Vaccine-Preventable Diseases Reported in North Carolina, 2018

Controlling vaccine-preventable diseases (VPDs) requires the consistent, concerted and coordinated efforts of public health agencies and healthcare providers to rapidly identify and report suspected cases, and swiftly implement control measures. Although many VPDs remain at or near record low levels, maintaining high immunization rates is still critical to prevent reemergence. This annual surveillance report summarizes 15 reportable VPDs in North Carolina during 2018 in the table below. Additional details about diseases for which cases were reported are presented on subsequent pages.

Report Specifications. Notable information about this report includes:

- Cases presented include those classified as confirmed or probable.
- Case counts are based on the earliest date of illness identification, typically onset date. Therefore, case counts in this report may differ from those included in national summaries, which can be based either on the earliest date of illness identification or on the date when cases were closed and reported to the Centers for Disease Control and Prevention (CDC).
- Unless otherwise noted, ages are based on date when the case was entered in the North Carolina Electronic Disease Surveillance System.
- Incidence rates are based on data obtained from the CDC bridged-race population estimates. Note that estimates of rates based on a small number of cases are unstable and can fluctuate widely. Therefore, these estimates should be interpreted with caution. Ninety-five percent confidence intervals are shown for demographic-specific rates.
- No cases of diphtheria, polio, rubella, or congenital rubella syndrome were reported in 2018. These diseases will not be discussed on subsequent pages

Number of Cases of VPDs Reported in North Carolina, 2013-2018

Disease	*2013*	*2014*	*2015*	*2016*	*2017*	*Previous five-year average*	*2018*	*Significant Change**
Diphtheria	0	0	0	0	0	*0*	0	--
Haemophilus influenzae, invasive disease	140	141	169	180	206	*167*	209	--
Hepatitis A	42	43	39	52	30	*41*	101	⇧
Hepatitis B (Acute)	94	113	146	169	187	*142*	221	⇧
Hepatits B (Chronic)	905	970	1111	1384	1177	*1109*	1084	--
Influenza Deaths**	64	218	61	218	391	*190*	209	--
Measles	22	1	0	1	0	*5*	3	--
Meningococcal invasive disease	9	10	5	5	9	*8*	8	--
Mumps	4	2	4	35	37	*16*	12	--
Pertussis	625	785	347	300	429	*497*	383	--
Pneumococcal meningitis	35	35	34	30	52	*37*	44	--
Polio	0	0	0	0	0	*0*	0	--
Rubella	0	0	0	0	0	*0*	0	--
Congenital rubella syndrome	0	0	0	0	0	*0*	0	--
Tetanus	0	0	3	0	3	*1*	3	--

** ⇧ = significant increase (≥ 2 standard deviations above average) ⇩ = significant decrease (≥ 2 standard deviations below average) -- = no significant change*

*** Influenza deaths are counted seasonally. The number 209 represents the number of influenza deaths that occurred during the 2018-2019 season*

Haemophilus influenzae, invasive disease

Background

Haemophilus influenzae, or "H. flu," can cause a variety of clinical syndromes, including invasive diseases like bacteremia, pneumonia, meningitis, and epiglottitis. H. flu organisms are divided into serotypes a, b, c, d, e, and f, based on proteins found in the capsule that surrounds the organism. Strains without a capsule are called non-typeable. All serotypes, including non-typeable serotypes, can cause invasive disease and are reportable in North Carolina. Haemophilus influenza serotype b (Hib) is the most virulent and is the only serotype for which there is a vaccine.

H. flu is often part of the normal respiratory flora. Carriage of Hib has dramatically decreased due to vaccination, but non-typeable strains can be found in the nose and throat of up to 80% of the population. It is transmitted from person to person by respiratory droplets. H. flu is not carried by animals and does not persist for long in the environment.

Hib was the leading cause of bacterial meningitis in children under 5 years of age before vaccine was available. Approximately 4-5% of Hib meningitis cases were fatal, and 20% of children who survived had complications such as hearing loss or developmental delays. Hib meningitis and other invasive Hib infections are now rare in the United States since the introduction of Hib vaccine into the routine childhood immunization series.

Immunization

The first conjugate Hib vaccine was licensed in 1987. Hib vaccine is currently a recommended routine childhood vaccine in the United States. Infants should receive 3 or 4 doses (depending on the type of vaccine) by 15 months of age. There are no vaccines for non-b or nontypeable H. flu.

Epidemiology

National

The rate of Hib disease has decreased by greater than 99% in children since 1987, while rates in adults have remained the same. Rates of Hib among Alaska Native populations remain higher than the rest of the United States. The success of the vaccine has caused a shift in the epidemiology of H. flu. The majority of invasive H. flu infections are now caused by nontypeable strains and primarily affect children under 5 years of age and adults over 65 years of age.

North Carolina

The number of H. flu cases in North Carolina has increased in recent years. In 2018, 209 cases were reported, more than double the number of cases that were reported just seven years ago, and 25% more than the previous five-year average. The reason for this trend is unknown. Thirty-eight deaths associated with H. flu were reported in 2018; 23 (61%) in individuals aged 65 years or older, and one (3%) in a child less than five years of age.

No cases reported in 2018 were type b. The large majority of H. flu cases in North Carolina are caused by nontypeable strains. The age group most affected in North Carolina reflects the national trend; adults aged 50 years and older made up 71% of cases.

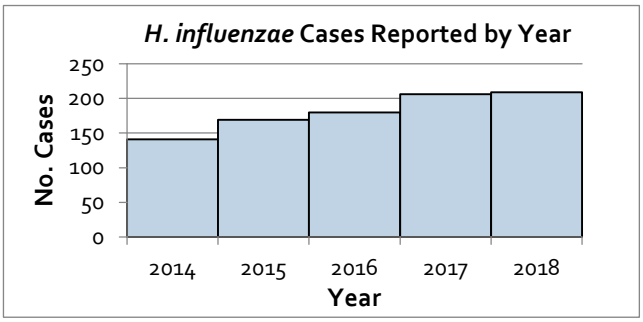
Outbreaks

No outbreaks of H. flu occurred in North Carolina in 2018.

Haemophilus influenzae , Invasive Disease, 2018

Annual Summary

		2014	2015	2016	2017	2018
Incidence / 100,000		1.42	1.68	1.77	2.01	2.01
No. cases		141	169	180	206	209
Serotypes	*type b, <5 years*	*0%*	*0%*	*0%*	*0%*	*0%*
	type b, ≥ 5 years	*0%*	*1%*	*2%*	*1%*	*0%*
	non-b, typeable	*24%*	*22%*	*18%*	*19%*	*16%*
	nontypeable	*65%*	*67%*	*72%*	*65%*	*70%*
	unknown	*10%*	*11%*	*8%*	*16%*	*14%*



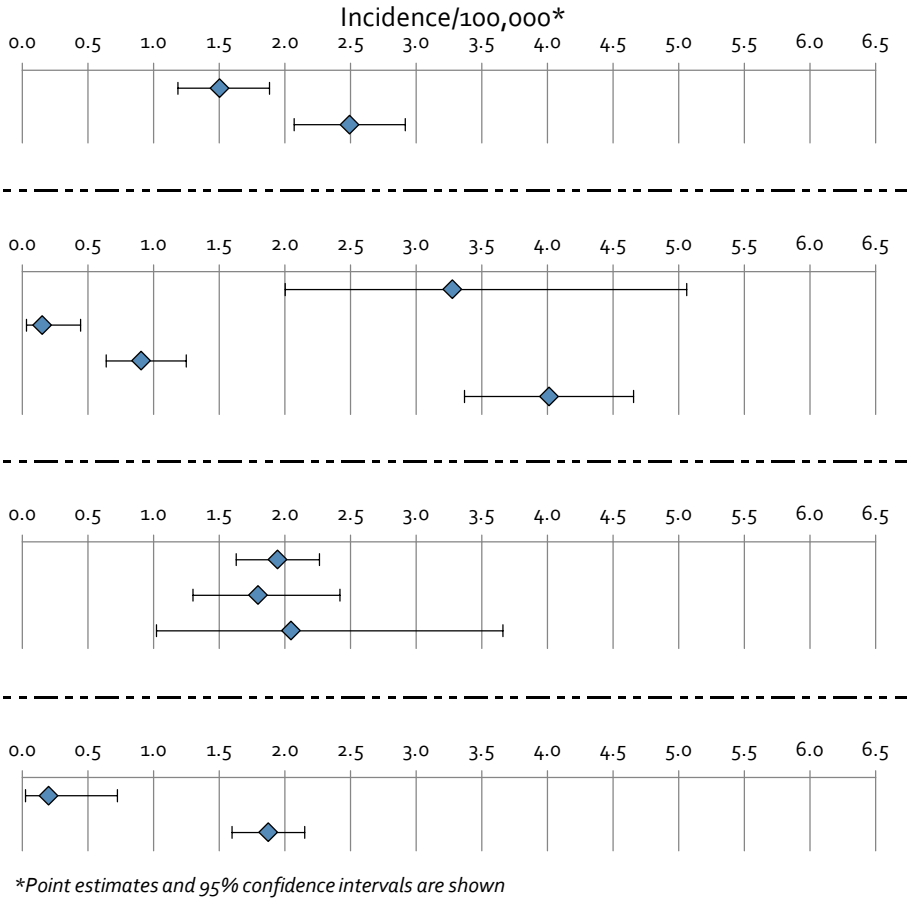
Case Demographics, 2018

Sex	*No. cases*	*% of total*	*Incidence/ 100,000*
Male	76	36%	1.5
Female	133	64%	2.5
Unknown	0	0%	--

Age Group	*No. cases*	*% of total*	*Incidence/ 100,000*
Under 5 yrs.	20	10%	3.3
5-19 yrs.	3	1%	0.2
20-49 yrs.	37	18%	0.9
50+ yrs.	149	71%	4.0
Unknown	0	0%	--

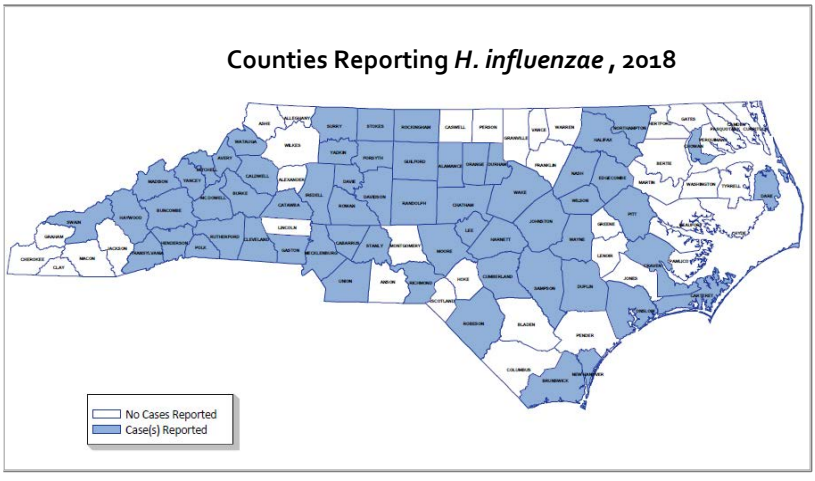
Race	*No. cases*	*% of total*	*Incidence/ 100,000*
White	145	69%	1.9
Black	43	21%	1.8
Other	11	5%	2.0
Multiple or Unknown	10	5%	--

Hispanic Ethnicity	*No. cases*	*% of total*	*Incidence/ 100,000*
Yes	2	1%	0.2
No	176	84%	1.9
Unknown	31	15%	--

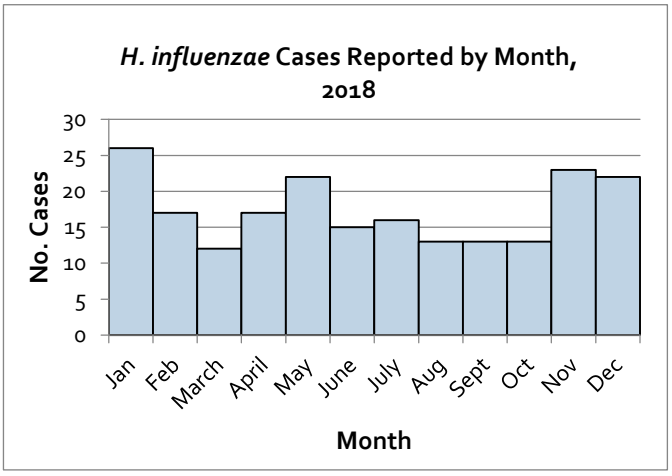


**Point estimates and 95% confidence intervals are shown*

Geographic Distribution



Cases By Month



Hepatitis A

Background

Hepatitis A virus (HAV) is a cause of acute liver disease transmitted by the fecal-oral route. In the United States, person-to-person transmission is most common. Common signs and symptoms include nausea, vomiting, abdominal pain, fatigue, and jaundice; however, infection is often asymptomatic in children under 6 years of age. HAV infection is laboratory confirmed by demonstration of IgM antibody directed against the virus in the patient's serum.

Common-source outbreaks of HAV can occur via fecal contamination of food or water, but a specific source is rarely identified. People at increased risk for acquiring HAV infection include travelers to endemic areas, men who have sex with men, and users of injection drugs, but no risk factor is identified for the majority of cases. Control and prevention of hepatitis A rests upon promotion of personal hygiene, immunization, and proper food and water sanitation.

People with HAV infection are infectious from 2 weeks before jaundice onset to 1 week after. If the patient did not have jaundice, or the jaundice onset date is unknown, the infectious period is considered to be from 1 week before to 2 weeks after the onset of other symptoms. Shedding can be longer in some cases, particularly in young children.

Post-exposure prophylaxis (PEP) should be considered for susceptible individuals who are household or sexual contacts to a case. Child care center staff and attendees should receive PEP if one or more cases are identified in the facility, or if cases are identified in two or more households of childcare attendees. If a case is identified in a food handler who worked while infectious, PEP may be considered for other food handlers and patrons. PEP is not generally considered effective if it is given more than two weeks after the exposure.

Immunization

Hepatitis A vaccine has been one of the great success stories of public health. Hepatitis A vaccines were first licensed in 1995, and the number of people for whom vaccine is recommended has gradually expanded since that time. Two doses of hepatitis A vaccine administered at least six months apart are currently recommended as a routine immunization for all children beginning at 12 months of age. Hepatitis A vaccine is also recommended for high-risk populations such as international travelers, men who have sex with men, people who use injection or non-injection drugs, people experiencing homelessness, and people who are or were recently incarcerated. People in these high risk groups should be offered hepatitis A vaccine even if receipt of the second dose is unlikely; even one dose of hepatitis A vaccine is highly effective at preventing infection.

Epidemiology

National

Incidence of hepatitis A increased due to several large outbreaks during 2018, spread through person-to-person contact. Infections among certain high-risk populations made up the majority of outbreak cases, including people who use drugs (injection or non-injection) and people experiencing homelessness.

North Carolina

Reported cases of hepatitis A in 2018 increased significantly when compared to the previous 5-year average, primarily due to a statewide outbreak (discussed below). However, the number of reported cases remains far lower than cases reported around the turn of the century (an average of 192 cases per year were reported from 1999-2002). One hepatitis A-associated death was reported in 2018.

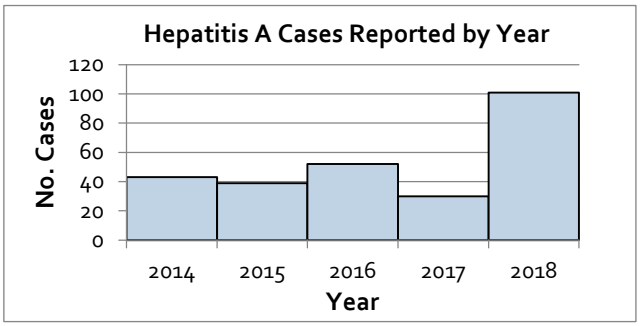
Outbreaks

North Carolina is experiencing a statewide outbreak of hepatitis A that began in April 2018. During 2018, 63 outbreak-associated cases were identified, primarily among three risk groups: men who have sex with men, people who use injection or non-injection drugs, and people experiencing homelessness.

Hepatitis A, 2018

Annual Summary

	2014	2015	2016	2017	2018
Incidence / 100,000	0.43	0.39	0.51	0.29	0.97
No. cases	43	39	52	30	101



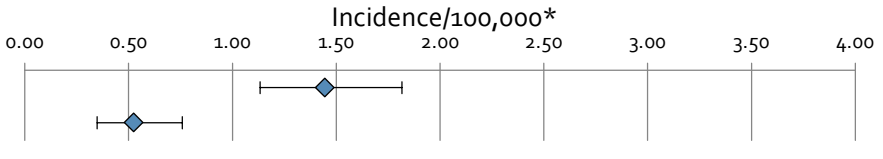
Case Demographics, 2018

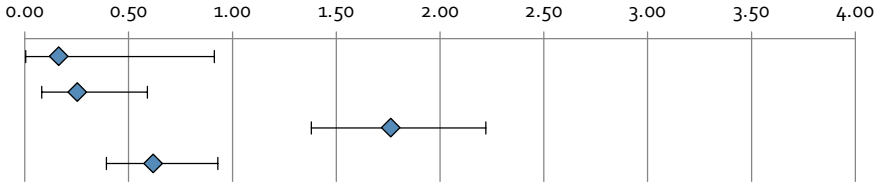
Sex	No. cases	% of total	Incidence/ 100,000
Male	73	72%	1.45
Female	28	28%	0.53
Unknown	0	0%	--

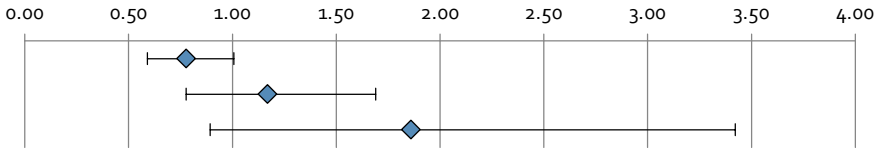
Age Group	No. cases	% of total	Incidence/ 100,000
Under 5 yrs.	1	1%	0.16
5-19 yrs.	5	5%	0.25
20-49 yrs.	72	71%	1.76
50+ yrs.	23	23%	0.62
Unknown	0	0%	--

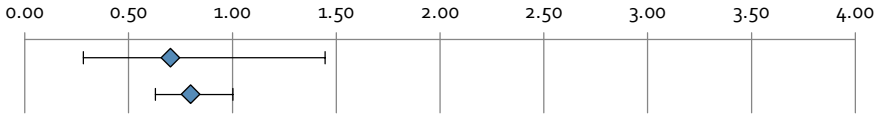
Race	No. cases	% of total	Incidence/ 100,000
White	58	57%	0.78
Black	28	28%	1.17
Other	10	10%	1.86
Multiple or Unknown	5	5%	--

Hispanic Ethnicity	No. cases	% of total	Incidence/ 100,000
Yes	7	7%	0.70
No	75	74%	0.80
Unknown	19	19%	--



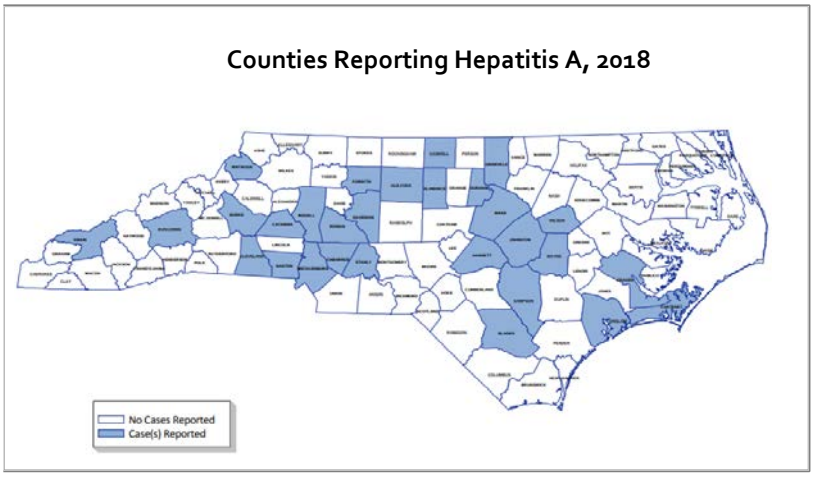




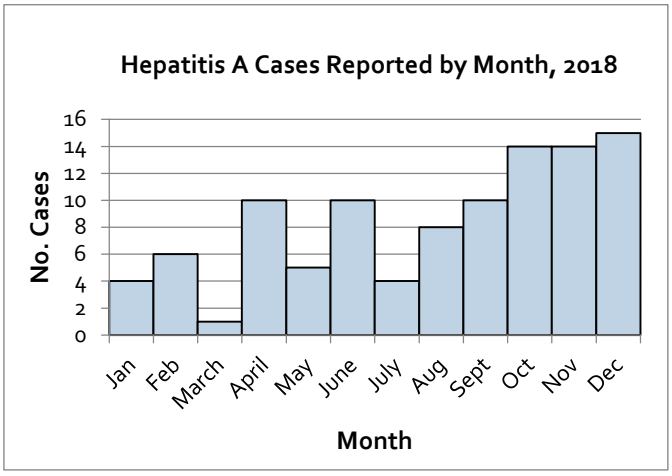


**Point estimates and 95% confidence intervals are shown*

Geographic Distribution

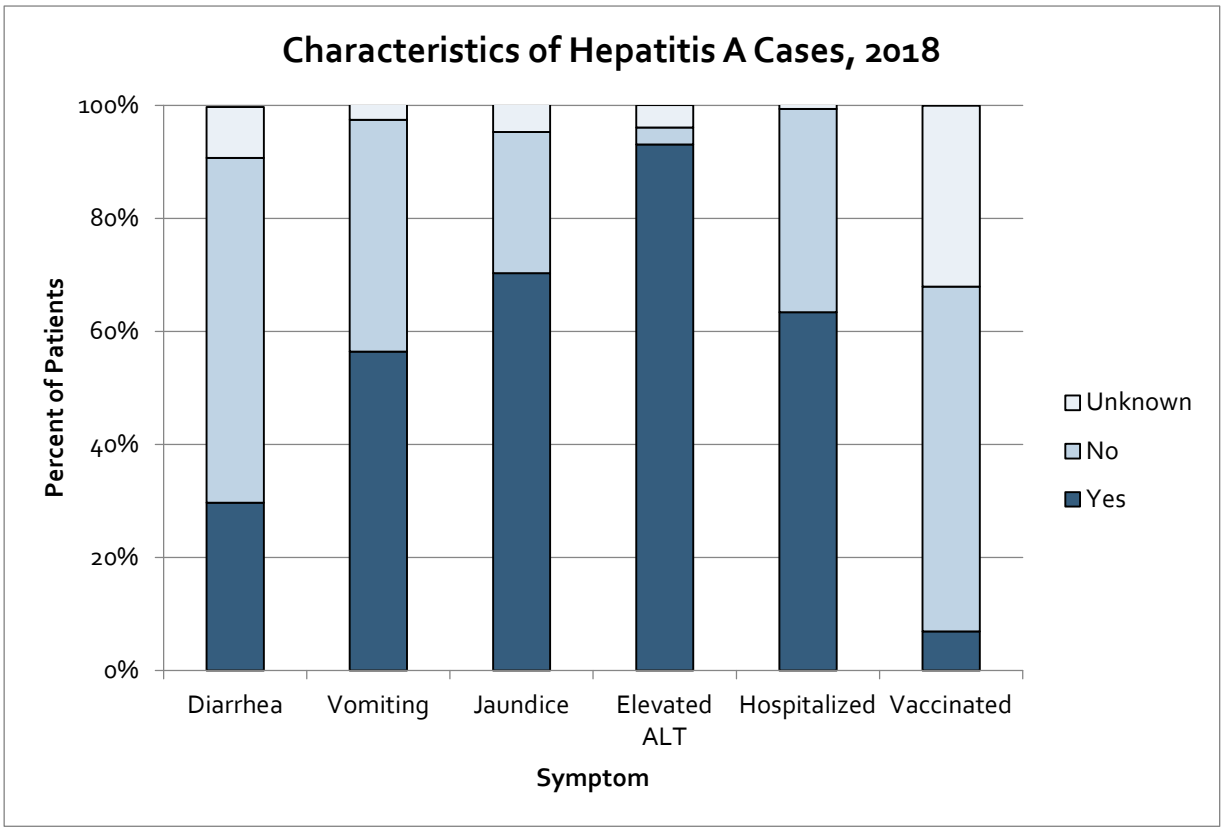


Cases By Month

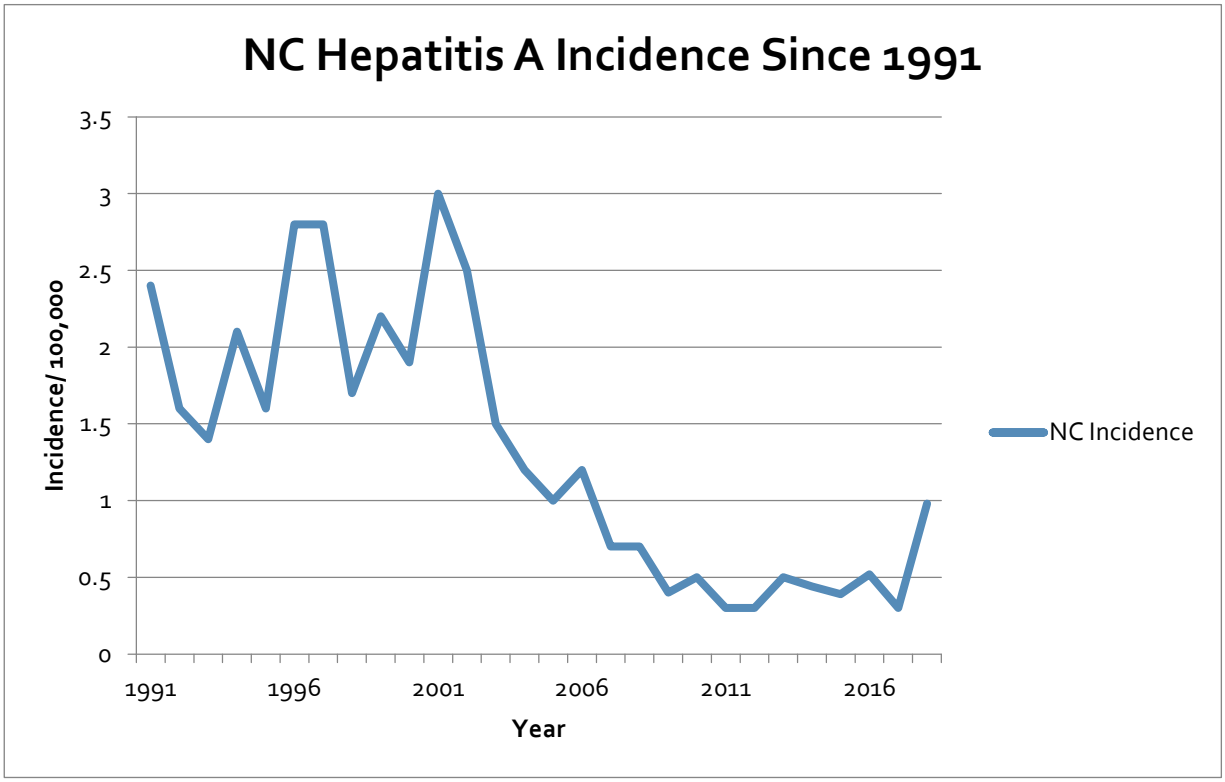


Hepatitis A, 2018 *(continued)*

2018 Case Summary



Hepatitis A, Incidence



Acute and Chronic Hepatitis B

Background

Hepatitis B is a vaccine-preventable, mild-to-severe liver infection, caused by the hepatitis B virus (HBV), which can advance from acute to chronic. HBV is a leading cause of liver cancer. HBV can be transmitted through sex with an infected person, sharing contaminated equipment, sharing personal items (such as toothbrushes and razors), and breaches in infection control resulting in outbreaks in health care facilities. Vertical transmission can also occur between an infected mother and her infant (perinatal HBV).

Symptoms for acute HBV include fever, fatigue, nausea, vomiting, abdominal pain, jaundice and dark urine. If symptoms do occur, they begin on average 90 days after HBV exposure. Symptoms can typically last for several weeks but can persist up to six months. Since acute infections can be asymptomatic and diagnostic criteria for chronic infections are relatively non-specific, a portion of reported chronic cases may in fact be acute.

Screening for HBV should be done for individuals born in countries with high HBV prevalence, men who have sex with men, individuals who are HIV positive, household/sexual and needle sharing partners of HBV positive people, people who require immunosuppressive therapies, people undergoing hemodialysis, blood and tissue donors, pregnant women, infants born to HBV-infected mothers, and people with elevated alanine aminotransferase levels. There is no treatment for acute hepatitis B as the infection is self-limiting about 90 to 95% of the time. Chronic hepatitis B is treated with several antiviral medications aimed at suppressing and decreasing the pathogenicity of the virus.

Immunization

The first HBV vaccine became commercially available in the United States in 1982. There are several single antigen and combination vaccines available for HBV in the United States. Three intramuscular injections are recommended as part of the routine childhood immunization schedule: the first dose at birth, with the second and third doses administered one and six months after the birth dose. The birth dose provides protection for infants born to mothers who may not know they are infected. Certain adults at high risk for hepatitis B infection are recommended to receive the vaccine, including people with chronic liver disease, men who have sex with men, people who use injection drugs, and people who are incarcerated.

Epidemiology

National

The Centers for Disease Control and Prevention (CDC) estimates that there are 850,000 people living with HBV, with about 21,000 new infections a year in the United States. The rate of new acute HBV infections has declined from 1990-2014. The rate of acute HBV has increased since 2014, which is likely due to the increase of injection drug use. In addition to screening for HBV, people who inject drugs should also be offered testing for hepatitis C and HIV, as well as other harm reduction services.

North Carolina

The number of acute hepatitis B cases diagnosed in North Carolina in 2018 was 221, a rate of 2.1 per 100,000 population, an increase from 187 cases in 2017 (1.8 per 100,000 population). The number of newly diagnosed chronic hepatitis B cases in North Carolina in 2018 was 1,084 at a rate of 10.4 per 100,000. As of December 31, 2018, there were 24,347 people diagnosed with chronic hepatitis B, who were presumed to be living in North Carolina.

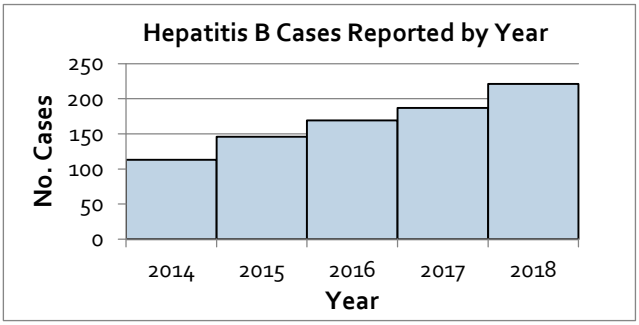
Outbreaks

Two acute HBV outbreaks occurred in North Carolina during 2018. One outbreak occurred in Gaston County; 27 cases were identified, of which 37% identified drug use as a potential exposure. The second outbreak occurred in Randolph County; 22 cases were identified, of which 50% identified drug use as a potential exposure.

Hepatitis B (Acute), 2018

Annual Summary

	2014	2015	2016	2017	2018
Incidence / 100,000	1.14	1.46	1.66	1.82	2.13
No. cases	113	146	169	187	221



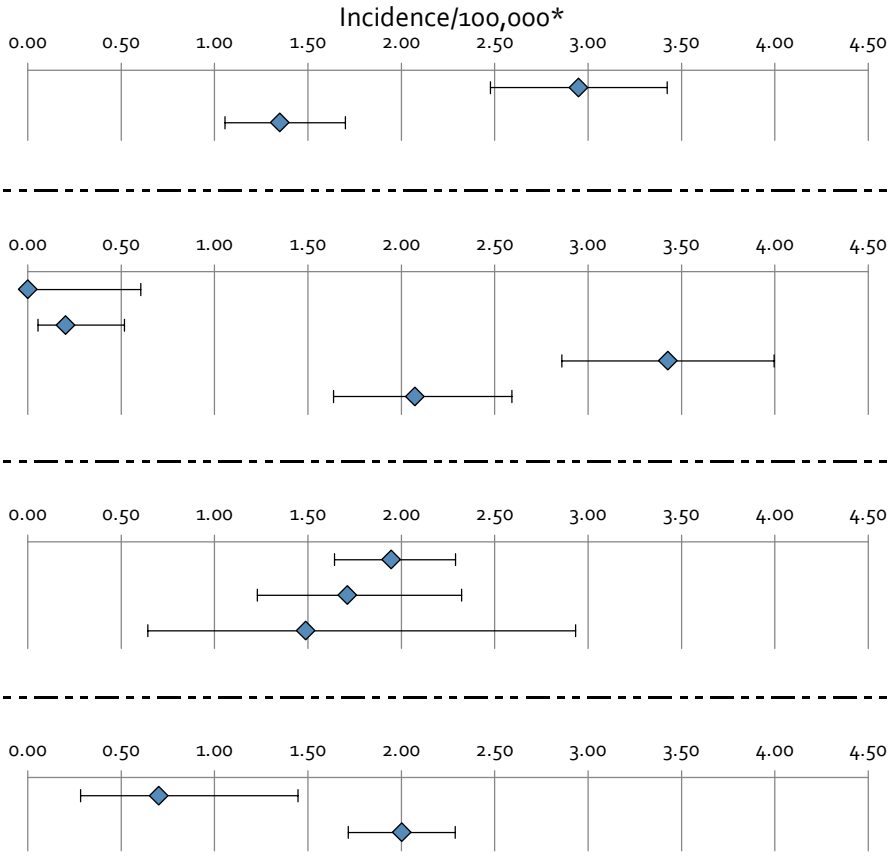
Case Demographics, 2018

Sex	No. cases	% of total	Incidence/ 100,000
Male	149	67%	2.95
Female	72	33%	1.35
Unknown	0	0%	--

Age Group	No. cases	% of total	Incidence/ 100,000
Under 5 yrs.	0	0%	0.00
5-19 yrs.	4	2%	0.20
20-49 yrs.	140	63%	3.43
50+ yrs.	77	35%	2.07
Unknown	0	0%	--

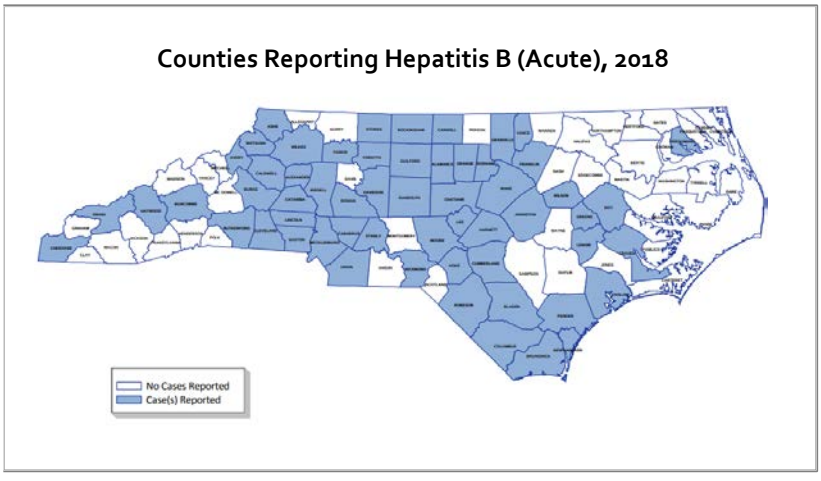
Race	No. cases	% of total	Incidence/ 100,000
White	145	66%	1.95
Black	41	19%	1.71
Other	8	4%	1.49
Multiple or Unknown	27	12%	--

Hispanic Ethnicity	No. cases	% of total	Incidence/ 100,000
Yes	7	3%	0.70
No	188	85%	2.00
Unknown	26	12%	--

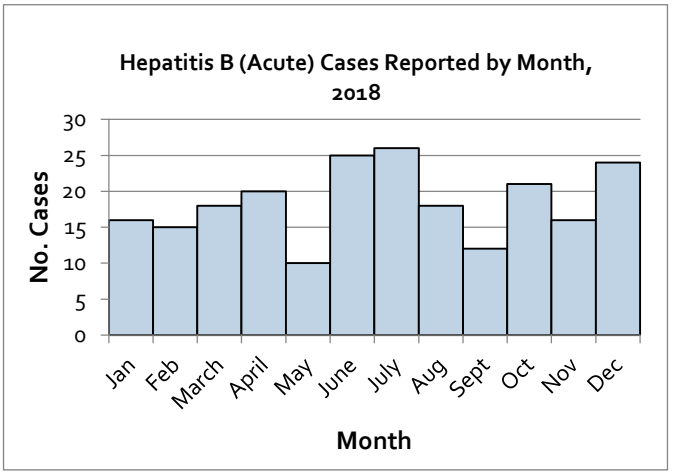


**Point estimates and 95% confidence intervals are shown*

Geographic Distribution

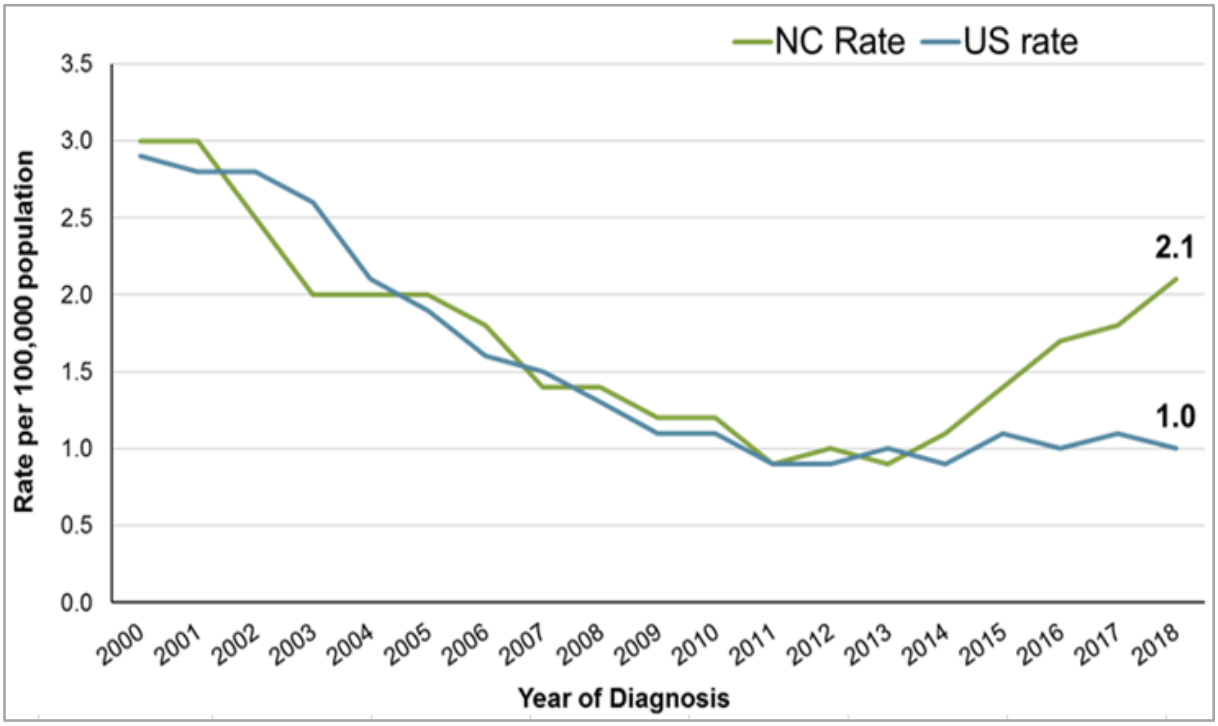


Cases By Month

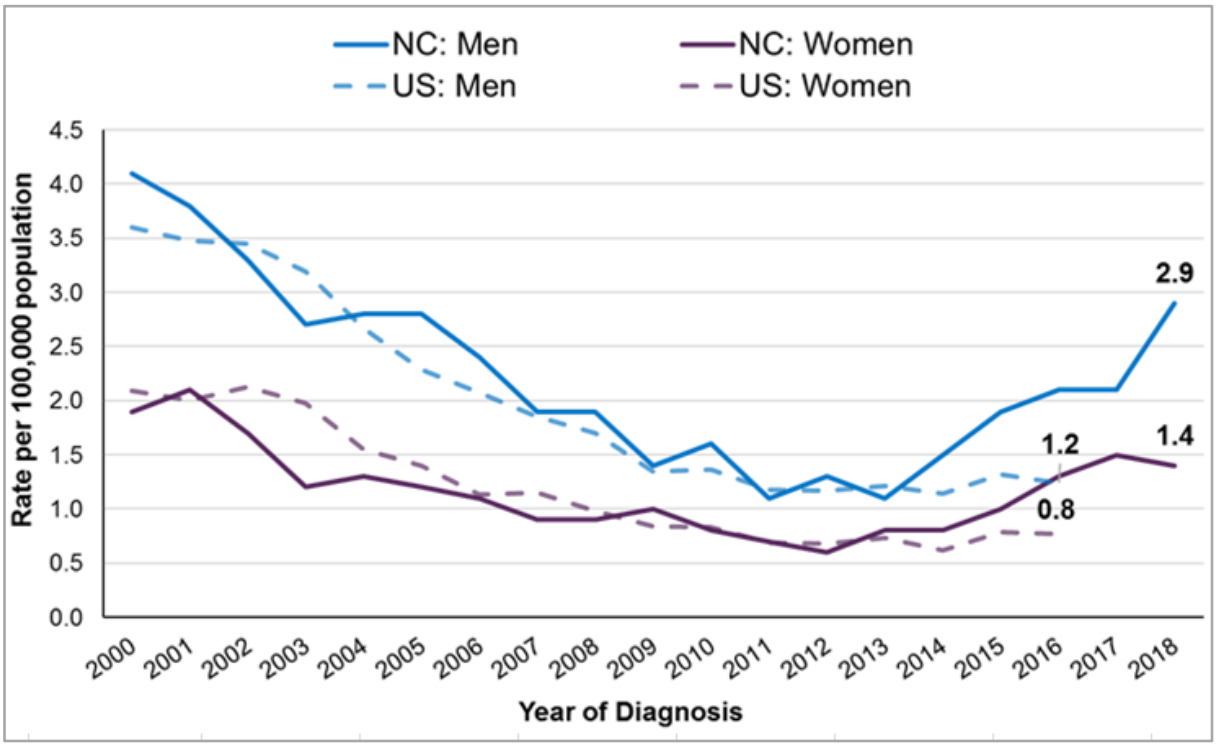


Hepatitis B (Acute), 2018 *(continued)*

Acute Hepatitis B, Overall Incidence



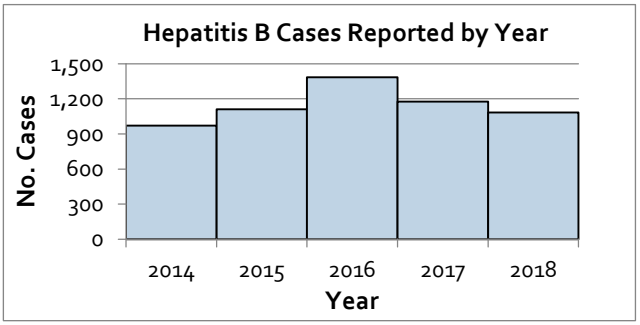
Acute Hepatitis B, Incidence by Sex



Hepatitis B (Chronic), 2018

Annual Summary

	2014	2015	2016	2017	2018
Incidence / 100,000	9.76	11.07	13.63	11.46	10.44
No. cases	970	1,111	1,384	1,177	1,084



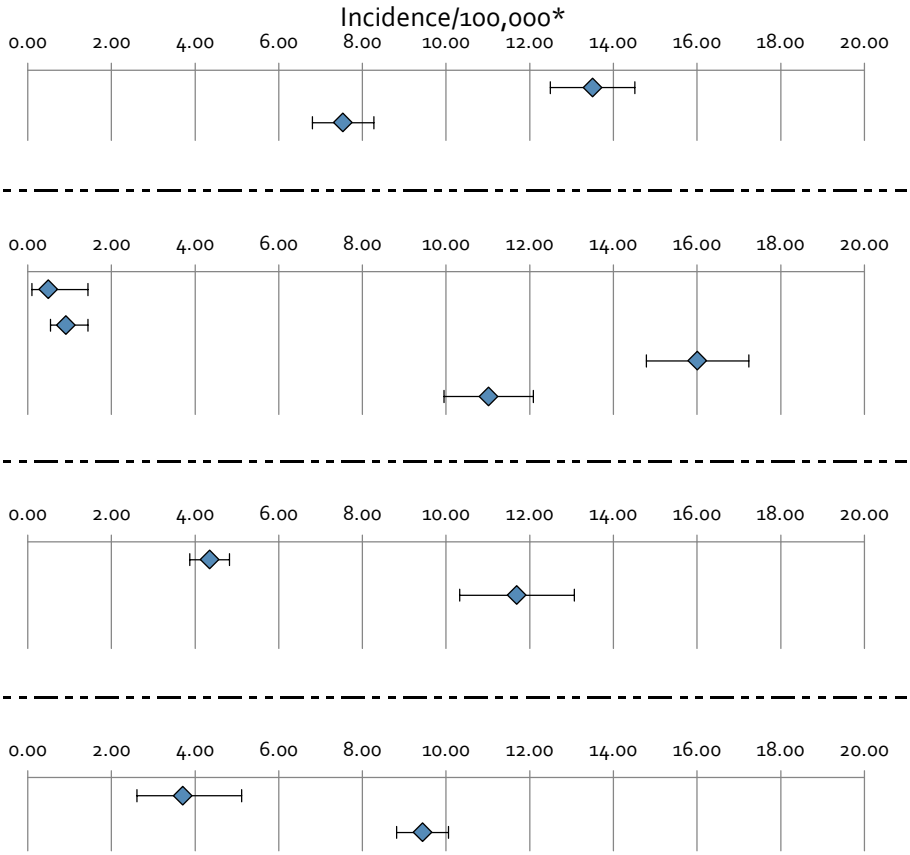
Case Demographics, 2018

Sex	No. cases	% of total	Incidence/ 100,000
Male	682	63%	13.50
Female	402	37%	7.54
Unknown	0	0%	--

Age Group	No. cases	% of total	Incidence/ 100,000
Under 5 yrs.	3	0%	0.49
5-19 yrs.	18	2%	0.91
20-49 yrs.	654	60%	16.01
50+ yrs.	409	38%	11.02
Unknown	0	0%	--

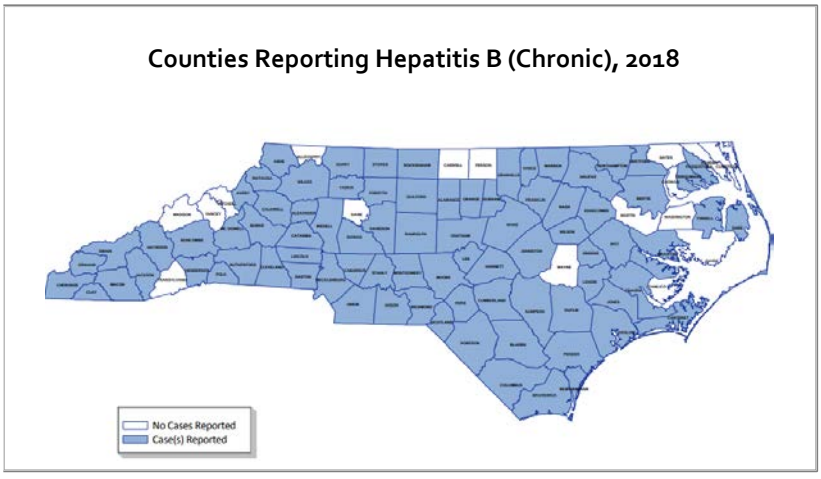
Race	No. cases	% of total	Incidence/ 100,000
White	324	30%	4.35
Black	280	26%	11.69
Other	283	26%	52.65
Multiple or Unknown	197	18%	--

Hispanic Ethnicity	No. cases	% of total	Incidence/ 100,000
Yes	37	3%	3.71
No	886	81%	9.44
Unknown	168	15%	--

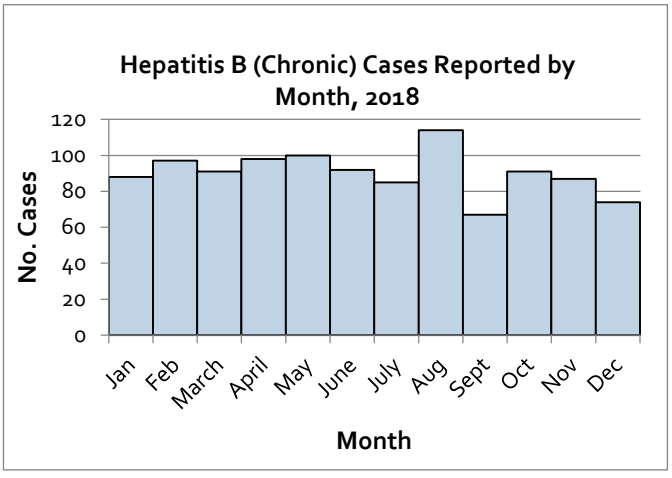


**Point estimates and 95% confidence intervals are shown*

Geographic Distribution



Cases By Month



Influenza-associated Deaths

Background

Influenza, commonly known as the flu, is a contagious respiratory disease caused by influenza viruses. It can be severe, and at times lead to death. Vulnerable groups such as older individuals, young children, and people with certain health conditions are at risk for serious flu complications. The flu season runs from September to May and varies in severity from year to year.

Signs and symptoms of the flu include a fever over 100.4 degrees Fahrenheit, cough and sore throat, runny or stuffy nose, head and body aches, chills, fatigue, and nausea, vomiting, and diarrhea. The seriousness of symptoms can vary from patient to patient with associated complications from pneumonia, dehydration, and ear or sinus infections. The flu may aggravate or worsen pre-existing medical conditions such as congestive heart failure, asthma, or diabetes.

Influenza is spread primarily by droplets expelled when an infected individual coughs, sneezes, or talks. These droplets can then infect people nearby who come in contact with the infected particles. The most contagious period for the flu is within the first three to four days after illness begins. An infected person can transmit the disease up to one day before symptoms begin and five to seven days after symptom onset.

Immunization

The most effective way to prevent the flu is to get vaccinated every year. Flu vaccines protect against three or four virus strains that are thought to be the most common for that particular year. Other benefits of the flu vaccination include a potentially milder case in the event of infection, reduction of risk of death from influenza among children, and prevention of flu-related hospitalizations. Every person older than six months of age should get a flu vaccine each year, generally before the end of October. Vaccination among high risk individuals is especially important particularly the elderly, young children, pregnant women, and those with chronic health conditions.

Epidemiology

National

While millions of influenza cases occurred during 2018-2019, the season was considered moderate. The CDC estimates that there were 37.4-42.9 million cases of influenza the United States during the 2018-2019 season, leading to 531,000-647,000 hospitalizations and 36,400-61,200 deaths.

North Carolina

Individual cases of influenza are not reportable in North Carolina. However, influenza-associated deaths are reported and tracked through state epidemiological surveillance.

Deaths

Since the 2014-2015 flu season (September 2014- May 2015), there have been 1,098 influenza-associated deaths reported in North Carolina. The highest total deaths came in the 2017-2018 flu season with 391 influenza-associated deaths. The most recent flu season, (September 2018-May 2019) resulted in 210 associated deaths. The average number of deaths over the five-year period is 219 per flu season.

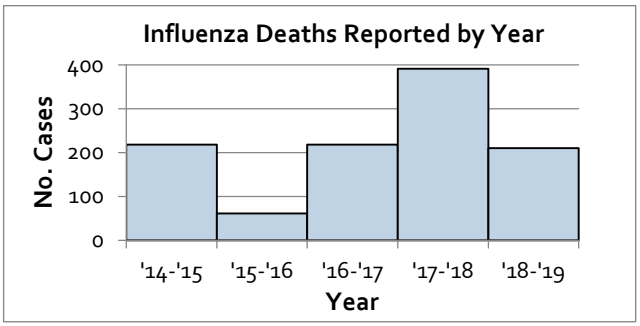
Outbreaks

Outbreaks of influenza are common during influenza season and occur primarily in long-term care facilities and schools. An outbreak is defined as two or more influenza cases in a common setting. During 2018, 246 outbreaks were reported. An average of 126 outbreaks were reported each year from 2015-2018.

Influenza-associated Deaths, 2018-2019 (reported seasonally)

Annual Summary

	'14-'15	'15-'16	'16-'17	'17-'18	'18-'19
Incidence / 100,000	2.19	0.61	2.15	3.81	2.02
No. cases	218	61	218	391	210



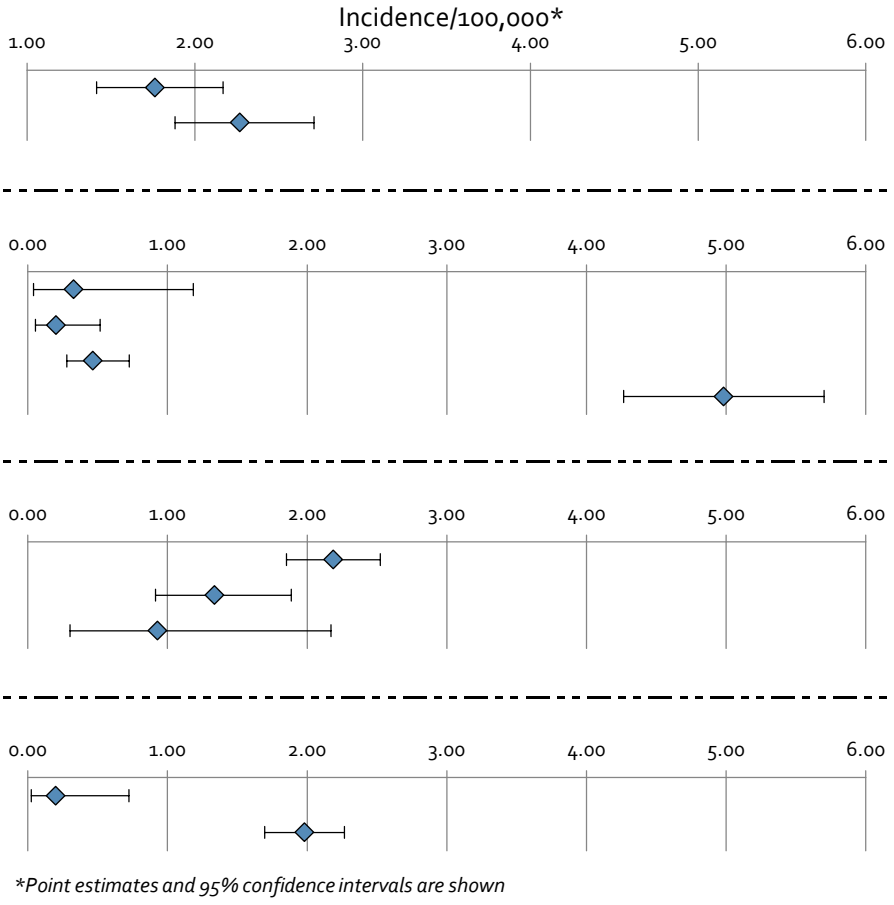
Case Demographics, 2018-2019

Sex	No. cases	% of total	Incidence/ 100,000
Male	89	42%	1.76
Female	121	58%	2.27
Unknown	0	0%	--

Age Group	No. cases	% of total	Incidence/ 100,000
Under 5 yrs.	2	1%	0.33
5-19 yrs.	4	2%	0.20
20-49 yrs.	19	9%	0.47
50+ yrs.	185	88%	4.98
Unknown	0	0%	--

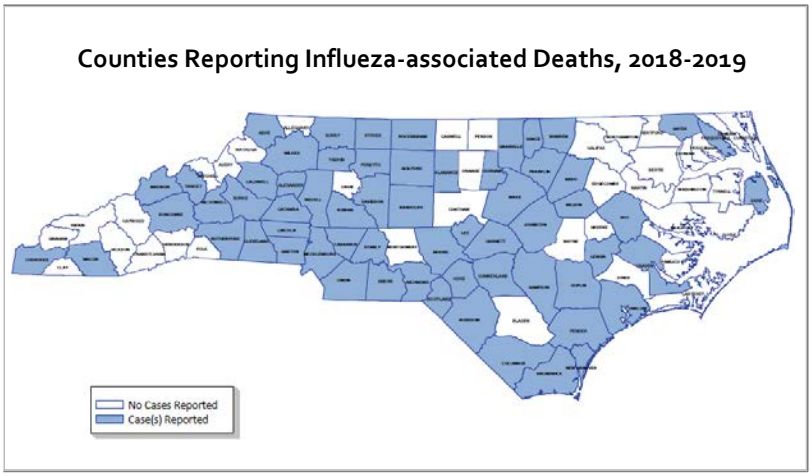
Race	No. cases	% of total	Incidence/ 100,000
White	163	78%	2.19
Black	32	15%	1.34
Other	5	2%	0.93
Multiple or Unknown	10	5%	--

Hispanic Ethnicity	No. cases	% of total	Incidence/ 100,000
Yes	2	1%	0.20
No	186	89%	1.98
Unknown	22	10%	--

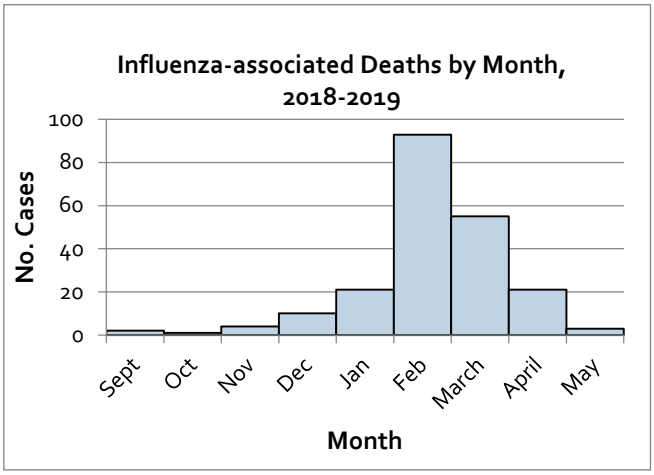


**Point estimates and 95% confidence intervals are shown*

Geographic Distribution



Cases By Month



Measles

Background

Measles is an acute viral illness that is transmitted through airborne droplets or by direct contact with respiratory or throat secretions from an infected person. Measles is characterized by fever, runny nose, red eyes, and a maculopapular rash that first begins on the head and face, and gradually moves down to the torso and the extremities. Complications such as pneumonia, encephalitis, and death can occur.

Measles is considered to be one of the most contagious diseases. Any person that shares the same space (e.g. being in the same room) as a measles case is considered exposed to measles. Individuals infected with measles are considered contagious from 4 days before the appearance of the rash to 4 days after. Measles-mumps-rubella (MMR) vaccine or immunoglobulin (IG) should be administered to susceptible contacts to prevent infection. Healthcare workers exposed to measles must show evidence of immunity or be excluded from work from day 7-21 after exposure.

Vaccination is the best way to reduce the risk of measles infection and complications. People who are unvaccinated are much more likely to be infected with measles and have complications than people who are vaccinated. People without evidence of immunity to measles should be brought up-to-date with age-appropriate vaccination (one or two doses). People born before 1957 are considered immune based on likely exposure during childhood.

Immunization

Two doses of MMR vaccine are routinely recommended for children; the first at 12-15 months, and the second at 4-6 years.

Epidemiology

National

Measles rates have declined dramatically since the first vaccine was introduced in the 1960s. Endemic measles was declared eliminated from the United States in 2000; however, the virus can spread rapidly if introduced into a population with low vaccination rates. The U.S. experienced 17 outbreaks in 2018. Three outbreaks in New York State, New York City, and New Jersey, respectively, contributed to most of the cases. Cases connected to outbreaks primarily occurred among unvaccinated people in close knit communities. These outbreaks were associated with travelers who brought measles back from countries where large outbreaks are occurring. Eighty-two people brought measles to the U.S. from other countries in 2018. This is the greatest number of imported cases since measles was eliminated from the U.S. in 2000.

North Carolina

Zero to three cases of measles are typically reported in North Carolina each year. The exception to this was an outbreak in 2013, caused by the importation of the disease by a traveler to India. Twenty-two cases and over 1,000 contacts were identified during the course of the investigation.

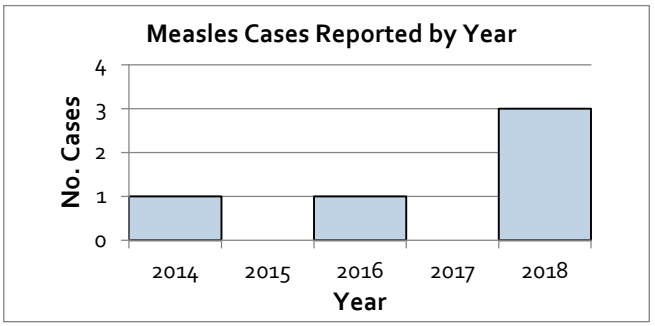
2018 Case Investigation

Three cases of measles were identified in North Carolina during 2018. The first case occurred in an unvaccinated traveler who returned from a trip to Europe, where measles is endemic. A large contact investigation was conducted as a result of this case; approximately 300 people were exposed to measles during five separate healthcare visits. Two members of the household were infected with measles. No deaths associated with measles occurred.

Measles, 2018

Annual Summary

	2014	2015	2016	2017	2018
Incidence / 100,000	0.01	0.00	0.01	0.00	0.03
No. cases	1	0	1	0	3



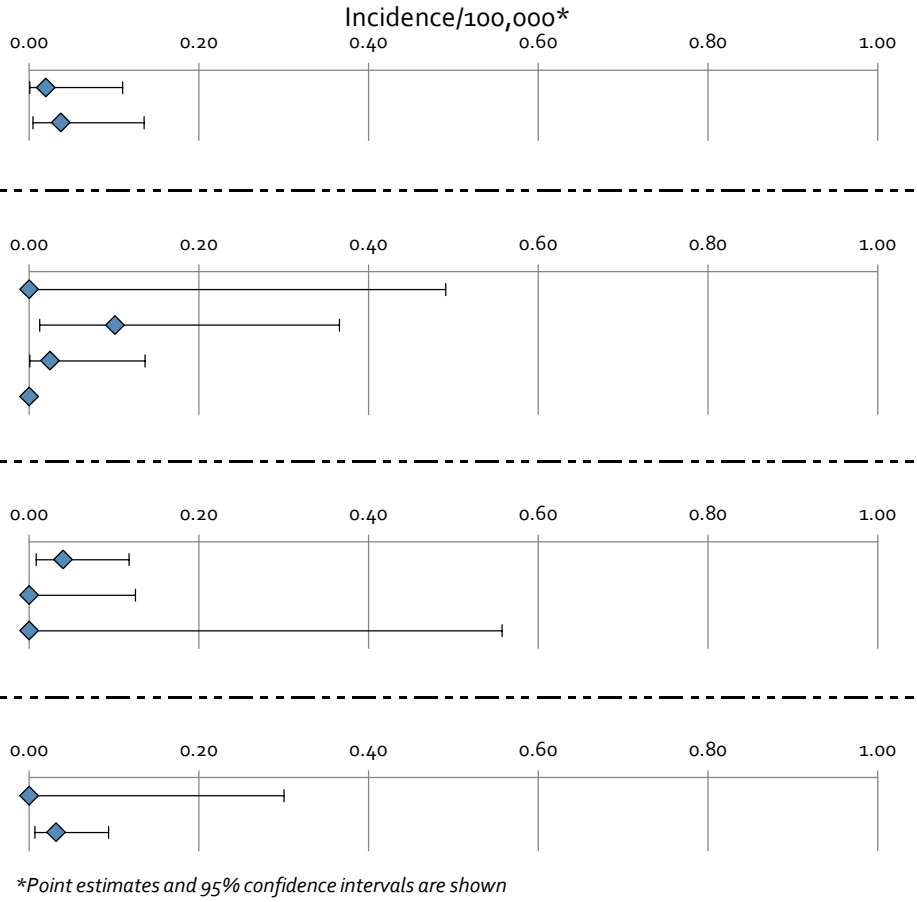
Case Demographics, 2018

Sex	No. cases	% of total	Incidence/ 100,000
Male	1	33%	0.02
Female	2	67%	0.04
Unknown	0	0%	--

Age Group	No. cases	% of total	Incidence/ 100,000
Under 5 yrs.	0	0%	0.00
5-19 yrs.	2	67%	0.10
20-49 yrs.	1	33%	0.02
50+ yrs.	0	0%	0.00
Unknown	0	0%	--

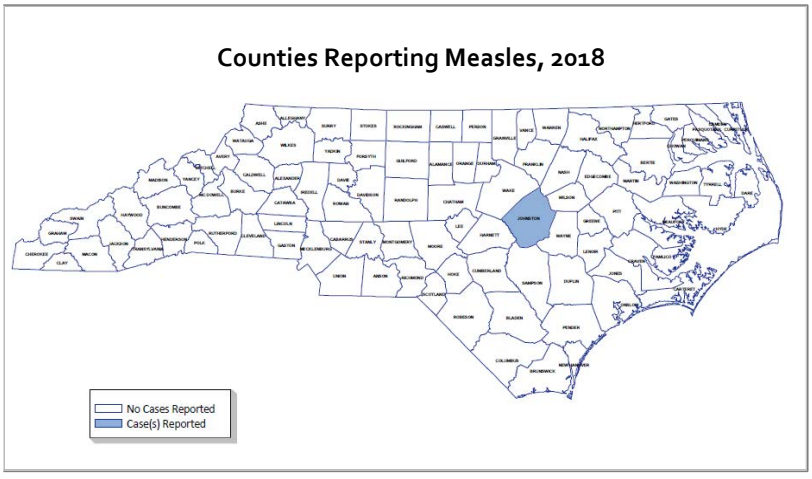
Race	No. cases	% of total	Incidence/ 100,000
White	3	100%	0.04
Black	0	0%	0.00
Other	0	0%	0.00
Multiple or Unknown	0	0%	--

Hispanic Ethnicity	No. cases	% of total	Incidence/ 100,000
Yes	0	0%	0.00
No	3	100%	0.03
Unknown	0	0%	--

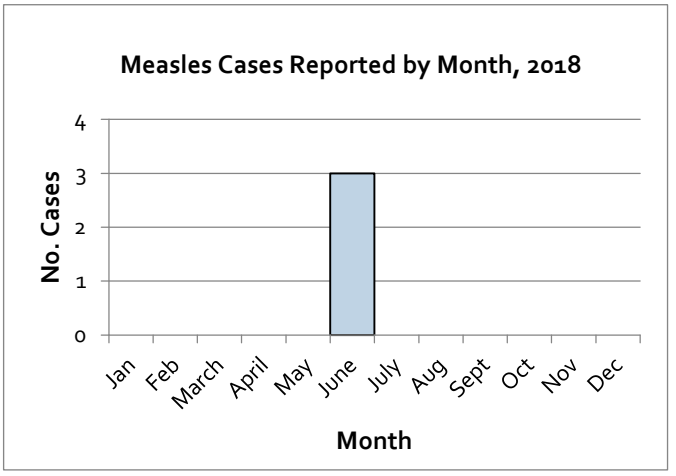


**Point estimates and 95% confidence intervals are shown*

Geographic Distribution



Cases By Month



Meningococcal Invasive Disease

Background

Invasive meningococcal disease caused by *Neisseria meningitidis* is an acute, serious illness that can cause several syndromes including meningitis, bacteremia, and sepsis. Infections can rapidly progress and result in death. Timely and appropriate antibiotic therapy is important for the treatment of this disease; however, even with the widespread use of antibiotics, the case-fatality rate is estimated to be 10-14%. Six serogroups are responsible for the vast majority of invasive disease: A, B, C, W, X, and Y.

Humans act as a natural reservoir for *N. meningitidis.* Up to 10% of adults are asymptomatic carriers, although most carriers develop immunity against the organism and do not develop invasive disease. Cases of meningococcal disease can occur sporadically or as part of outbreaks. Outbreaks can occur among groups living in close-contact settings, such as college dormitories, or among high-risk populations in a community setting.

Patients are considered infectious beginning 7 days before symptom onset until 24 hours after starting appropriate antibiotics. Post-exposure prophylaxis (PEP) should be given to close contacts within 24 hours after the index patient is identified, if possible. PEP is of limited value if started more than 14 days after the last exposure. Effective antimicrobial regimens for prophylaxis include rifampin, ceftriaxone, and ciprofloxacin. PEP is critically important for close contacts of patients with invasive meningococcal infections, and is recommended for household contacts, childcare contacts, and others with direct exposures to the patient's oral secretions. PEP is not recommended for casual contacts such as coworkers, classmates, or healthcare workers who were not directly exposed to oral secretions.

Immunization

The quadrivalent meningococcal conjugate vaccine was first licensed in 2005. It contains four serogroups (A, C, Y, and W). Two doses are recommended for children as part of the routine immunization schedule; the first at 11-12 years, and the second at age 16 years. Vaccination with the quadrivalent and serogroup B vaccine is recommended apart from the routine schedule for various populations considered to be at increased risk for disease, such as immunocompromised children and adults, military recruits, and laboratory workers.

Epidemiology

National

The incidence rate of meningococcal disease in the U.S. has been declining since the 1990s, and is currently at an all-time low of 0.11 per 100,000 people. There were about 350 cases of meningococcal disease reported nationwide in 2017. Rates are highest in children less than one year of age, followed by adolescents and young adults. Serogroup B causes about 60% of cases in children under five years of age.

North Carolina

Rates of meningococcal invasive disease are at an all-time low in North Carolina, reflecting the national trend; the incidence rate in 2018 was just 0.09 per 100,000 people. From 2014-2018, 38 cases of meningococcal invasive disease were identified; serogroup B caused the largest share of infections (42%) followed by serogroup Y (18%). No deaths associated with meningococcal disease were reported in 2018.

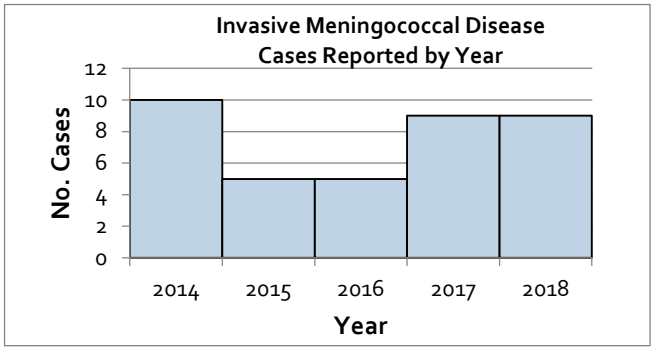
Outbreaks

No outbreaks of meningococcal invasive disease occurred in North Carolina during 2018.

Meningococcal Invasive Disease, 2018

Annual Summary

		2014	2015	2016	2017	2018
Incidence / 100,000		0.10	0.05	0.05	0.09	0.09
No. of cases		10	5	5	9	9
Serogroups	*A*	*0%*	*0%*	*0%*	*0%*	*0%*
	C	*10%*	*20%*	*0%*	*11%*	*0%*
	Y	*30%*	*0%*	*20%*	*11%*	*11%*
	W-135	*10%*	*20%*	*0%*	*11%*	*22%*
	B	*40%*	*40%*	*60%*	*33%*	*44%*
	Unknown	*10%*	*20%*	*20%*	*33%*	*22%*



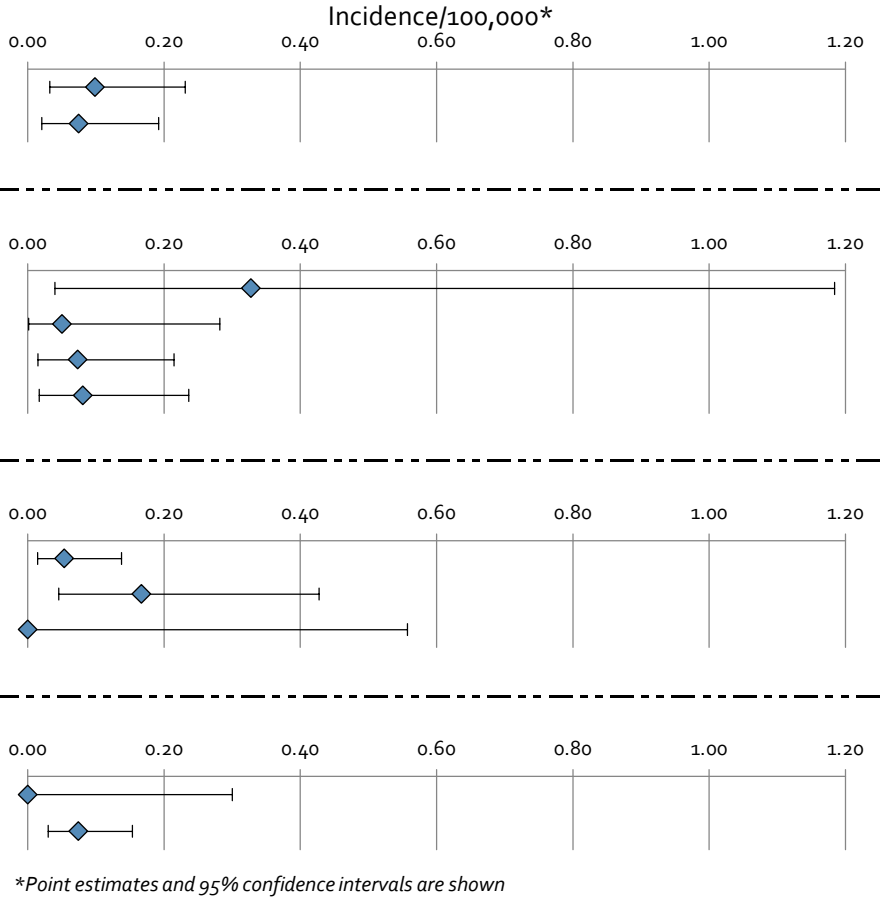
Case Demographics, 2018

Sex	*No. cases*	*% of total*	*Incidence/*
Male	5	56%	0.10
Female	4	44%	0.08
Unknown	0	0%	--

Age Group	*No. cases*	*% of total*	*Incidence/*
Under 5 yrs.	2	22%	0.33
5-19 yrs.	1	11%	0.05
20-49 yrs.	3	33%	0.07
50+ yrs.	3	33%	0.08
Unknown	0	0%	--

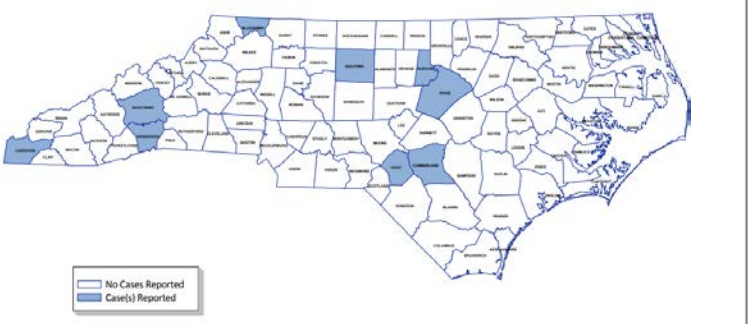
Race	*No. cases*	*% of total*	*Incidence/*
White	4	44%	0.05
Black	4	44%	0.17
Other	0	0%	0.00
Multiple or Unknown	1	11%	--

Hispanic Ethnicity	*No. cases*	*% of total*	*Incidence/*
Yes	0	0%	0.00
No	7	78%	0.07
Unknown	2	22%	--

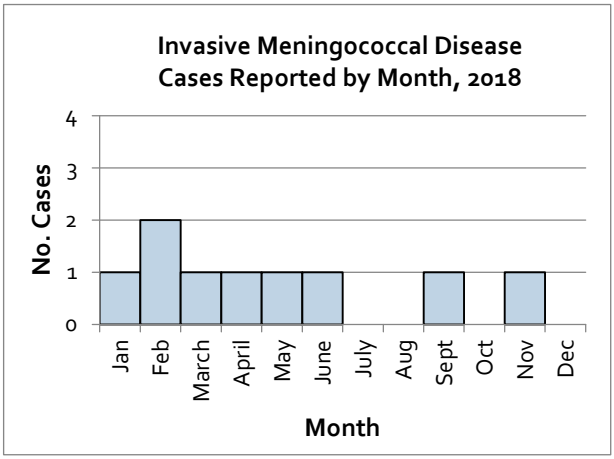


**Point estimates and 95% confidence intervals are shown*

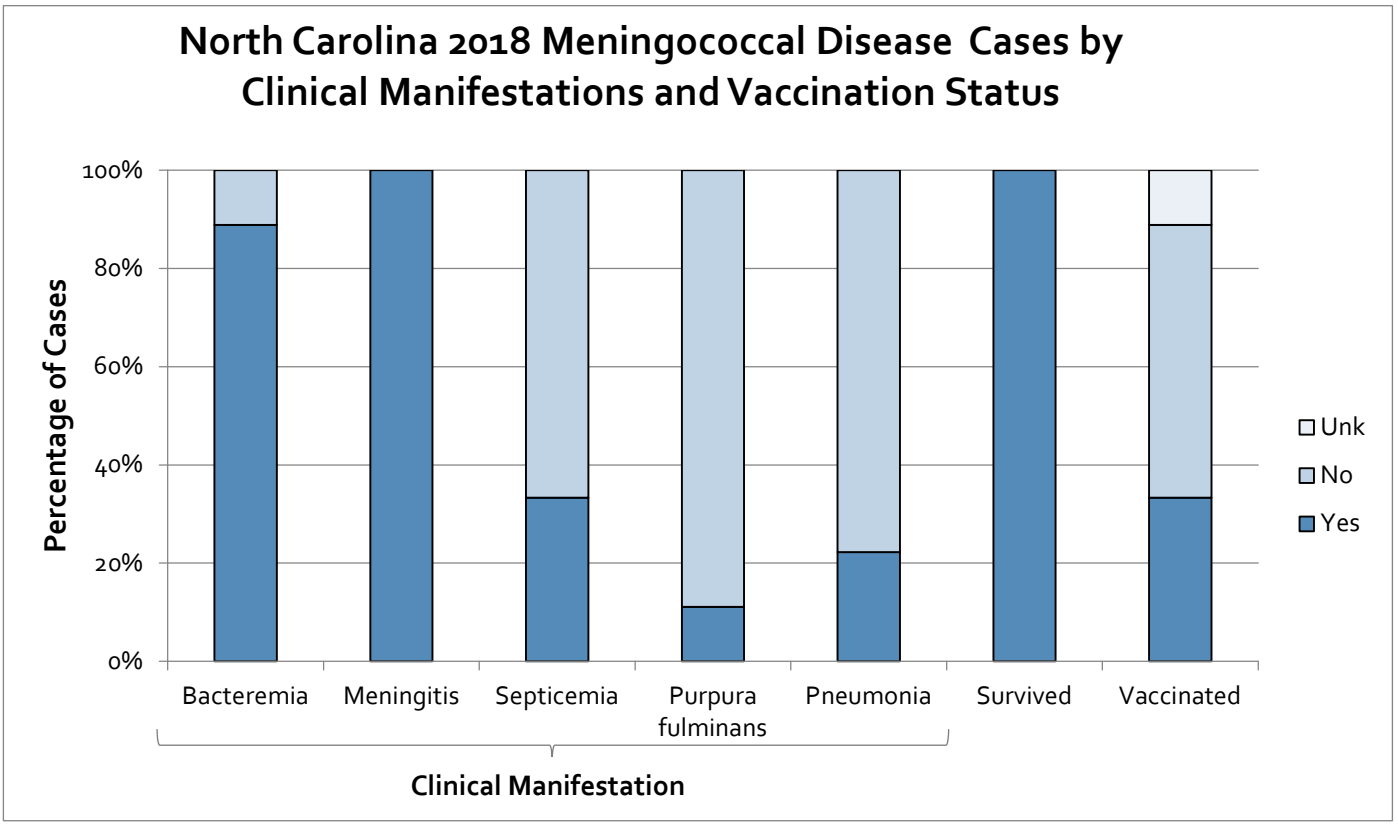
Geographic Distribution



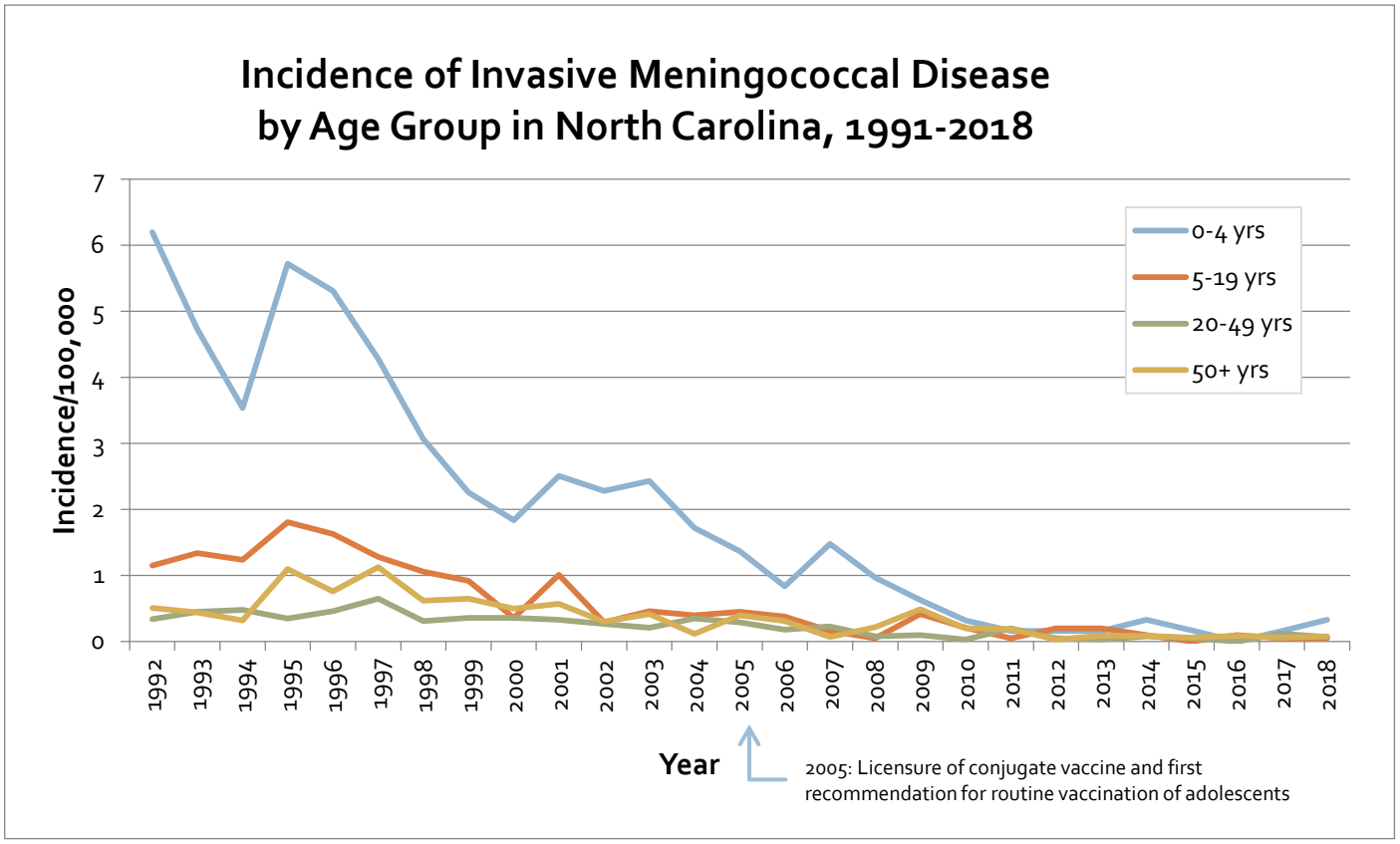
Cases By Month



2018 Case Summary



Meningococcal Disease Incidence by Age Group



Mumps

Background

Mumps is a viral illness best known for causing swelling of the salivary glands below the ears and above the jaw, called parotitis. Complications are possible from mumps, including orchitis (inflammation of the testicles) in males, oophoritis (inflammation of the ovaries) in females, deafness, and meningitis. People with mumps are considered contagious from 2 days before to 5 days after symptoms begin. A significant number of people infected with the mumps virus may not have symptoms (30-40%).

Suspected cases of mumps should avoid contact with others from the time of diagnosis until 5 days after the onset of parotitis. Suspected cases should stay home from work or school and stay in a separate room from other people if possible. Susceptible close contacts to mumps cases should be offered vaccine and instructed to monitor for signs and symptoms of mumps. Healthcare workers with unprotected exposure to a mumps patient must show evidence of immunity to mumps or be excluded from work from day 12-25 after exposure.

Vaccination is the best way to prevent mumps. People without evidence of immunity should receive age-appropriate measles-mumps-rubella (MMR) vaccine. People born before 1957 are considered immune based on likely exposure during childhood. People who are unvaccinated are more likely to contract mumps and have complications than persons who are vaccinated.

Immunization

Two doses of MMR vaccine are routinely recommended for children; the first at 12-15 months, and the second at 4-6 years.

Epidemiology

National

Before the U.S. mumps vaccination program began in 1967, about 200,000 cases of mumps were reported each year. Since that time, there has been more than a 99% decrease in mumps cases in the United States. However, the number of reported cases of mumps has recently spiked, with an average of almost 5,000 cases per year reported from 2016-2018. Adolescents and college-aged adults appear to be at increased risk for disease, likely due to close-contact, congregate settings like schools and universities.

North Carolina

Twelve cases of mumps were reported in 2018, the lowest number of cases in the state since 2015.

Outbreaks

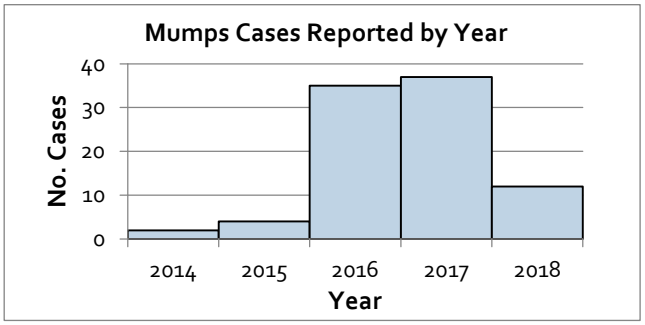
No outbreaks of mumps were reported in 2018.

Mumps, 2018

Annual Summary

	2014	2015	2016	2017	2018
Incidence / 100,000	0.02	0.04	0.34	0.36	0.12
No. cases	2	4	35	37	12
Confirmed	*0%*	*0%*	*31%*	*62%*	*25%*
Probable	*100%*	*100%*	*69%*	*38%*	*75%*
*Unvaccinated or unknown immune status**	*100%*	*0%*	*40%*	*30%*	*50%*

**Cases born before 1957 are considered immune*



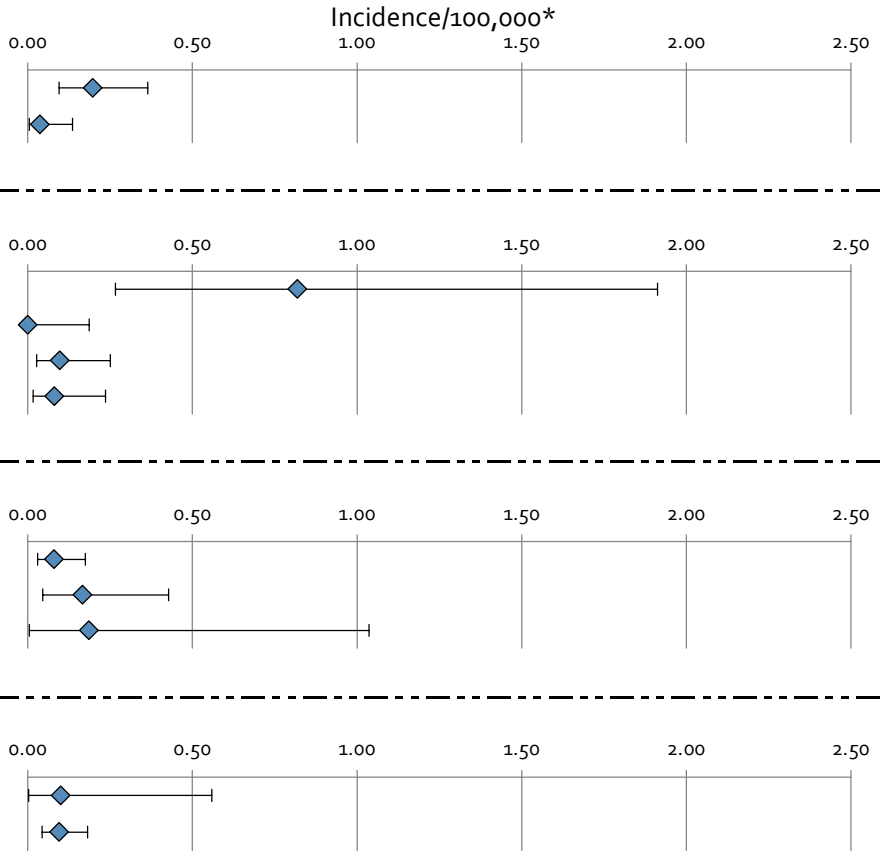
Case Demographics, 2018

Sex	No. cases	% of total	Incidence/
Male	10	83%	0.20
Female	2	17%	0.04
Unknown	0	0%	--

Age Group	No. cases	% of total	Incidence/
Under 5 yrs.	5	42%	0.82
5-19 yrs.	0	0%	0.00
20-49 yrs.	4	33%	0.10
50+ yrs.	3	25%	0.08
Unknown	0	0%	--

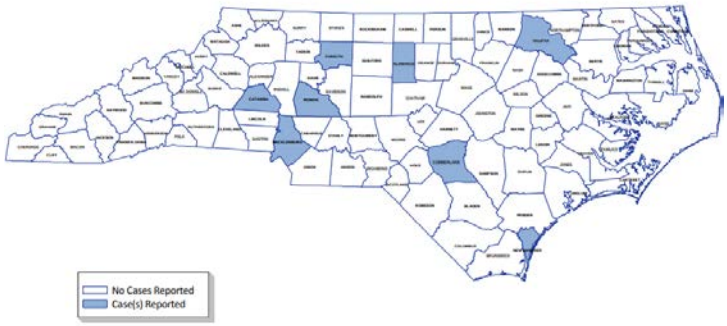
Race	No. cases	% of total	Incidence/
White	6	50%	0.08
Black	4	33%	0.17
Other	1	8%	0.19
Multiple or Unknown	1	8%	--

Hispanic Ethnicity	No. cases	% of total	Incidence/
Yes	1	8%	0.10
No	9	75%	0.10
Unknown	2	17%	--

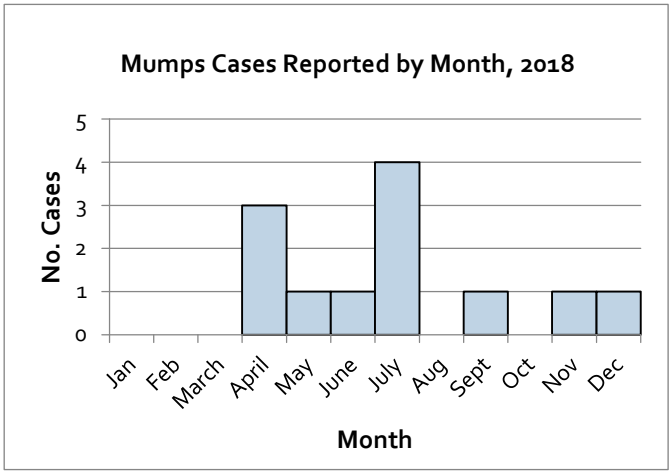


**Point estimates and 95% confidence intervals are shown*

Geographic Distribution



Cases By Month



Pertussis

Background

Pertussis (commonly known as "Whooping Cough") is a highly contagious respiratory infection spread from person to person through respiratory droplets from a cough or sneeze or by direct contact with respiratory secretions. Pertussis is primarily a toxin-mediated disease. *Bordetella pertussis* causes disease by attaching to the cilia in the upper respiratory tract and releasing toxins that paralyze the cilia, causing inflammation of the respiratory tract. The incubation period of pertussis ranges from 5-21 days, but typically is 10-14 days. People with pertussis are infectious from the start of symptoms through 3 weeks of cough, or if treated, until completion of appropriate antibiotic treatment.

Pertussis occurs in three disease stages. The first is the catarrhal stage, which generally begins with the gradual onset of runny nose, sneezing and low-grade fever with a mild, occasional cough, similar to the common cold. Next is the paroxysmal stage, characterized by the onset of paroxysms, or uncontrollable fits of coughing. Following one of these fits of coughing, the patient may gasp for air, which can sometimes result in a "whooping" sound. The paroxysmal stage can be quite long with paroxysms increasing in frequency during the first 1-2 weeks and then remaining stable for 2-3 weeks. A gradual recovery begins during the convalescent stage and the coughing fits become less frequent. Secondary infections are most likely to occur during this stage, and paroxysms can recur with later respiratory infections for many months after the onset of pertussis.

Post-exposure prophylaxis (PEP) is recommended for household contacts of pertussis cases, as well as high-risk contacts such as infants, women in the third trimester of pregnancy, and immunocompromised persons. Azithromycin is the most common choice of antimicrobial used for both treatment of pertussis and PEP.

Immunization

The current pertussis vaccines available in the United States contain acellular pertussis antigens in combination with tetanus and diphtheria toxoids (DTaP and Tdap). Five doses of DTaP are recommended for children at 2, 4, 6, and 15-18 months and 4-6 years. One dose of Tdap is recommended for adolescents, preferably at 11-12 years. Tdap is also recommended for pregnant women during the 3rd trimester of each pregnancy to facilitate the transfer of maternal antibodies to the infant. Of the 42 cases of pertussis among infants in 2018, just 29% were born to mothers known to have received Tdap during their pregnancy.

Epidemiology

National

In recent years, an increasing burden of disease has been observed in children, likely due to the transition to the acellular pertussis vaccine in the 1990s. Almost 19,000 cases and an incidence rate of 5.83 per 100,000 persons occurred in the United States during 2017. Pertussis is cyclical in nature with peaks occurring every 3-5 years, likely because of an increase in the number of susceptible people accumulating following peak years.

Infants are at highest risk of complications and death from pertussis. Secondary bacterial pneumonia is the most common complication in both infants and other age groups.

North Carolina

The cyclical nature of pertussis transmission is evident in North Carolina. The average number of cases in North Carolina during 2012-2014 was 679. Transmission has trended downward since 2014, with an average of 364 cases reported during 2015-2018. No deaths associated with pertussis were reported in 2018.

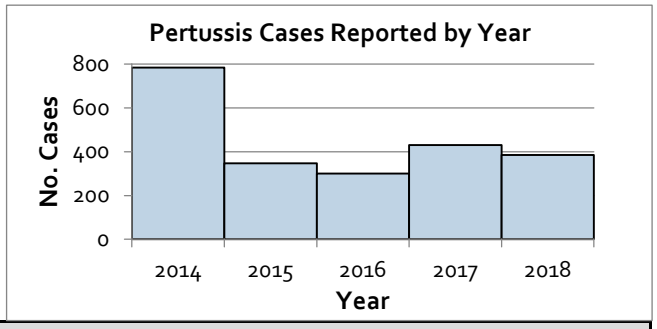
Outbreaks

Seven pertussis outbreaks were reported during 2018 in Buncombe, Caldwell, Carteret, Durham, Forsyth, Stokes, and Wake counties. All outbreaks occurred primarily among school-aged children. The largest outbreak occurred in Buncombe County, during which 24 outbreak-associated cases were reported.

Pertussis, 2018

Annual Summary

	2014	2015	2016	2017	2018
Incidence / 100,000	7.90	3.46	2.95	4.19	3.71
No. cases	785	347	300	430	385
Culture confirmed	*7%*	*3%*	*3%*	*3%*	*3%*
PCR confirmed	*44%*	*33%*	*37%*	*48%*	*50%*
Epi-link confirmed	*14%*	*10%*	*8%*	*9%*	*8%*
Probable	*35%*	*54%*	*52%*	*41%*	*38%*



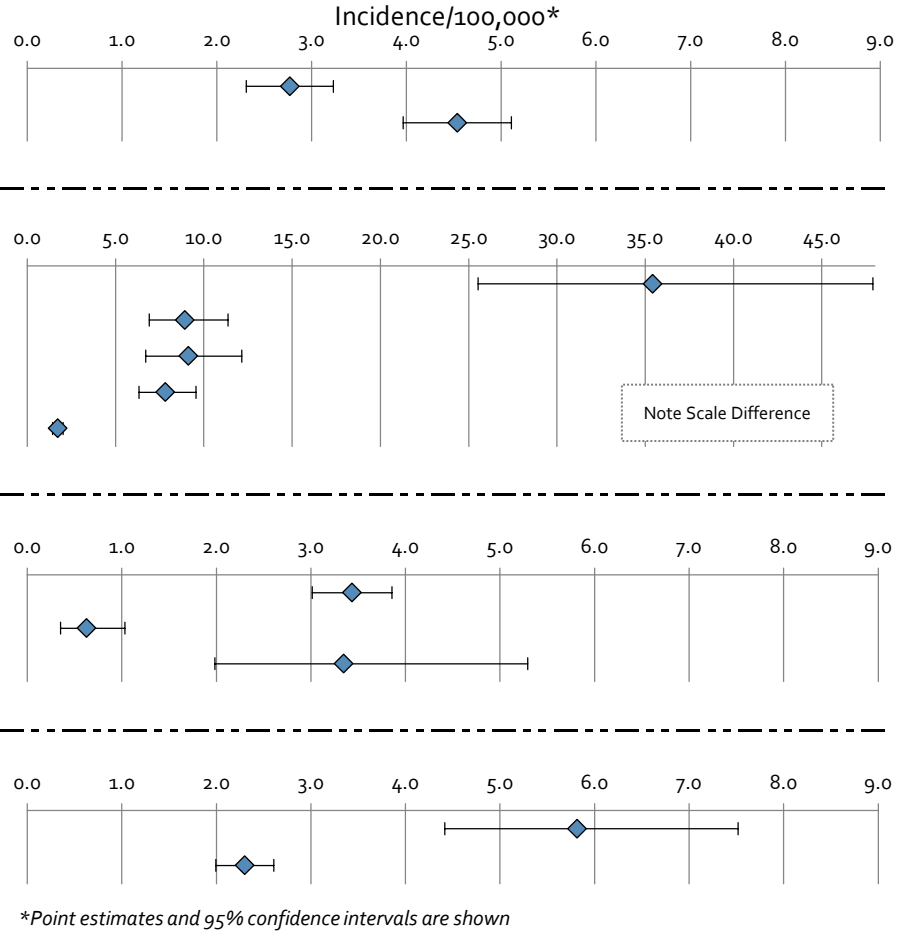
Case Demographics, 2018

Sex	*No. cases*	*% of total*	*Incidence/*
Male	140	36%	2.8
Female	242	63%	4.5
Unknown	3	1%	--

Age Group	*No. cases*	*% of total*	*Incidence/*
Infants (<1 yr.)	42	11%	35.4
1-6 yrs.	66	17%	8.9
7-10 yrs.	47	12%	9.1
11-19 yrs.	95	25%	7.8
20+ yrs.	135	35%	1.7
Unknown	0	0%	--

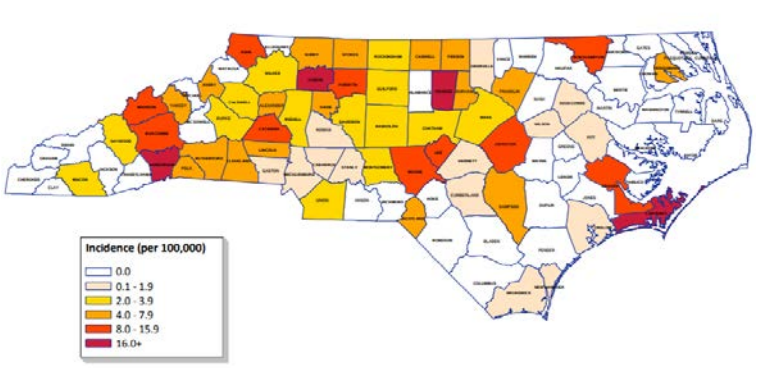
Race	*No. cases*	*% of total*	*Incidence/*
White	256	66%	3.4
Black	15	4%	0.6
Other	18	5%	3.3
Multiple or Unknow	96	25%	--

Hispanic Ethnicity	*No. cases*	*% of total*	*Incidence/*
Yes	58	15%	5.8
No	216	56%	2.3
Unknown	111	29%	--

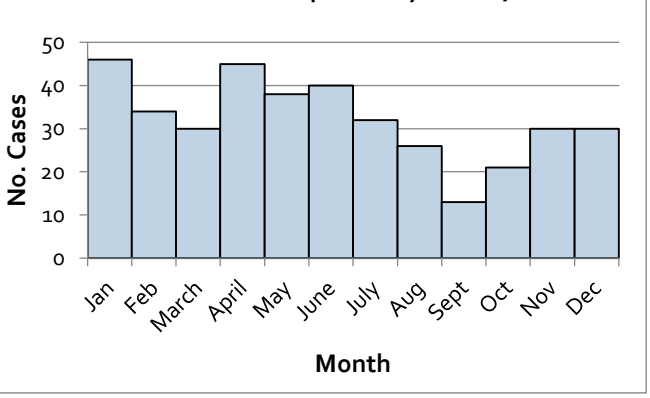


**Point estimates and 95% confidence intervals are shown*

Geographic Distribution



Cases By Month



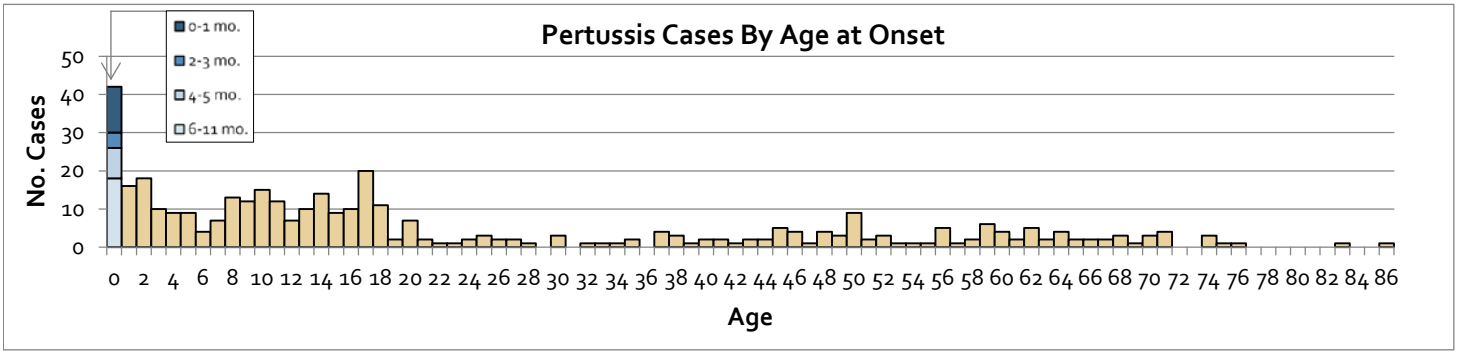
Pertussis, 2018 *(continued)*

Pertussis Cases by County and Month*														Incidence
County	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Totatl	
Alexander County	.	.	2	.	.	.	.	.	.	.	.	.	2	5.4
Ashe County	3	.	.	.	.	.	.	.	.	.	.	.	3	11.1
Avery County		1											1	5.7
Brunswick County	.	.	.	1	.	.	.	.	.	.	.	.	1	0.8
Buncombe County		.	3	4	8	8	1	1	1	1	3		30	11.6
Burke County	.	.	.	.	.	1	.	1	.	.	1	.	3	3.4
Cabarrus County	1	.	.	.	.	.	.	1	.	.	.	.	2	1.0
Caldwell County	.	.	.	.	.	1	1	.	.	.	.	.	2	2.4
Carteret County	3	4	1	5	1	.	1	.	.	.	.	.	15	21.8
Caswell County	.	.	.	.	.	.	1	.	.	.	.	.	1	4.4
Catawba County	.	.	.	1	.	3	2	2	1	2	2	1	14	8.9
Cleveland County	.	.	2	.	.	.	1	.	1	1	.	1	6	6.2
Chatham County	.	.	1	.	.	.	.	.	.	.	1	.	2	2.8
Craven County	1	3	.	2	1		.	2	1	1		2	13	12.7
Cumberland County	.	.	1	1	.	.	.	.	.	.	2	.	4	1.2
Davidson County	.	.	.	.	1	.	2	.	.	.	1	.	4	2.4
Davie County	.	.	.	.	1	.	1	.	.	.	.	.	2	4.7
Durham County	.	.	.	3	2	1	1	.	.	.	1	6	14	4.5
Edgecombe County	.	.	.	.	1	.	.	.	.	.	.	.	1	1.9
Forsyth County	1	.	3	6	4	5	.	3	2	1	4	2	31	8.2
Franklin County	.	.	1	.	2	1	.	.	.	.	.	.	4	6.0
Gaston County	.	.	1	1	.	1	.	.	.	.	.	1	4	1.8
Granville County	1	.	.	.	.	.	.	.	.	.	.	.	1	1.7
Guilford County	1	2	2	.	1	1	1	1	.	2	.	1	12	2.3
Harnett County	.	.	.	1	.	.	.	.	.	.	.	1	2	1.5
Haywood County	2	.	.	.	.	.	.	.	.	.	.	.	2	3.3
Henderson County	11	2	2	.	2	.	.	.	.	2	1	4	24	20.7
Iredell County	1	1	.	.	.	.	.	.	1	.	1	.	4	2.3
Johnston County	1	4	1	2	3	5	1	.	.	.	.	.	17	8.6
Lee County	.	.		1	.	.	5	1	.	.	.	.	7	11.6
Lincoln County	.	.	1	.	.	.	1	1	.	.	2	.	5	6.1
Macon County	.	.	.	.	.	.	.	.	.	1	.	.	1	2.2
Madison County					1				1	3			5	14.4
Mecklenburg County	1	.	4	1	.	2	2	3	1	1	1	1	17	1.6
Montgomery County	1	.	.	.	.	.	.	.	.	.	.	.	1	3.6
Moore County	1	2	1	.	.	.	.	.	.	.	.	5	9	9.3
New Hanover County	.	.	.	1	.	.	1	.	.	.	.	.	2	0.1
Northhampton County								1	1				2	10.1
Onslow County	1	.	.	.	.	.	.	.	.	.	1	1	3	1.5
Orange County	5	4	2	6	3		2	1	.		1	.	24	16.6
Perquimans County	.	.	.	1	.	.	.	.	.	.	.	.	1	7.4
Person County	1	.	.	.	1	.	.	.	.	.	.	.	2	5.1
Pitt County	1	.	.	.	.	.	.	.	1	.	.	.	2	1.1
Polk County	.	1	.	.	.	.	.	.	.	.	.	.	1	4.9
Randolph County	.	2	1	1	.	.	1	.	.	.	.	.	5	3.5
Rockingham County	.	1	.	.	2	.	.	.	.	.	.	.	3	3.3
Rowan County	.	1	.	.	.	.	.	.	.	.	.	1	2	1.4
Rutherford County	.	.	.	.	.	.	.	.	.	.	3	.	3	4.5
Sampson County	1	.	.	1	.	.	.	.	.	.	.	.	3	4.7
Scotland County	.	.	.	.	.	.	1	.	.	1	.	.	2	5.7
Stanly County	.	.	.	.	.	.	.	.	.	.	1	.	1	1.6
Stokes County	.	.	.	.	.	1	1	.	.	.	.	.	2	4.4
Surry County	1	.	2	.	.	.	.	1	1	.	.	.	5	6.9
Union County	1	.	.	.	.	3	1	3	.	.	.	.	8	3.5
Wake County	6	6	2	2	3	4	3	3	.	1	3	3	36	3.4
Wilkes County	.	.	.	.	1	.	.	.	.	1	.	.	2	2.9
Wilson County	.	.	.	.	.	.	.	.	.	1	.	.	1	1.2
Yadkin County					2	2	1	1	1	1			8	21.2
Yancey County	.	.	.	.	.	.	.	1	.	.	1	.	1	5.6
North Carolina	46	34	33	41	40	39	32	27	13	20	30	30	385	3.9

*Only Counties with at least one case of Pertussis are listed

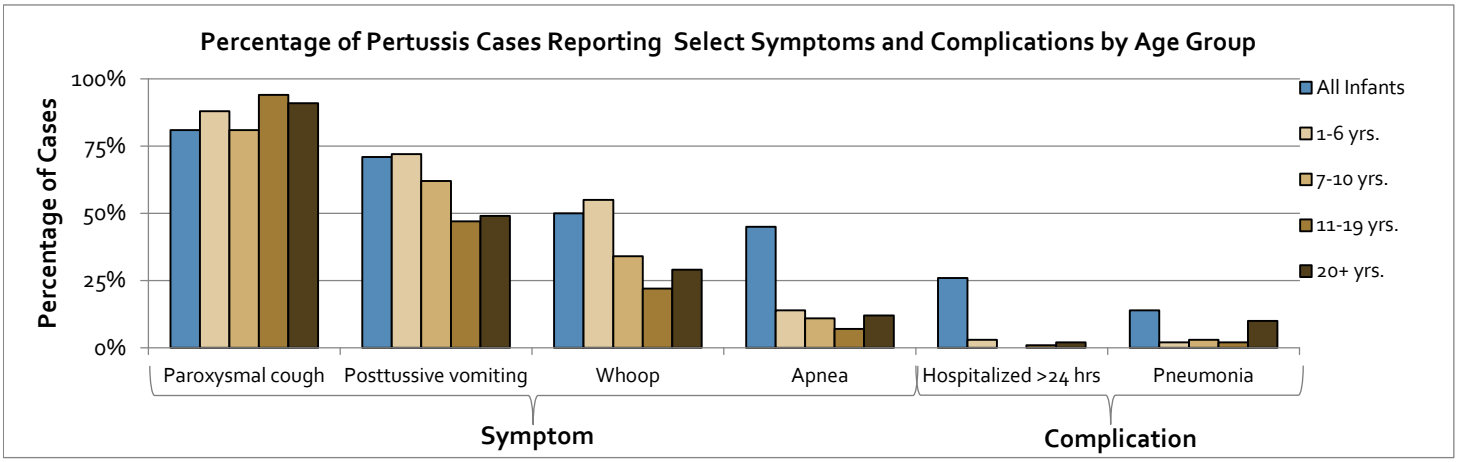
Pertussis, 2018 *(continued)*

Age Distribution



Clinical Information

	Infant Age Groups								Age Groups										All Ages	
	0-1 mo.		2-3 mo.		4-5 mo.		6-11 mo.		All Infants		1-6 yrs.		7-10 yrs.		11-19 yrs.		20+ yrs.			
No. cases	12		4		8		18		42		66		47		95		135		385	
Symptoms (No. cases, % of known responses)																				
Paroxysmal cough	10	83%	4	100%	6	75%	14	78%	34	81%	57	88%	38	81%	89	94%	117	91%	335	89%
Posttussive vomiting	8	67%	3	75%	6	75%	13	72%	30	71%	47	72%	29	62%	45	47%	63	49%	214	57%
Whoop	5	42%	2	50%	3	38%	11	61%	21	50%	36	55%	16	34%	21	22%	38	29%	132	35%
Apnea	9	75%	2	50%	4	50%	4	22%	19	45%	9	14%	5	11%	7	7%	16	12%	56	15%
Complications (No. cases, % of known responses)																				
Hospitalized >24 hrs	9	75%	1	25%	0	0%	1	6%	11	26%	2	3%	0	0%	1	1%	2	2%	16	4%
Pneumonia	2	17%	1	25%	1	13%	2	11%	6	14%	1	2%	1	3%	2	2%	10	10%	20	5%
Seizures	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
Encephalopathy	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	1	1%	1	<1%
Died	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%



Maternal Tdap (for infant cases <1 year of age)

Mother Received Tdap in Association with Case Pregnancy	*No. cases in 2018*	*% of total*
Yes, during pregnancy	12	29%
Yes, postpartum	2	5%
No	16	38%
Unknown	12	29%
Total	**42**	**100%**

Pneumococcal Meningitis

Background

Streptococcus pneumoniae (pneumococcus) is a gram-positive bacterium that can cause many clinical syndromes including pneumonia, bacteremia, and meningitis. Pneumococcal meningitis is the only form of invasive disease that is reportable in North Carolina. There are over 90 pneumococcal serotypes, and vaccines are available to protect against those that are most likely to cause invasive disease. Pneumococcal infections are most common during the late winter and early spring.

Transmission of pneumococcus occurs as the result of direct contact with respiratory droplets from an infected person. Certain groups are at higher risk of invasive pneumococcal disease, including children less than 2 years of age, adults over 65, and people with certain chronic medical conditions. Contacts to people infected with pneumococcus are not generally at increased risk for disease and antibiotic prophylaxis is rarely indicated.

Immunization

PCV13 is a conjugate vaccine that protects against the thirteen serotypes most commonly associated with severe infections. PPSV23 is a pneumococcal polysaccharide vaccine, and protects against 23 of the most common *S. pneumoniae* serotypes.

Routine vaccination with a series of 4 PCV13 vaccinations prior to 15 months of age is recommended for all children. Pneumococcal vaccination with PCV13 followed by PPSV23 is recommended for all adults over the age of 65 and for adults aged 18-64 who are at increased risk of infection. The recommended number of doses for high-risk adults and additional recommendations for catch-up vaccination and vaccination of individuals with certain conditions can be found at the CDC's website at www.cdc.gov/vaccines/vpd/pneumo/hcp/recommendations.html

Epidemiology

National

The first pneumococcal conjugate vaccine, PCV7, was introduced in 2000. Since that time, rates of invasive pneumococcal disease have declined significantly among children less than 5 years of age, and rates have continued to decline with the use of PCV13 as a routine childhood vaccination.

North Carolina

Rates of pneumococcal meningitis have been consistent in North Carolina for several years; 44 cases were reported during 2018, slightly more than the five-year average of 37 cases. Ten (23%) pneumococcal meningitis-associated deaths were reported.

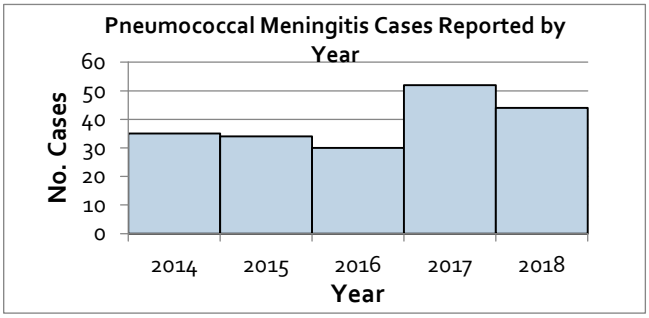
Outbreaks

No outbreaks of pneumococcal meningitis were reported in 2018.

Pneumococcal Meningitis, 2018

Annual Summary

	2014	2015	2016	2017	2018
Incidence / 100,000	0.35	0.34	0.30	0.51	0.42
No. cases	35	34	30	52	44
<5 yrs.	*9%*	*12%*	*20%*	*6%*	*7%*
≥ 5 yrs.	*91%*	*88%*	*80%*	*94%*	*93%*
Unvaccinated or unknown vaccination status (<5 yrs. only)	*67%*	*25%*	*0%*	*0%*	*0%*



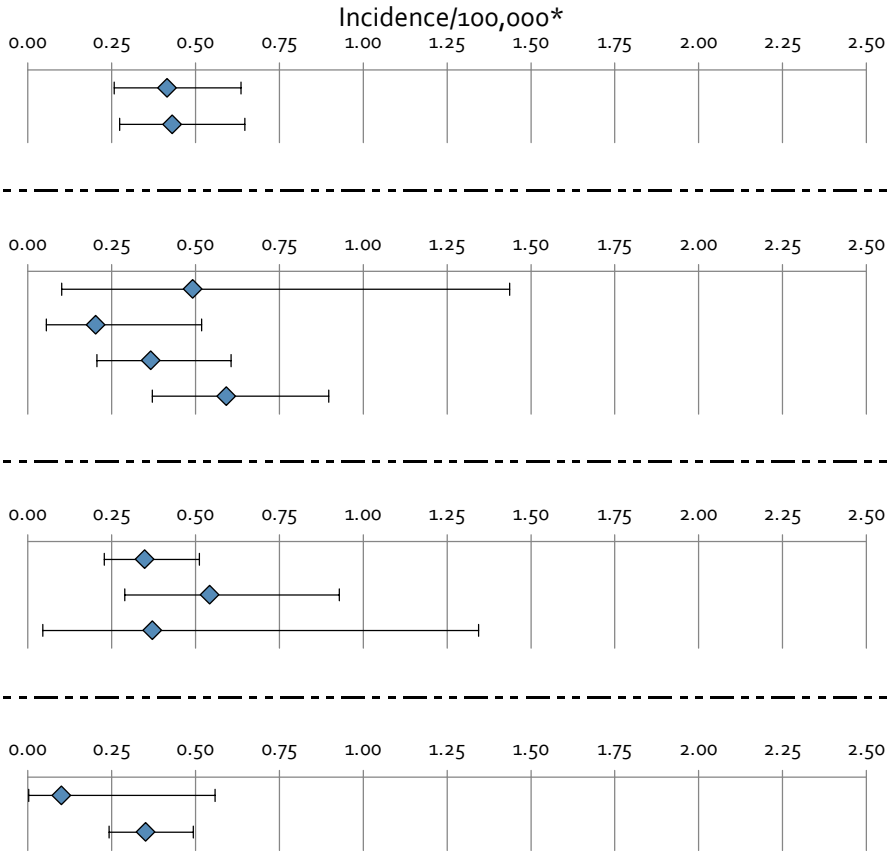
Case Demographics, 2018

Sex	*No. cases*	*% of total*	*Incidence/ 100,000*
Male	21	48%	0.42
Female	23	52%	0.43
Unknown	0	0%	--

Age Group	*No. cases*	*% of total*	*Incidence/ 100,000*
Under 5 yrs.	3	7%	0.49
5-19 yrs.	4	9%	0.20
20-49 yrs.	15	34%	0.37
50+ yrs.	22	50%	0.59
Unknown	0	0%	--

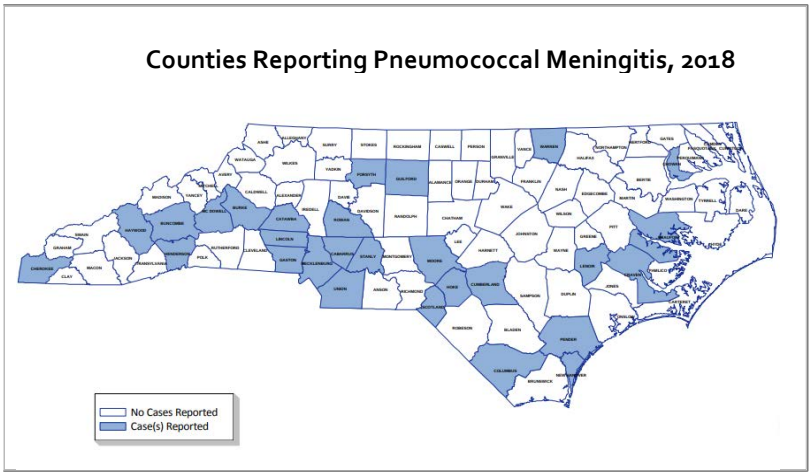
Race	*No. cases*	*% of total*	*Incidence/ 100,000*
White	26	59%	0.35
Black	13	30%	0.54
Other	2	5%	0.37
Multiple or Unknown	3	7%	--

Hispanic Ethnicity	*No. cases*	*% of total*	*Incidence/ 100,000*
Yes	1	2%	0.10
No	33	75%	0.35
Unknown	10	23%	--

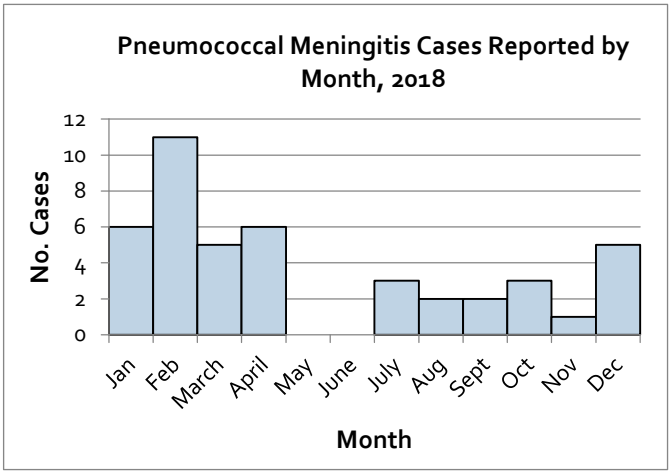


**Point estimates and 95% confidence intervals are shown*

Geographic Distribution



Cases By Month



Tetanus

Background

Tetanus infections are caused by the bacterium *Clostridium tetani*. Spores of tetanus bacteria are present naturally in the environment and are widespread in dust, soil, and manure. Spores thrive in anaerobic conditions, meaning that they can grow in environments without oxygen. When spores are introduced into dead tissue or deep wounds, they germinate into full-grown bacteria and secrete tetanus toxin, which causes disease.

Certain types of wounds are more likely to become infected with tetanus bacteria because of the anaerobic conditions present. Deep puncture wounds (e.g. stepping on a nail), burn wounds, or crush injuries that are contaminated with dust or dirt are at higher risk of becoming infected than shallow wounds. Tetanus is not transmitted from person to person.

Symptoms of tetanus include jaw cramping (lockjaw), muscle spasms and stiffness, headache, and fever. Serious complications can occur, including seizures, broken bones, difficulty breathing, and death. Tetanus is treatable with antibiotics and tetanus immune globulin (TIG).

Immunization

Tetanus vaccines are combined with vaccines for diphtheria and pertussis (DTaP and Tdap). Five doses of DTaP are recommended for children at 2, 4, 6, and 15-18 months and 4-6 years. One dose of Tdap is recommended for adolescents, preferably at 11-12 years, and should be followed by a dose of Td vaccine (excludes the pertussis component) every 10 years.

Epidemiology

National

Cases of tetanus have declined by 95% since the disease began to be reported in 1947, and deaths have been reduced by 99%. Sporadic cases of tetanus still occur in people who are not up-to-date on their tetanus vaccination.

North Carolina

Ten cases of tetanus (including one death) have been reported during the previous 10 years. Although it is rare in North Carolina, any tetanus infection emphasizes the need for strong vaccination recommendations for people who are not up-to-date or who are unsure of their vaccination status.

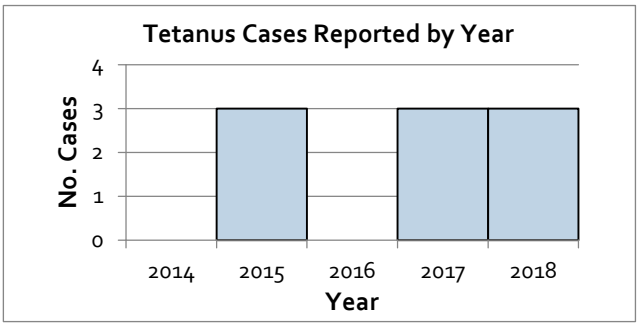
Outbreaks

No outbreaks of tetanus were reported in 2018.

Tetanus, 2018

Annual Summary

	2014	2015	2016	2017	2018
Incidence / 100,000	0.00	0.03	0.00	0.03	0.03
No. cases	0	3	0	3	3



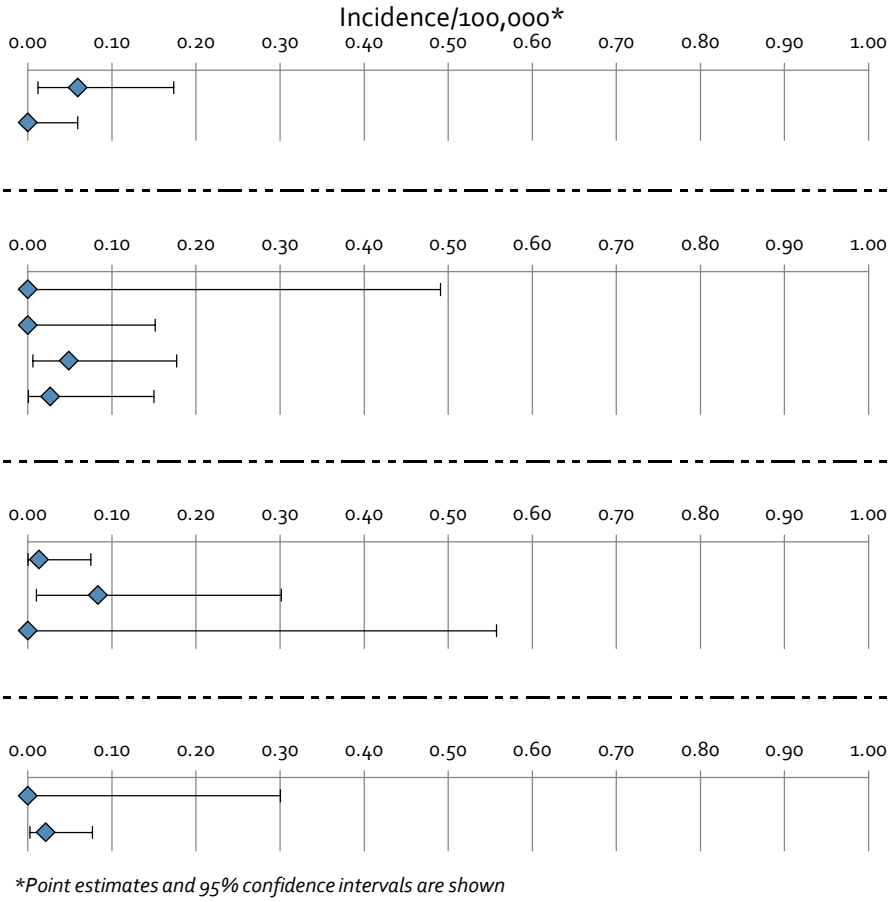
Case Demographics, 2018

Sex	No. cases	% of total	Incidence/ 100,000
Male	3	100%	0.06
Female	0	0%	0.00
Unknown	0	0%	--

Age Group	No. cases	% of total	Incidence/ 100,000
Under 5 yrs.	0	0%	0.00
5-19 yrs.	0	0%	0.00
20-49 yrs.	2	67%	0.05
50+ yrs.	1	33%	0.03
Unknown	0	0%	--

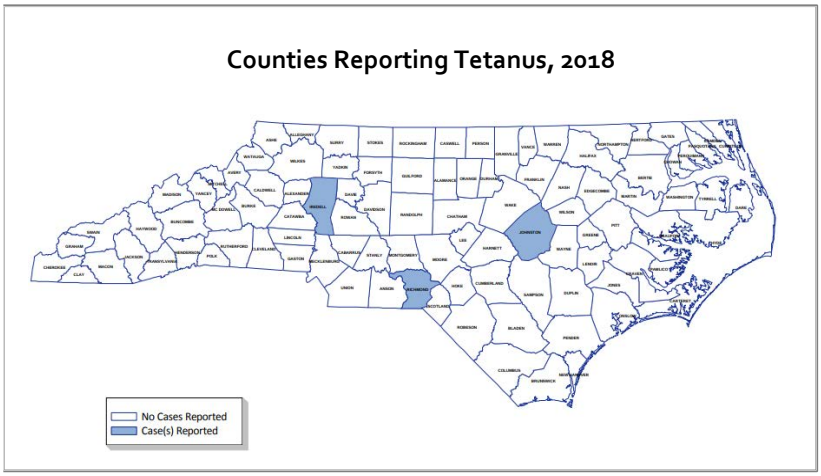
Race	No. cases	% of total	Incidence/ 100,000
White	1	33%	0.01
Black	2	67%	0.08
Other	0	0%	0.00
Multiple or Unknown	0	0%	--

Hispanic Ethnicity	No. cases	% of total	Incidence/ 100,000
Yes	0	0%	0.00
No	2	67%	0.02
Unknown	1	33%	--



**Point estimates and 95% confidence intervals are shown*

Geographic Distribution



Cases By Month