

# North Carolina 2023 Vaccine-Preventable Diseases Annual Report

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NC DEPARTMENT OF  
**HEALTH AND  
HUMAN SERVICES**  
Division of Public Health

## Vaccine-Preventable Diseases Reported in North Carolina, 2023

Controlling vaccine-preventable diseases (VPDs) requires consistent, concerted and coordinated efforts of public health agencies and health care 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 14 VPDs, eight of which were reported in North Carolina during 2023. Additional details regarding case and disease statistics and surveillance data for which diseases were reported are presented on subsequent pages.

### 2023 Surveillance Highlights

- Cases of invasive meningococcal disease have been increasing since 2022, with no specific outbreaks or high-risk groups identified.
- Other bacterial invasive diseases such as pneumococcal meningitis and Haemophilus influenza both increased in 2023.
- Varicella cases increased significantly, likely due to reporting becoming more commonplace after varicella was made a reportable condition in 2020.
- Case numbers for pertussis continue to be much lower than the five-year average but increased when compared to 2022.
- No cases of diphtheria, measles, polio, rubella, congenital rubella syndrome, or tetanus were reported.

### Vaccination Summary

Vaccination rates in North Carolina are generally at or above the national average among children, but vaccine hesitancy and nonmedical vaccine exemptions in school aged children are increasing. For the 2023-2024 influenza season, vaccination coverage among people age  $\geq 6$  months in North Carolina was only 48.8% compared to 50.8% in the 2022-2023 season, and 55.7% in the pre-COVID, 2019-2020 season. National Immunization Survey coverage estimates are updated annually and are typically published in the fall. Influenza immunization data from 2017 to 2024 are [available](#).

According to the [North Carolina Kindergarten Immunization Dashboard](#), the percentage of kindergartners who had not received all required immunizations by day 30 of enrollment increased from 2.7% in 2021-2022 to 4.5% in 2022-2023. Religious exemptions rose for all school types, with the most dramatic increases seen in private school settings where the percentage of kindergartners with a religious exemption rose from 5.4% in 2021-2022 to 7.3% in 2022-2023. Please note that exemption data relies on school reporting and should be interpreted with this in mind. Vaccine-hesitant individuals often cluster geographically, and those communities are at significant risk of VPD outbreaks. Under-vaccination in specific communities has contributed to outbreaks of varicella and pertussis in North Carolina over the last five years.

# Vaccine-Preventable Diseases Reported in North Carolina, 2023

Number of Cases of VPDs Reported in North Carolina, 2018-2023								
Disease	2018	2019	2020	2021	2022	Previous five-year average	2023	Significant Change*
Diphtheria	0	0	0	0	0	0	0	--
<i>Haemophilus influenzae</i> , invasive disease	209	242	129	110	218	182	269	--
Hepatitis A	100	162	521	945	106	367	28	
Measles	3	0	0	0	0	1	0	--
Meningococcal invasive disease	8	9	7	9	18	10	26	↑
Mpox (formerly monkeypox)	0	0	0	0	703	141	12	--
Mumps	12	89	21	2	2	25	4	--
Pertussis (whooping cough)	386	496	191	52	46	234	106	--
Pneumococcal meningitis	44	54	23	25	62	42	89	↑
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	3	0	0	0	1	1	0	--
Varicella (chickenpox)	n/a	n/a	13	32	98	48	173	↑

↑ = significant increase ( $\geq 2$  standard deviations above average) ↓ = significant decrease ( $\geq 2$  standard deviations below average) -- = no significant change

## Report Specifications. Notable information about this report includes:

- Cases include those classified as confirmed or probable and are only among North Carolina residents.
- Cases are counted using the earliest date of illness identification which is most frequently the symptom onset date. Therefore, case counts in this report may differ slightly from those published in national summaries or state dashboards which can be based on other dates such as date of initial report or the date when cases were closed and reported to the Centers for Disease Control and Prevention (CDC).
- Ages are based on the date the case was entered in the North Carolina Electronic Disease Surveillance System (NC EDSS).
- Incidence rates are based on data obtained from the U.S. census population estimates project. 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.
- Fourteen VPDs are shown in the table above. Data for other VPDs in North Carolina such as influenza and hepatitis B are summarized in separate reports.
- Please note that case classification criteria are subject to change and counts may fluctuate based on these changes.

# Haemophilus influenzae, invasive disease

## 2023 Key Points

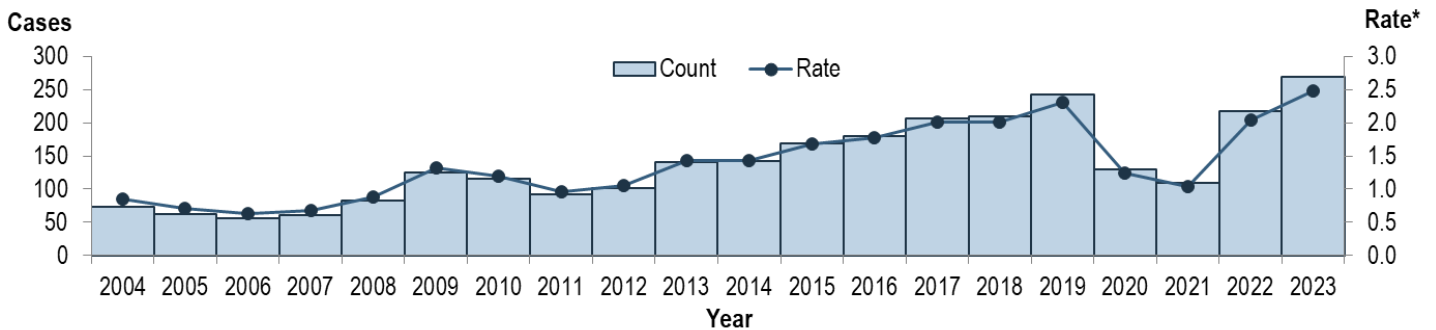
- 269 cases of *H. influenzae* were reported in North Carolina, which is the greatest number of cases reported in a year since at least 1991 (see [CDC National Surveillance and Trends](#)).
- No outbreaks were reported in North Carolina (NC).

*Haemophilus influenzae* can cause a variety of clinical syndromes, including invasive diseases like bacteremia, pneumonia, meningitis, and epiglottitis. *H. influenzae* organisms are divided into serotypes based on proteins found in the capsule that surrounds the organism. Serotypes without a capsule are called non-typeable. Invasive disease caused by any serotype, including non-typeable serotypes, is reportable in North Carolina. *H. influenzae* serotype b (Hib) is the most virulent and is the only serotype for which there is a vaccine. Hib was the leading cause of bacterial meningitis in children under five years of age before vaccine was available.

[CDC recommends Haemophilus influenzae type b \(Hib\) vaccination](#) for all children younger than five years old in the United States. In North Carolina, Hib vaccination is required for all children under the age of five. According to the 2022 National Immunization Survey (NIS), it is estimated that 76.7% of North Carolinian children born in 2020 had completed the full *H. influenzae* vaccine series by 24 months of age.

### *H. influenzae* reached the highest count and rate North Carolina has seen in the last 20 years.

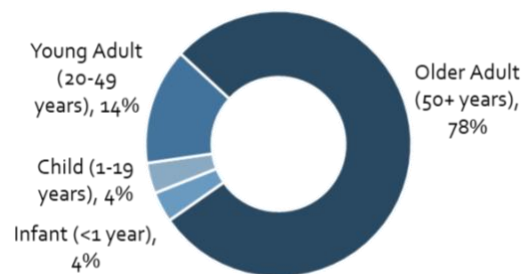
NC 2024-2023 *Haemophilus influenzae* case count and rate by year



### The majority of *H. influenzae* cases were older adults.

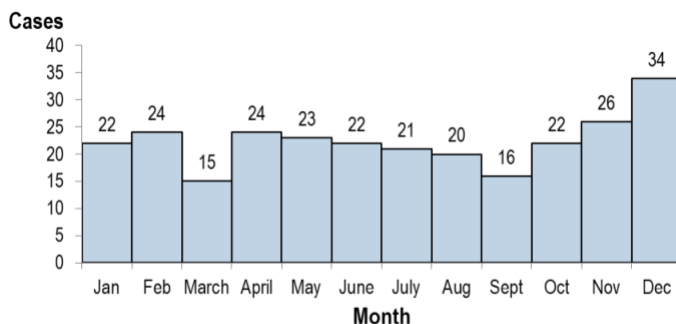
NC 2023 *Haemophilus influenzae* cases by age group status

The age group most affected in North Carolina reflects the national trend; adults ages 50 years and older made up 78% of cases.



### *H. influenzae* occurred consistently throughout the year.

NC 2023 *Haemophilus influenzae* cases by month

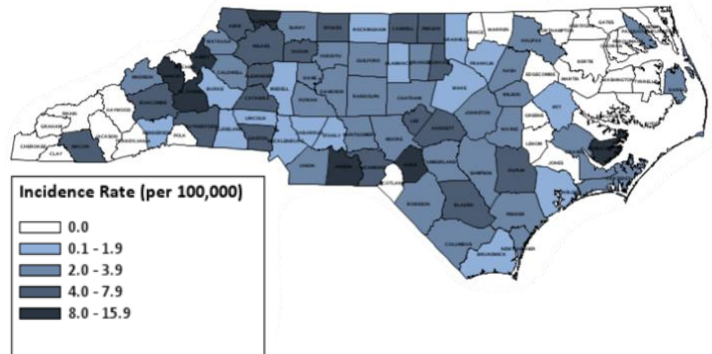


Invasive *H. influenzae* cases are reported throughout the year, but cases generally increase during the late autumn and early winter months. In 2023, cases peaked in November and December.

# Haemophilus influenzae, invasive disease

Cases are widespread, occurring in 71 of North Carolina’s 100 counties during 2023. Many counties in far western North Carolina and northeastern North Carolina reported zero cases.

**H. influenzae cases occurred all throughout NC.**  
NC 2023 *Haemophilus influenzae* cases by county



Annual Summary					
	2019	2020	2021	2022	2023
Cases	242	129	110	218	269
Rate*	2.3	1.2	1.0	2.0	2.5
Case Statistics, 2023					
Sex	Cases	%	Rate*	95% CI	
Male	111	41%	2.1	1.7, 2.6	
Female	157	58%	2.9	2.4, 3.4	
Unknown	1	0%	--	--	
Age Group	Cases	%	Rate*	95% CI	
Infant	10	4%	8.2	3.9, 15.1	
1-4 yrs	4	1%	0.8	0.2, 2.2	
5-9 yrs	4	1%	0.6	0.2, 1.6	
10-19 yrs	2	1%	0.1	0.0, 0.5	
20-49 yrs	38	14%	0.9	0.6, 1.2	
50-74 yrs	114	42%	3.6	3.0, 4.3	
75+ yrs	97	36%	12.8	10.4, 15.7	
Unknown	0	0%	--	--	
Race	Cases	%	Rate*	95% CI	
White	176	65%	2.4	2.0, 2.7	
Black or African American	66	25%	2.8	2.2, 3.5	
American Indian/Alaskan Native	4	1%	2.4	0.7, 6.2	
Asian or Pacific Islander	4	1%	1.0	0.3, 2.6	
Multiple Races	4	1%	1.4	0.4, 3.7	
Other or Unknown	15	6%	--	--	
Hispanic Ethnicity	Cases	%	Rate*	95% CI	
Yes	6	2%	0.5	0.2, 1.2	
No	237	88%	2.5	2.2, 2.8	
Unknown	26	10%	--	--	
Disease Severity	Cases	%			
Hospitalized	223	83%			
Died	41	15%			
Serotypes	Cases	%			
Type b	1	0%			
Non-b, typeable	35	13%			
Nontypeable	192	71%			
Unknown	41	15%			

### Annual Summary Key Points

- As noted above, the 269 cases experienced in 2023 is a high point for North Carolina. The number of annual cases has been steadily increasing since 2012, interrupted only by the COVID-19 pandemic from 2020-2022. The 2023 case number reflects a return to the trend of increasing cases, the cause of which is unknown.
- Cases are more commonly reported in females than males.
- Invasive *H. influenzae* affects people over age 50 the most frequently (78%). People over age 75 make up over one third of cases. Underlying medical conditions are more common among people of this age group, which can lead to an increase in disease severity. However, infants also have a high infection rate (8.2 per 100,000 North Carolinians).
- Although Black or African American North Carolina residents only made up 25% of cases, they experienced the highest rate of infection (2.8 per 100,000).
- Most cases were hospitalized in 2023 (83%) and 15% of cases were reported to have died from their *H. influenzae* illness.
- One case of invasive *H. influenzae* reported in 2023 was type b. The majority of cases in North Carolina were caused by nontypeable strains (71%).

\*Incidence rate, calculated per 100,000 North Carolina residents

# Hepatitis A

## 2023 Key Points

- 28 cases were reported in 2023.
- The majority of cases occurred in people who were unvaccinated or had an unknown vaccination status.
- No outbreaks were reported in NC.

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. Learn more about [hepatitis A](#).

According to the 2022 NIS results, it is estimated that 85.2% of North Carolina children born in 2020 had received at least one dose of the hepatitis A vaccine by 24 months of age, compared to 88.5% nationally. However, a significant decline in coverage was observed for the recommended second dose. An estimated 37.8% of children born in 2020 received at least two doses of Hep A vaccine by 24 months of age, compared to 47.3% nationally. In contrast, 89.2% of adolescents aged 13-17 years had received at least two doses of the Hepatitis A vaccine, compared to 85.0% nationally. Currently, North Carolina immunization law does not require that individuals be immunized against Hepatitis A.

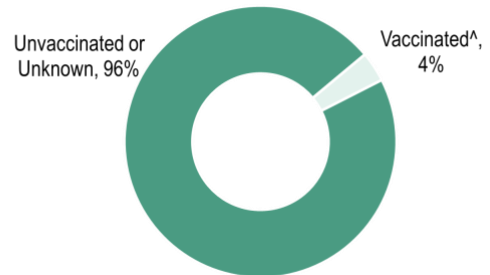
Reported cases of hepatitis A decreased greatly in 2023 when compared to the previous five-year period due to the end of a statewide outbreak in North Carolina. The outbreak that began in April 2018 was declared over in 2022. No outbreaks of hepatitis A were reported in 2023.

**Hepatitis A case counts returned to a normal range in 2023 after a large peak following a statewide outbreak.**  
NC 2024-2023 hepatitis A case count and rate by year

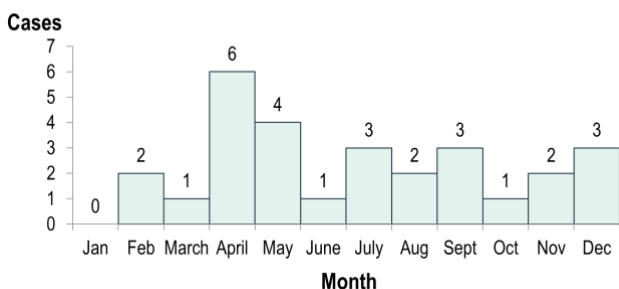


**Almost all (96%) Hepatitis A cases were unvaccinated.**  
NC 2023 hepatitis A cases by vaccination status

All but one (96%) cases of hepatitis A were in people who were unvaccinated or had an unknown vaccination status. The hepatitis A vaccine is highly effective against Hepatitis A virus.



**Hepatitis A cases occurred during most (92%) months of 2023.**  
NC 2023 hepatitis A cases by month

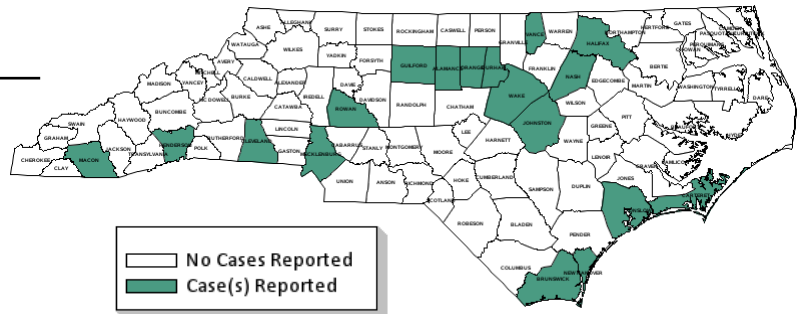


Cases can occur at any time of the year. In 2023, more cases were reported in spring than at other times of the year.

# Hepatitis A

**Hepatitis A cases resided in 18 (18%) counties in 2023.**  
NC 2023 hepatitis A cases by county

Eighteen counties reported at least one case of hepatitis A in 2023. No county reported more than four cases.



Annual Summary					
	2019	2020	2021	2022	2023
Cases	162	521	945	106	28
Rate*	1.5	5.0	8.9	1.0	0.3
Case Statistics, 2023					
Sex	Cases	%	Rate*	95% CI	
Male	15	54%	0.3	0.2, 0.5	
Female	13	46%	0.2	0.1, 0.4	
Unknown	0	0%	--	--	
Age Group					
Infant	0	0%	0.0	0.0, 3.0	
1-4 yrs	0	0%	0.0	0.0, 0.8	
5-9 yrs	1	4%	0.2	0.0, 0.9	
10-19 yrs	2	7%	0.1	0.0, 0.5	
20-49 yrs	15	54%	0.4	0.2, 0.6	
50-74 yrs	7	25%	0.2	0.1, 0.5	
75+ yrs	3	11%	0.4	0.1, 1.2	
Unknown	0	0%	--	--	
Race					
White	16	57%	0.2	0.1, 0.3	
Black or African American	5	18%	0.2	0.1, 0.5	
American Indian/Alaskan Native	0	0%	0.0	0.0, 2.2	
Asian or Pacific Islander	1	4%	0.3	0.0, 1.4	
Multiple Races	0	0%	0.0	0.0, 1.3	
Other or Unknown	6	21%	--	--	
Hispanic Ethnicity					
Yes	7	25%	0.6	0.3, 1.3	
No	17	61%	0.2	0.1, 0.3	
Unknown	4	14%	--	--	
Disease Severity					
Hospitalized	15	54%			
Died	1	4%			

### Annual Summary Key Points

- Reported cases of hepatitis A peaked nationally in 2019 during the height of the multi-state outbreak among people who use drugs and people experiencing homelessness.
- The outbreak in North Carolina didn't peak until 2021, when over 900 cases were reported in a single year.
- The 28 cases in 2023 represent a return to a baseline level that was last observed in 2017, before the outbreak began.
- Most cases are seen in adults aged 20-49 (54%). This is due in part to the relatively low vaccination coverage among adults compared to children, as the vaccine was not available until the 1990s
- Rates for Hispanic North Carolinians were 3.5 times higher than non-Hispanic North Carolinians (0.6 versus 0.2 per 100,000, respectively).
- The majority of cases (54%) were hospitalized, and one death was reported in 2023.

\*Incidence rate, calculated per 100,000 North Carolina residents

# Meningococcal Invasive Disease

## 2023 Key Points

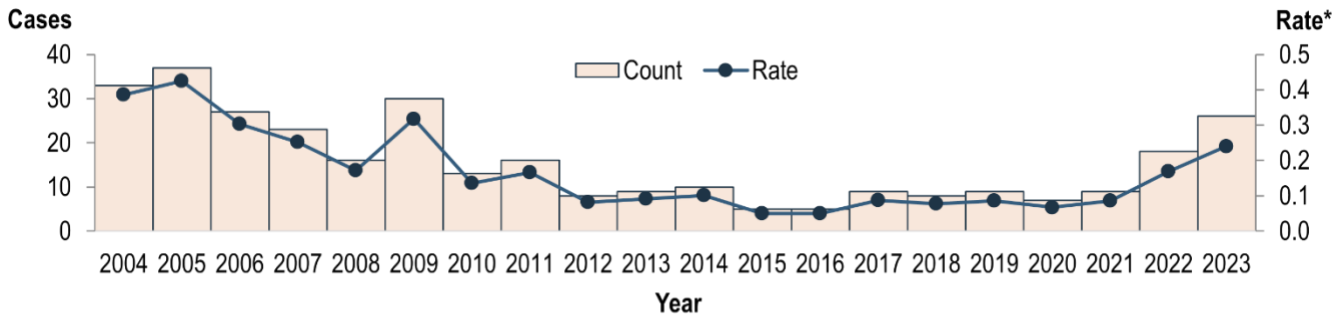
- 26 cases occurred in 2023, which is the greatest number of cases reported since 2009.
- No outbreaks were reported in 2023.

Invasive meningococcal disease caused by *Neisseria meningitidis* is an acute, serious illness that can cause several syndromes including meningitis, bacteremia, and sepsis. Learn more about [meningococcal disease](#).

The quadrivalent meningococcal conjugate vaccine contains four serogroups (A, C, Y, and W). Two doses are recommended for children by 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 various populations considered to be at increased risk for disease. In North Carolina, one dose of meningococcal conjugate vaccine is required for 7th grade entry (or by 12 years of age), and a second dose is required for 12th grade entry (or by 17 years of age). According to the 2022 NIS, it is estimated that 92.8% of North Carolinians aged 13-17 had received at least one dose of the meningococcal conjugate vaccine, which is higher than the estimated 88.6% of teenagers nationally.

### Meningococcal cases have been increasing in North Carolina since 2020. Cases doubled from 2021 to 2023.

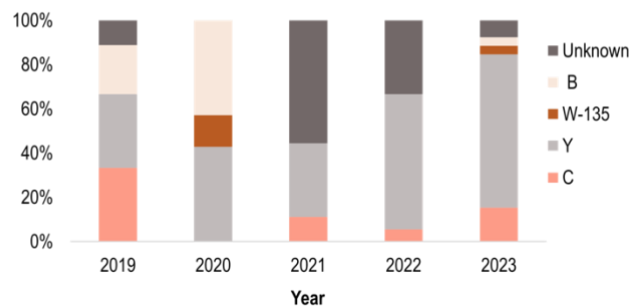
NC 2004-2023 invasive meningococcal disease case count and rate by year



The proportion of cases that are serogroup Y increased during 2022 and 2023, driving an increase in overall reported cases. This trend has been seen in North Carolina (see graph to right) and [nationally](#).

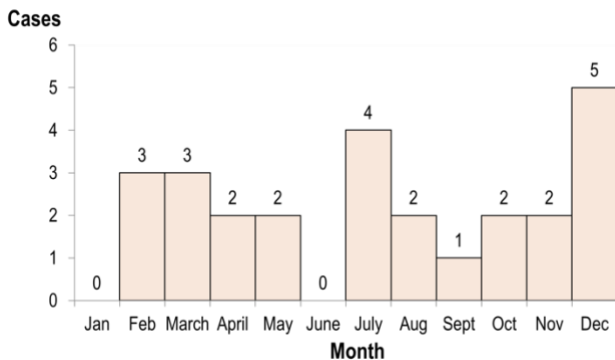
### Meningococcal serogroups were primarily Y in 2023.

NC 2019-2023 meningococcal serogroup type by year



### Meningococcal cases occurred infrequently throughout 2023.

NC 2023 invasive meningococcal disease cases by month



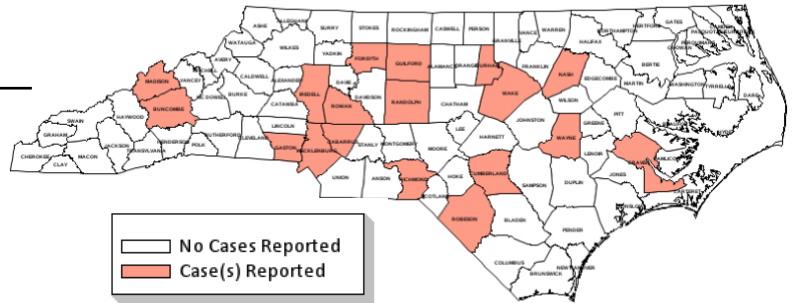
In 2023, more cases were reported in December than in any other month. Cases are generally more common during the winter months.



# Meningococcal Invasive Disease

**Meningococcal cases resided within 18 (18%) counties in 2023.**  
 NC 2023 invasive meningococcal disease cases by county

Eighteen of North Carolina's 100 counties (18%) reported at least one meningococcal case in 2023. Four was the highest case count from a single county.



Annual Summary					
	2019	2020	2021	2022	2023
Cases	9	7	9	18	26
Rate*	0.09	0.07	0.09	0.17	0.24
Case Statistics, 2023					
Sex	Cases	%	Rate*	95% CI	
Male	14	54%	0.3	0.1, 0.4	
Female	12	46%	0.2	0.1, 0.4	
Unknown	0	0%	--	--	
Age Group					
Infant	2	8%	1.6	0.2, 5.9	
1-4 yrs	1	4%	0.2	0.0, 1.2	
5-9 yrs	0	0%	0.0	0.0, 0.6	
10-19 yrs	0	0%	0.0	0.0, 0.3	
20-49 yrs	13	50%	0.3	0.2, 0.5	
50-74 yrs	9	35%	0.3	0.1, 0.5	
75+ yrs	1	4%	0.1	0.0, 0.7	
Unknown	0	0%	--	--	
Race					
White	13	50%	0.2	0.1, 0.3	
Black or African American	10	38%	0.4	0.2, 0.8	
American Indian/Alaskan Native	1	4%	0.6	0.0, 3.4	
Asian or Pacific Islander	0	0%	0.0	0.0, 0.9	
Multiple Races	1	4%	0.4	0.0, 2.0	
Other or Unknown	1	4%	--	--	
Hispanic Ethnicity					
Yes	3	12%	0.3	0.1, 3.1	
No	22	85%	0.2	0.1, 0.3	
Unknown	1	4%	--	--	
Serogroups					
A	0	0%			
B	1	4%			
C	4	15%			
Y	18	69%			
W-135	1	4%			
Unknown^	2	8%			
Disease Severity					
Hospitalized	26	100%			
Died	3	12%			

### Annual Summary Key Points

- The increase in cases over the past two years is in line with [national trends](#).
- The large majority of cases occurred in adults aged 20-74 years. However, infants had an infection rate 5.5 times higher (1.65 versus 0.3 per 100,000, respectively).
- Black or African American people have been disproportionately affected by the recent increase in cases (38% of total cases, 0.4 per 100,000 NC residents). Additionally, 2023 rates were high for American Indian and Alaskan Natives (0.6 per 100,000 North Carolinians) and individuals identifying with multiple races (0.4 per 100,000).
- Meningococcal infections were mostly serogroup Y in 2023 (69%).
- All (100%) people with invasive meningococcal disease in 2023 were hospitalized. Three deaths, 12% of cases, were reported.
- In 2023, there was an [increase in ciprofloxacin- and penicillin-resistant strains](#) of invasive meningococcal disease caused by *Neisseria meningitidis* serogroup Y (NmY) in the Charlotte Metropolitan region.

\*Incidence rate, calculated per 100,000 North Carolina residents

# Mpox

- 2023 Key Points**
- 12 cases were reported in NC in 2023.
  - Transmission of mpox is still occurring globally, and North Carolina is at risk of cases re-emerging.
  - No outbreaks of mpox occurred in 2023 that were linked to a common setting or geographic area.

Mpox (formerly known as monkeypox) is a viral disease that can be spread person-to-person through contact with body fluids or lesions, items that have been in contact with fluids or lesions, and respiratory droplets. Learn more about [mpox](#).

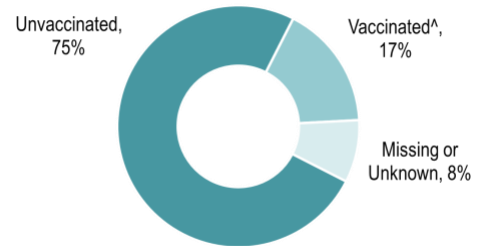
Vaccination is the best way to reduce the risk of mpox infection. People who have known or presumed exposure to mpox virus should receive the mpox vaccine as post-exposure prophylaxis. Mpox vaccination should also be offered before exposure to people with high potential for exposure or who anticipate potential exposure. Two doses of the JYNNEOS vaccine are recommended for those who meet the vaccine eligibility criteria. The second dose should occur at least 28 days after the initial vaccine to ensure suitable immunity to mpox. Information on vaccine eligibility criteria and uptake can be found on the [NC DHHS mpox webpage](#).

**A global outbreak of clade IIb mpox virus began in 2022. Transmission continued in 2023 but at a much lower level.**  
 NC 2004-2023 mpox case count and rate by year



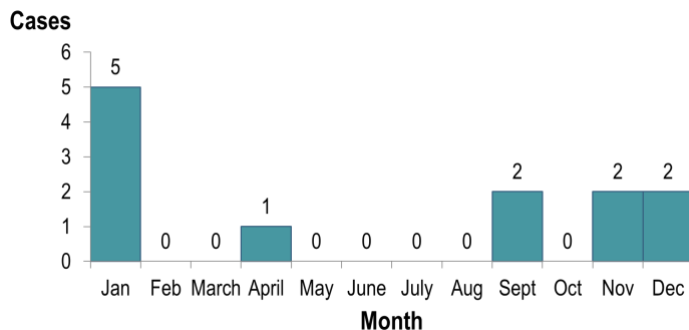
**Most (75%) of mpox cases were unvaccinated in 2023.**  
 NC 2023 mpox cases by vaccination status

Most cases of mpox occurred in people who were unvaccinated.



<sup>^</sup>Received at least one dose of mpox (JYNNEOS) vaccine

**Mpox cases occurred infrequently throughout 2023.**  
 NC 2023 mpox cases by month

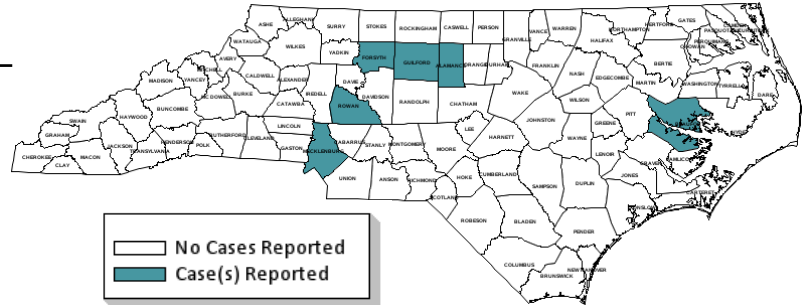


North Carolina went four consecutive months with no mpox cases in mid-2023.

# Mpox

**Mpox cases resided within six (6%) counties in 2023.**  
NC 2023 mpox cases by county

Six of North Carolina's 100 counties (6%) reported at least one mpox case in 2023.



Annual Summary					
	2019	2020	2021	2022	2023
Cases	0	0	0	703	12
Rate*	0.0	0.0	0.0	6.6	0.1
Case Statistics, 2023					
Sex	Cases	%	Rate*	95% CI	
Male	11	92%	0.21	0.1, 0.4	
Female	1	8%	0.02	0.0, 0.1	
Unknown	0	0%	--	--	
Age Group	Cases	%	Rate*	95% CI	
Infant	0	0%	0.0	0.0, 3.0	
1-4 yrs	0	0%	0.0	0.0, 0.8	
5-9 yrs	0	0%	0.0	0.0, 0.6	
10-19 yrs	1	8%	0.07	0.0, 0.4	
20-49 yrs	9	75%	0.22	0.1, 0.4	
50-74 yrs	2	17%	0.06	0.0, 0.2	
75+ yrs	0	0%	0.0	0.0, 0.5	
Unknown	0	0%	--	--	
Race	Cases	%	Rate*	95% CI	
White	3	25%	0.04	0.0, 0.1	
Black or African American	5	42%	0.21	0.1, 0.5	
American Indian/Alaskan Native	0	0%	0.0	0.0, 2.2	
Asian or Pacific Islander	0	0%	0.0	0.0, 0.9	
Multiple Races	2	17%	0.72	0.1, 2.6	
Other or Unknown	2	17%	--	--	
Hispanic Ethnicity	Cases	%	Rate*	95% CI	
Yes	4	33%	0.36	0.1, 0.9	
No	7	58%	0.07	0.0, 0.2	
Unknown	1	8%	--	--	
Disease Severity	Cases	%	Rate*	95% CI	
Hospitalized	1	8%			
Died	0	0%			

\*Incidence rate, calculated per 100,000 North Carolina residents

### Annual Summary Key Points

- In May 2022, a global outbreak of clade IIb mpox was identified. The outbreak occurred primarily among gay, bisexual or other men who have sex with men (MSM).
- Although transmission has significantly decreased since the peak outbreak months during the summer of 2022, cases continue to be consistently reported in the United States and globally.
- Black and African American men have been disproportionately affected by the mpox outbreak. In 2023, mpox rates among Black or African American North Carolina residents were 5.3 times higher than white North Carolina residents (0.21 versus 0.04 per 100,000, respectively). Additionally, rates among male North Carolinians were 11.5 times higher than females (0.21 versus 0.02 per 100,000, respectively).
- In 2023, the mpox rate among Hispanic North Carolinian was 4.9 times higher than non-Hispanics (0.36 versus 0.07 per 100,000, respectively).
- One person was hospitalized in 2023 due to mpox. No deaths were reported.

# Mumps

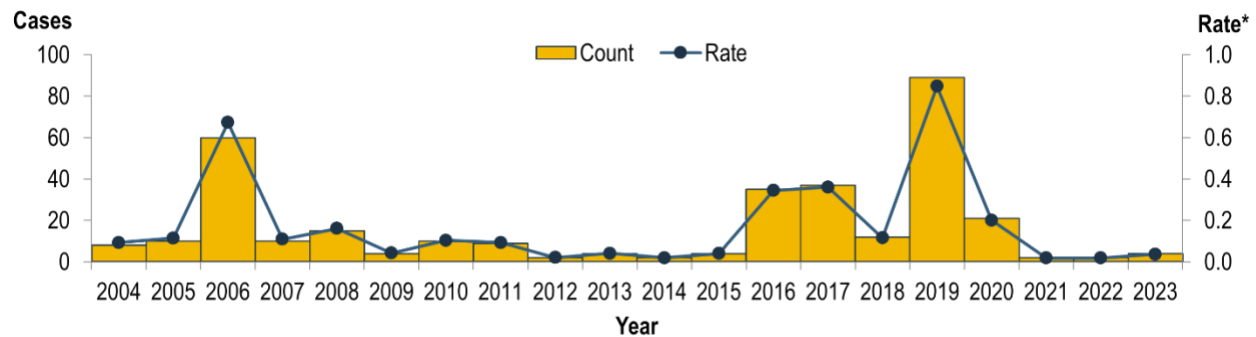
## 2023 Key Points

- 4 cases were reported in NC in 2023.
- No outbreaks of mumps were reported in 2023.

Mumps is a viral illness best known for causing swelling of the salivary glands below the ears and above the jaw, called parotitis. Learn more about [mumps](#).

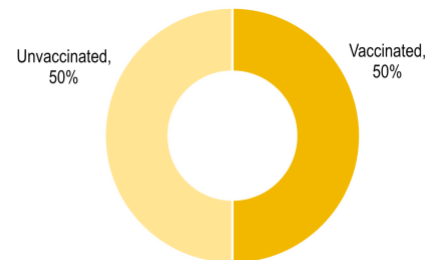
[Vaccination](#) is the best way to prevent mumps. In North Carolina, one dose of MMR vaccine is required for children on or after 12 months and before 16 months of age, and a second dose is required for students entering school, college, or university for the first time. Results from the 2022 NIS estimate that 90.1% of children born in 2020 had received at least one dose of MMR vaccine by 24 months of age, compared to 91.4% nationally. Additionally, 96.1% of teens 13-17 years of age were estimated to have received at least two doses of MMR vaccine compared to 91.2% nationally.

**Mumps virus often leads to outbreaks. 2023 was the third consecutive year without an outbreak.**  
 NC 2004-2023 mumps case count and rate by year

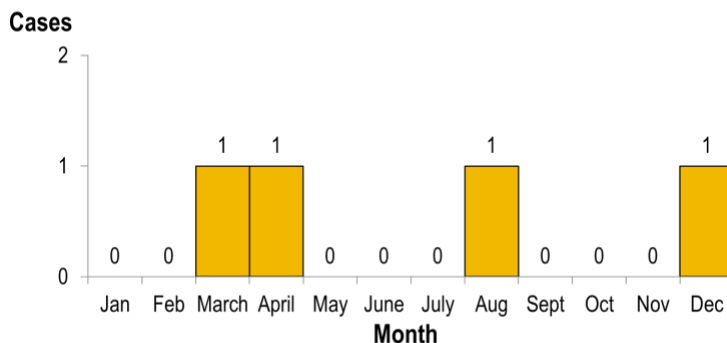


**Only half (50%) of mumps cases were vaccinated in 2023.**  
 NC 2023 mumps cases by vaccination status

Two doses of the MMR vaccine are 88% effective against mumps. People who receive two doses can still become infected with mumps, but the disease is usually milder. In 2023, half (50%) of mump cases were fully vaccinated against mumps.



**Mumps cases occurred infrequently throughout 2023.**  
 NC 2023 mumps cases by month

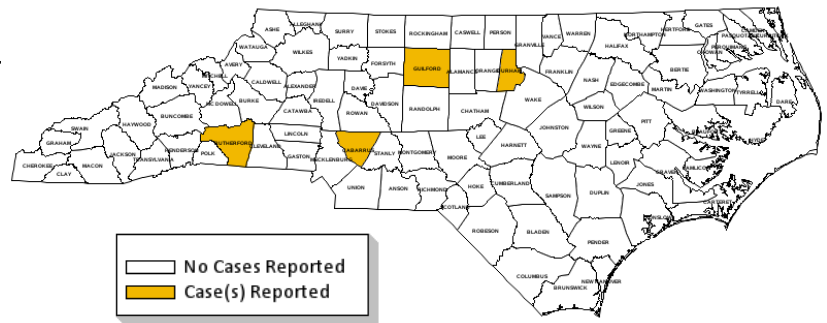


Historically, mumps is most common during the spring months in North Carolina. In 2023, mumps cases were sporadic across the year.

# Mumps

All 2023 mumps cases resided in different counties.  
NC 2023 mumps cases by county

In 2023, each of the four mumps cases occurred in a different county.



Annual Summary					
	2019	2020	2021	2022	2023
Cases	89	21	2	2	4
Rate*	0.85	0.20	0.02	0.02	0.04
Case Demographics, 2023					
Sex	Cases	%	Rate*	95% CI	
Male	2	50%	0.04	0.0, 0.14	
Female	2	50%	0.04	0.0, 0.13	
Unknown	0	0%	--	--	
Age Group	Cases	%	Rate*	95% CI	
Infant	0	0%	0.0	0.0, 3.03	
1-4 yrs	0	0%	0.0	0.0, 0.78	
5-9 yrs	2	50%	0.32	0.0, 1.16	
10-19 yrs	0	0%	0.0	0.0, 0.27	
20-49 yrs	2	50%	0.05	0.0, 0.17	
50-74 yrs	0	0%	0.0	0.0, 0.12	
75+ yrs	0	0%	0.00	0.0, 0.49	
Unknown	0	0%	--	--	
Race	Cases	%	Rate*	95% CI	
White	1	25%	0.01	0.0, 0.07	
Black or African American	2	50%	0.08	0.0, 0.30	
American Indian/Alaskan Native	0	0%	0.0	0.0, 2.22	
Asian or Pacific Islander	1	25%	0.25	0.01, 1.40	
Multiple Races	0	0%	0.0	0.0, 1.32	
Other or Unknown	0	0%	--	--	
Hispanic Ethnicity	Cases	%	Rate*	95% CI	
Yes	0	0%	0.0	0.0, 0.33	
No	2	50%	0.02	0.0, 0.08	
Unknown	2	50%	--	--	
Disease Severity	Cases	%	Rate*	95% CI	
Hospitalized	0	0%			
Died	0	0%			

### Annual Summary Key Points

- From 2021 to 2023 an average of 3 mumps cases were reported annually, the lowest three-year average since 2013-2015.
- Large outbreaks can happen in congregate or close-contact settings.
- From 2017-2020, four mumps outbreaks occurred in North Carolina universities. Most cases occurred among young adults.
- Most individuals recover from mumps. In 2023, there were no hospitalizations or deaths associated with mumps infection.

\*Incidence rate, calculated per 100,000 North Carolina residents

# Pertussis

## 2023 Key Points

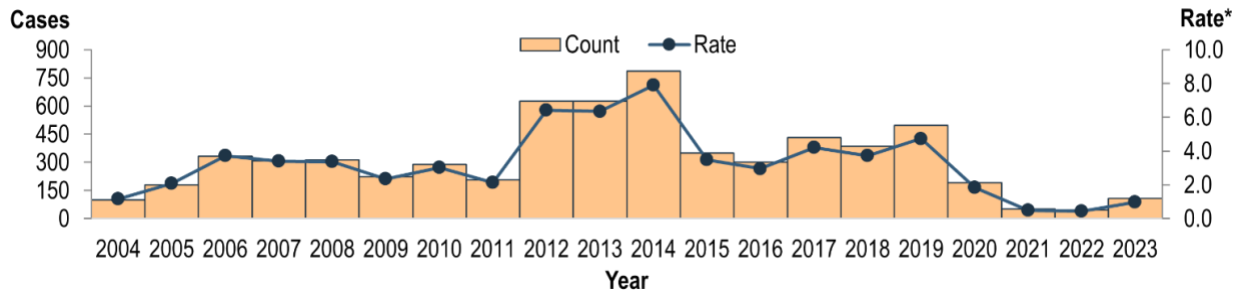
- 106 cases were reported in NC in 2023, more than double those in 2022.
- 2 outbreaks were reported in 2023.

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. Learn more about [pertussis](#).

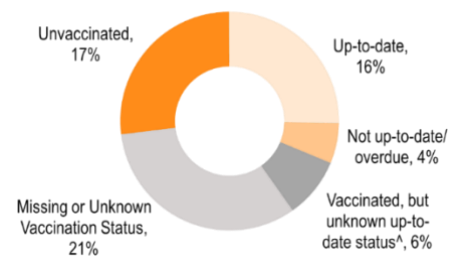
[Vaccines](#) are the best way to protect against pertussis. In North Carolina, five doses of DTaP are required, three doses by 7 months and two booster doses, the first by 19 months and the second on or after the fourth birthday and before entering school for the first time. A booster dose of Tdap vaccine is required for 7th grade entry or by 12 years of age, whichever comes first.

Two outbreaks of pertussis were reported during 2023. The first outbreak included ten cases of pertussis among members of a religious community in northeastern North Carolina. The second outbreak involved three cases among high school students in central North Carolina.

**Despite annual cases being low compared to the 20-year trend, 2023 counts still doubled those from 2022.**  
NC 2004-2023 pertussis case counts and rate by year



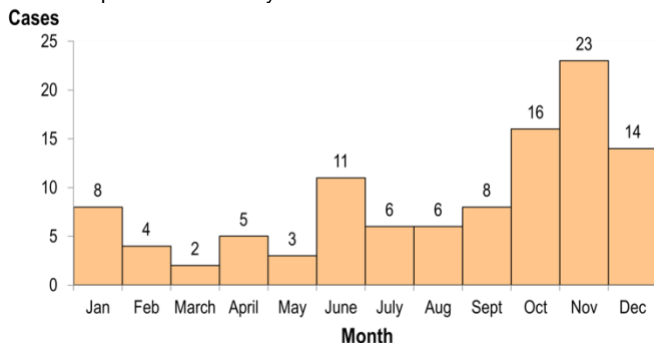
**Only 16% of pertussis cases were up-to-date on vaccines.**  
NC 2023 pertussis cases by immunization status



<sup>a</sup>Vaccinated, but unknown status refers to individuals without documentation referring as to how many doses or date of last Tdap received.

Cases can occur in unvaccinated, partially vaccinated, or fully vaccinated people. Partially vaccinated means that a person has received some, but not all, of the recommended doses in the series and may not be fully protected against the disease. In 2023, only 16% of cases were fully up-to-date on immunization with a pertussis containing vaccine.

**Many of the 2023 pertussis cases occurred in early winter.**  
NC 2023 pertussis cases by month

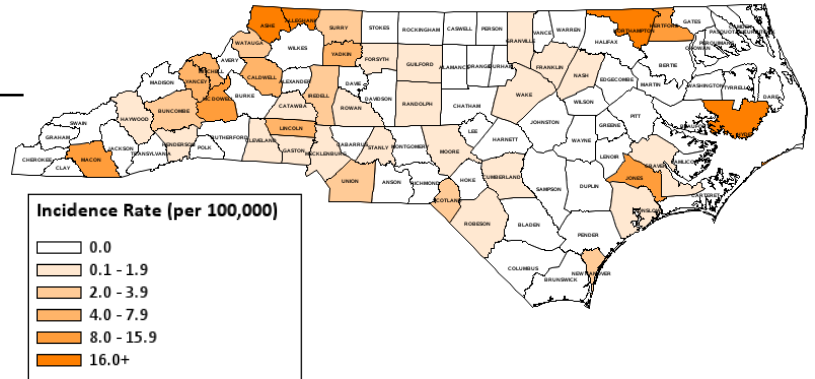


Most (58%) cases occurred late in the year during the autumn and early winter months. However, pertussis cases can occur at any time of the year.

# Pertussis

Less than half of NC counties had a pertussis case in 2023.  
NC 2023 pertussis cases by county

Forty counties reported at least one case in 2023. Generally, pertussis had a higher infection rate in the western half of the state.



Annual Summary					
	2019	2020	2021	2022	2023
Cases	496	191	52	46	106
Rate*	4.7	1.8	0.5	0.4	1.0
<i>Culture confirmed</i>	3%	4%	4%	2%	4%
<i>PCR confirmed</i>	52%	65%	25%	22%	36%
<i>Probable</i>	33%	30%	71%	76%	60%
Case Demographics, 2023					
Sex	Cases	%	Rate*	95% CI	
Male	41	39%	0.8	0.6, 1.1	
Female	65	61%	1.2	0.9, 1.5	
Unknown	0	0%	--	--	
Age Group					
Infant	3	3%	2.5	0.5, 7.2	
1-4 yrs	13	12%	2.7	1.5, 4.7	
5-9 yrs	11	10%	1.8	0.9, 3.2	
10-19 yrs	18	17%	1.3	0.8, 2.1	
20-49 yrs	29	27%	0.7	0.5, 1.0	
50-74 yrs	31	29%	1.0	0.7, 1.4	
75+ yrs	1	1%	0.1	0.0, 0.7	
Unknown	0	0%	--	--	
Race					
White	82	77%	1.1	0.9, 1.4	
Black or African American	5	5%	0.2	0.1, 0.5	
American Indian/Alaskan Native	0	0%	0.0	0.0, 2.2	
Asian or Pacific Islander	2	2%	0.5	0.1, 1.8	
Multiple Races	0	0%	0.0	0.0, 1.3	
Other or Unknown	17	16%	--	--	
Hispanic Ethnicity					
Yes	6	6%	0.5	0.2, 1.2	
No	64	60%	0.7	0.5, 0.9	
Unknown	36	34%	--	--	
Severity					
Hospitalized	3	3%			
Died	0	0%			

### Annual Summary Key Points

- 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.
- In 2023, pertussis rates were higher among females than males (1.2 versus 0.8 per 100,000 North Carolinians).
- Pertussis can affect people of any age. In 2023, cases occurred in each age group, but the majority of cases were among adults 20 to 74 years old (57%).
- Infants are at highest risk of complications and death from pertussis. Despite numbers being lower than older adults, rates among infants are 3 times higher than adults 20 to 74 years old (2.5 versus 0.8 per 100,000 North Carolina residents). In 2023, three cases were hospitalized. No pertussis-associated deaths were reported.

\*Incidence rate, calculated per 100,000 North Carolina residents

# Pneumococcal Meningitis

## 2023 Key Points

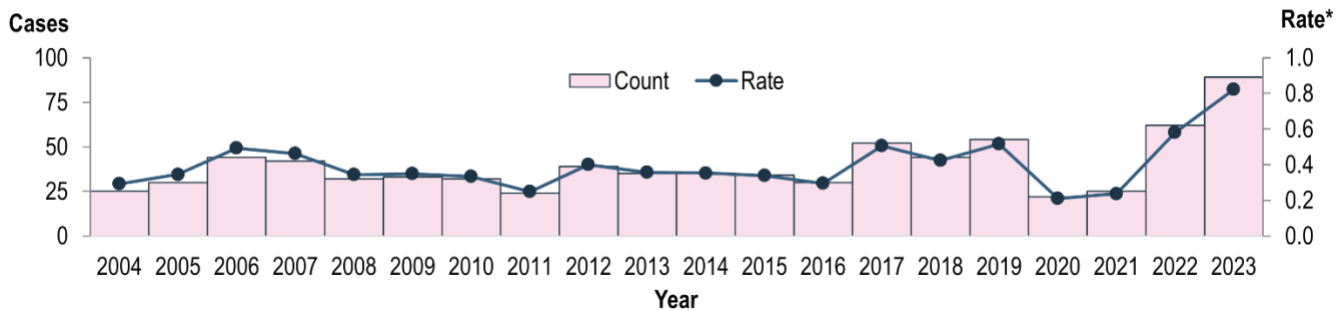
- 89 cases were reported in NC, a significant increase compared to recent years and the most cases reported in a single year since at least 1991.
- No outbreaks of pneumococcal meningitis were reported in NC.

*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. Learn more about [pneumococcal disease](#).

CDC recommends [pneumococcal vaccination](#) for people based on their age or if they have certain risk conditions. In North Carolina, four doses of PCV vaccine are required for children before 15 months of age. According to the 2022 NIS, an estimated 89.0% of North Carolina children born in 2020 had received at least four doses of PCV by 24 months of age, compared to 82.1% nationally. Results from the 2021 Behavioral Risk Factor Surveillance System (BRFSS) survey found that 75.2% of North Carolina adults 65 years of age and older had received at least one dose of pneumococcal vaccine, compared to 70.1% nationally.

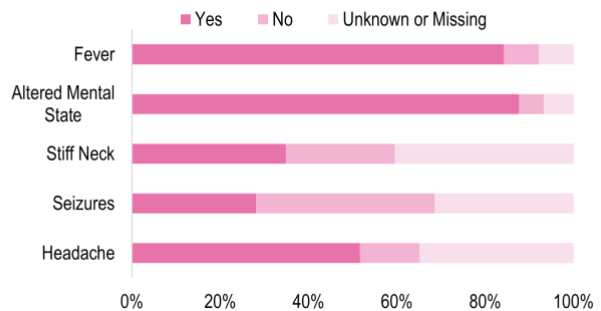
### Pneumococcal had the highest rate and count North Carolina has ever seen in 2023.

NC 2004-2024 pneumococcal meningitis case count by rate and year



### Most cases experienced an altered mental state in 2023.

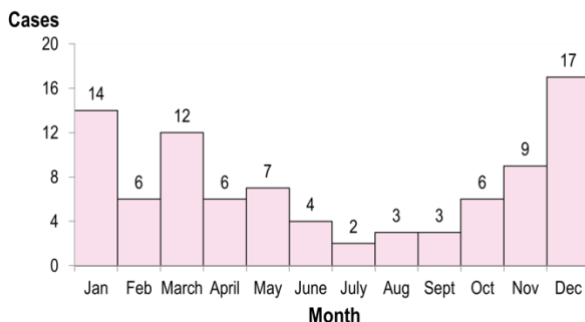
NC 2023 pneumococcal meningitis cases by symptoms experienced



Fever, altered mental status, and headache were the most common symptoms experienced by 2023 pneumococcal meningitis cases.

### Pneumococcal meningitis is more common in the winter months.

NC 2023 pneumococcal meningitis cases by month



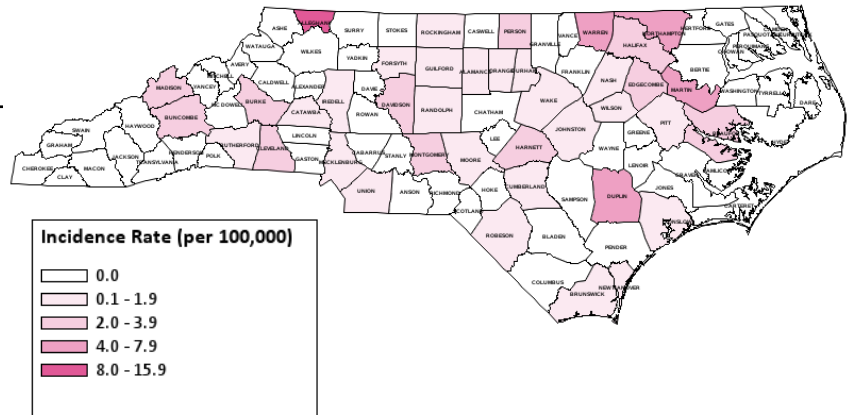
Historically, cases are most common in winter and early spring. This is what we would expect, because pneumococcal meningitis incidence usually mirrors cold and flu season.



# Pneumococcal Meningitis

Pneumococcal meningitis occurs sporadically across the state.  
NC 2023 pneumococcal meningitis cases by county

Thirty-nine of North Carolina's 100 counties (39%) reported at least one case. Rates were highest in central and northeastern North Carolina.



Annual Summary					
	2019	2020	2021	2022	2023
Cases	54	22	25	62	89
Rate*	0.5	0.2	0.2	0.6	0.8
Case Demographics, 2023					
Sex	Cases	%	Rate*	95% CI	
Male	40	45%	0.8	0.5, 1.0	
Female	48	54%	0.9	0.6, 1.2	
Unknown	1	1%	--	--	
Age Group	Cases	%	Rate*	95% CI	
Infant	4	4%	3.3	0.9, 8.4	
1-4 yrs	5	6%	1.1	0.3, 2.5	
5-9 yrs	3	3%	0.5	0.1, 1.4	
10-19 yrs	3	3%	0.2	0.0, 0.6	
20-49 yrs	15	17%	0.4	0.2, 0.6	
50-74 yrs	52	58%	1.6	1.2, 2.1	
75+ yrs	7	8%	0.9	0.4, 1.9	
Unknown	0	0%	--	--	
Race	Cases	%	Rate*	95% CI	
White	52	58%	0.7	0.5, 0.9	
Black or African American	24	27%	1.0	0.6, 1.5	
American Indian/Alaskan Native	3	3%	1.8	0.4, 5.3	
Asian or Pacific Islander	0	0%	0.0	0.0, 0.9	
Multiple Races	3	3%	1.1	0.2, 3.1	
Other or Unknown	7	8%	--	--	
Hispanic Ethnicity	Cases	%	Rate*	95% CI	
Yes	9	10%	0.8	0.4, 1.5	
No	75	84%	0.8	0.6, 1.0	
Unknown	5	6%	--	--	
Disease Severity	Cases	%	Rate*	95% CI	
Hospitalized	86	97%			
Died	3	3%			

### Annual Summary Key Points

- The high number of pneumococcal meningitis cases is one indication of increasing invasive bacterial diseases in the years following the COVID-19 pandemic.
- Most cases occur in adults over age 50 (66%). However, rates are highest in children under four. Infants had the highest rate (3.3 per 100,000), followed by adults ages 20 to 40 (1.6 per 100,000), and children ages 1-4 (1.1 per 100,000).
- White North Carolinians had the most cases overall (58%), but American Indian/Alaskan Native NC residents had an infection rate 2.6 times higher (1.8 versus 0.7 per 100,000, respectively).
- The majority of cases were non-Hispanic North Carolinians (84%). However, Hispanics and non-Hispanics had the same infection rate (0.8 and 0.8 per 100,000).
- Almost all people with pneumococcal meningitis were hospitalized (97%). Three deaths were reported.

\*Incidence rate, calculated per 100,000 North Carolina residents

# Varicella

## 2023 Key Points

- 173 cases were reported in NC.
- One outbreak was reported in NC.

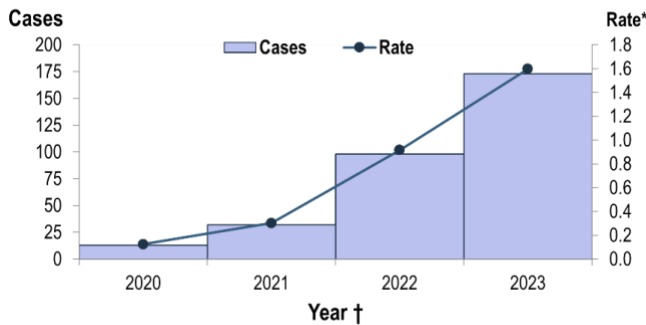
Varicella (chickenpox) is a viral illness best known for causing an itchy, blister-like rash that can spread over the entire body. Varicella is caused by the varicella-zoster virus (VZV). Learn more about [varicella](#).

Vaccination is the best way to prevent varicella. In North Carolina, children are required to have two doses of varicella vaccine, one on or after 12 months and before 19 months of age and a second before entering school for the first time. Results from the 2022 NIS estimate that 87.9% of North Carolina children born in 2020 had received at least one dose of varicella vaccine by 24 months of age, compared to 91.2% nationally. According to the 2021 BRFSS results, 50.7% of North Carolina adults aged 65 years and older were estimated to have received at least one dose of zoster vaccine, compared to 45.7% nationally.

Varicella became reportable in North Carolina in mid-2020. In 2023, 173 cases of varicella were reported. There was also one outbreak of varicella reported in 2023. The outbreak occurred in a child care facility and ended with six total cases; five cases among child care attendees and one in a staff member. Although not a reportable condition, it has been found that adult cases of shingles may contribute to outbreaks in child care settings.

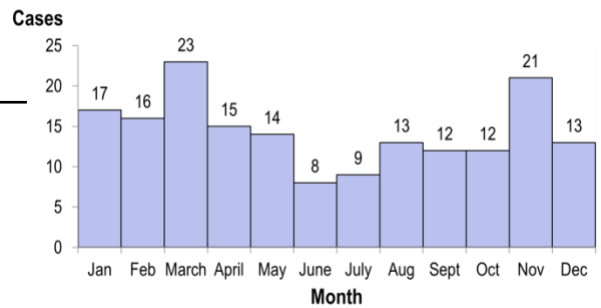
### Varicella cases and counts have increased every year since it became reportable.

NC 2020-2023 varicella case count and rate by year



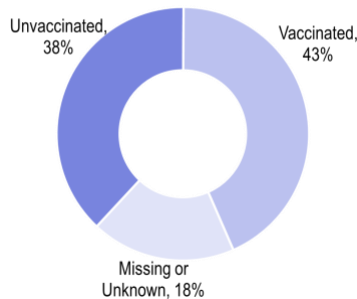
Varicella became reportable in 2020, thus only four years of data are available. The increase in cases may be due in part to physicians and laboratories adjusting to the new reporting requirements. However, it is notable that 2023 rates are 1.7 times higher than 2022 rates.

### Varicella cases dropped during the summer in 2023. NC 2023 varicella rate by month in 2023



Varicella can occur at any time of the year, but cases drop during the summer months. This is similar to national trends, where varicella cases seem to peak in the late winter and early spring.

### Only 43% of varicella cases were vaccinated. NC 2023 varicella cases by vaccination status

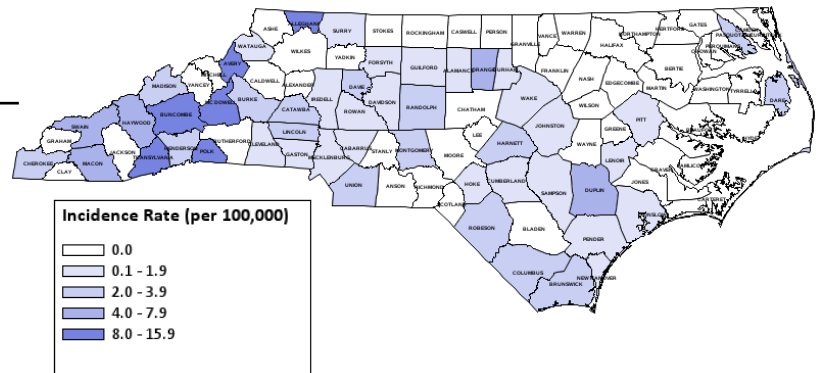


Varicella can occur in unvaccinated and vaccinated people. Cases in vaccinated people are called “breakthrough” cases and these individuals generally have milder symptoms.

# Varicella

Most North Carolina counties reported varicella cases in 2023. NC 2023 varicella rate by county

Cases occurred in 50 of North Carolina’s 100 counties (50%). Rates of varicella were highest in western North Carolina.



Annual Summary					
Year†	2019	2020	2021	2022	2023
Cases	--	13	32	98	173
Rate*	--	0.1	0.3	0.9	1.6
Case Demographics, 2023					
Sex	Cases	%	Rate*	95% CI	
Male	85	49%	1.6	1.3, 2.0	
Female	87	50%	1.6	1.3, 2.0	
Unknown	1	1%	--	--	
Age Group	Cases	%	Rate*	95% CI	
Infant	20	12%	16.5	10.1, 25.4	
1-4 yrs	46	27%	9.7	7.1, 12.9	
5-9 yrs	38	22%	6.1	4.3, 8.4	
10-19 yrs	28	16%	2.1	1.4, 3.0	
20-49 yrs	34	20%	0.8	0.6, 1.1	
50-74 yrs	6	3%	0.2	0.1, 0.4	
75+ yrs	1	1%	0.1	0.0, 0.7	
Unknown	0	0%	--	--	
Race	Cases	%	Rate*	95% CI	
White	108	62%	1.4	1.2, 1.7	
Black or African American	9	5%	0.4	0.2, 0.7	
American Indian/Alaskan Native	0	0%	0.0	0.0, 2.2	
Asian or Pacific Islander	13	8%	3.3	1.7, 5.6	
Multiple Races	2	1%	0.7	0.1, 2.6	
Other or Unknown	41	24%	--	--	
Hispanic Ethnicity	Cases	%	Rate*	95% CI	
Yes	38	22%	3.4	2.4, 4.6	
No	111	64%	1.2	1.0, 1.4	
Unknown	24	14%	--	--	
Severity	Cases	%	Rate*	95% CI	
Hospitalized	11	6%	--	--	
Died	1	1%	--	--	

### Annual Summary Key Points

- Cases were split evenly between males and females.
- Over 60% of cases occurred in children less than 10 years of age. Infants had a rate 32.6 times higher than adults 20 years and over (16.5 versus 0.5 per 100,000 North Carolinians).
- Asian or Pacific Islanders rates were 2.3 times higher than white North Carolinians (3.3 versus 1.4 per 100,000). Hispanic North Carolinians made up 22% of cases, but rates were 2.9 higher than non-Hispanic individuals (3.4 versus 1.2 per 100,000).
- Eleven cases were hospitalized, and one varicella-related death was reported in 2023.

† Varicella became a reportable condition in 2020; therefore, historical data is not available

\*Incidence rate, calculated per 100,000 North Carolina residents