.

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

SHIGELLOSIS

2017 CASE TOTAL: 153
2016 CASE TOTAL: 291

2017 INCIDENCE RATE: 2.29 per 100,000
2016 INCIDENCE RATE: 4.39 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 United States 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 2017, 153 cases of shigellosis were reported in Indiana, for a case rate of 2.29 cases per 100,000 population (Table 1). Males (2.43) were more likely to be reported than females (2.16). The rate of illness among blacks (4.00) was higher than the rate for other races (2.76) and whites (1.63); however, 25 cases did not report race data.

Table 1: Shigellosis Case Rates by Race and Sex – Indiana, 2017[*+]

	Cases	Rate	2013-2017 Total
Race			
White	93	1.63	1,307
Black	26	4.00	761
Other	9	2.76	108
Unknown	25	-	126
Sex			
Male	80	2.43	996
Female	73	2.16	1,204
Unknown	0	-	1
Total	153		2,201

[*]All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates as of July 1, 2017, obtained on July 10, 2018.
[+] Rates based on fewer than 20 occurrences are considered statistically unstable and should not be compared.

Figure 1 shows the number of reported cases per year for 2013-2017. The number of shigellosis cases in 2014 was much higher than is typically seen due to a large outbreak in Indiana.

Figure 1: Shigellosis Cases by Year – Indiana, 2013-2017

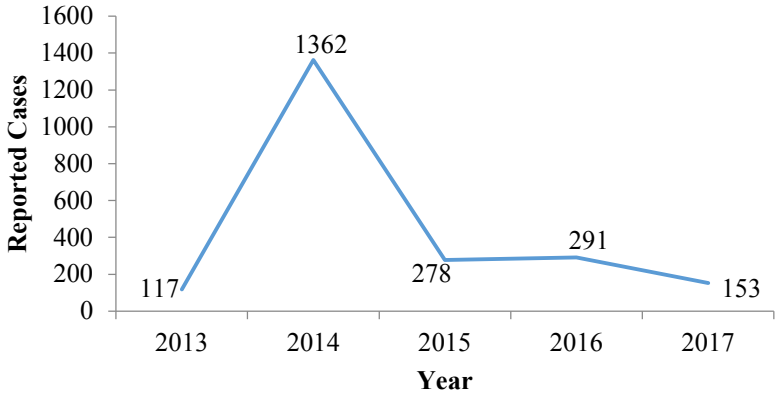
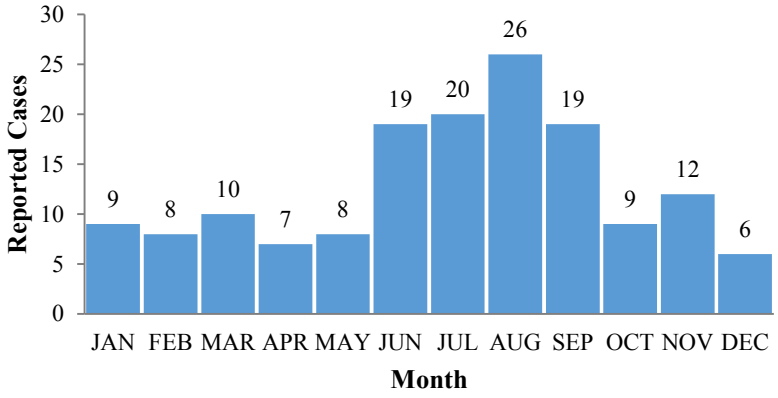


Figure 2 shows the number of cases per month in Indiana for 2017. Incidence of disease peaked in the summer months, where August had the highest number of reported cases (26).

Figure 2: Shigellosis Cases by Month – Indiana, 2017



*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates as of July 1, 2017, obtained on July 10, 2018.

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

As shown in Figure 3, age-specific rates were highest among preschoolers ages 1-4 years (9.2), children ages 5-9 years (3.9) and adults between the ages of 20 and 29 (2.7).

Figure 3: Shigellosis Incidence Rates by Age Group – Indiana, 2017*+

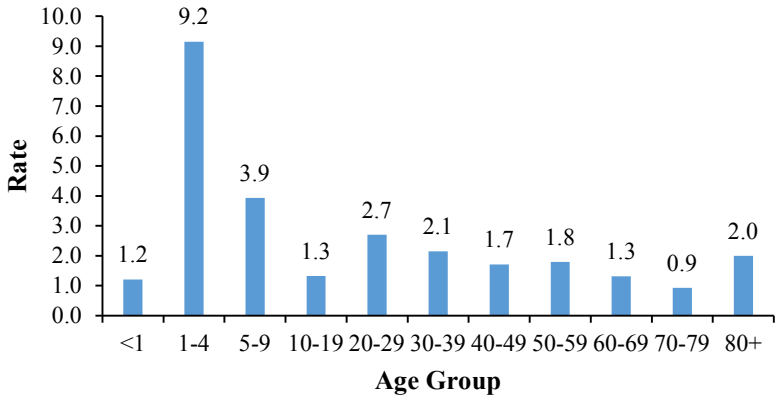


Table 2 shows the top five Indiana counties reporting five or more cases. The incidence rate was highest in Vanderburgh County (14.3) followed by Warrick County (9.6).

Table 2: Shigellosis Incidence Rates by County – Indiana, 2017*+

County	Cases	Rate
Vanderburgh	26	14.3
Warrick	6	9.6
Clark	8	6.8
LaPorte	7	6.4
Marion	45	4.7

LEARN MORE

https://www.cdc.gov/shigella/

*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates as of July 1, 2017, obtained on July 10, 2018.

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

YERSINIOSIS

2017 CASE TOTAL: 27
2016 CASE TOTAL: 13

2017 INCIDENCE RATE: 0.27 per 100,000
2016 INCIDENCE RATE: 0.20 per 100,000

YERSINIOSIS is a disease most commonly caused by *Yersinia enterocolitica* bacteria, which live in livestock and domestic animals and can be found in untreated water. These bacteria are also found in unpasteurized milk and raw or undercooked meat. People become infected with *Yersinia* by consuming water and raw produce contaminated with animal or human feces (fecal-oral route). Infection can also occur after contact with symptomatic, infected animals through person-to-person contact, eating contaminated food and touching items such as soiled diapers or linens and then touching the mouth. Infected persons can shed the bacteria in their stool for several months if untreated. Children are infected more often than adults.

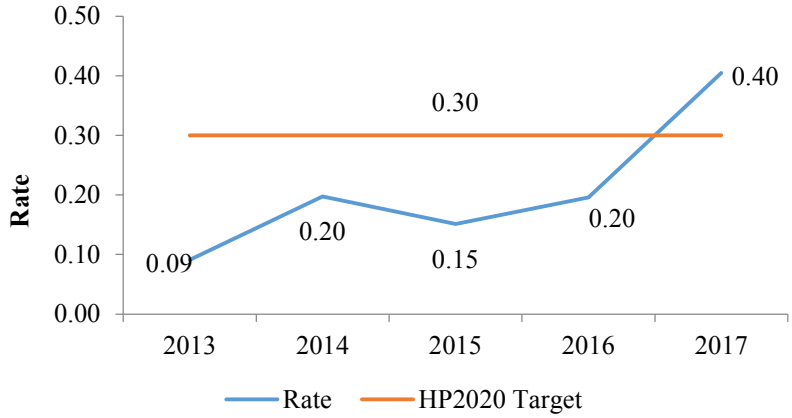
CLINICAL AND PUBLIC HEALTH SIGNIFICANCE

Symptoms of yersiniosis include fever, abdominal pain, diarrhea and vomiting. Symptoms usually begin 3-7 days (up to 10 days) after exposure and last 1-3 weeks. In older children and adults, pain in the lower right side and fever can be the main symptoms and may be confused with appendicitis. Some people may also have a sore throat. Most people recover within 5-7 days without medical treatment. A doctor may prescribe antibiotics for people with severe infection.

HEALTHY PEOPLE 2020 GOAL

The Healthy People 2020 goal for yersiniosis is 0.3 cases per 100,000 population per year. Indiana met this goal every year during the five-year reporting period 2013-2017 except in 2017.

Figure 1: Yersinoisis Rates by Year – Indiana, 2017*+



EPIDEMIOLOGY

In 2017, 27 cases of yersiniosis were reported in Indiana, for a rate of 0.27 cases per 100,000 population (Table 1).

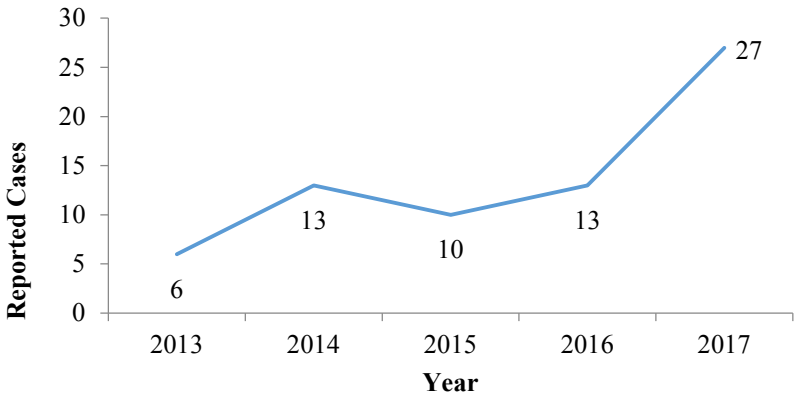
*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates as of July 1, 2017, obtained on July 10, 2018.
+ Rates based on fewer than 20 occurrences are considered statistically unstable and should not be compared.

Table 1: Yersiniosis Case Rates by Race and Sex – Indiana, 2017*+

	Cases	Rate	2013-2017 Total
Race			
White	20	0.35	45
Black	3	0.46	6
Other	0	-	0
Unknown	4	-	18
Sex			
Male	10	0.30	21
Female	17	0.50	48
Unknown	0	-	0
Total	27		69

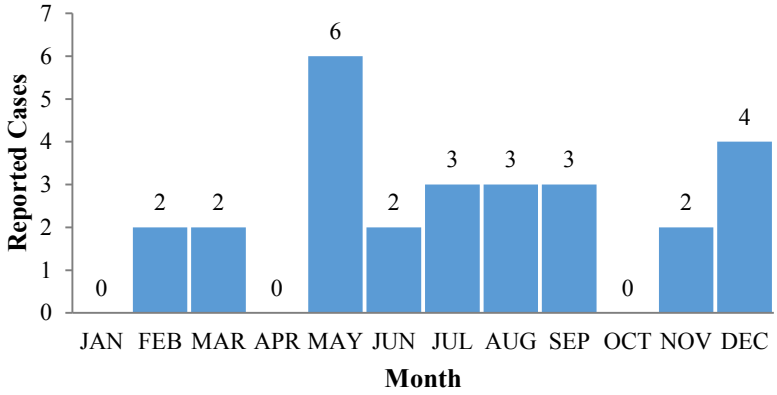
Figure 2 shows the number of reported cases per year for 2013-2017.

Figure 2: Yersiniosis Cases by Year – Indiana, 2013-2017



Incidence of yersiniosis can occur at any time of the year; however, it was most common in May (6) and December (4) 2017 (Figure 3).

Figure 3: Yersiniosis Cases by Month – Indiana, 2017

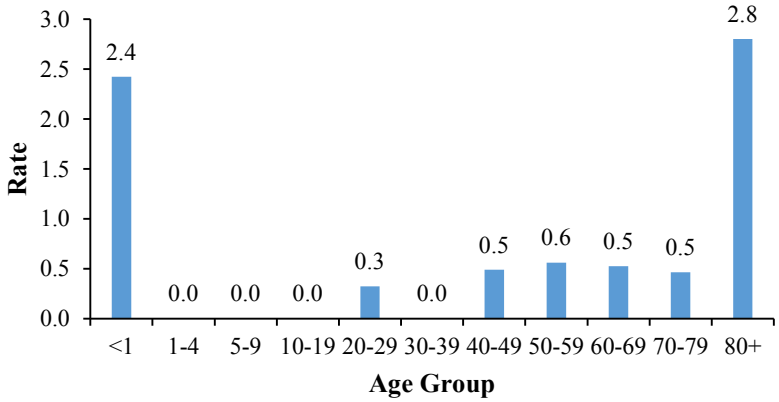


*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates as of July 1, 2017, obtained on July 10, 2018.

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

Figure 4 shows age-specific rates were greatest in elderly adults aged 80-plus years (2.8) followed by infants younger than age 1 (2.4).

Figure 4: Yersiniosis Incidence Rates by Age Group – Indiana, 2017*+



Only one county, Allen, reported five or more cases (5). No outbreaks of yersiniosis were reported in Indiana in 2017.

LEARN MORE

https://www.cdc.gov/yersinia/

*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates as of July 1, 2017, obtained on July 10, 2018.

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

INCLUDES: Diphtheria, Hansen's Disease (Leprosy), Invasive *Haemophilus influenzae*, measles, meningococcal disease, mumps, pertussis, pneumococcal invasive disease, polio, pubella, smallpox, streptococcus Group A (Invasive), tetanus, toxic shock syndrome and varicella

INVASIVE & VACCINE PREVENTABLE DISEASE PREVENTION

Diphtheria
The typical series of vaccinations (for children 7 years old and younger) is five doses given at 2, 4 and 6 months; 15-18 months of age; and 4-6 years of age. Unvaccinated adults and children age 7 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 United States.

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 United States. 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 United States occur in immigrants and refugees who acquired the disease in their native countries.

Invasive Haemophilus Influenzae
Haemophilus influenzae type B (Hib) vaccine is recommended for all infants at 2, 4 and 6 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 5 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 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 16-23 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 4-6 years of age. The DTaP vaccine should not be administered to persons older than 7 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 5 years of age and for adults older than 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 2 months, 4 months, 6-18 months, and 4-6 years of age for children. Oral polio vaccine (OPV) is used in some countries around the world but has not been used in the United States 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 United States.

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. Healthcare 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.

2017 CASE TOTAL: 160
2016 CASE TOTAL: 129

2017 INCIDENCE RATE: 2.40 per 100,000
2016 INCIDENCE RATE: 1.94 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 0.27 cases of Hib disease per 100,000 children younger than 5 years of age. In 2017, one case of Hib disease occurred in Indiana in children younger than 5 years of age for whom isolates were submitted for testing. In 2017, Indiana met the Healthy People 2020 goal, with 0.24 cases of Hib per 100,000 children younger than five years of age.

EPIDEMIOLOGY

In 2017, 160 cases of invasive *H. influenzae* (all types) disease were reported in Indiana. Males (2.49 per 100,000) (Table 1) and females (2.31 per 100,000) had similar rates of invasive *H. influenzae* disease.

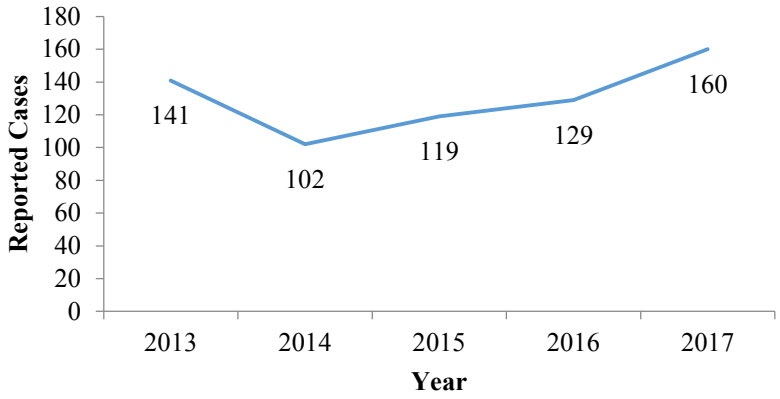
Table 1: Invasive Haemophilus Influenzae Case Rates by Race and Sex – Indiana, 2017[*+]

	Cases	Rate	2013-2017 Total
Race			
White	124	2.18	500
Black	13	2.00	50
Other	3	0.92	20
Unknown	20	-	81
Sex			
Male	82	2.49	299
Female	78	2.31	352
Unknown	0	-	0
Total	160		651

[*]All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates as of July 1, 2017, obtained on July 10, 2018.
[+] Rates based on fewer than 20 occurrences are considered statistically unstable and should not be compared.

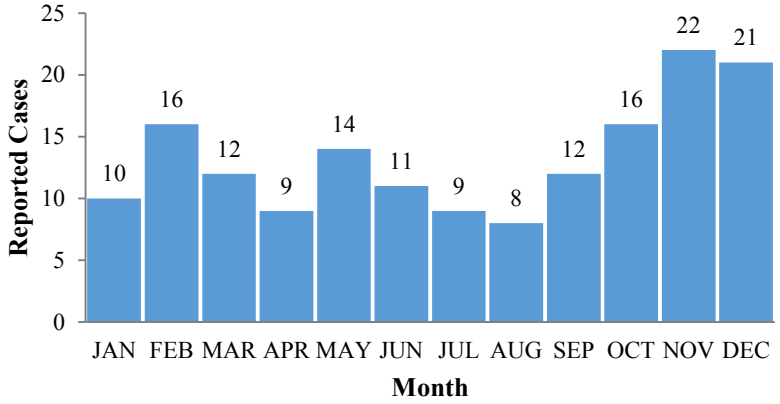
Figure 1 shows reported cases of *H. influenzae* for the five-year period 2013-2017.

Figure 1: Invasive Haemophilus Influenzae Cases by Year – Indiana, 2013-2017



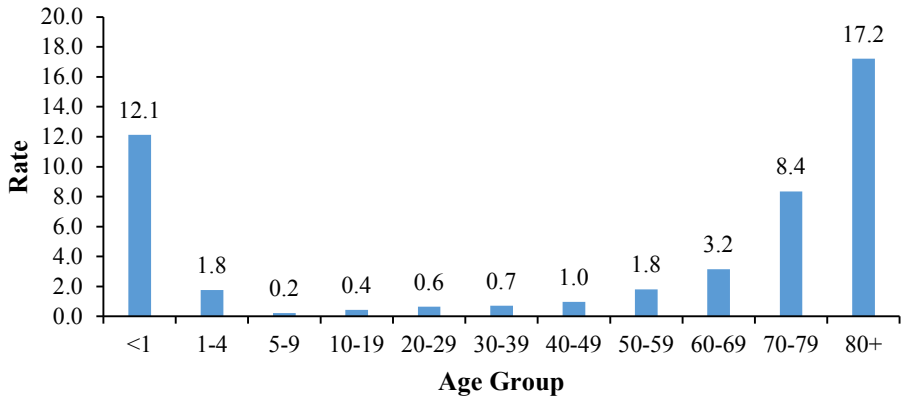
H. influenzae occurred throughout the year in 2017, with the highest number of cases occurring in November and December (Figure 2).

Figure 2: Invasive Haemophilus Influenzae Cases by Month – Indiana, 2017



Age-specific rates were greatest for adults age 80 years and older (17.2) and infants younger than 1 year (12.1). Figure 3 shows *H. influenzae* incidence by age group.

Figure 3: Invasive Haemophilus Influenzae Incidence Rates by Age Group – Indiana, 2017[*+]



[*]All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates as of July 1, 2017, obtained on July 10, 2018.

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

Although 60 counties reported cases of *H. influenzae*, only six counties (Allen, Lake, Marion, St. Joseph, Tippecanoe, and Vanderburgh) had five or more cases. Of the 160 cases reported in 2017, 126 (78.8 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, 2017

Type	Number	Percent
a	3	1.88%
b	3	1.88%
e	8	5.00%
f	17	10.63%
Nontypeable	95	59.38%
Not Tested/Unknown	34	21.25%
Total	160	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 as of July 1, 2017, obtained on July 10, 2018.

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

MENINGOCOCCAL DISEASE

2017 CASE TOTAL: 14
2016 CASE TOTAL: 8

2017 INCIDENCE RATE: 0.21 per 100,000
2016 INCIDENCE RATE: 0.12 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.

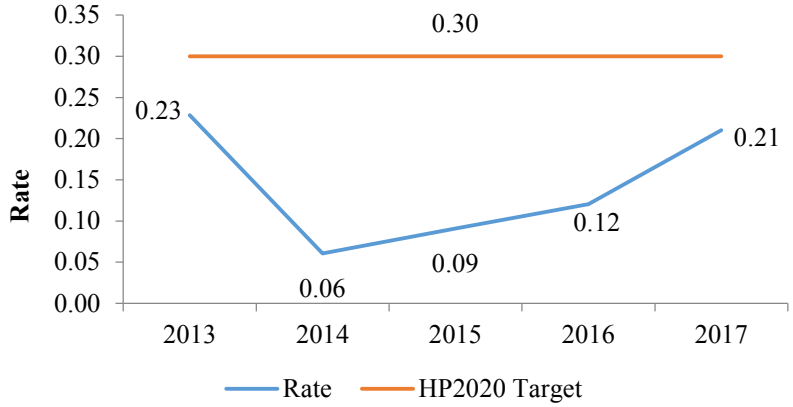
HEALTHY PEOPLE 2020 GOAL

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 2017 (Figure 1).

*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates as of July 1, 2017, obtained on July 10, 2018.

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

Figure 1: Meningococcal Invasive Disease Rate by Year – Indiana, 2013-2017*+



EPIDEMIOLOGY

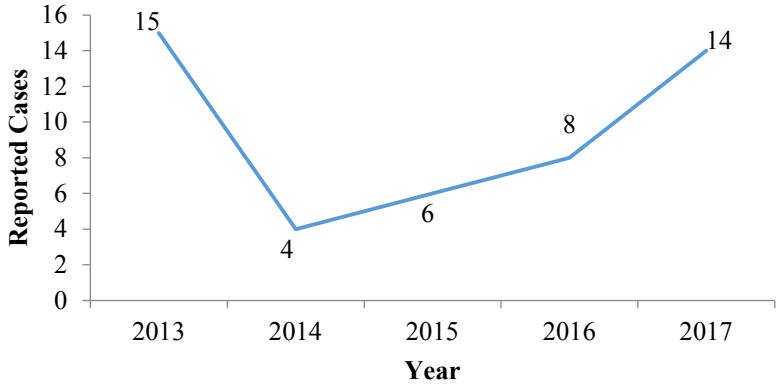
In 2017, 14 confirmed and probable cases of invasive meningococcal disease (Table 1) were reported.

Table 1: Meningococcal Case Rates by Race and Sex – Indiana, 2017*+

	Cases	Rate	2013-2017 Total
Race			
White	12	0.21	37
Black	1	0.15	5
Other	1	0.31	1
Unknown	0	-	4
Sex			
Male	4	0.12	22
Female	10	0.30	25
Unknown	0	-	0
Total	14		47

Indiana experienced an increase in meningococcal disease cases, from eight cases in 2016 to 14 cases in 2017. Figure 2 displays the number of cases by year for the previous five years.

Figure 2: Meningococcal Invasive Disease Cases by Year – Indiana, 2013-2017

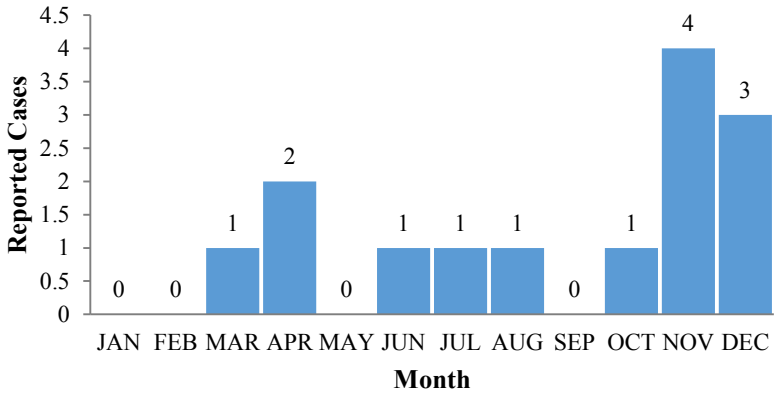


*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates as of July 1, 2017, obtained on July 10, 2018.

+ Rates based on fewer than 20 occurrences are considered statistically 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. The highest number of cases occurred in November and December 2017.

Figure 3: Meningococcal Invasive Disease Cases by Month – Indiana, 2017



Nine counties reported confirmed or suspected cases during 2017. 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 2017, serogroup B accounted for 64.3 percent of Indiana cases. Serogroup B had the highest proportion (68.1 percent) of cases from 2013 to 2017 followed by serogroup Y with 17.0 percent. Table 2 gives the total numbers for Indiana serogroups for the past five years.

Table 2: *Neisseria meningitidis* Serogroups – Indiana, 2013-2017

Serogroup	2013	2014	2015	2016	2017	Total
A	-	-	-	-	-	-
B	9 (60%)	4 (100%)	5 (83.3%)	5 (62.5%)	9 (64.3%)	32 (68.1%)
C	1 (6.7%)	-	-	1 (12.5%)	-	2 (4.3%)
Y	5 (33.3%)	-	-	2 (25%)	1 (7.1%)	8 (17.0%)
W135	-	-	-	-	1 (7.1%)	1 (2.1%)
Z	-	-	-	-		-
Nonviable	-	-	-	-		-
Unknown	-	-	1 (16.7%)	-	3 (21.4%)	4 (8.5%)

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

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MUMPS

2017 CASE TOTAL: 42
2016 CASE TOTAL: 293

2017 INCIDENCE RATE: 0.63 per 100,000
2016 INCIDENCE RATE: 4.42 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, healthcare 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 (0.16 per 100,000 population). Indiana did not meet the Healthy People 2020 goal in 2017 with 42 U.S.-acquired cases (a rate of 0.63 cases per 100,000 population).

EPIDEMIOLOGY

In 2017, 42 probable or confirmed cases of mumps were reported in Indiana. Many of these cases were associated with large ongoing outbreaks at four universities in Indiana. During the five year period 2013-2017, 369 cases were reported.

Table 1: Mumps Case Rates by Race and Sex – Indiana, 2017

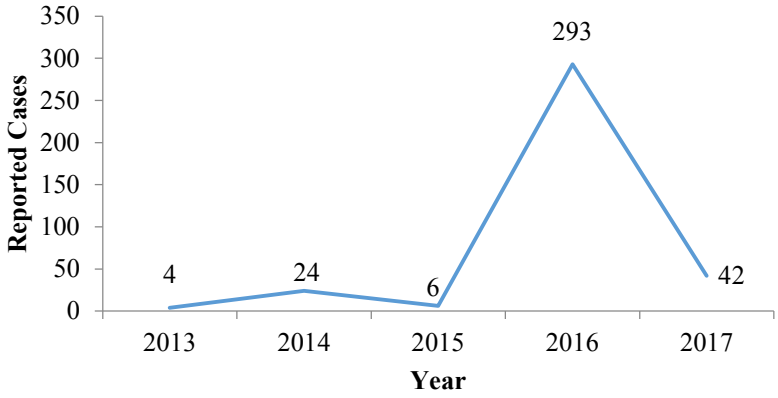
	Cases	Rate	2013-2017 Total
Race			
White	17	0.30	222
Black	2	0.31	41
Other	5	1.53	26
Unknown	18	-	80
Sex			
Male	24	0.73	204
Female	18	0.53	165
Unknown	0	-	0
Total	42		369

*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates as of July 1, 2017, obtained on July 10, 2018.

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

The increase in 2016 was due to a large outbreak at four universities in Indiana. The outbreak lasted through Spring 2017 which is why there were a greater number of cases in 2017 compared to 2013-2015.

Figure 1: Mumps Cases by Year – Indiana, 2013-2017



The increase in March 2017 was the end of the 2016-2017 outbreak across four universities.

Figure 2: Mumps Cases by Month – Indiana, 2017

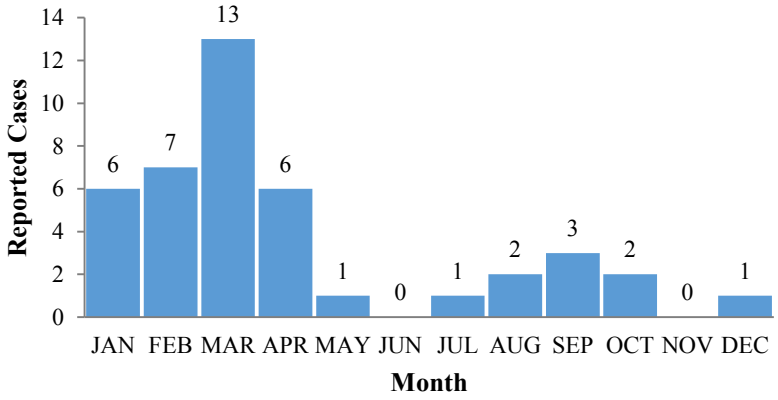
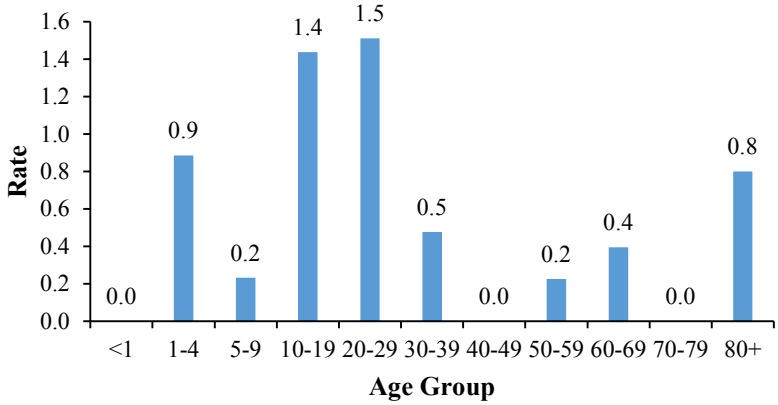


Figure 3: Mumps Cases by Age Group – Indiana, 2017*+



*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates as of July 1, 2017, obtained on July 10, 2018.

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

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 as of July 1, 2017, obtained on July 10, 2018.
+ Rates based on fewer than 20 occurrences are considered statistically unstable and should not be compared.

PERTUSSIS

2017 CASE TOTAL: 382
2016 CASE TOTAL: 178

2017 INCIDENCE RATE: 5.73 per 100,000
2016 INCIDENCE RATE: 2.68 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 younger than 1 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 did not meet this goal for children younger than 1 year of age with 70 cases (84.9 cases per 100,000 population) and but did meet the goal for adolescents ages 11-18 years with 29 cases (4.0 cases per 100,000 population) in 2017.

EPIDEMIOLOGY

Indiana had 382 reported cases of pertussis in 2017, for a rate of 5.73 cases per 100,000 population. Females (5.71) had a slightly higher incidence rate than males (5.70) (Table 1). The rate for other races (4.60) was higher than for blacks (3.69) and for whites (4.39), though this trend could be a result of low prevalence of pertussis among non-white races.

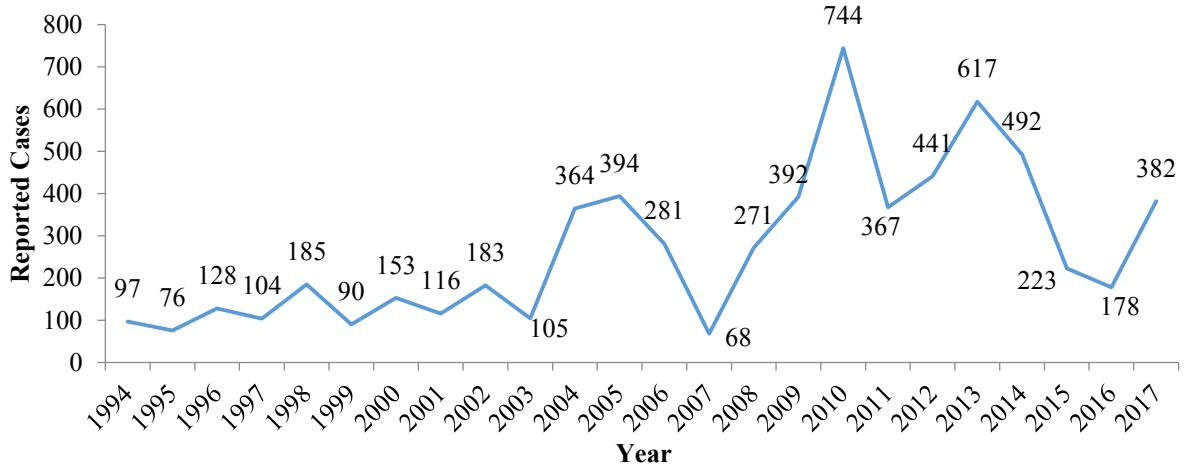
Table 1: Pertussis Case Rates by Race and Sex – Indiana, 2017*+

	Cases	Rate	2013-2017 Total
Race			
White	250	4.39	1,416
Black	24	3.69	78
Other	15	4.60	70
Unknown	93	-	328
Sex			
Male	187	5.70	879
Female	193	5.71	1,007
Unknown	0	-	4
Total	382		1,892

*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates as of July 1, 2017, obtained on July 10, 2018.
+ Rates based on fewer than 20 occurrences are considered statistically unstable and should not be compared.

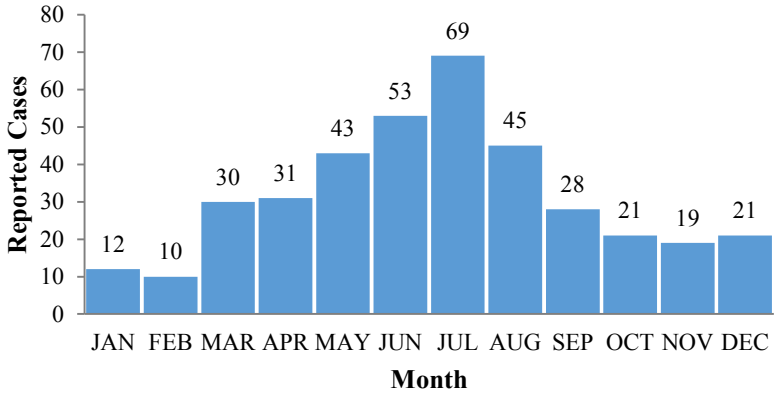
Pertussis incidence, unlike other vaccine-preventable diseases, has increased overall since the 1980s. Pertussis incidence is cyclic, with increases and decreases every three to five years. Figure 1 illustrates this cycle.

Figure 1: Pertussis Cases by Year – Indiana, 1994-2017



In 2017, disease incidence was highest during May, June, July and August; however, pertussis can occur anytime during the year (Figure 2).

Figure 2: Pertussis Cases by Month – Indiana, 2017

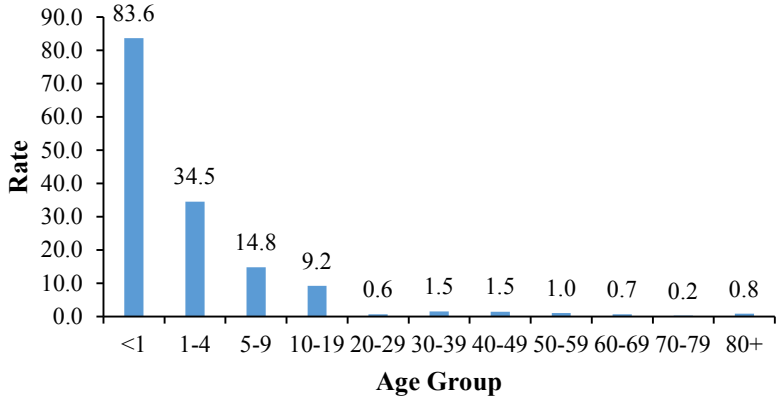


Pertussis is the most frequently reported vaccine-preventable disease among children younger than 5 years old in Indiana. In 2017, 48.4 percent of all cases occurred in children younger than 5 years old. Incidence rates were highest for infants younger than one year of age (86.6), followed by children ages 1-4 years (34.5) and children ages 5-9 years (14.8). School-aged children, 5-18 years of age, accounted for 38.6 percent of cases in 2017. 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 as of July 1, 2017, obtained on July 10, 2018.

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

Figure 3: Pertussis Incidence Rates by Age Group – Indiana, 2017*+



In 2017, 70 counties reported at least one case, and 17 counties reported five or more cases of pertussis. The incidence rates were highest among the following counties reporting five or more cases (Figure 4, next page): Lagrange (106.9), Cass (105.3) and Parke (59.2). 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, 2017

Age Group	Total Cases	Unknown	0 Doses	1-2 Doses	3+ Doses
3-11 Months	42	2 (4.8%)	21 (50.0%)	13 (30.9%)	6 (14.3%)
1-4 Years	117	11 (9.4%)	58 (49.6%)	12 (10.2%)	36 (30.8%)
5-9 Years	64	6 (9.4%)	24 (37.5%)	1 (1.5%)	33 (51.6%)
Total (3 mos-9 yrs.)	223	19 (8.5%)	103 (46.2%)	26 (11.7%)	75 (33.6%)

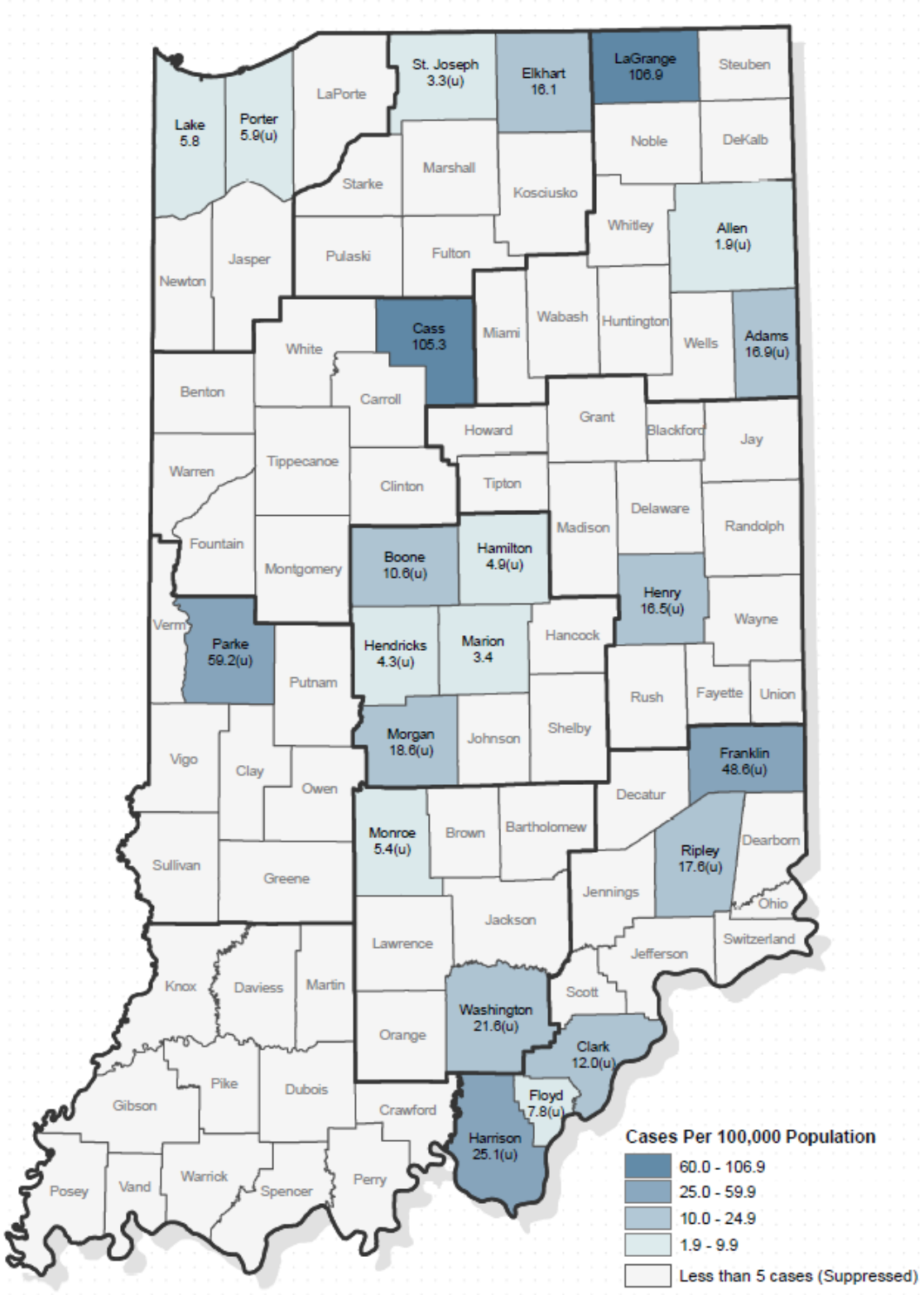
LEARN MORE

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 as of July 1, 2017, obtained on July 10, 2018.

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

Figure 4: Pertussis Incidence Rates by County – Indiana, 2017*+



*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates as of July 1, 2017, obtained on July 10, 2018.

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

PNEUMOCOCCAL DISEASE

2017 CASE TOTAL: 777
2016 CASE TOTAL: 688

2017 INCIDENCE RATE: 11.65 per 100,000
2016 INCIDENCE RATE: 10.37 per 100,000

PNEUMOCOCCAL DISEASE is caused by the bacterium *Streptococcus pneumoniae* and is the source of significant illness and death in the United States. Prior to routine vaccination of children and older adults, this disease represented a large proportion of deaths in young children in the United States. 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 younger than 5 years old and 31 cases per 100,000 population for adults ages 65 and older. Indiana met the Healthy People 2020 Goal for children younger than 5 years of age in 2017, with an incidence rate of 3.87 cases per 100,000 population. Indiana did not meet the Healthy People 2020 Goal for adults ages 65 and older; the incidence rate for this population was 33.1 cases per 100,000 in 2017. 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 younger than 5 years old and two cases of penicillin-resistant cases per 100,000 population for adults ages 65 and older. Indiana met the goal, with 0.66 cases per 100,000 children under age 5 with penicillin-resistant pneumococcal disease but did not meet the goal for adults 65 and older, with 3.53 cases per 100,000 with penicillin-resistant pneumococcal disease in 2017.

EPIDEMIOLOGY

In 2017, 777 cases of pneumococcal disease were reported in Indiana, for a case rate of 11.65 per 100,000 population (Table 1). In 2017, the incidence rate among the other population (13.49 per 100,000 population) was higher than that of the white population (10.35 per 100,000) and black population (10.93 per 100,000).

*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates as of July 1, 2017, obtained on July 10, 2018.

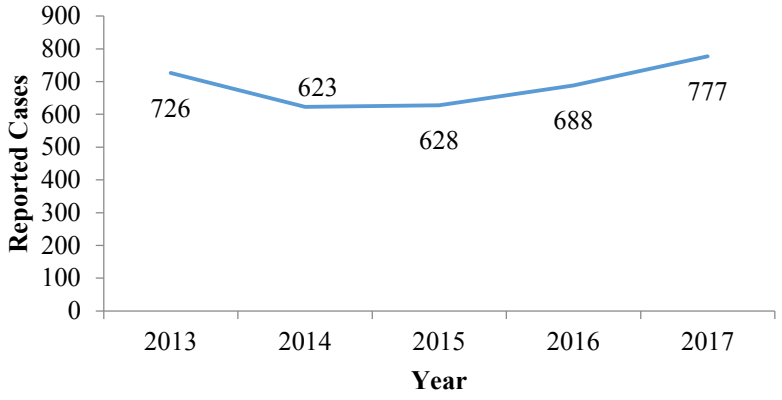
+ Rates based on fewer than 20 occurrences are considered statistically unstable and should not be compared.

Table 1: Pneumococcal Disease Case Rates by Race and Sex – Indiana, 2017*+

	Cases	Rate	2013-2017 Total
Race			
White	589	10.35	2,515
Black	71	10.93	349
Other	44	13.49	122
Unknown	73	-	456
Sex			
Male	417	12.72	1,735
Female	360	10.65	1,707
Unknown	0	-	0
Total	777		3,442

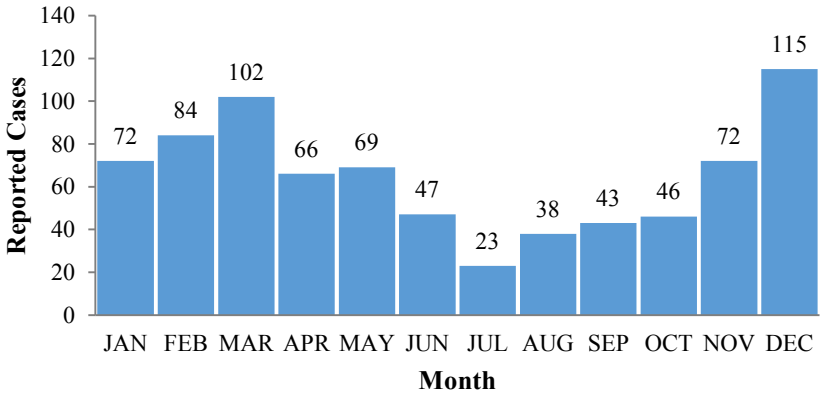
Figure 1 shows the number of reported cases per year for 2012-2017.

Figure 1: Pneumococcal Disease Cases by Year – Indiana, 2013-2017



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

Figure 2: Pneumococcal Disease Cases by Month – Indiana, 2017

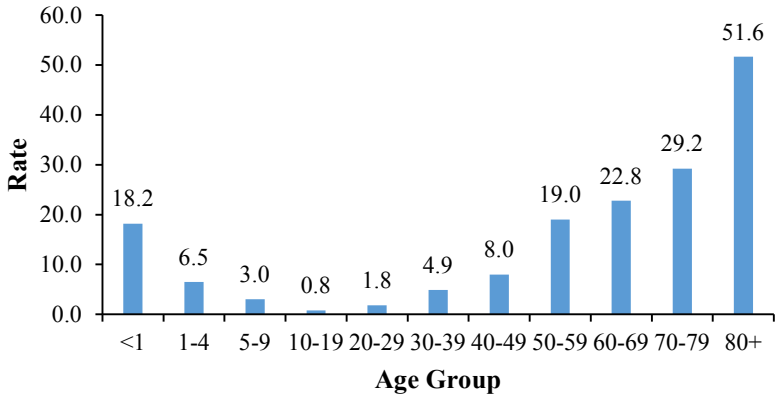


*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates as of July 1, 2017, obtained on July 10, 2018.

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

Incidence of invasive pneumococcal disease varies considerably with age. In 2017, the highest incidence rates were for adults ages 80 and older (51.6 per 100,000 population), followed by adults ages 70-79 (29.2 per 100,000) (Figure 3).

Figure 3: Pneumococcal Disease Incidence Rates by Age Group – Indiana, 2017*+

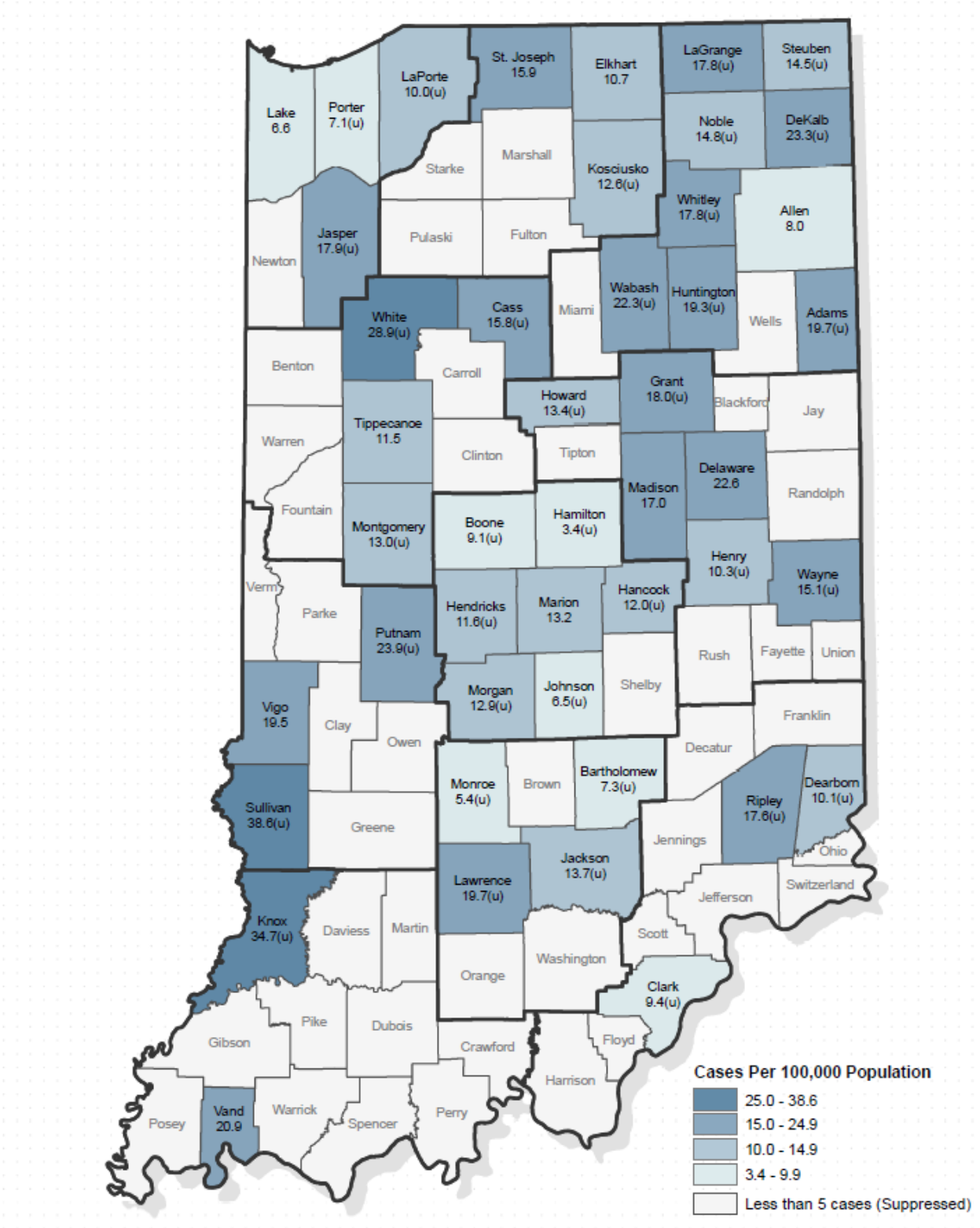


In 2017, 47 counties reported at least one case, and 45 counties reported five or more cases of invasive pneumococcal disease (Figure 4, next page). The incidence rates were highest among the following counties reporting five or more cases: Sullivan (38.6), Knox (34.7) and White (28.9).

*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates as of July 1, 2017, obtained on July 10, 2018.

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

Figure 4: Pneumococcal Disease Incidence Rates by County – Indiana, 2017*+



*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates as of July 1, 2017, obtained on July 10, 2018.

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

410 IAC 1-2.5 requires laboratories to submit isolates from all invasive cases younger than 5 years old for serotyping. Of the 36 cases under the age of 5, viable isolates from 21 were sent to ISDH for serotyping. 15 isolates were successfully serotyped. Predominant serotypes included Type 19A (14.0 percent), Type 38/25F/25A (8.0 percent) and Type 8 (6.0 percent) (Figure 5). Serotypes represented in the PCV13 vaccine represented 9.10 percent of cases under age 5 for whom typing data was available. Of these, all cases occurred in children who had at least one dose of PCV13 vaccination. The majority of cases in children younger than 5 years of age occurred as a result of types not contained in the routine vaccines available for children (Figure 6).

Figure 5: Pneumococcal Serotypes, Children Younger than Age 5 – Indiana, 2017

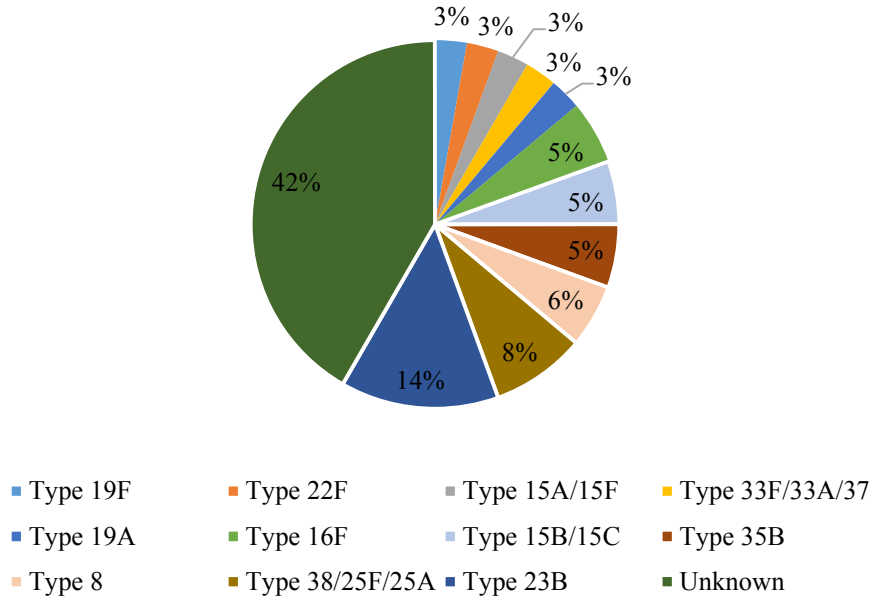
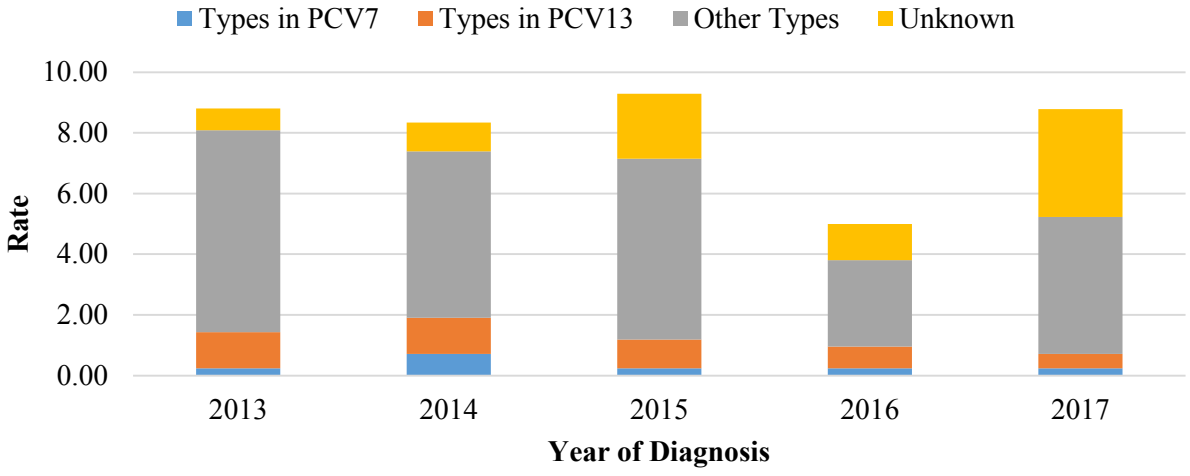


Figure 6: Incidence of Pneumococcal Serotypes, Children Younger than Age Five by Vaccine Serotype Indiana, 2013-2017

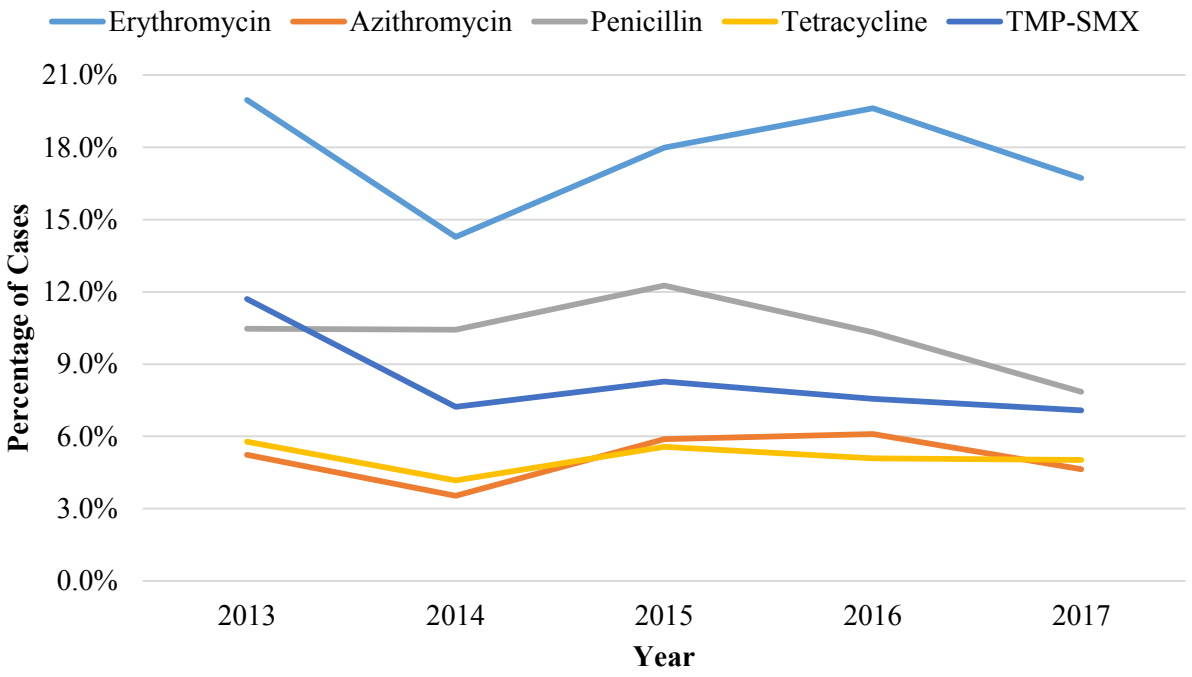


*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates as of July 1, 2017, obtained on July 10, 2018.

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

In 2017, 197 (25.3 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 from 2013 to 2017 (Figure 7). Trimethoprim-sulfamethoxazole (TMP-SMX) resistance has declined from 2013 to 2017, while erythromycin resistance remains high and penicillin resistance remains relatively steady.

Figure 7: Antibiotic Nonsusceptibility by Year – Indiana, 2013-2017



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 as of July 1, 2017, obtained on July 10, 2018.

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

STREPTOCOCCUS, GROUP A (INVASIVE)

2017 CASE TOTAL: 244
2016 CASE TOTAL: 251

2017 INCIDENCE RATE: 3.66 per 100,000
2016 INCIDENCE RATE: 3.78 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 2017, 244 cases of invasive GAS disease were reported in Indiana for a rate of 3.66 cases per 100,000 (Table 1). Incidence rates for males (4.02) and females (3.31) were similar. Additionally, blacks had a higher rate of invasive GAS (5.69) than whites (3.11) and people of other races (3.07), although low case numbers among minorities make rate comparisons problematic from year to year. Of these cases, 21 (8.6 percent) had manifestations of STSS. Prior to 2007, confirmed cases of STSS were not included in the annual report; however, these most severe cases of GAS have been incorporated in the data and are included in the five-year reporting totals.

*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates as of July 1, 2017, obtained on July 10, 2018.

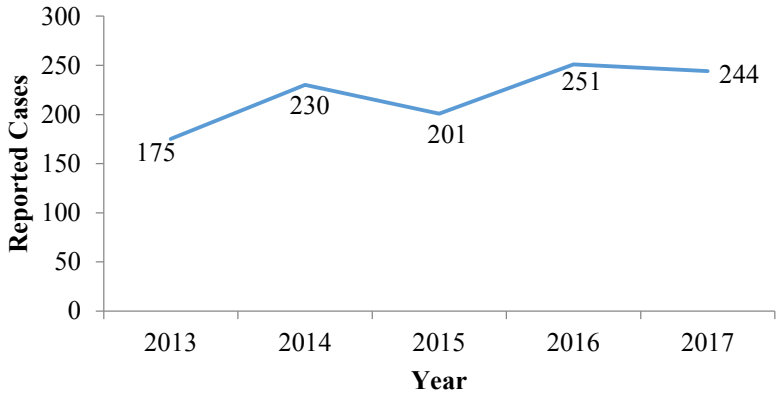
+ Rates based on fewer than 20 occurrences are considered statistically unstable and should not be compared.

Table 1: Group A *Streptococcus* Case Rates by Race and Sex – Indiana, 2017*+

	Cases	Rate	2013-2017 Total
Race			
White	177	3.11	799
Black	37	5.69	125
Other	10	3.07	44
Unknown	20	-	133
Sex			
Male	132	4.02	526
Female	112	3.31	575
Unknown	0	-	0
Total	244		1,101

Figure 1 shows reported cases by year for the five-year reporting period 2013-2017.

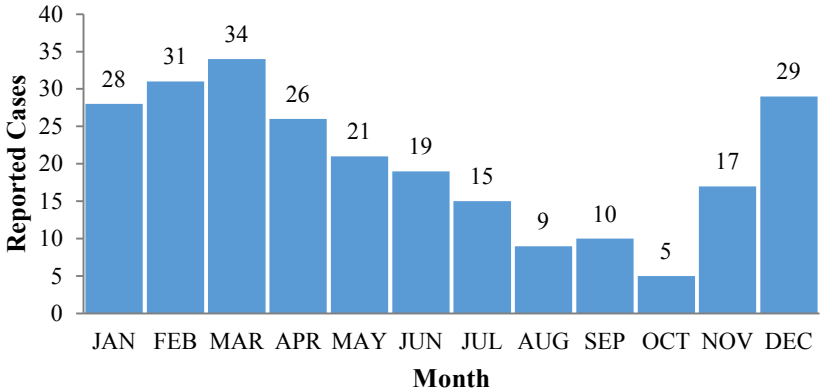
Figure 1: Group A *Streptococcus* Cases by Year – Indiana, 2013-2017□



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

In 2017, the incidence of invasive GAS peaked in the late winter and spring, as shown in Figure 2.

Figure 2: Group A *Streptococcus* Cases by Month – Indiana, 2017

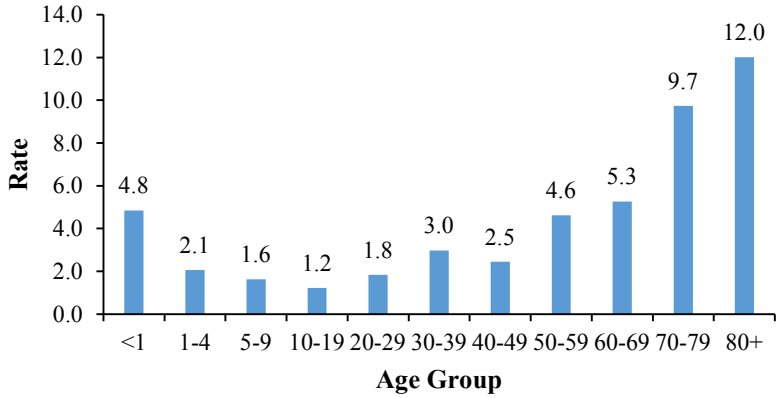


*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates as of July 1, 2017, obtained on July 10, 2018.

+ Rates based on fewer than 20 occurrences are considered statistically 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 older than 80 (12.0), followed by adults 70-79 years of age (9.7).

Figure 3: Group A *Streptococcus* Incidence Rates by Age Group – Indiana, 2017*+□



□ 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, 2017*+

County	Cases	Rate
Boone	5	7.6
Elkhart	14	6.8
Vanderburgh	12	6.6
St. Joseph	16	5.9
Marion	46	4.8

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 as of July 1, 2017, obtained on July 10, 2018.

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

VARICELLA

2017 CASE TOTAL: 236
2016 CASE TOTAL: 209

2017 INCIDENCE RATE: 3.54 per 100,000
2016 INCIDENCE RATE: 3.15 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 2017, with 176 cases of varicella reported in children younger than 18 (rate of 11.19 per 100,000 population).

EPIDEMIOLOGY

In 2017, 236 cases of varicella were reported in Indiana. Ten of these cases were hospitalized with no reported deaths. The incidence rate of varicella was 3.54 cases per 100,000 population (Table 1). The rate of varicella disease was higher in other races (7.67) than either whites (2.53) or blacks (2.31). A slightly higher rate was observed in males (3.42) than in females (2.78). The rate of hospitalizations was 0.06 per 100,000 populations, similar to 2016 (0.05 per 100,000).

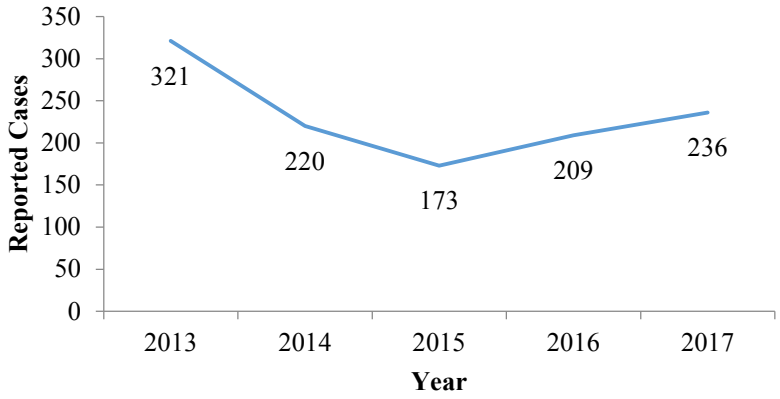
Table 1: Varicella Case Rates by Race and Sex – Indiana, 2017[*+]

	Cases	Rate	2013-2017 Total
Race			
White	144	2.53	795
Black	15	2.31	65
Other	25	7.67	90
Unknown	52	-	209
Sex			
Male	112	3.41	612
Female	122	3.61	544
Unknown	2	-	3
Total	236		1,159

[*]All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates as of July 1, 2017, obtained on July 10, 2018.
[+] Rates based on fewer than 20 occurrences are considered statistically unstable and should not be compared.

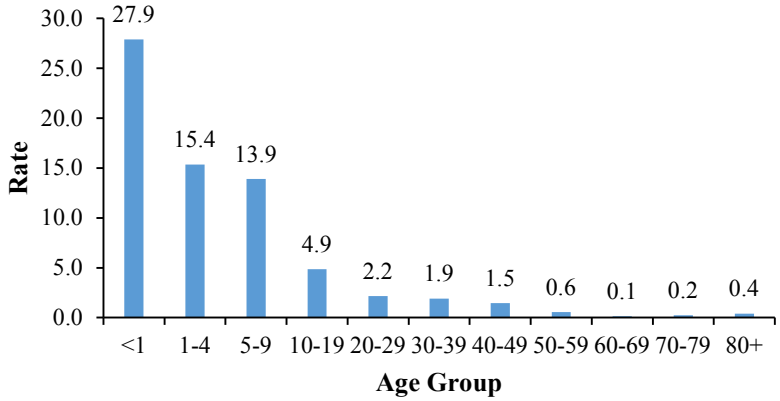
Figure 1 shows total reported varicella cases by year from 2013 to 2017.

Figure 1: Varicella Cases by Year – Indiana, 2013-2017



Incidence of varicella varies considerably with age. In 2017, the highest varicella incidence rate occurred in children younger than 1 year at 27.9 cases per 100,000 population, followed by children ages 1-4 (incidence of 15.4 cases 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, 2017*+



The total number of cases was highest in August and September 2017 (30 and 32 cases, respectively) and lowest in February (6 cases), March (12 cases), and December (7 cases). Typically, the number of cases tends to be higher throughout the fall and spring, corresponding roughly with the timing of the school year, which is a characteristic pattern for varicella (Figure 3). Many varicella cases are first identified by vigilant school nurses, suggesting that case reports might be artificially low during the summer months when school is not in session.

*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates as of July 1, 2017, obtained on July 10, 2018.

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Figure 3: Varicella Case by Month – Indiana, 2017

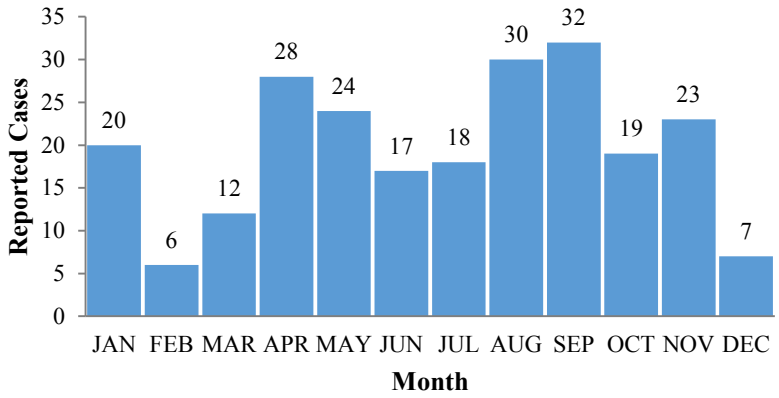
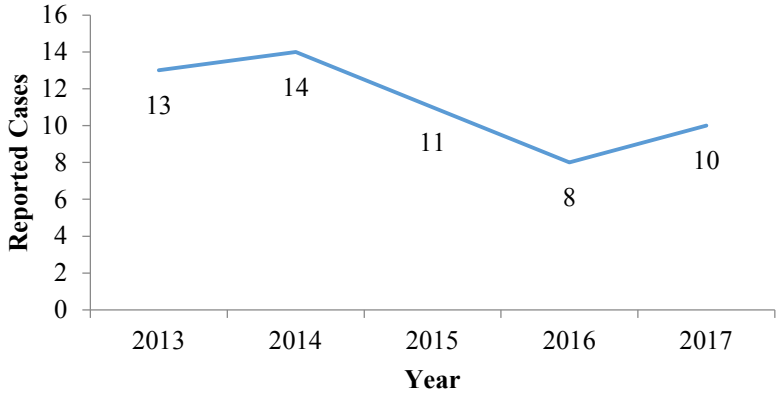


Figure 4 shows reported hospitalized cases by year from 2013 to 2017, the number of which has remained steady since 2013 with further decrease within the last two years.

Figure 4: Varicella Hospitalization Cases by Year – Indiana, 2013-2017



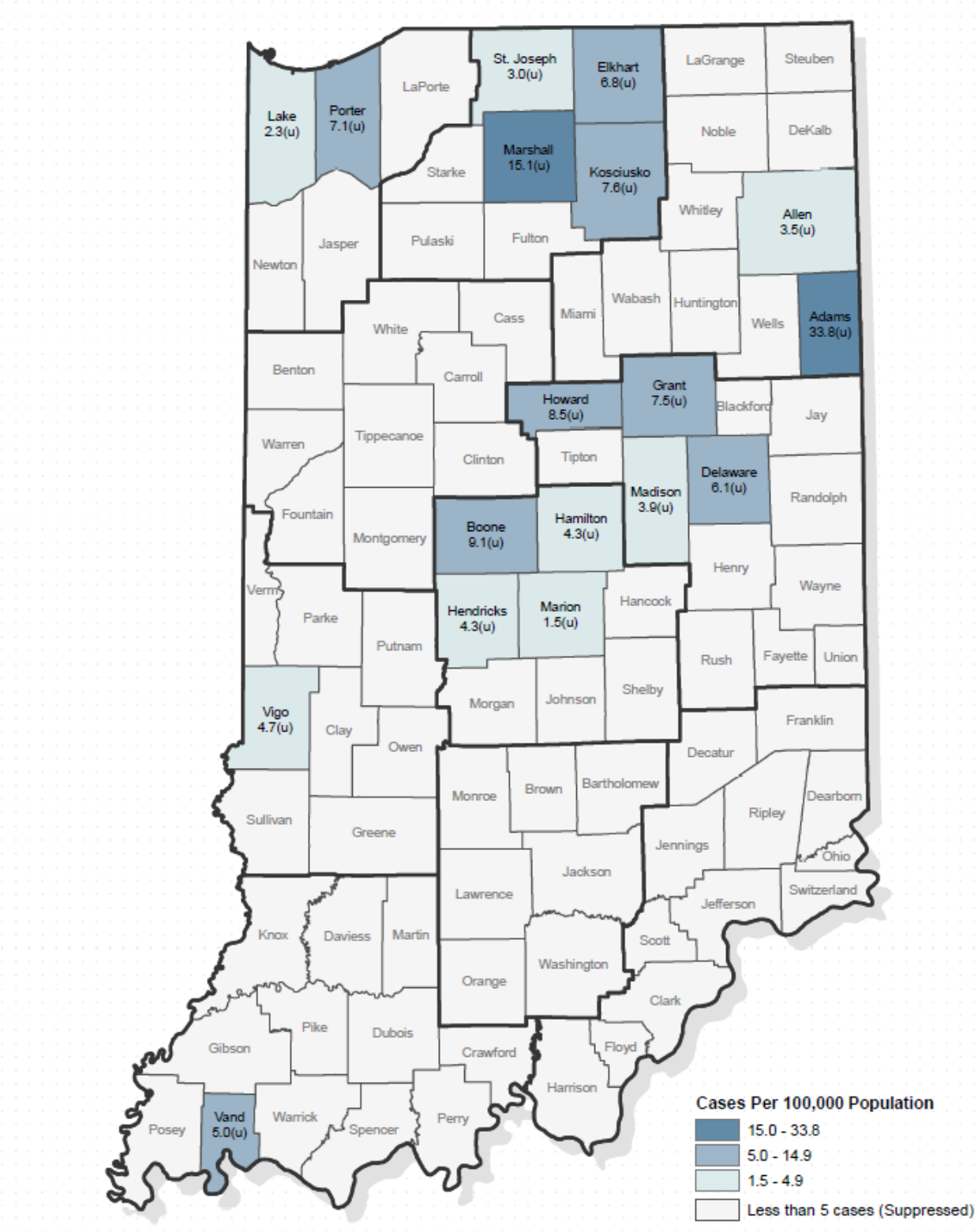
In 2017, 62 counties reported at least one case, and 18 counties reported five or more cases of varicella (Figure 5, next page). Among counties reporting five or more cases during the year, incidence rates were highest in Adams (33.8) and Marshall (15.1) Counties.

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 as of July 1, 2017, obtained on July 10, 2018.
+ Rates based on fewer than 20 occurrences are considered statistically unstable and should not be compared.

Figure 5: Varicella Incidence Rates by County – Indiana, 2017*+



*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates as of July 1, 2017, obtained on July 10, 2018.

+ Rates based on fewer than 20 occurrences are considered statistically 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 healthcare 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

Healthcare 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*

2017 CASE TOTAL: 293
2016 CASE TOTAL: 355

2017 INCIDENCE RATE: 4.39 per 100,000
2016 INCIDENCE RATE: 5.35 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, so accurate yearly counts are unavailable.

In 2017, 293 confirmed cases of CP-CRE were reported in Indiana, for a rate of 4.39 cases per 100,000 population (Table 1). Females (4.67) were slightly more likely to be reported with CP-CRE than males (4.11). The rate among blacks (11.08) was greater than among whites (2.74) or other races (7.47), while 40 cases did not report race data.

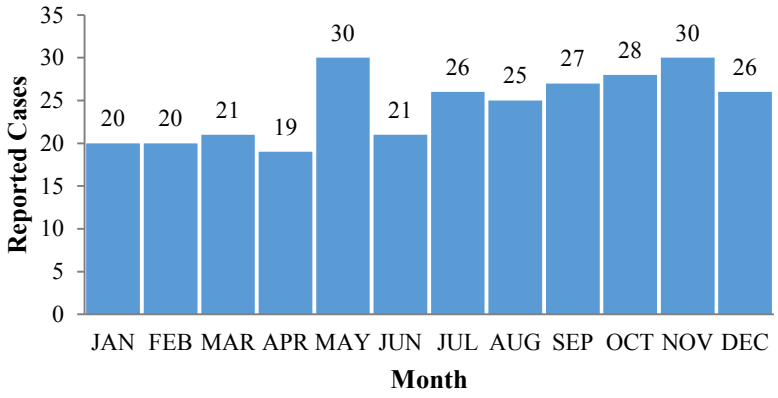
Table 1: CP-CRE Case Rates by Race and Sex – Indiana, 2017[*+]

	Cases	Rate	2013-2017 Total
Race			
White	156	2.74	363
Black	72	11.08	157
Other	25	7.67	50
Unknown	40	-	92
Sex			
Male	135	4.11	291
Female	158	4.67	371
Unknown	0	-	0
Total	293		662

[*]All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates as of July 1, 2017, obtained on July 10, 2018.
[+] Rates based on fewer than 20 occurrences are considered statistically unstable and should not be compared.

Cases of CP-CRE occurred year-round in 2017, but with more cases reported in the last half of the year (Figure 1).

Figure 1: CP-CRE Cases by Month – Indiana, 2017



As shown in Figure 2, age-specific rates progressively increased among the older populations with the highest incidence observed in individuals ages 80 and older (20.8).

Figure 2: CP-CRE Incidence Rates by Age Group – Indiana, 2017*+

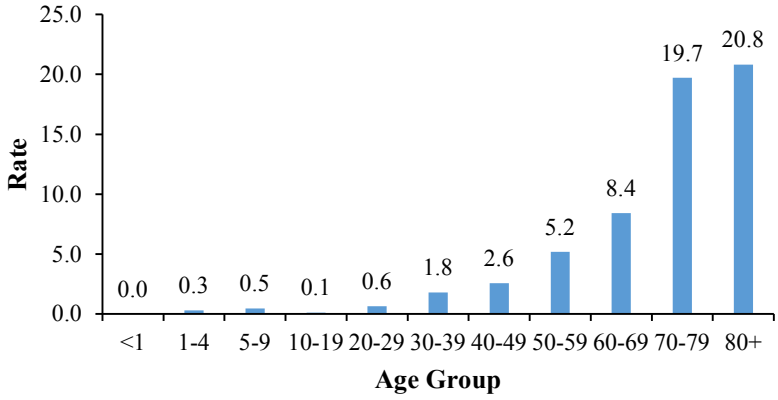


Figure 3 (next page) shows Indiana counties reporting five or more cases of CP-CRE. The incidence rate was highest in Porter County (23.2), followed by Lake County (18.3).

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 as of July 1, 2017, obtained on July 10, 2018.
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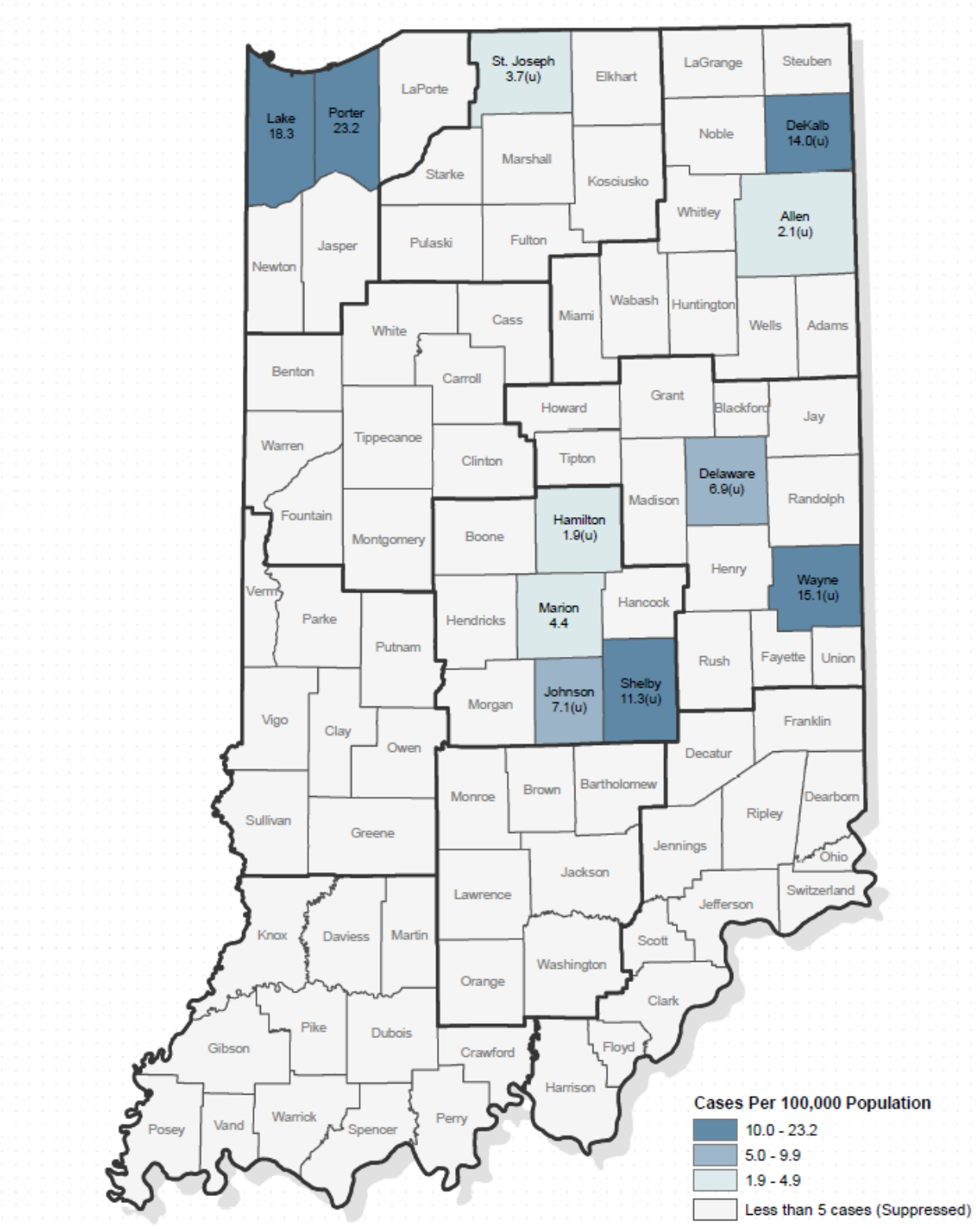
Figure 3: CP-CRE Incidence Rates by County – Indiana, 2017*+



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

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

2017 CASE TOTAL: 257
2016 CASE TOTAL: 220

2017 INCIDENCE RATE: 3.85 per 100,000
2016 INCIDENCE RATE: 3.32 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 2017, 257 confirmed cases of histoplasmosis were reported in Indiana, for an incidence rate of 3.85 cases per 100,000 population (Table 1). Females (4.38) were more likely to be reported with histoplasmosis infection than males (3.32).

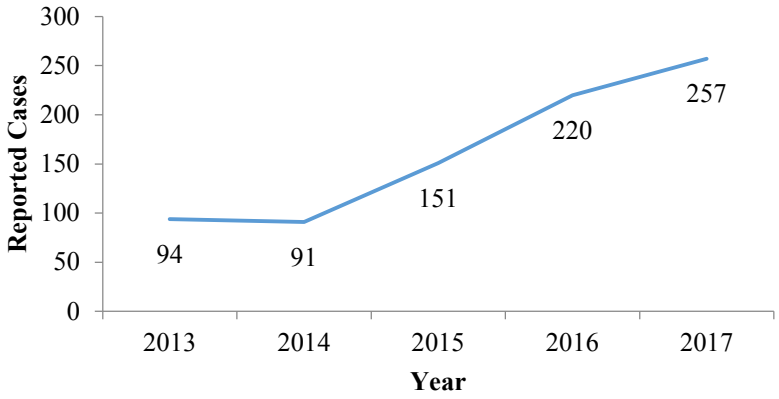
Table 1: Histoplasmosis Case Rates by Race and Sex – Indiana, 2017[*+]

	Cases	Rate	2013-2017 Total
Race			
White	139	2.44	468
Black	28	4.31	64
Other	18	5.52	41
Unknown	72	-	240
Sex			
Male	109	3.32	468
Female	148	4.38	344
Unknown	0	-	1
Total	257		813

[*]All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates as of July 1, 2017, obtained on July 10, 208.
[+] Rates based on fewer than 20 occurrences are considered statistically unstable and should not be compared.

Figure 1 illustrates the number of cases by year for 2013-2017.

Figure 1: Histoplasmosis Cases by Year – Indiana, 2013-2017



Histoplasmosis occurred throughout the year in 2017, with the largest number of cases occurring in April (Figure 2).

Figure 2: Histoplasmosis Cases by Month – Indiana, 2017

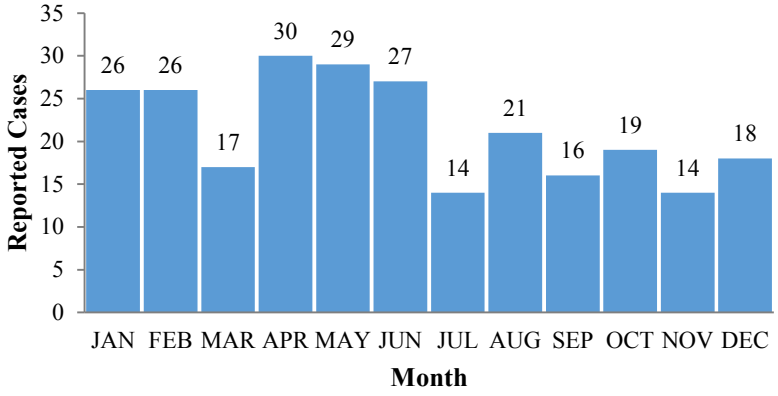
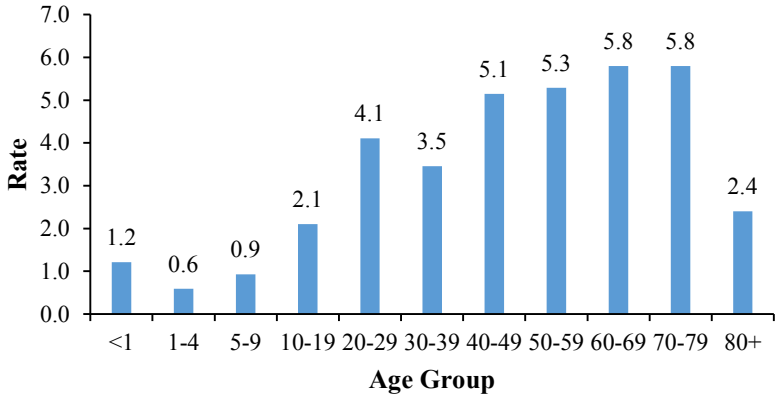


Figure 3 shows the distribution of cases by age group. Age-specific rates were greatest among adults ages 70 to 79 years (5.8) and 60 to 69 years (5.8) closely followed by adults ages 50 to 59 (5.3).

Figure 3: Histoplasmosis Incidence Rates by Age Group – Indiana, 2017*+



*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates as of July 1, 2017, obtained on July 10, 208.

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

HISTOPLASMOSIS

In 2017, 63 counties in Indiana reported at least one case of histoplasmosis. Table 2 shows the counties with the highest disease incidence rates of histoplasmosis in 2017. Incidence rates were highest among the following counties reporting five or more cases: Bartholomew (11.0), Howard (9.7), Morgan (7.2), Hancock (6.7) and Kosciusko (6.3).

Table 2: Histoplasmosis Incidence Rates by County – Indiana, 2017*+

County	Cases	Rate
Bartholomew	9	11.0
Howard	8	9.7
Morgan	5	7.2
Hancock	5	6.7
Kosciusko	5	6.3

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 as of July 1, 2017, obtained on July 10, 208.
+ Rates based on fewer than 20 occurrences are considered statistically unstable and should not be compared.

INFLUENZA-ASSOCIATED DEATHS

2017 CASE TOTAL: 130
2016 CASE TOTAL: 73

2017 INCIDENCE RATE: 1.95 per 100,000
2016 INCIDENCE RATE: 1.10 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 2017, 130 confirmed cases of influenza-associated death were reported in Indiana, for an incidence rate of 1.95 cases per 100,000 population (Table 1). Females (2.01) were slightly more likely to be reported as an influenza-associated death than females (1.89).

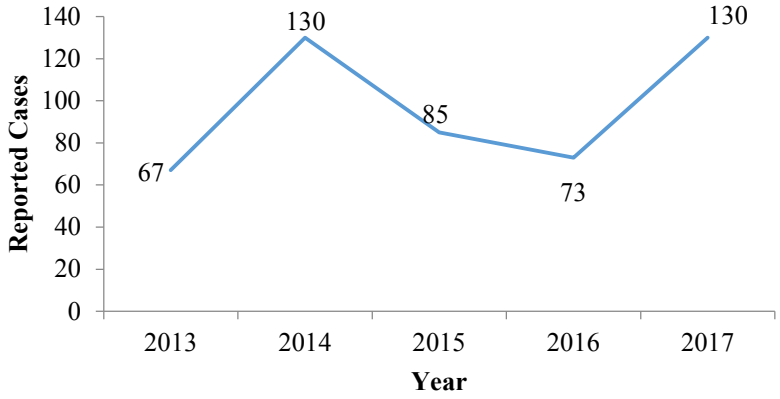
Table 1: Influenza-Associated Death Case Rates by Race and Sex – Indiana, 2017[*+]

	Cases	Rate	2013-2017 Total
Race			
White	117	2.06	390
Black	8	1.23	42
Other	0	-	11
Unknown	5	-	42
Sex			
Male	62	1.89	232
Female	68	2.01	252
Unknown	0	-	1
Total	130		485

[*]All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates as of July 1, 2017, obtained on July 10, 2018.
[+] Rates based on fewer than 20 occurrences are considered statistically unstable and should not be compared.

Figure 1 illustrates the number of cases by year for 2013-2017.

Figure 1: Influenza-Associated Death Cases by Year – Indiana, 2013-2017



In 2017, influenza-associated deaths occurred throughout the normal flu season months of October through May. The largest number of cases occurred during the month of March. (Figure 2).

Figure 2: Influenza-Associated Death Cases by Month – Indiana, 2017

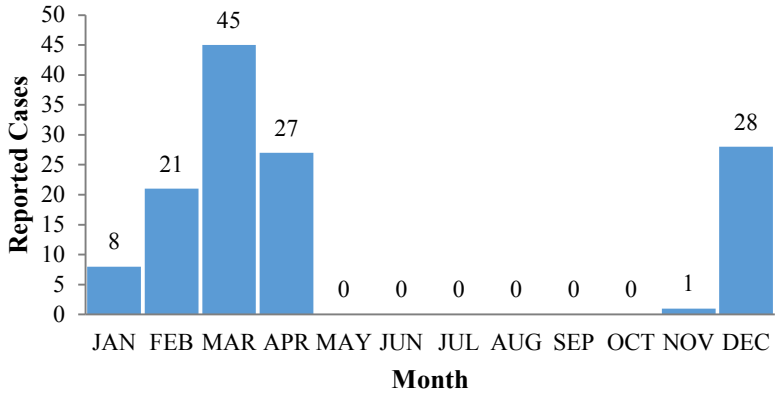
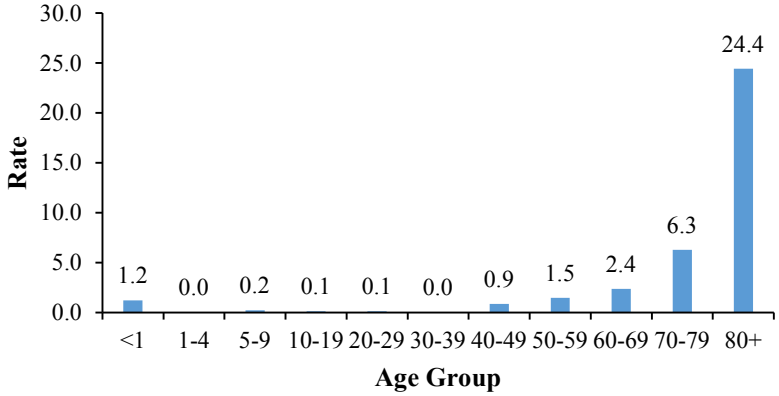


Figure 3 shows the distribution of cases by age group. Age-specific rates were greatest among adults aged 80+ (24.4) closely followed by adults aged 70-79 (6.3).

*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates as of July 1, 2017, obtained on July 10, 2018.

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

Figure 3: Influenza-Associated Death Incidence Rates by Age Group – Indiana, 2017*+



In 2017, 46 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 2017. Incidence rates were highest among the following counties reporting five or more cases: Shelby (11.3), Noble (10.5), LaPorte (5.5), Allen (4.0) and Tippecanoe (3.1).

Table 2: Influenza-Associated Death Incidence Rates by County – Indiana, 2017*+

County	Cases	Rate
Shelby	5	11.3
Noble	5	10.5
LaPorte	6	5.5
Allen	15	4.0
Tippecanoe	6	3.1

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 as of July 1, 2017, obtained on July 10, 2018.
+ Rates based on fewer than 20 occurrences are considered statistically unstable and should not be compared.

VECTORBORNE AND ZOONOTIC DISEASES & CONDITIONS

INCLUDES: Animal bites, anthrax, arboviral encephalitis, babesiosis, brucellosis, bhikungunya, 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

2017 CASE TOTAL: 7,532
2016 CASE TOTAL: 7,811

2017 INCIDENCE RATE: 112.98 per 100,000
2016 INCIDENCE RATE: 117.74 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.

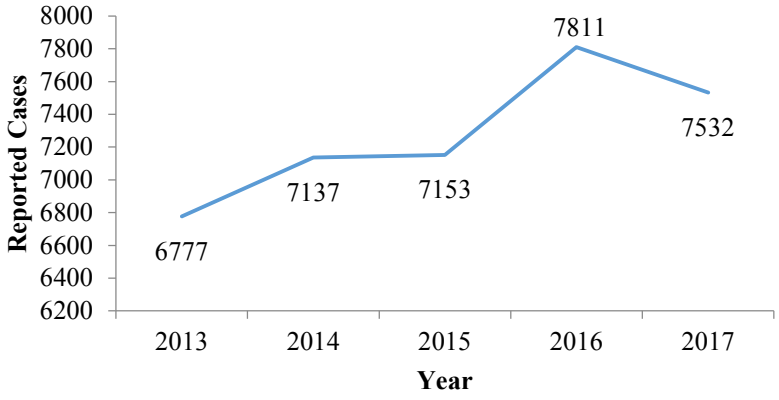
After an animal bite is reported to public health officials, the biting animal will be either quarantined for 10 days to observe for signs of rabies or submitted to the ISDH Rabies Laboratory for diagnostic testing. Post-exposure prophylaxis to prevent rabies may be recommended for the exposed person 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 2017 calendar year, 7,532 animal bite cases were reported in Indiana. This is a slight decrease from the previous year (Figure 1).

Figure 1: Animal Bites Cases by Year – Indiana, 2013-2017

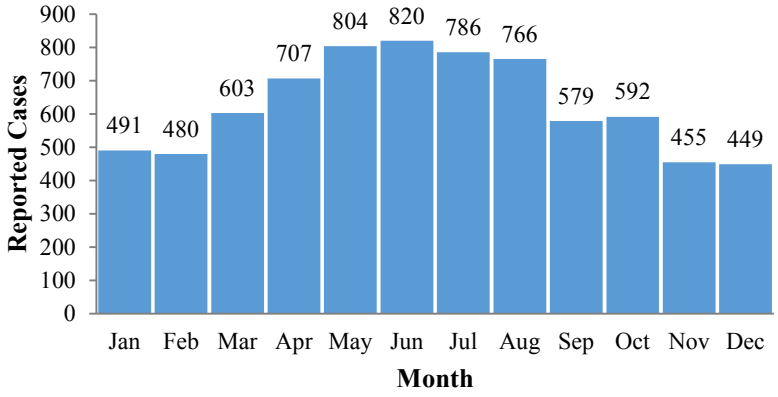


*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates as of July 1, 2017, obtained on July 10, 2018.

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

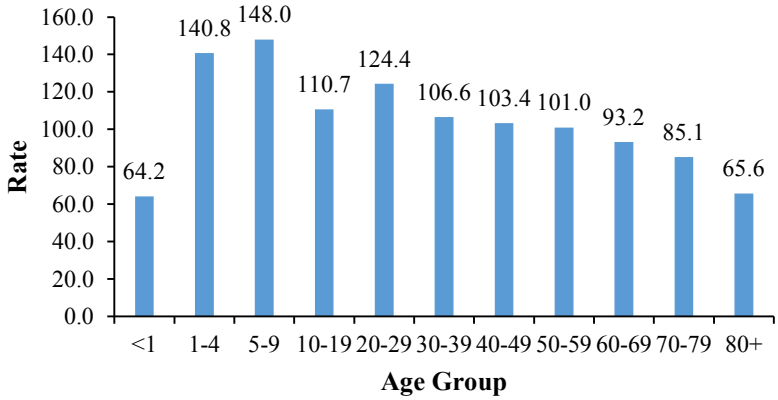
Animal bites occurred at all times of the year but were most common in the spring and summer months (Figure 2).

Figure 2: Animal Bites Cases by Month – Indiana, 2017



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

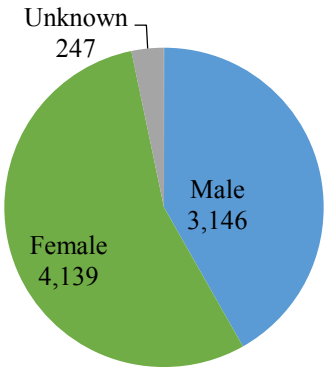
Figure 3: Animal Bites Incidence Rates by Age Group – Indiana, 2017*+□



+Missing age group for 337 cases

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

Figure 4: Animal Bites by Gender of Victim – Indiana, 2017



*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates as of July 1, 2017, obtained on July 10, 2018.

+ Rates based on fewer than 20 occurrences are considered statistically 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, 2017

Type of Animal	Number	Percent
Dog	5,721	76%
Cat	1,391	18%
Bat	205	3%
Raccoon	51	<1%
Squirrel	29	<1%
Other	135	2%
Total	7,532	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, 2017

	Dogs		Cats		Dogs and Cats	
	Number	Percent	Number	Percent	Number	Percent
Spayed or neutered	1,768	25%	461	7%	2,229	31%
Not spayed or neutered	1,098	15%	214	3%	1,312	19%
Unknown	2,855	40%	716	10%	3,571	50%
Total	**5,721**	**80%**	**1,391**	**20%**	**7,112**	**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, 2017

	Dogs		Cats		Dogs and Cats	
	Number	Percent	Number	Percent	Number	Percent
Vaccinated	2,416	34%	434	6%	2,773	40%
Not vaccinated	655	9%	260	4%	958	13%
Unknown	2,650	37%	697	10%	3,679	47%
Total	**5,721**	**80%**	**1,391**	**20%**	**7,112**	**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 as of July 1, 2017, obtained on July 10, 2018.
+ Rates based on fewer than 20 occurrences are considered statistically unstable and should not be compared.

EHRLICHIOSIS

2017 CASE TOTAL: 39
2016 CASE TOTAL: 24

2017 INCIDENCE RATE: 0.58 per 100,000
2016 INCIDENCE RATE: 0.36 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

Thirty-nine confirmed and probable cases of ehrlichiosis were reported in 2017 in Indiana. From 2013 to 2017, 180 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, 2013-2017[*+]

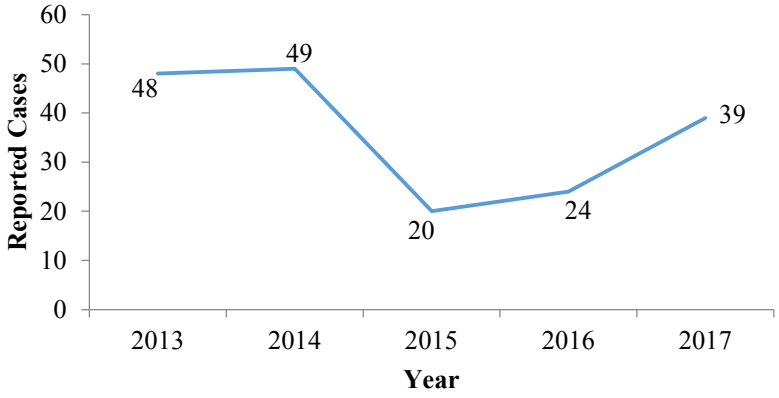
	Cases	Rate	2013-2017 Total
Race			
White	25	0.44	135
Black	0	-	3
Other	1	0.31	1
Unknown	13	-	41
Sex			
Male	24	0.73	106
Female	15	0.44	74
Unknown	0	-	0
Total	39		180

[*]All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates as of July 1, 2017, obtained on July 10, 2018.
[+] Rates based on fewer than 20 occurrences are considered statistically unstable and should not be compared.

EHRLICHIOSIS

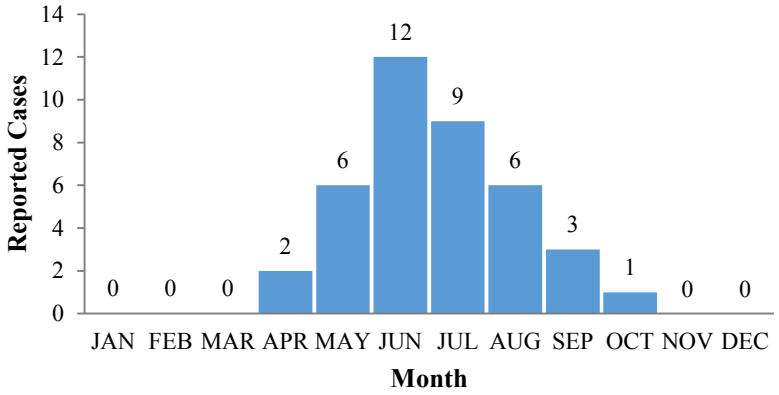
The number of reported cases of ehrlichiosis in Indiana has increased steadily in recent years but dropped in 2015 with a slight increase in 2016 and 2017 (Figure 1).

Figure 1: Ehrlichiosis Cases by Year – Indiana, 2013-2017



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, 2017



In 2017, 22 counties had at least one case of ehrlichiosis; however, none had counts greater than five.

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 as of July 1, 2017, obtained on July 10, 2018.

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

LYME DISEASE

2017 CASE TOTAL: 143
2016 CASE TOTAL: 154

2017 INCIDENCE RATE: 2.14 per 100,000
2016 INCIDENCE RATE: 2.32 per 100,000

LYME DISEASE is caused by the bacterium *Borrelia burgdorferi* and is the most commonly diagnosed tick-borne disease in the United States. 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 2017, 143 cases of Lyme disease were reported in Indiana, for a rate of 2.14 cases per 100,000 population. For the five-year reporting period from 2013 to 2017, 660 cases of Lyme disease were reported.

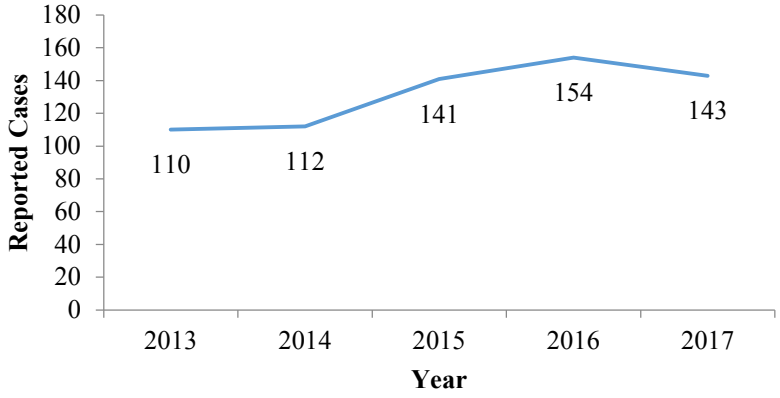
Table 1: Lyme Disease Case Rates by Race and Sex – Indiana, 2013-2017[*+]

	Cases	Rate	2013-2017 Total
Race			
White	87	1.53	390
Black	0	-	3
Other	18	5.52	35
Unknown	38	-	232
Sex			
Male	81	2.46	379
Female	62	1.83	281
Unknown	0	-	0
Total	143		660

[*]All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates as of July 1, 2017, obtained on July 10, 2018.

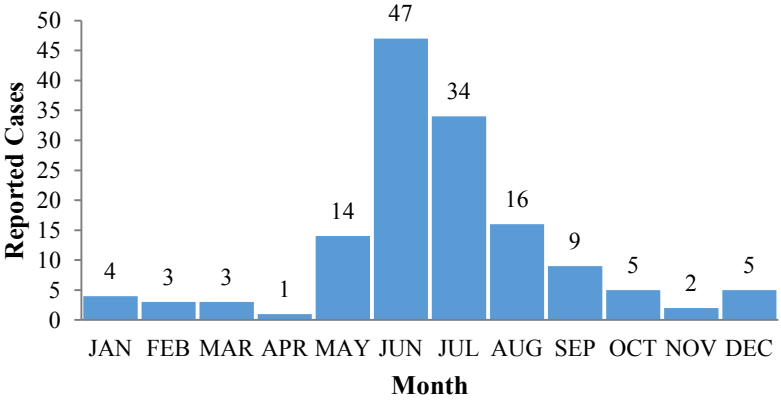
[+] Rates based on fewer than 20 occurrences are considered statistically unstable and should not be compared.

Figure 1: Lyme Disease Cases by Year – Indiana, 2013-2017



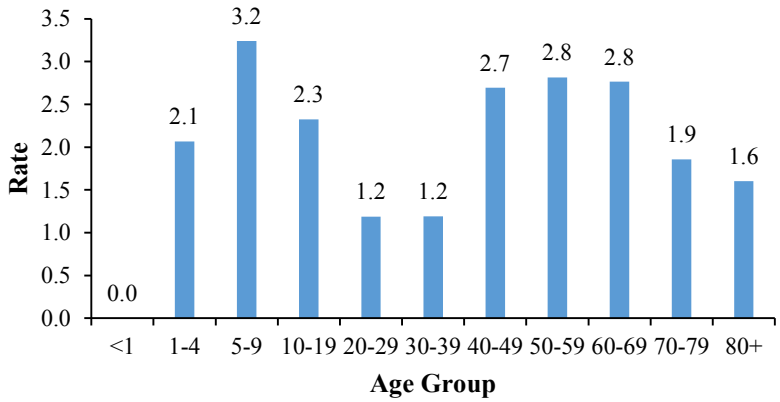
While the disease is most common in the spring and summer months when ticks are active, Lyme disease can occur anytime during the year (Figure 2).

Figure 2: Lyme Disease Cases by Month – Indiana, 2017



Reported cases of Lyme disease in Indiana are most common among boys aged 5-9, which is consistent with the national trend (Figure 3).

Figure 3: Lyme Disease Incidence Rates by Age Group – Indiana, 2017*+



*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates as of July 1, 2017, obtained on July 10, 2018.

+ Rates based on fewer than 20 occurrences are considered statistically 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 (next page) depicts cases of Lyme disease by county of residence. Figure 5 (page 87) 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.

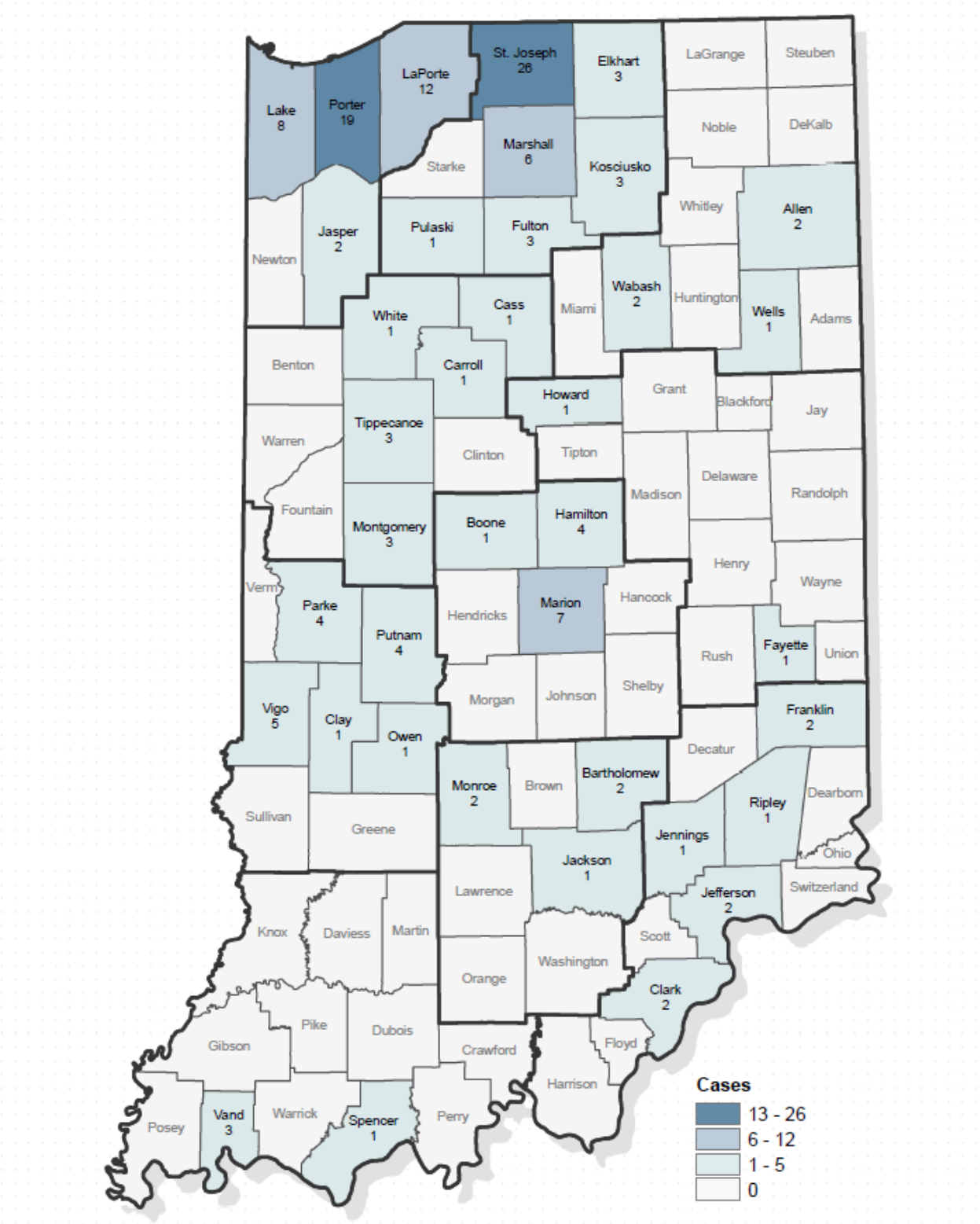
LEARN MORE

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 as of July 1, 2017, obtained on July 10, 2018.

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

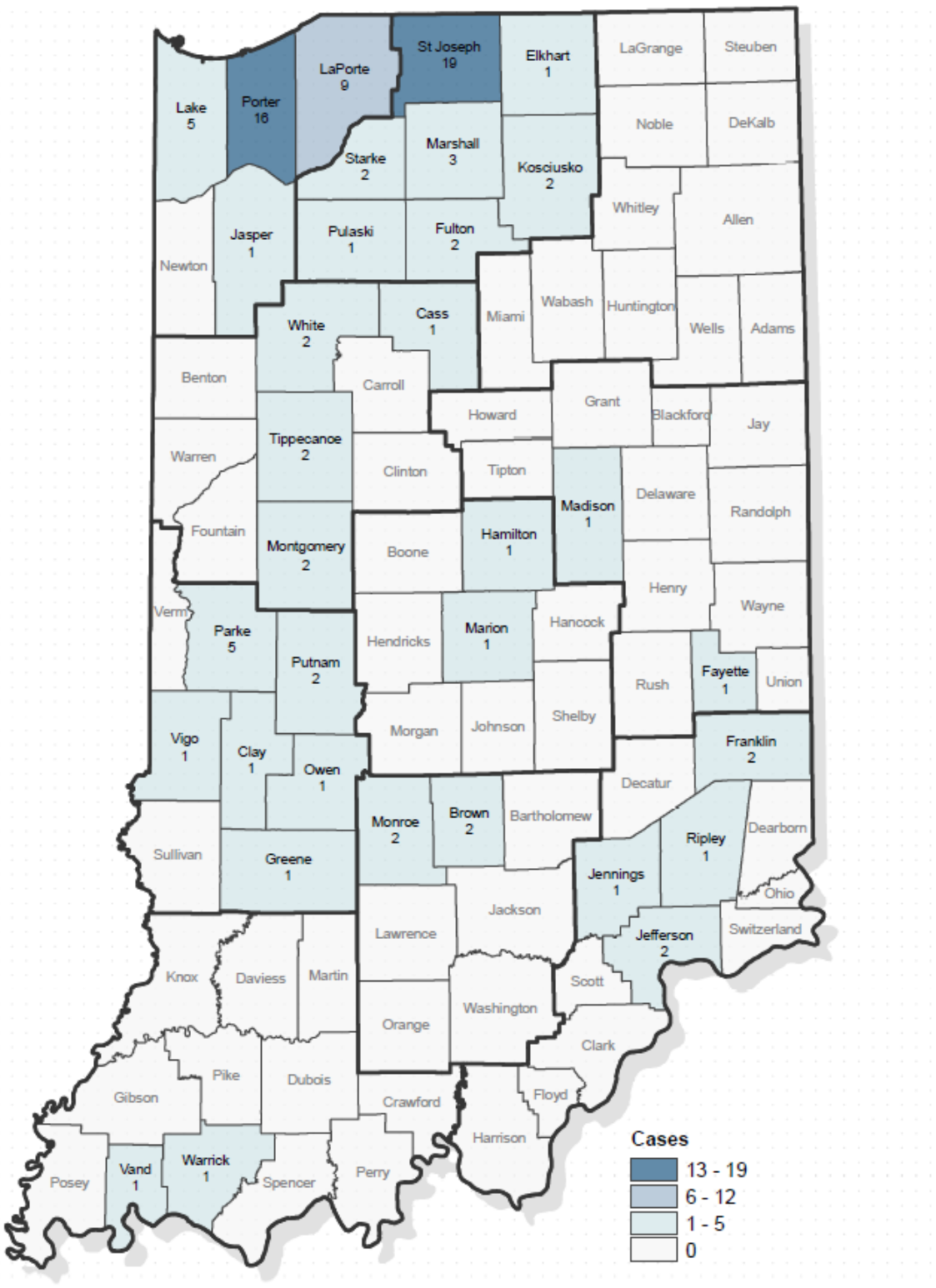
Figure 4: Lyme Disease Counts by County – Indiana, 2017*+



*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates as of July 1, 2017, obtained on July 10, 2018.

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

Figure 5: Lyme Disease Counts by County of Likely Exposure – Indiana, 2017*+\



*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates as of July 1, 2017, obtained on July 10, 2018.

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

MALARIA

2016 CASE TOTAL: 18
2015 CASE TOTAL: 17

2016 INCIDENCE RATE: 0.27 per 100,000
2015 INCIDENCE RATE: 0.26 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 United States, 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 healthcare provider.

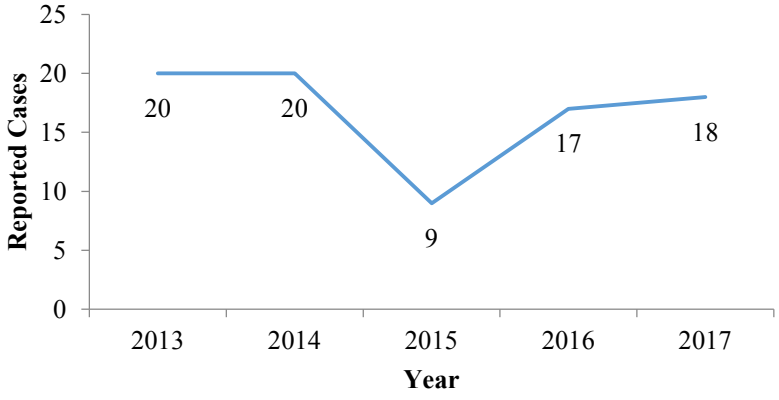
HEALTHY PEOPLE 2020 GOAL

The Healthy People 2020 goal for malaria is to reduce the number of cases reported in the United States to 999. Malaria is one of three diseases that account for a large proportion of illness and disability for international travelers. In 2015, 1,390 new cases of malaria were reported in the United States for a rate of 0.43 per 100,000 population.

EPIDEMIOLOGY

In 2017, 18 cases of malaria were reported in Indiana. A total of 85 cases of malaria were reported during the five-year reporting period from 2013 to 2017 (Figure 1). All were acquired outside the United States. Countries of exposure included India, Malawi, Mozambique, Nigeria, Rwanda, Senegal, South Africa, South Sudan, Uganda and Zambia.

Figure 1: Malaria Cases by Year – Indiana, 2013-2017



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 as of July 1, 2016, obtained on June 30, 2017.

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

RABIES

2017 CASE TOTAL: 0
2016 CASE TOTAL: 0

2017 INCIDENCE RATE: N/A
2016 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 United States, 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 2017, 1,168 animals of various species were tested for rabies in Indiana, and 14 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 1-3 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.

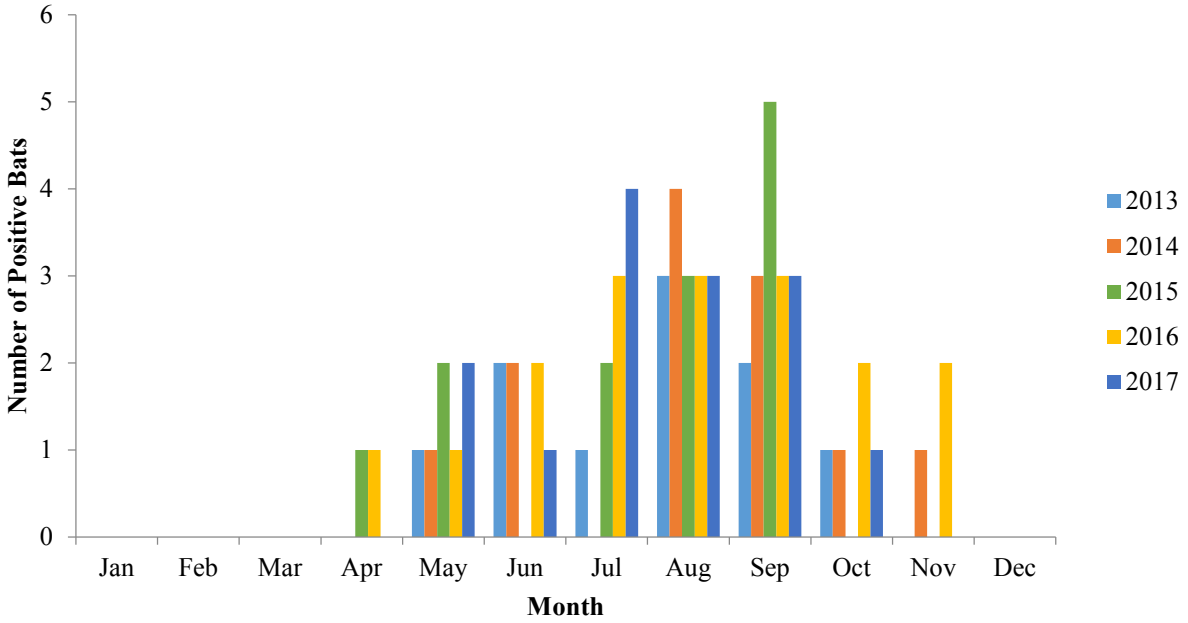
EPIDEMIOLOGY

Rabies is a rare disease of humans in the United States; no human cases were reported in Indiana in 2017 or in the five-year reporting period from 2013 to 2017. 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 2017, being the only animal species found positive: 14 bats tested positive in 2017 and 66 bats tested positive from 2013 to 2017. The peak months for positive bats in 2017 were July through September (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 as of July 1, 2017, obtained on July 10, 2018.

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

Figure 1. Rabid Bats by Month of Collection – Indiana, 2013-2017



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 as of July 1, 2017, obtained on July 10, 2018.

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ROCKY MOUNTAIN SPOTTED FEVER

2017 CASE TOTAL: 94
2016 CASE TOTAL: 40

2017 INCIDENCE RATE: 1.41 per 100,000
2016 INCIDENCE RATE: 0.60 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 2017, 94 cases of Rocky Mountain spotted fever were reported in Indiana. During the five-year period from 2013 to 2017, 232 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.

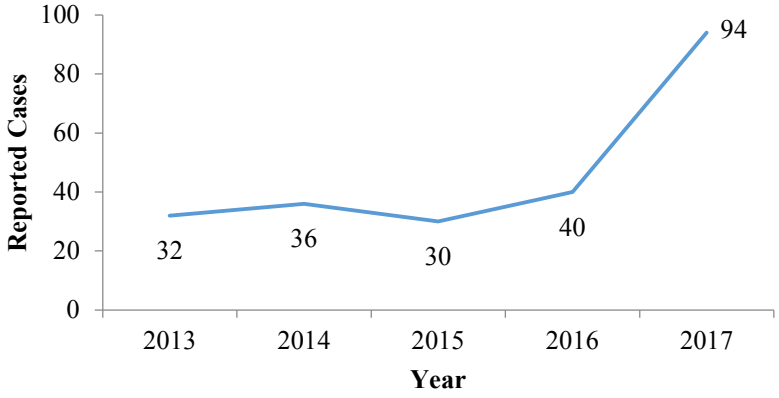
Table 1: Rocky Mountain Spotted Fever Case Rates by Race and Sex – Indiana, 2013-2017[*+]

	Cases	Rate	2013-2017 Total
Race			
White	58	1.02	152
Black	1	0.15	2
Other	4	1.23	5
Unknown	31	-	73
Sex			
Male	62	1.89	149
Female	32	0.95	82
Unknown	0	-	1
Total	94		232

[*]All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates as of July 1, 2017, obtained on July 10, 2018.

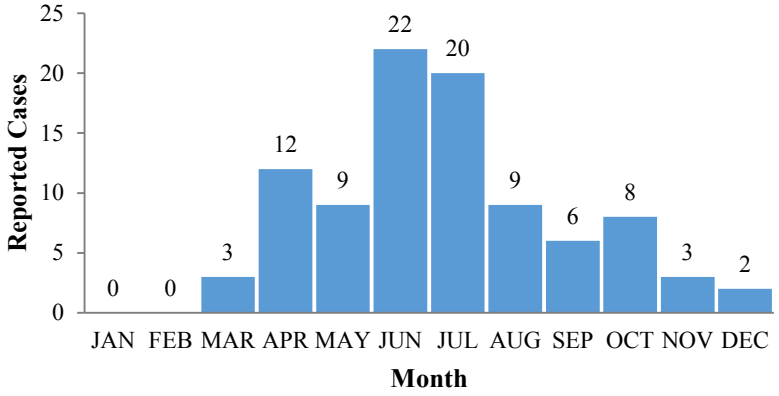
[+] Rates based on fewer than 20 occurrences are considered statistically unstable and should not be compared.

Figure 1: Rocky Mountain Spotted Fever Cases by Year – Indiana, 2013-2017



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, 2017



In 2017, 29 counties reported at least one case of RMSF with Clark County (12), Dubois County (7), Harrison County (8), Spencer County (10), Vanderburgh County (5), and Warrick County (9) having five cases or more (Figure 3, next page).

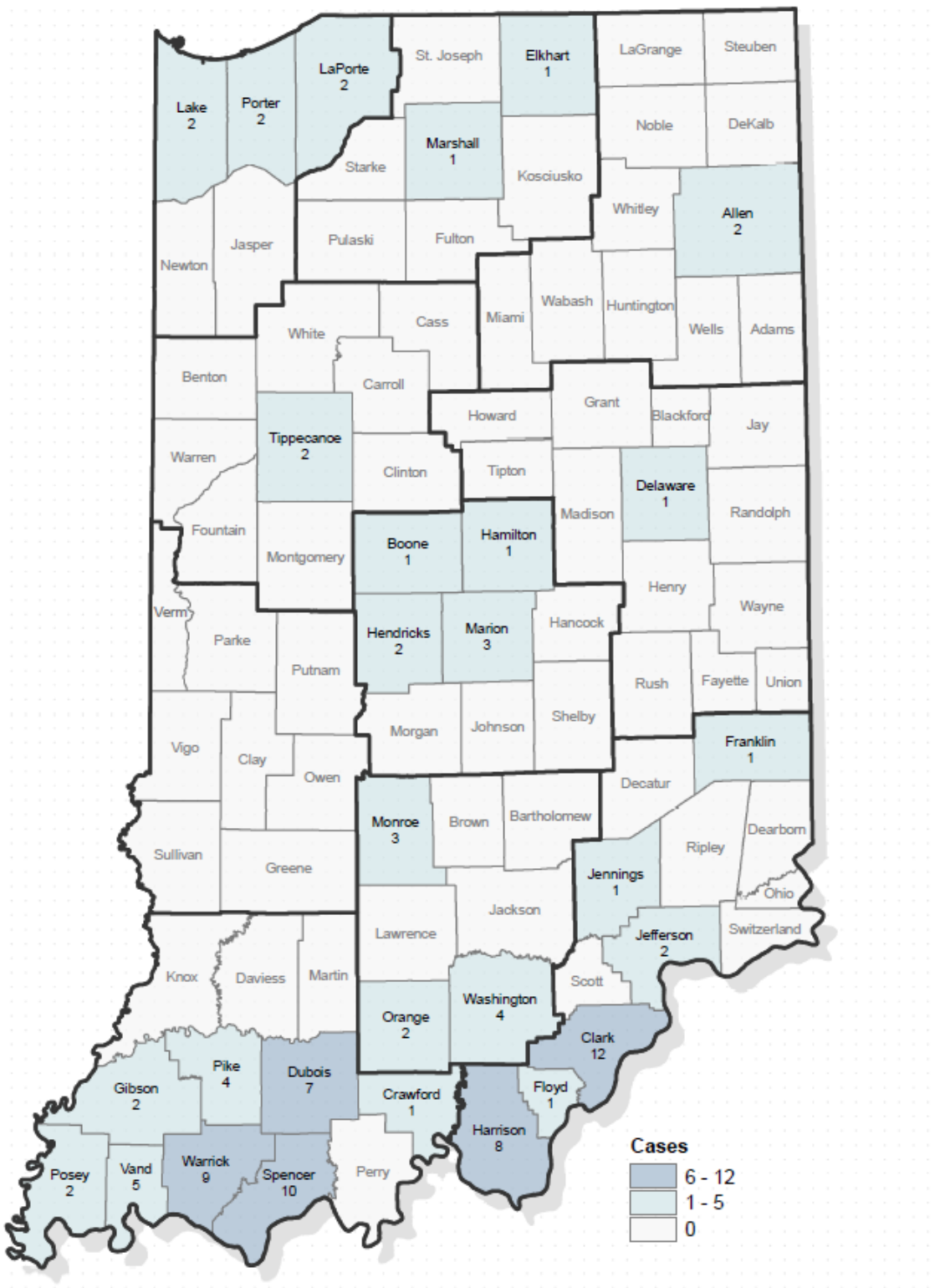
LEARN MORE

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 as of July 1, 2017, obtained on July 10, 2018.

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

Figure 3: Rocky Mountain Spotted Fever Counts by County – Indiana, 2017*+



*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates as of July 1, 2017, obtained on July 10, 2018.

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

2017 CASE TOTAL: 26
2016 CASE TOTAL: 18

2017 INCIDENCE RATE: 0.39 per 100,000
2016 INCIDENCE RATE: 0.27 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. Fewer 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 2017, Indiana reported 26 cases of WNV with four deaths. In the five-year reporting period from 2013 to 2017, 99 human cases of WNV, including 11 deaths, were reported (Table 1). Cases of WNV disease occur throughout the state.

Table 1: WNV Human Cases and Deaths – Indiana, 2013-2017

	Cases	Neuroinvasive Disease	Non-Neuroinvasive Disease	Deaths
2017	26	18	8	4
2016	18	15	3	2
2015	21	16	5	3
2014	10	9	1	0
2013	24	19	4	2
Five-year total	98	71	27	15

In 2017, mosquito samples were collected from 92 Indiana counties; a total of 174,241 mosquitoes divided into 2,945 pools were tested for WNV. In 2017, 649 pools collected from 90 different counties tested positive for WNV (Table 2).

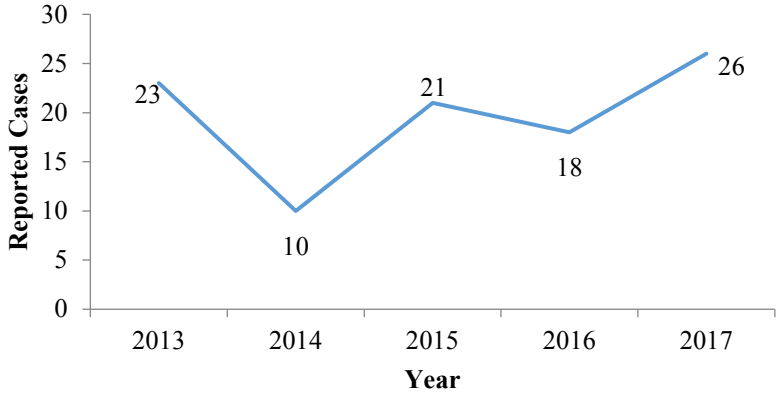
*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates as of July 1, 2016, obtained on June 30, 2017.
+ Rates based on fewer than 20 occurrences are considered statistically unstable and should not be compared.

Table 2: WNV Positive Mosquitoes – Indiana, 2017

	2017
Number of mosquitoes collected	174,241
Number of pools tested	2,945
WNV positive pools	649
Percent positivity of pools	22%
Number of counties with WNV-positive mosquitoes	90

Figure 1 shows reported cases by year from 2013 to 2017.

Figure 1: WNV Cases by Year – Indiana, 2013-2017



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, 2017

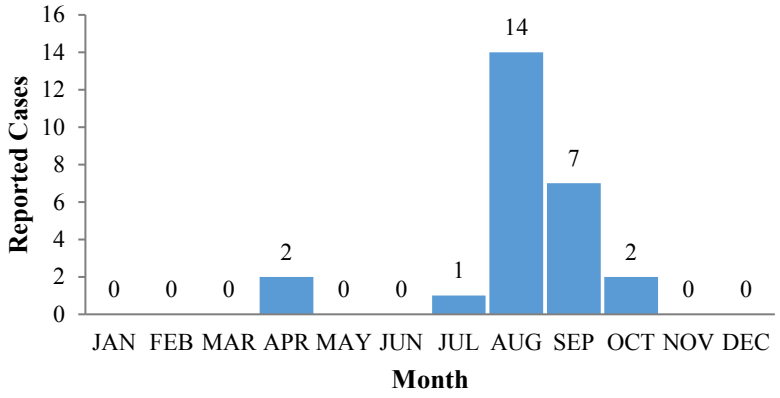


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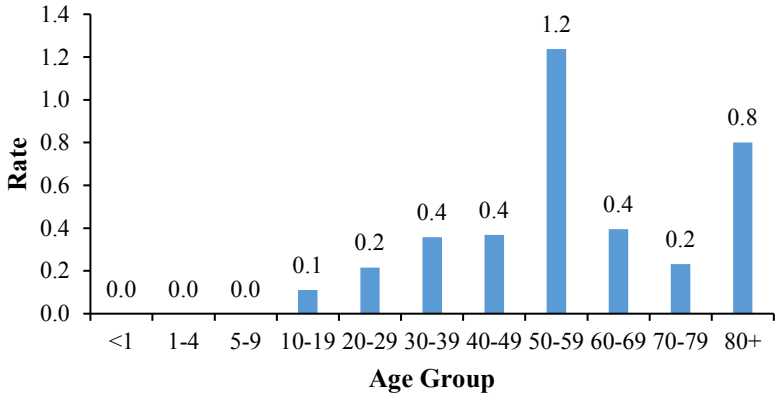
Figure 3 shows the incidence of WNV by age group. People older than age 50 are known to be at higher risk of WNV-associated neuroinvasive disease.

Figure 3: WNV Incidence Rates by Age Group – Indiana, 2017*+



In 2017, 19 counties reported at least one case of WNV with no county 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 as of July 1, 2016, obtained on June 30, 2017.

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

ZIKA VIRUS

2017 CASE TOTAL: 3
2016 CASE TOTAL: 49

2017 INCIDENCE RATE: 0.04 per 100,000
2016 INCIDENCE RATE: 0.74 per 100,000

ZIKA VIRUS DISEASE (ZIKA) is caused by a single-stranded RNA virus of the *Flaviviridae* family. The virus occurs in tropical and subtropical areas of the world. The primary vector, the *Aedes aegypti* mosquito, is rarely seen in Indiana. However, another competent vector, *Aedes albopictus*, is present in several of Indiana's counties, most predominantly in the southern part of the state. Zika is found in the same parts of the world, is transmitted by the same mosquito species, and has some clinical similarities to dengue virus and chikungunya virus.

CLINICAL AND PUBLIC HEALTH SIGNIFICANCE

Symptoms of Zika occur within 14 days after exposure. The most common symptoms of Zika are fever, rash, headache, joint pain, conjunctivitis, and muscle pain. Zika is usually mild with symptoms lasting several days to a week, although many people infected with Zika do not develop symptoms. There is no vaccine to prevent or medicine to treat Zika.

Zika virus is primarily spread through mosquito bites. Zika virus also can be spread from an infected person to his/her sex partner before symptoms start, while symptomatic and after symptoms end. Zika also can be passed from an infected pregnant woman to her fetus during pregnancy or around the time of birth. Zika is a cause of microcephaly and other severe fetal brain and eye defects. For this reason, the CDC recommends that pregnant women should not travel to areas with documented or likely Zika virus transmission. Zika virus also may be introduced into new areas by travelers who become infected while visiting tropical areas where Zika is endemic.

Before 2007, at least 14 cases of Zika had been documented, although other cases were likely to have occurred and were not reported. Because the symptoms of Zika are similar to those of many other diseases, many cases may not have been recognized. Starting in early 2015, a Zika outbreak began in Brazil that spread to many countries and territories throughout the Americas, Pacific Islands and Africa. Zika continues to be a risk in multiple countries and territories, with the most updated information on "Areas with Zika" on the CDC Zika webpage.

EPIDEMIOLOGY

In 2017, three confirmed and probable cases of Zika virus disease were reported in residents of Indiana. From 2015 to 2017, 55 cases of Zika virus disease were reported in Indiana. All cases were acquired during foreign travel to tropical and subtropical areas.

LEARN MORE

http://www.cdc.gov/zika/index.html
http://wwwnc.cdc.gov/travel/diseases/zika

*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates as of July 1, 2017, obtained on July 10, 2018

+ Rates based on fewer than 20 occurrences are considered statistically 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 United States 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 two doses administered one 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 percent. 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 United States. 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

2017 CASE TOTAL (ACUTE): 170
2016 CASE TOTAL (ACUTE): 171

2017 INCIDENCE RATE: 2.55 per 100,000
2016 INCIDENCE RATE: 2.58 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 goal for hepatitis B is to reduce both new and chronic infections: Reduce new infections in adults ages 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 2016, 170 confirmed cases of acute hepatitis B virus were reported in Indiana (Table 1). An overall increase in acute cases of hepatitis B was reported from 2013 to 2017. 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 as of July 1, 2016, obtained on June 30, 2017.

+ 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, 2017*+

	Cases	Rate	2013-2017 Total
Race			
White	122	2.1	499
Black	8	1.2	40
Other	19	5.8	34
Unknown	21	-	128
Sex			
Male	97	3.0	417
Female	73	2.2	284
Unknown	0	-	0
Total	170		701

Table 1 Reported cases and rates per 100,000 population of acute Hepatitis B in 2017 by race and sex and the count of total cases from 2013-2017 by race and sex

Reported cases of acute hepatitis B for the five-year period 2013-2017 is shown in Figure 1. The number of reported cases remained stable from 2016 (171) to 2017 (170) but, have increased over the last five years. 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 2017, incidence rates were highest among those where non-white and non-black (5.8 per 100,000) and among males (2.9 per 100,000).

Figure 1: Acute Hepatitis B Cases and Incidence Rates by Year – Indiana, 2013-2017

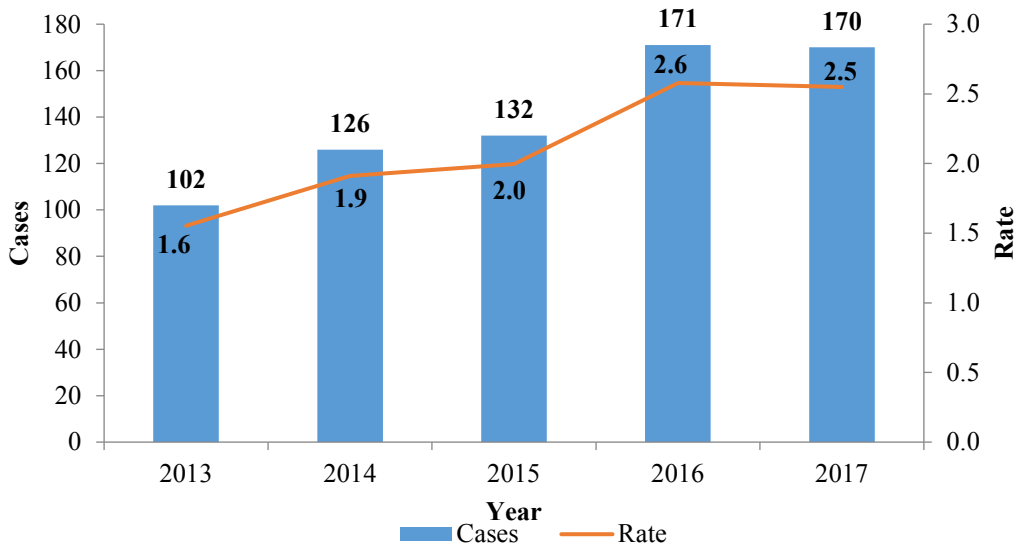


Figure 1 Reported cases of acute hepatitis B over the five year period 2013-2017

[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

*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates as of July 1, 2016, obtained on June 30, 2017.

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

Hepatitis B cases have trended upward over the last five years. The number of reported cases and rates per 100,000 population has increased since 2013, as can be seen in Figure 1. Rates per 100,000 population have increased from 1.5 in 2013 to 2.5 in 2017.

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

Table 2: Acute Hepatitis B Risk Factors – Indiana, 2017

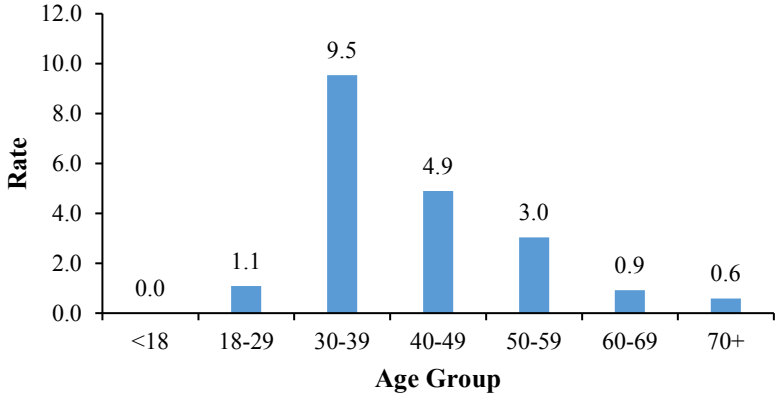
Risk Factors	Number of Cases (Percent)
Injection drug use	67 (39.4%)
Multiple sex partners	25 (14.7%)
Application of a tattoo	21 (12.4%)
Contact of a case	18 (10.6%)
History of dental work	11 (6.5%)
History of surgery	5 (2.9%)
MSM	3 (1.8%)
Medical employment	0 (0.0%)

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 (39.4%) followed by having multiple sex partners (14.7%). 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 2017. 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, 2013-2017*+



In 2017, 50 Indiana counties reported at least one case of acute hepatitis B. This is increased from those counties reporting acute cases in 2016 (49 counties).

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 as of July 1, 2016, obtained on June 30, 2017.
+ Rates based on fewer than 20 occurrences should be considered unstable and should not be compared.

HEPATITIS C

2017 CASE TOTAL (ACUTE): 236
(ACUTE, CONFIRMED): 191
2016 CASE TOTAL (ACUTE): 181
(ACUTE, CONFIRMED): 146

2017 INCIDENCE RATE: 3.54 per 100,000
INCIDENCE RATE: 2.87 per 100,000
2016 INCIDENCE RATE: 2.73 per 100,000
INCIDENCE RATE: 2.20 per 100,000

HEPATITIS C is the leading chronic blood-borne disease in the United States 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 goals for hepatitis C are 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 2017, 231 probable and confirmed cases of acute hepatitis C infection were reported, representing a 30.3 percent increase from 2016 (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, 8,435 probable and confirmed cases were reported during 2017 for an incidence rate of 126.5 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 as of July 1, 2016, obtained on June 30, 2017.

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

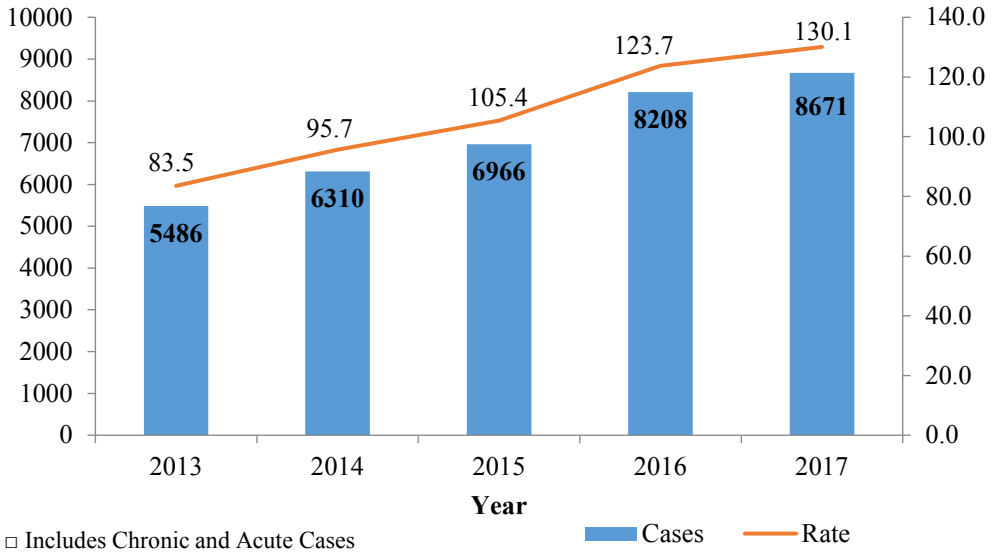
Table 1: Acute and Chronic Hepatitis C Cases Rate by Race and Sex – Indiana, 2017*+▲

	Acute		Chronic		2013-2017
	Cases	**Rate**	**Cases**	**Rate**	**Total Cases**
Race					
White	176	3.1	5,164	90.7	22,310
Black	13	2.0	558	85.9	2,451
Other	22	6.8	568	174.2	1,374
Unknown	25	-	2,145	-	9,505
Sex					
Male	114	3.5	4,945	150.9	21,409
Female	122	3.6	3,478	102.9	14,212
Unknown	-	-	12	-	19
Total	236	3.5	8,435	126.5	35,640

Table 1 Reported cases and rates per 100,000 population of acute (confirmed) and chronic (probable and confirmed) hepatitis C in 2017 and the count of Total Cases from 2013-2017, by race and sex.

The incidence rate for chronic hepatitis C probable and confirmed infections among males was 150.8 per 100,000 population and the incidence rate among females was 102.9 (Table 1). In 2017, incidence rates for both acute (6.7 per 100,000) and chronic (174.2) cases were highest among those who reported race as Other (Table 1).

Figure 1: Hepatitis C Cases and Incidence Rates by Year – Indiana, 2013-2017▲□



□ Includes Chronic and Acute Cases

Figure 1 Reported cases of acute (confirmed) and chronic (probable and confirmed) hepatitis C over the five year period from 2013-2017.

*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates as of July 1, 2016, obtained on June 30, 2017.

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

Hepatitis C acute and chronic cases have trended upward over the last five years. The number of reported cases and rates per 100,000 population has increased each year since 2013 (Figure 2). The rate of hepatitis C per 100,000 population was 83.5 in 2013 compared to 130.1 in 2017.

Table 2: Acute Hepatitis C Risk Factors – Indiana, 2017

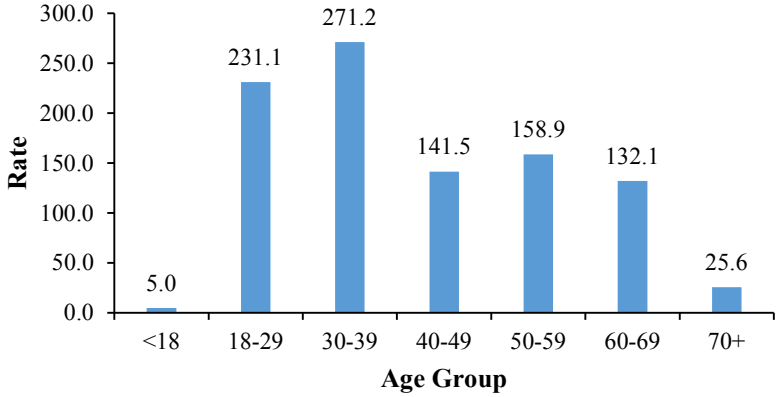
Risk Factor	Number of Cases (%)
Inject drugs not prescribed by doctor	162 (68.6%)
Use street drugs but do not inject	147 (62.3%)
Incarcerated > 24 hours	106 (44.9%)
Social contact with HCV infected person	61 (25.8%)

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 2017.

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, 2017▲+□



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

Figure 2 Age-specific incidence rates for total acute (confirmed) and chronic (probable and confirmed) reported cases of hepatitis C infection during 2017.

The incidence rate of acute and chronic hepatitis C cases is highest among adults under 40 years old. Rates are highest for adults aged 18-29 years (231.1 per 100,000) and 30-39 years (271.2) compared to older adults aged 40-49 years (141.5), 50-59 years (158.9), and 60-69 years (132.1). 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 as of July 1, 2016, obtained on June 30, 2017.

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

A state map (Figure 3, next page) displays the incidence of acute (confirmed) and chronic (confirmed and probable) 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.)

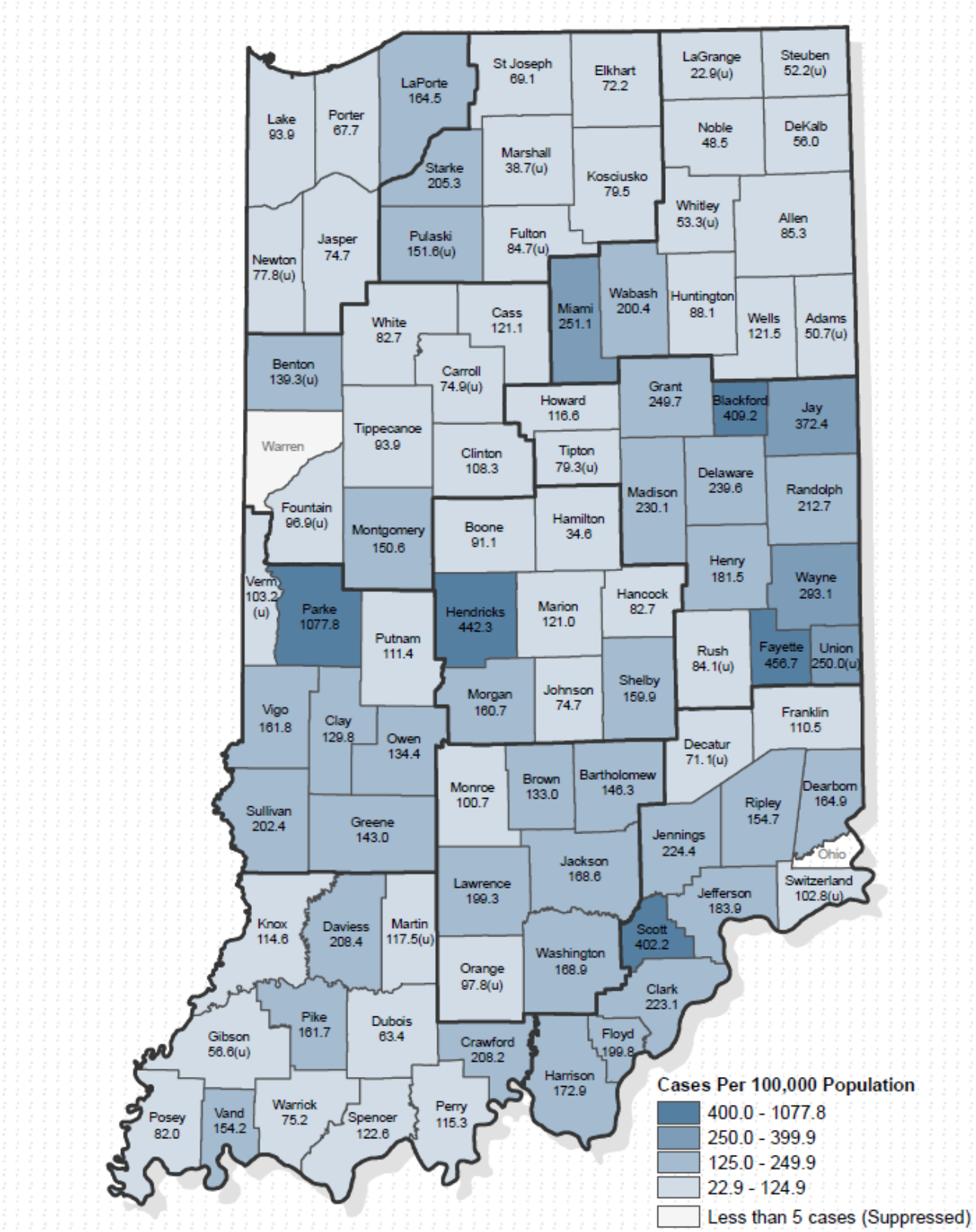
In 2017, there was at least one case of hepatitis C infection reported in 81 of Indiana's 92 counties.

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 as of July 1, 2016, obtained on June 30, 2017.
+ Rates based on fewer than 20 occurrences are considered statistically unstable and should not be compared.

Figure 3: Hepatitis C Incidence Rates by County – Indiana, 2017*+▲



*All rates are calculated per 100,000 population based on the U.S. Census Bureau's population estimates as of July 1, 2016, obtained on June 30, 2017.

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

	2017 Cases	2016	2015	2014	2013	5-Year Total (2013-2017)
Anthrax	0	0	0	0	0	0
Arboviral Encephalitis	0	0	0	0	0	0
Babesiosis	1	0	0	0	1	2
Botulism	1	0	0	1	0	2
Brucellosis	0	0	2	0	1	3
Chikungunya	0	2	7	33[1]	NR	42
Cholera	1	0	0	0	0	1
Coccidioidomycosis	12	1	2	2	0	17
Cyclosporiasis	4	3	0	2	1	10
Dengue	3	8	0	5	6	22
Dengue, severe	0	1	0	0	0	1
Diphtheria	0	0	0	0	0	0
Hansen's disease (Leprosy)	0	0	1	0	1	2
Hantavirus Pulmonary Syndrome	0	1	1	0	0	2
Hepatitis B, perinatal	1	0	0	0	3	4
Hepatitis D	5	7	3	4	2	21
Hepatitis E	1	2	2	1	4	10
Influenza A, Novel	0	0	0	0	0	0
La Crosse Encephalitis	1	0	0	2	1	4
Leptospirosis	0	0	2	1	0	3
Measles	0	1	0	1	2	4
Plague	0	0	0	0	0	0
Poliomyelitis	0	0	0	0	0	0
Psittacosis	0	0	0	0	0	0
Q Fever	4	1	1	2	1	9
Rubella	0	0	0	0	0	0
Smallpox	0	0	0	0	0	0
Tetanus	1	1	0	1	1	4
Toxic Shock Syndrome (Other than Streptococcal)	0	2	2	0	1	5
Trichinosis	0	0	1	1	0	2
Tularemia	2	0	3	2	5	12
Typhoid Fever	8	7	6	5	4	30
Typhus Fever	0	0	0	0	0	0
Vibriosis	7	12	3	6	9	37
Yellow Fever	0	0	0	0	0	0

[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 as of July 1, 2016, obtained on June 30, 2017.

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