

North Carolina Enteric Diseases Annual Report 2024

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

Enteric Diseases Reported in North Carolina, 2024

INTRODUCTION TO ENTERIC DISEASES

Foodborne and waterborne diseases represent a significant public health burden in North Carolina. Fourteen conditions are specifically listed as reportable by law in NC, and outbreaks due to any foodborne or waterborne pathogen are also reportable. Like many communicable diseases, these conditions are reportable so that disease trends can be understood, sources of infection can be identified, and control measures implemented. This requires the dedicated efforts of local and state health departments, health care providers, and anyone involved in food production or service.

Most enteric infections are not vaccine preventable and require a comprehensive “One Health” approach to disease prevention. Disease prevention is a multistep process involving:

- Food industry partners such as farmers, slaughterhouses, processors, distributors, and food preparation and serving (restaurants); the Farm to Fork
- Regulators such as USDA, FDA, NCDA&CS, and local and state Environmental Health
- Health care providers, commercial laboratories and the NC State Laboratory of Public Health
- And finally, disease investigators to identify and control infections that occur despite all other comprehensive control measures

This annual surveillance report summarizes eight common food and waterborne diseases reported in North Carolina during 2024. Additional details regarding surveillance data are presented on subsequent pages.

2024 Enteric Surveillance Highlights

- Foodborne conditions are the second most reported communicable diseases in NC and the US, second only to sexually transmitted infections.
- Foodborne disease investigation is challenging as it often relies on interviews with infected or sick people to recall their food history days or weeks prior to their illness onset date.
- Most reports of foodborne and waterborne cases are increasing, though the exact reasons for this increase remain unknown.
- Use of Culture Independent Diagnostic Testing (CIDT) is likely one reason for the increasing number of case reports. While CIDT has benefits for clinical management of cases, it can severely limit the public health response. CIDT results do not give the additional level of detail often required to identify if pathogens are genetically related, which could indicate a common exposure. Genetic relatedness could be compared when CIDT results are forwarded to state laboratories of public health where advanced testing can be conducted. Genetic relatedness can be compared not only between different specimens from different individuals, but also among individuals and contaminated food items.
- Detailed reports of national and state data can be found on the CDC [BEAM](#) dashboard. Many cases never have an isolate, so the data from those cases will not be present.

Enteric Diseases Reported in North Carolina, 2024

Number of Reported Cases of Enteric Diseases in North Carolina, 2019 - 2024								
Disease	2019	2020	2021	2022	2023	Previous five-year average	2024	Significant Change*
Campylobacteriosis	2,025	1,737	1,861	1,881	2,589	2019	2968	↑
Salmonellosis	2,677	2,338	2,241	2,430	2,294	2396	2935	↑
<i>E. coli</i> shiga-toxin producing	391	280	315	465	568	404	553	--
Shigellosis	330	200	204	349	443	305	474	--
Cryptosporidiosis	289	206	262	370	396	305	443	--
Cyclosporiasis	76	35	108	133	151	101	328	↑
Vibriosis (other than cholera and vulnificus)	74	42	64	75	96	70	122	↑
Listeriosis	32	32	25	37	43	34	38	--
<i>Vibrio vulnificus</i> Infection	4	8	14	11	16	11	14	--

↑ = significant increase (≥ 2 standard deviations above average)

↓ = significant decrease (≥ 2 standard deviations below average)

-- = no significant change

Report Specifications. Notable information about this report includes:

- Cases presented include those classified as confirmed and probable.
- Case counts are based on the earliest date of illness identification, typically the symptom onset year. Case counts in this report may differ from those included in national summaries, which can be based either on the earliest date of illness identified or the date when cases were closed and reported to the Centers for Disease Control and Prevention (CDC).
- Unless otherwise noted, ages are based on the date when the case was entered in the North Carolina Electronic Disease Surveillance System (NC EDSS).
- Incidence rates are based on state population data for each individual year obtained from the United States Census Bureau. The most recent census data available was used for population numbers at the time of reporting.
- Case data from NC EDSS were obtained on February 24, 2025.
- The most common enteric diseases are summarized in this report and shown in the table above.

Campylobacteriosis

2968

cases reported
in 2024

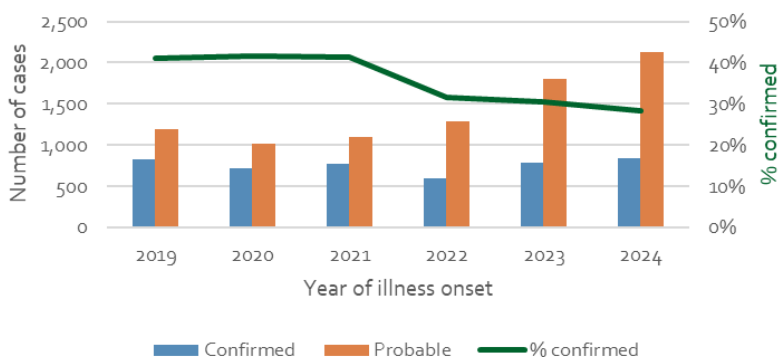
- There has been an increase in the number and rate of campylobacteriosis cases reported annually since 2020.
- *Campylobacter* infection is now the most reported foodborne illness in NC.

Campylobacter are bacteria that can make people ill with diarrhea. [Campylobacter](#) cause the most bacterial diarrheal illnesses in the United States. CDC estimates that 1.5 million people in the United States get ill from *Campylobacter* every year. Anyone can get *Campylobacter* infection. Some groups of people are at increased risk for infection or serious illness. These groups include children younger than 5, adults 65 and older, people with a weakened immune system, people who work with animals and international travelers.

Campylobacter organisms are transmitted via the fecal oral route. Common ways people are infected include eating undercooked poultry or other foods such as seafood, meat and produce that may have had contact with raw poultry or preparation surfaces. Contact with animals, their food, belongings or feces as well as untreated drinking water are also common exposure risks.

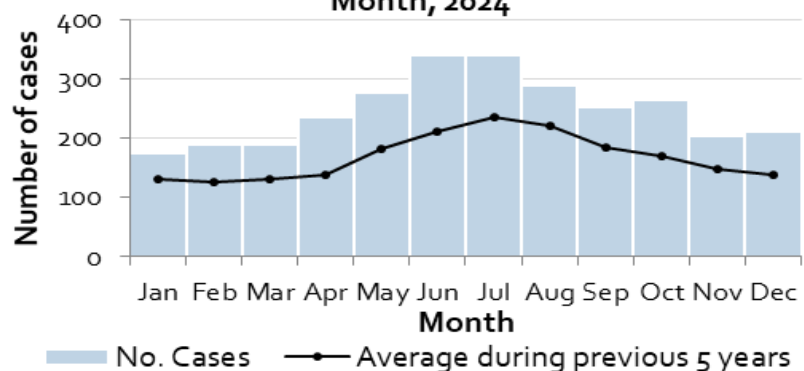
Campylobacteriosis was made reportable in the US and NC because it was recognized as an increasing cause of illness among CDC active surveillance [FoodNet sites](#). We conduct surveillance for campylobacteriosis to recognize outbreaks, identify trends and implement control measures. [Learn more about prevention measures here.](#)

Confirmed cases remained steady annually, while probable *Campylobacter* cases increased annually. The percentage of confirmed cases declined.

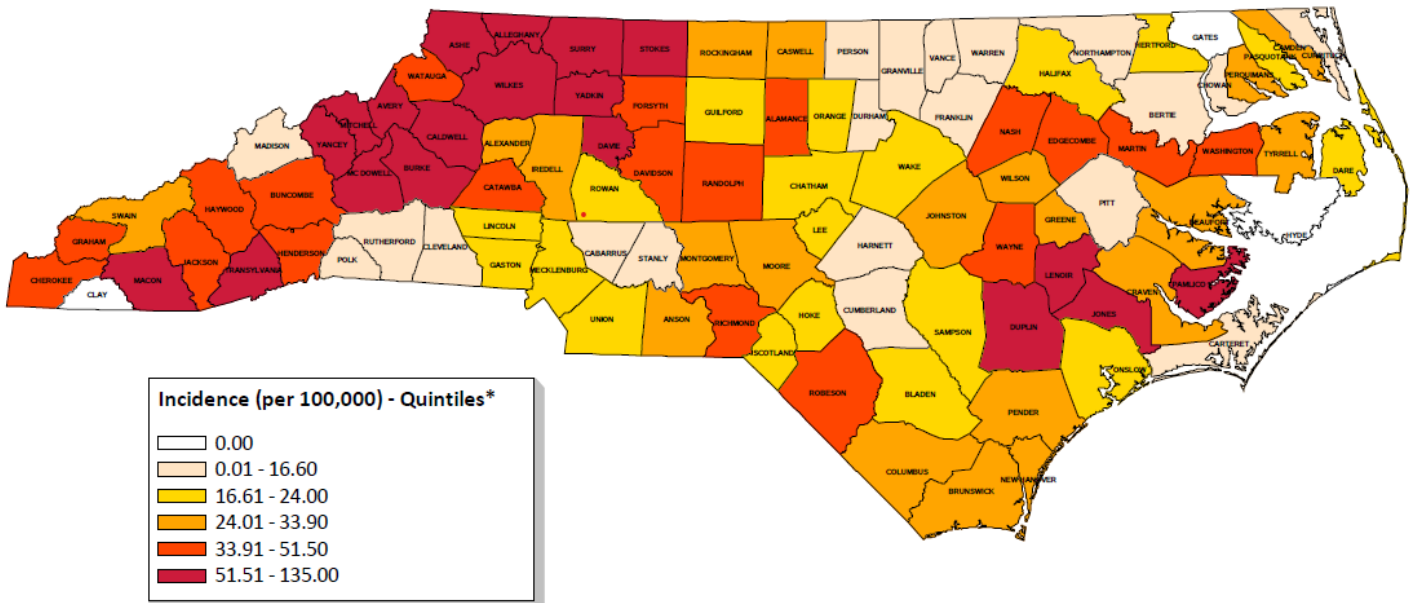


The percentage of confirmed cases reached a low of 28% in 2024. This reflects an increasing use of Culture Independent Diagnostic Testing (CIDT), a common test type for many enteric and other reportable conditions. CIDT are useful for clinicians as they provide quick results for health care decisions. CIDT limit the ability of public health to perform detailed molecular analysis. Public health analysis can help identify outbreaks and potentially contaminated food products that may be locally produced or distributed across the US.

Campylobacteriosis Cases Reported by Month, 2024



Like many enteric conditions, reported cases of campylobacteriosis increase in the summer months. Monthly case counts during 2024 were above the average number of cases seen during the previous 5 years.



*Counties with at least one case were ranked by incidence rate and placed into quintiles (5 roughly equal groups divided at 20-percentile intervals).

Reported cases of campylobacteriosis do not have a uniform, or even, distribution across NC. The reasons for this are not clear. It is possible that cases may be associated with environmental or occupational factors that are specific to a region, or there may be a clinical diagnosis, testing or reporting bias unique to certain areas. This pattern of distribution requires further study for a more complete understanding.

Annual Summary						
	2019	2020	2021	2022	2023	2024
Cases	2,025	1,737	1,861	1,881	2,589	2,968
Rate*	19.3	16.6	17.6	17.6	23.9	27.4
Case Statistics, 2024						
Sex	Cases	%	Rate*	95% CI	Annual Incidence Rate	• •<



Annual Summary Key Points

- The number of cases reported in 2024 is the highest ever in NC. This is due to the increasing use of CIDT.
- Cases are evenly distributed among men and women.
- Cases are most reported in those over 50 years old.

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

What work needs to be done to improve surveillance for Campylobacteriosis?

1. **Improve data quality and completeness.** Individual case investigation is a time-consuming and laborious process, and it is challenging for LHD staff to collect all required information, especially as a patient's memory of their illness and food history may fade over time. A potential solution is to focus on the most essential questions and utilize new technology such as electronic case reporting during interviews. This will ensure we can better analyze demographic trends and well as disease severity.
2. **Increase the proportion of confirmed cases to facilitate better identification of outbreaks and contaminated food products.** This is achievable by having more clinical specimens submitted to the NC State Laboratory of Public Health for culture (recovery of the organism) or encouraging the use of culture as a diagnostic technique. Although the latter method is less likely, as the health care industry is moving away from culture in favor of quicker and less expensive CIDT.
3. **Evaluate and identify the reasons for the non-uniform distribution of cases by geography and race across NC.** This is important information to convey to residents of our state as some people may be at an increased risk based on the region in which they live. The non-uniform distribution phenomenon is well established for certain vectorborne diseases but is less well characterized for campylobacteriosis and other foodborne diseases in general.

Cryptosporidium

443

cases reported in
2024

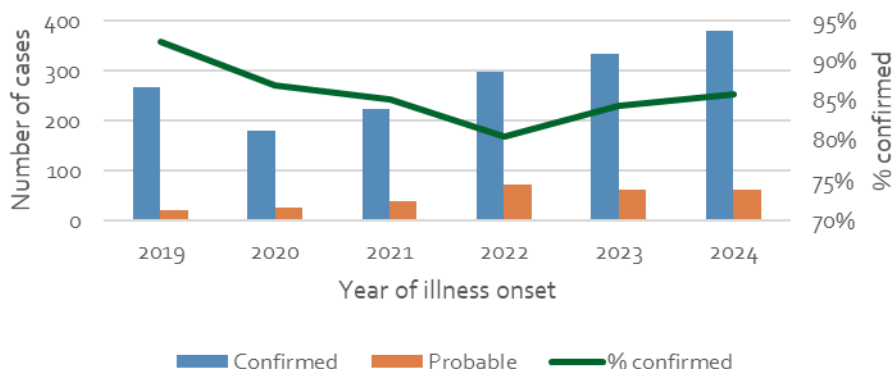
- Cryptosporidiosis cases have been steadily increasing for the past four years
- Most cases are not associated with outbreaks, though [outbreaks](#) have occurred in NC in the past.
- [Prevent infection](#) with good hygiene (hand washing) and thoroughly

Cryptosporidiosis is a diarrheal disease caused by microscopic parasites of the genus *Cryptosporidium*. Both the disease and the parasite are commonly known as "Crypto." Many species of these parasites infect humans and a wide range of animals.

The most common symptom of crypto is watery diarrhea. Other symptoms include stomach cramps, dehydration, nausea, vomiting, fever, and weight loss. Crypto may be found in soil, food, water, or on contaminated surfaces. Contamination is caused by feces from infected humans or animals. Water is a common vehicle of transmission and crypto is one of the most frequent causes of water-borne disease among humans in the United States. This hardy parasite is protected by an outer shell, which allows it to survive outside the body for long periods of time. Crypto can be hard to kill and even displays resistance to chlorine disinfection. Recreationally, swimming pools are sources of infection. To reduce risk of exposure and infection, local Environmental Health staff work closely with pool operators. The disease can also spread through person-to-person transmission and through the consumption of contaminated food.

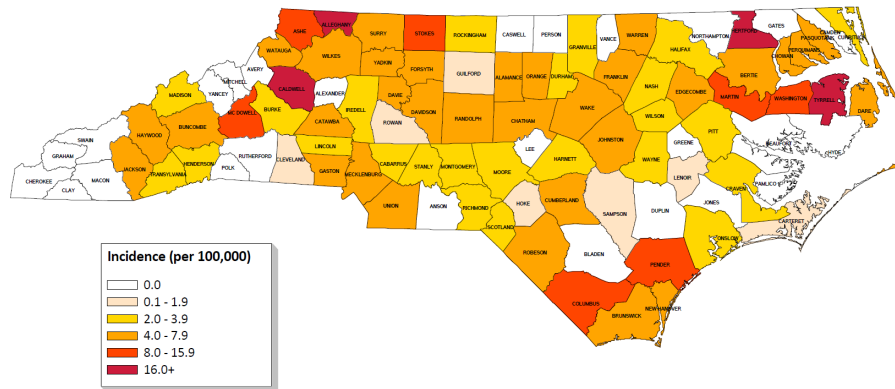
Prevention: Do not drink untreated water. Thoroughly wash hands after toileting, changing diapers and before eating. Do not swallow water while swimming.

Confirmed cases steadily increased since 2020, while probable *Cryptosporidium* cases remained steady. The percentage of confirmed cases remained ~80% during the last 3 years.



Because *Cryptosporidium* organisms are protozoa, and not bacteria, they cannot be cultured. As such, the mechanisms to definitively identify the organism in the laboratory are different and often involve [directly visualizing](#) the organism under a light microscope. Because of this highly reliable method, most cases are confirmed.

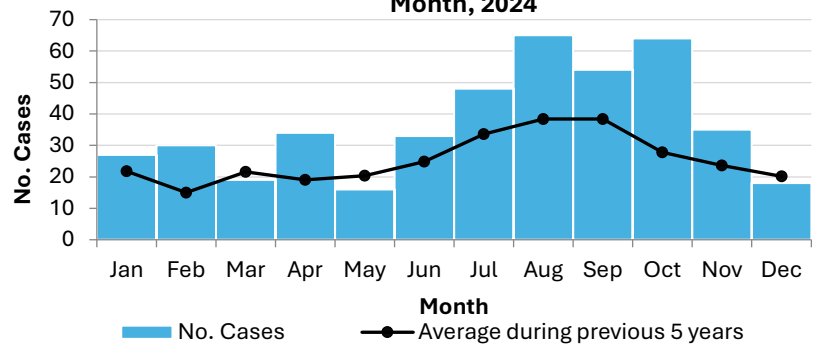
Rate of Cryptosporidiosis (per 100,000 people) in North Carolina Counties, 2024



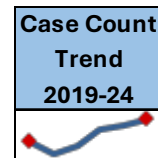
Cases occur across the state and are associated with activities such as swimming in contaminated water or handling ruminants, mammals with four-chambered stomachs who are known to shed crypto without being ill.

Cases occur throughout the year though most occur in late summer to early fall. However, several large swimming pool associated outbreaks have occurred in winter in NC.

Cryptosporidiosis Cases Reported in North Carolina by Month, 2024



Annual Summary						
	2019	2020	2021	2022	2023	2024
Cases	289	206	262	370	396	443
Rate*	2.8	2.0	2.5	3.5	3.7	4.1
Case Statistics, 2024						
Sex	Cases	%	Rate*	95% CI		
Male	201	45%	3.8	3.3, 4.4		
Female	241	54%	4.4	3.8, 4.9		
Unknown	1	0%	--	--		
Age Group	Cases	%	Rate*	95% CI		
Under 5 yrs.	29	7%	4.8	3.2, 6.9		
5-19 yrs.	58	13%	2.9	2.2, 3.7		
20-49 yrs.	236	53%	5.6	4.9, 6.4		
50+ yrs.	120	27%	3.0	2.5, 3.6		
Unknown	0	0%	--	--		
Race	Cases	%	Rate*	95% CI		
White	292	66%	3.9	3.4, 4.3		
Black or African American	70	16%	2.9	2.3, 3.7		
Other	31	7%	5.3	3.6, 7.5		
Multiple or Unknown	50	11%	--	--		
Hispanic Ethnicity	Cases	%	Rate*	95% CI		
Yes	36	8%	2.9	2.0, 4.0		
No	292	66%	3.0	2.7, 3.4		
Unknown	115	26%	--	--		
Disease Severity	Cases	%	Rate*	95% CI		
Hospitalized	83	19%				
Died	5	1%				



Cases are generally evenly distributed between male and female. Most cases occur in people aged 20-49 years.

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

Cyclosporiasis

328

cases reported in
2024

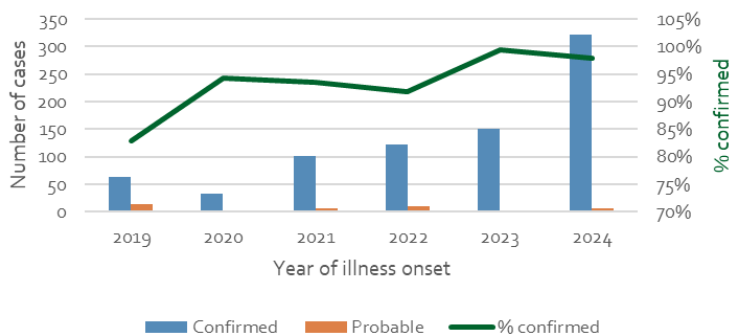
- There was a 117% increase in Cyclospora cases in 2024 compared to 2023.
- In line with national reports, most North Carolina cases were reported in June and July.

Cyclospora cayetanensis is a unicellular parasite that causes an intestinal infection called cyclosporiasis. Cyclospora infection is transmitted by ingesting food or water that has been contaminated with *Cyclospora* oocysts.

Cyclospora infects the small intestine and typically causes watery diarrhea with frequent, sometimes explosive, bowel movements. Other common symptoms include loss of appetite, weight loss, abdominal cramping/bloating, nausea, vomiting and body aches. Cyclosporiasis is usually not life-threatening.

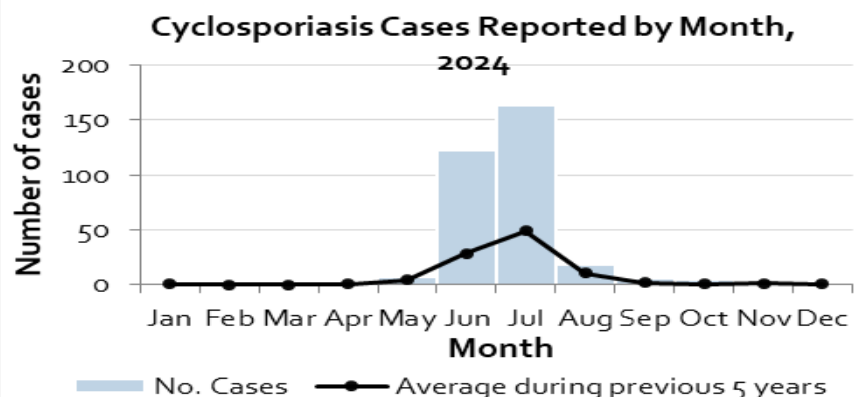
Prevention: The best way for people to [prevent infection](#) is to avoid consuming food or water that may be contaminated with stool. Washing fruit and vegetables, including herbs, is a good practice to reduce surface contamination. Travelers to cyclosporiasis-endemic areas should be aware that food and water precautions for *Cyclospora* are like precautions for other intestinal pathogens.

Confirmed cases significantly increased since 2020, while probable *Cyclospora* cases remained very low. The percentage of confirmed cases are nearly 100%.



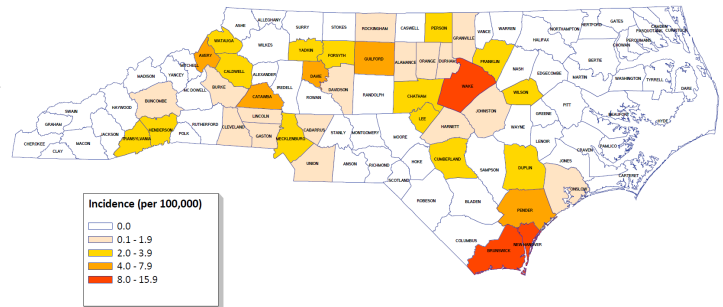
NC's *Cyclospora* case counts were significantly higher in 2024 than previous years. Multiple outbreaks were identified and investigated during 2024. Because *Cyclospora* organisms are protozoa, and not bacteria, they cannot be cultured. PCR tests are most often used for identifying cyclospora and are accepted as confirmatory.

NC's *Cyclospora* seasonality has consistently occurred during June and July each year. This same trend is seen on a national level.



Rate of Cyclosporiasis (per 100,000 people) in North Carolina Counties, 2024

Three counties had the highest proportion (58%) of cases during 2024. Multiple investigations occurred during this time. Dishes containing fresh herbs were most often associated with illnesses.



Annual Summary						
	2019	2020	2021	2022	2023	2024
Cases	76	35	108	133	151	328
Rate*	0.7	0.3	1.0	1.2	1.4	3.0
Case Statistics, 2024						
Sex	Cases	%	Rate*	95% CI	• There were 328 significant reported cases compared to 111 in 2020. • Incidence of COVID-19 cases was higher in females than males. • Those aged 50+ years often accounted for more than half of the cases. • Reported incidence of infection during the 2020-2024 period was 1.4 per 100,000.	
Male	147	45%	2.8	2.3 , 3.2		
Female	179	55%	3.2	2.8 , 3.7		
Unknown	2	1%	--	--		
Age Group						
Under 5 yrs.	1	0%	0.2	0.0 , 1.0		
5-19 yrs.	11	3%	0.5	0.3 , 1.0		
20-49 yrs.	123	38%	2.9	2.4 , 3.5		
50+ yrs.	193	59%	4.8	4.2 , 5.5		
Unknown	0	0%	--	--		
Race						
White	236	72%	3.1	2.7 , 3.5		
Black or African American	25	8%	1.0	0.7 , 1.5		
Other	21	6%	3.6	2.2 , 5.5		
Multiple or Unknown	46	14%	--	--		
Hispanic Ethnicity						
Yes	19	6%	1.5	0.9 , 2.4		
No	217	66%	2.3	2.0 , 2.6		
Unknown	92	28%	--	--		
Disease Severity						
Hospitalized	21	6%				
Died	0	0%				



- There was a statistically significant increase in cases reported during 2024 compared to previous years.
 - Ingredient level analysis of foods consumed by cases indicates that fresh herbs and fruit were commonly consumed by cases.
- Those age 50+ years are most often affected.
- Reported cases of *cyclospora* infection were not severe during 2024.

*Incidence rate calculated per 100,000 North Carolina residents

Unique Challenges to the Surveillance and Prevention of Cyclosporiasis

Cyclospora cayenatensis is a parasite that cause acute gastroenteritis. The only known host for this parasite is people, and it occurs worldwide. The [life cycle](#) for this organism is complex, but it is shed in the feces of infected people where it can contaminate the environment, including fields used for fresh fruit and vegetable (FFV) and herb production. While boiling and fully cooking can kill cyclospora, these methods are rarely applied to FFV and herbs. Additionally, cyclospora organisms are resistant to routine chemical (chlorine and iodine) methods of disinfection. In the absence of “kill steps” that are so successful for bacterial pathogens (such as cooking your chicken to an internal temperature of 165F to eliminate salmonella) consumers must be careful to avoid potentially contaminated food.

The first large [outbreak](#) of cyclosporiasis in the United States occurred in 1996 and was associated with raspberries imported from Guatemala. Since then, cases and [outbreaks](#) of cyclosporiasis associated with FFV and herbs from Latin America have continued. Due to suspected widespread contamination of growing areas, the FDA has essentially [banned](#) importation of certain products from certain areas.

Because cyclospora contamination is widespread, the organism is resistant to classic control methods, and cases continue to rise, the CDC and FDA have established a [task force](#) for prevention, response and research.

In NC, the DPH works collaboratively with multiple partners (LHDs, NCD&CS, CDC, FDA and other state health departments) to investigate cases. Our **goal** is to conduct comprehensive ingredient level analysis of foods consumed by cases with the **intent** of identifying common foods that may be acting as the vehicle for the organism. This information is shared with our partners to facilitate traceback to the point of origin. However, this is challenging and can take time. This process is very dependent on individual cases remembering what they ate or ordered, and where it was purchased.

If human clinical specimens or implicated food items can be collected, the CDC may be able to identify [Temporal Genetic Clusters](#) (TGC) of cases. Because the cyclospora genome is so much larger than that of a bacteria, molecular analysis only allows investigators to infer the probability of relatedness between cases and (possibly) food sources. This is in contrast to molecular analysis for bacteria (such as salmonella) that may determine a direct (causal) relationship between cases and food sources.

In summary, cyclospora is a relatively new pathogen for surveillance. The parasite is challenging to control, and the methods of case and outbreak investigation are evolving. We encourage all consumers to stay abreast of [food recalls](#), practice good [food safety](#), and see your health care provider if you believe you have a food borne illness, as this will likely allow for your case to be reported.

E. Coli (shiga toxin-producing): STEC

553

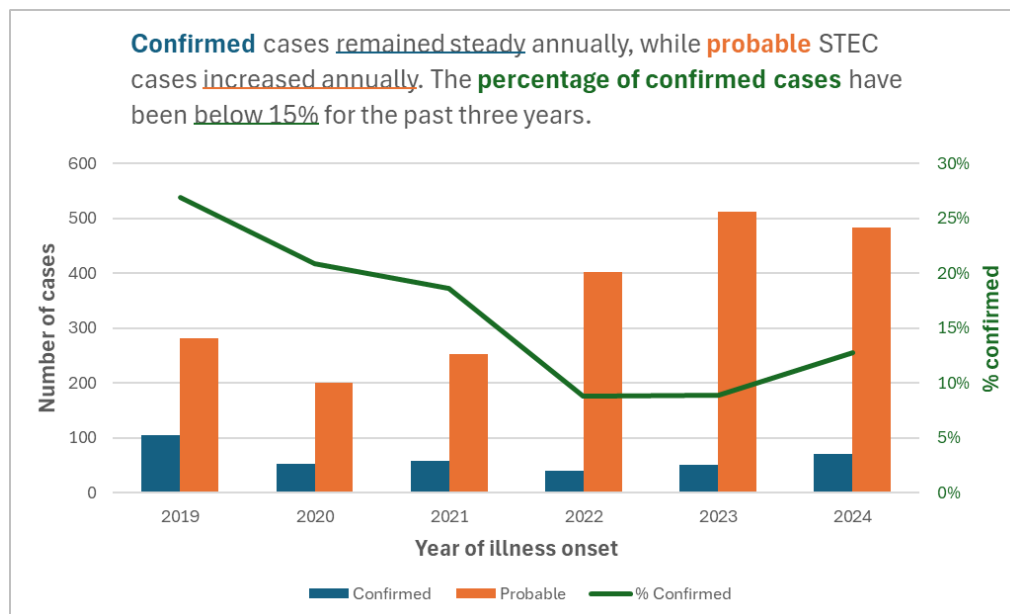
cases reported in
2024

- There has been an increase in the number and rate of STEC cases reported annually since 2020.
- Given the potential for serious illness associated with STEC infection, the increase in cases is concerning.
- As with many enteric conditions, the increasing use of CIDT is hampering surveillance.

Escherichia coli are bacteria commonly found in the intestinal tract of almost all mammals, including food animals such as ruminants (e.g. cows, sheep, goats). Most *E. coli* cause only mild illness, but those that produce shiga (or shiga like) toxin can cause very serious illness in people. These bacteria are referred to as Shiga Toxin producing *E. coli* or STEC. There are many serotypes of STEC but the most common, and most pathogenic, is *E. coli* O157. Other important serotypes are commonly referred to as the “Big Six.” Infection with any STEC serotypes, all of which are reportable in NC, may lead to a life threatening illness called [Hemolytic Uremic Syndrome](#).

Infections with these organisms have been nationally notifiable since 1995. This was a result of the Jack in the Box outbreak of [1993](#) that resulted in the deaths of three children. That outbreak ultimately led to the USDA [declaring](#) in 1994 that any beef product found to be contaminated with *E. coli* O157 is adulterated and must be removed for the food supply. The other “big six” were added as adulterants in 2012.

Due to ongoing surveillance, we can detect outbreaks (such as the [2004 NC State Fair](#) and the 2012 Cleveland County Fair) and identify potentially contaminated food products or infected animals. Prevention of STEC relies on thorough handwashing with soap and water before preparing or eating food, after contact with animals or their environment, and after using the bathroom or changing a diaper. Additionally, food safety measures such as cooking ground beef or pork to a minimum internal temperature of 165°F and avoiding the consumption of rare or undercooked ground beef.



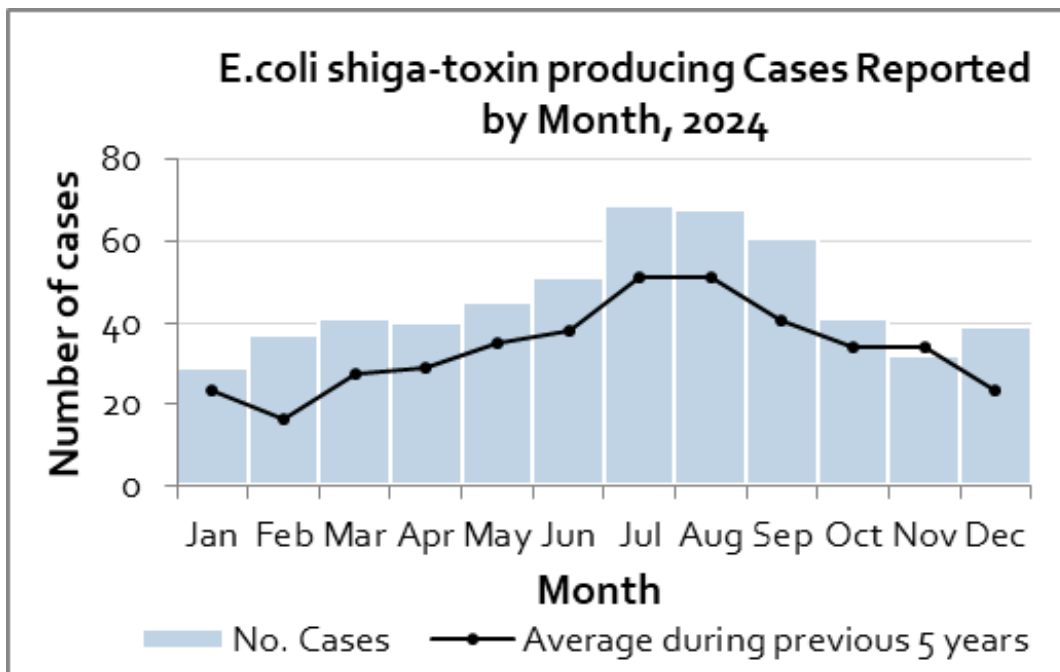
Interpretation of Cases Reported by Year in NC

The bar graph above is intended to show the current burden of reported STEC cases in NC. The national case definition for STEC was updated in 2018 and implemented in 2019. This case definition allowed for “culture independent diagnostic testing” to be used for supportive laboratory evidence of infection, and cases with these lab results were categorized as probable for the first time.

As shown, the number of reported cases has risen significantly and has been incrementally increasing since 2020. While the number of confirmed cases has remained relatively constant at 50 – 70 cases per year, the percent of confirmed cases has decreased from 25% to only 13% in 2024 during the first five years with the new case definition. As with other enteric conditions this is likely due to the adoption of Culture Independent Diagnostic Testing (CIDT) in place of culture and isolation. CIDT are useful for clinicians as they provide quick results for health care decisions. However, increased use of CIDT limits the ability of public health to perform detailed molecular analysis. This limitation reduces the means to help identify outbreaks and potentially contaminated food products that may be locally produced or distributed across the US.

What does the Increase in Probable Cases Represent?

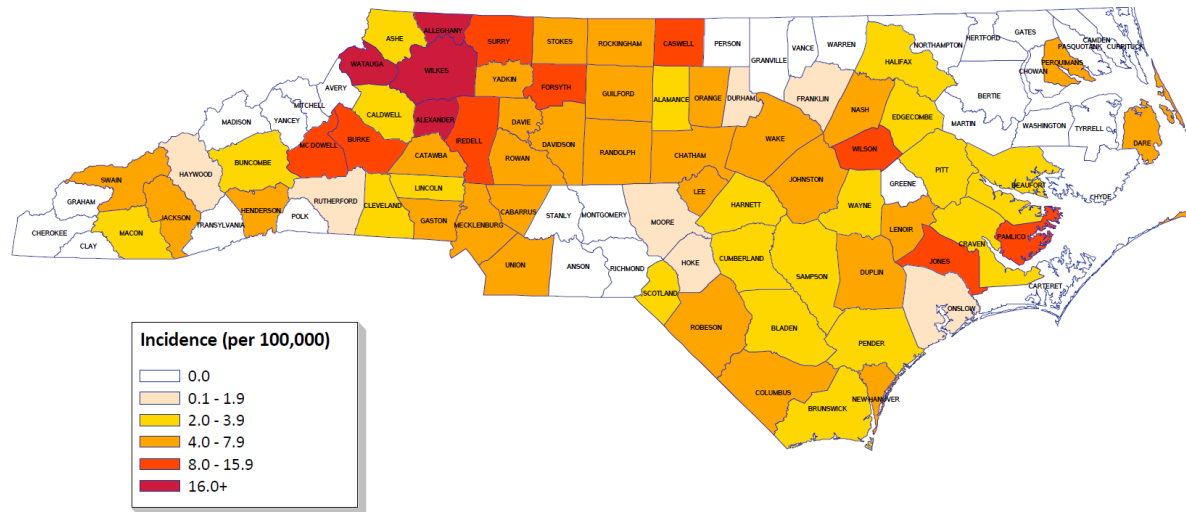
It is possible that the increase in reported cases is a true event, and there is more STEC occurring among the population than in previous years. It is also possible that, through the widespread adoption of CIDT, more cases are being detected than would have been without the use of CIDT. This would mean that an increased number of STEC cases were always present but were not being identified and reported. Regardless, **public health must be able to explain this increase to improve our understanding of STEC in NC.**



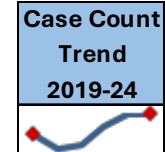
Monthly case counts during 2024 remained above the average number of cases seen per month during the previous 5 years.

As shown in the map below, reported cases of STEC do not have a uniform, or even, distribution across NC. The reasons for this are not clear. It is possible that cases may be associated with environmental or occupational factors that are specific to a region, or there may be a clinical diagnosis, testing or reporting bias unique to certain areas. This pattern of distribution requires further study for a more complete understanding.

Rate of Shiga toxin producing E. Coli (per 100,000 people) in North Carolina Counties, 2024



Annual Summary						
	2019	2020	2021	2022	2023	2024
Cases	391	280	315	465	568	553
Rate*	3.7	2.7	3.0	4.3	5.2	5.1
Case Statistics, 2024						
Sex	Cases	%	Rate*	95% CI		
Male	258	47%	4.9	4.3, 5.5		
Female	292	53%	5.3	4.7, 5.9		
Unknown	3	1%	--	--		
Age Group	Cases	%	Rate*	95% CI		
Under 5 yrs.	98	18%	16.2	13.1, 19.7		
5-19 yrs.	81	15%	4.0	3.2, 5.0		
20-49 yrs.	171	31%	4.1	3.5, 4.7		
50+ yrs.	199	36%	5.0	4.3, 5.7		
Unknown	4	1%	--	--		
Race	Cases	%	Rate*	95% CI		
White	341	62%	4.5	4.0, 5.0		
Black or African American	54	10%	2.3	1.7, 3.0		
Other	71	13%	12.1	9.4, 15.2		
Multiple or Unknown	87	16%	--	--		
Hispanic Ethnicity	Cases	%	Rate*	95% CI		
Yes	96	17%	7.8	6.3, 9.5		
No	285	52%	3.0	2.6, 3.3		
Unknown	172	31%	--	--		
Disease Severity	Cases	%	Rate*	95% CI		
Hospitalized	111	20%				
Died	1	0%				



Annual Summary Key Points

- STEC cases are more commonly reported among females.
- The highest reported incidence rate is among children less than five years of age.
- Cases are most commonly reported among white, non-Hispanic people.
- There is a clustering of cases in the northwest portion of the state; this is noted in 2022 and 2023

*Incidence rate calculated per 100,000 North Carolina residents

What work may be done to enhance surveillance for STEC?

1. **Improve data quality and completeness.** Individual case investigation is a time-consuming and laborious process, and it is challenging for LHD staff to collect all required information, especially as a patient's memory of their illness and food history (or other risk history) may fade over time. One possible solution is to focus only the most essential questions and utilize new technology such as electronic case reporting that could improve reporting. This will ensure better analysis of demographic trends and disease severity.
2. **Increase the proportion of confirmed cases (serotype identified) to facilitate better identification of outbreaks and contaminated food products.** This can be done by increasing the number of clinical specimens submitted to the NC State Laboratory of Public Health for culture (recovery of the organism) or encouraging the use of culture as a diagnostic technique. This latter method is less likely, as the health care industry is moving away from culture in favor of quicker and less expensive CDT.
3. **Analyze data to identify which serotypes most commonly occur in NC.** Identifying serotype frequency involved in infection could help determine if there are any unique risk factors or clinical presentations among them, which could reduce disease occurrence.
4. **Evaluate and identify the reasons for the non-uniform distribution of cases across NC.** By identifying factors related to disease distribution, improved information and prevention measures could be targeted to communities of increased risk. This phenomenon is well established for certain vectorborne diseases but is less well characterized for STEC and other foodborne diseases in general.
5. **Analyze data to identify which type of transmission may be responsible for illness.** By identifying if the route of transmission is from food or animals may help to better explain geographic and/or demographic differences.

Listeriosis

38

cases reported in
2024

- Listeria is the third leading cause of death from foodborne illness in the US
- Individuals most at risk of severe illness, including death, are pregnant women, newborns, adults 65 or older and those who are immunocompromised

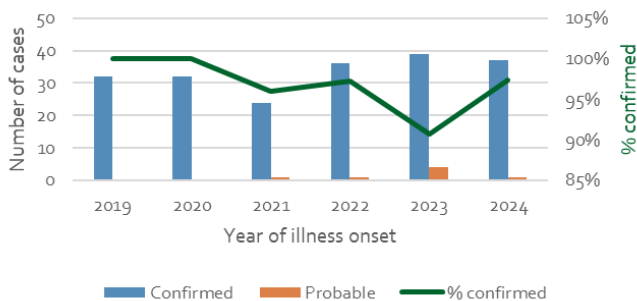
Listeriosis is a serious infection. It is caused by eating food contaminated with the bacterium *Listeria monocytogenes*. The bacteria are found naturally in soil and water. It can be serious for the elderly, pregnant women, newborns, and adults with weakened immune systems.

Symptoms of listeriosis may include fever, muscle aches or a headache. Sometimes people have nausea or diarrhea. Symptoms such as stiff neck, confusion, loss of balance or convulsions can occur.

Pregnant women with listeriosis may experience only a mild, flu-like illness, however, infection while pregnant can be serious for the baby. Infection can cause miscarriage or stillbirth, premature delivery, or infection of the newborn.

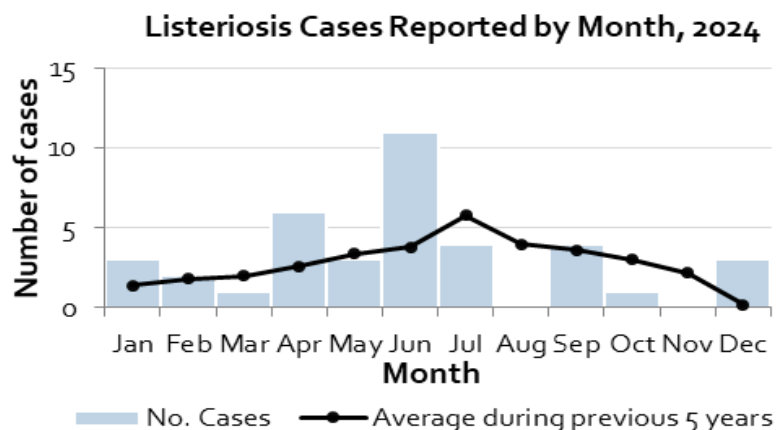
Prevention: Individuals at risk of severe illness should avoid unheated queso fresco type cheeses, unpasteurized dairy, unheated deli meats and hot dogs, premade deli salads, raw or lightly cooked sprouts, and cut melons left out for more than 2 hours.

Confirmed cases remained steady, while probable Listeria cases are very low. The percentage of confirmed cases has been above 95% during most years.



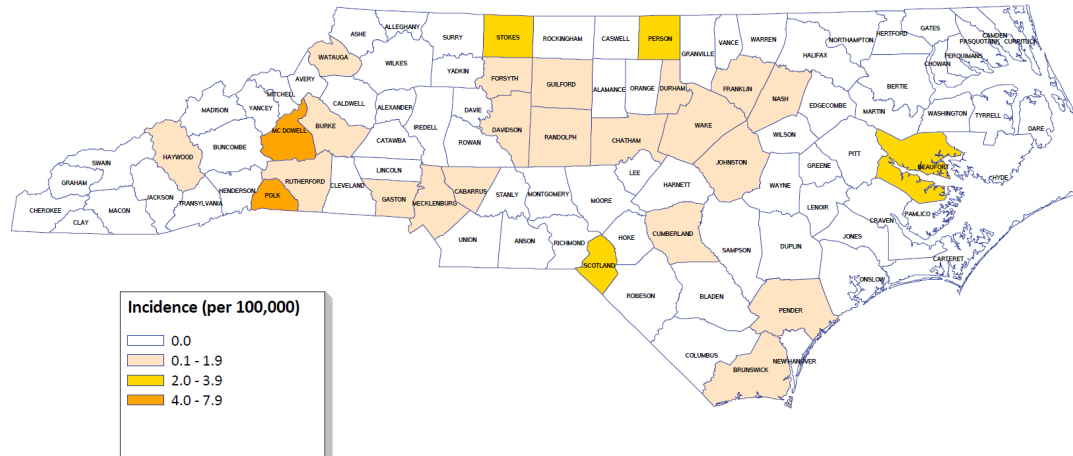
In contrast to many foodborne illnesses, most listeria cases are confirmed. This is likely due to the serious nature of the illness, most cases are hospitalized, and most laboratories still test for the pathogen using culture, but that method is declining as it is for other organisms.

Listeria cases are reported throughout the year; however, there is a general increase seen during the summer months.



Listeria has been reported across the state. However, due to the small number of reported cases it is difficult to say if there are any meaningful geographic differences.

Rate of Listeria (per 100,000 people) in North Carolina Counties, 2024



Annual Summary						
	2019	2020	2021	2022	2023	2024
Cases	32	32	25	37	43	38
Rate*	0.3	0.3	0.2	0.3	0.4	0.4
Case Statistics, 2024						
Sex	Cases	%	Rate*	95% CI	• The re • C y6 th • Li w 13	
Male	17	45%	0.3	0.2, 0.5		
Female	21	55%	0.4	0.2, 0.5		
Unknown	0	0%	--	--		
Age Group						
Under 5 yrs.	2	5%	0.3	0.0, 1.2		
5-19 yrs.	1	3%	0.0	0.0, 0.3		
20-49 yrs.	9	24%	0.2	0.1, 0.4		
50+ yrs.	26	68%	0.7	0.4, 0.9		
Unknown	0	0%	--	--		
Race						
White	23	61%	0.3	0.2, 0.4		
Black or African American	10	26%	0.4	0.2, 0.8		
Other	4	11%	0.7	0.2, 1.7		
Multiple or Unknown	1	3%	--	--		
Hispanic Ethnicity						
Yes	5	13%	0.4	0.1, 0.9		
No	29	76%	0.3	0.2, 0.4		
Unknown	4	11%	--	--		
Disease Severity						
Hospitalized	35	92%				
Died	5	13%				



Annual Summary Key Points

- The number of cases reported in 2024 remains similar to prior years.
- Cases are seen more in those over 50 years of age. This is consistent with the most recent [national data](#).
- Listeria has a high disease severity with a 92% hospitalization rate and 13% dying from the disease.

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

Salmonellosis

2935

cases reported in
2024

- North Carolina had the largest number of reported Salmonellosis cases since 2019; a significant increase over the past five years
- While increasing use of CIDT may explain some increase, other factors are contributing more
- Most cases are sporadic, but there are many clusters of cases linked by Whole Genome Sequencing. Finding a source for these clusters is challenging, but essential to identify potentially contaminated food.

Salmonellosis is an infection caused by the *Salmonella spp.* bacterium. There are over 2000 known [serotypes](#) of (non-typhoidal) *Salmonella*, referred to by common names such as Enteritidis, Typhimurium, and Newport. Differentiating salmonella by serotype continues to be an important way to monitor the burden of disease and detect outbreaks and clusters. While serotypes used to be identified using biochemical reactions of the Kaufmann White scheme, they are now inferred from Whole Genome Sequencing (WGS), which requires culture and isolation of the bacteria from the patient.

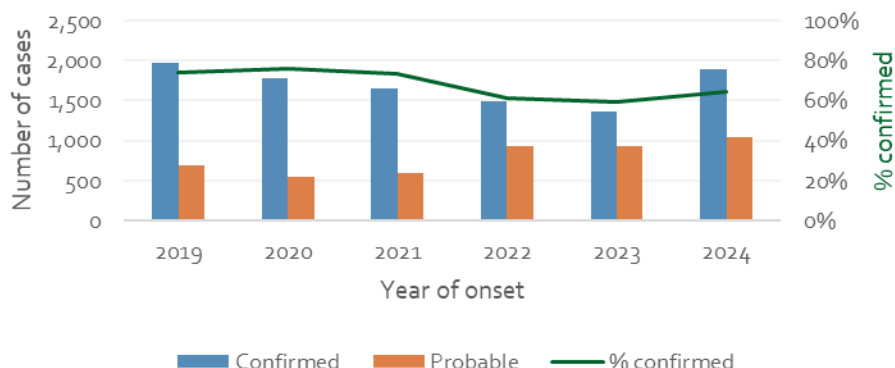
Salmonella bacteria are naturally harbored by many animals (such as poultry, livestock, reptiles, and amphibians) and can be transmitted to people in a variety of ways. Foods most associated with infection are meat, poultry, eggs, and unpasteurized milk. People can also get it from handling certain pets like [dogs](#), [cats](#), reptiles and [baby chicks](#).

The most common symptoms of *Salmonella* infection are diarrhea, fever, and abdominal cramps. The illness usually lasts four to seven days. The elderly, infants, and those with weak immune systems are more likely to have severe illnesses.

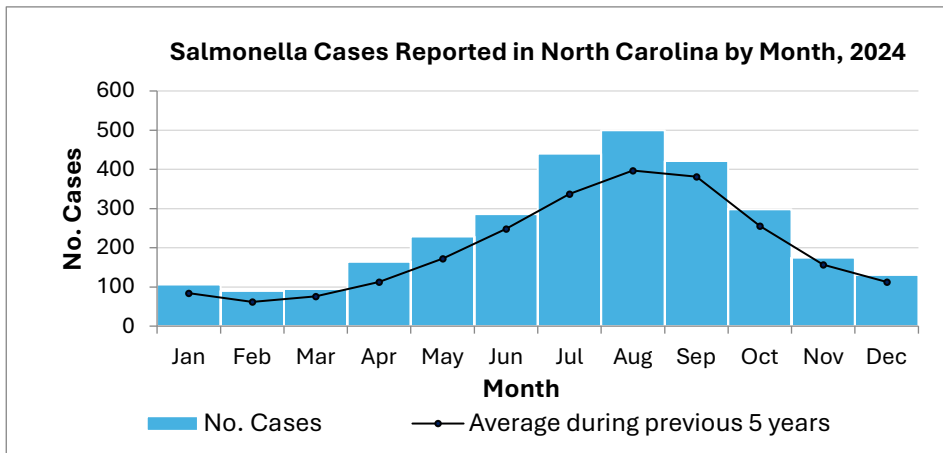
It is important to note that salmonellosis does not include Typhoid and Paratyphoid fever. Those illnesses are much more severe, and people serve as the only source of the bacteria that cause them (*Salmonella typhi* and *paratyphi*). These illnesses are relatively rare in the US and are generally acquired overseas.

Prevention: Thorough handwashing with soap and water, safe food preparation practices, being aware of recalled products, and safe animal handling especially with species known to naturally harbor salmonella bacteria.

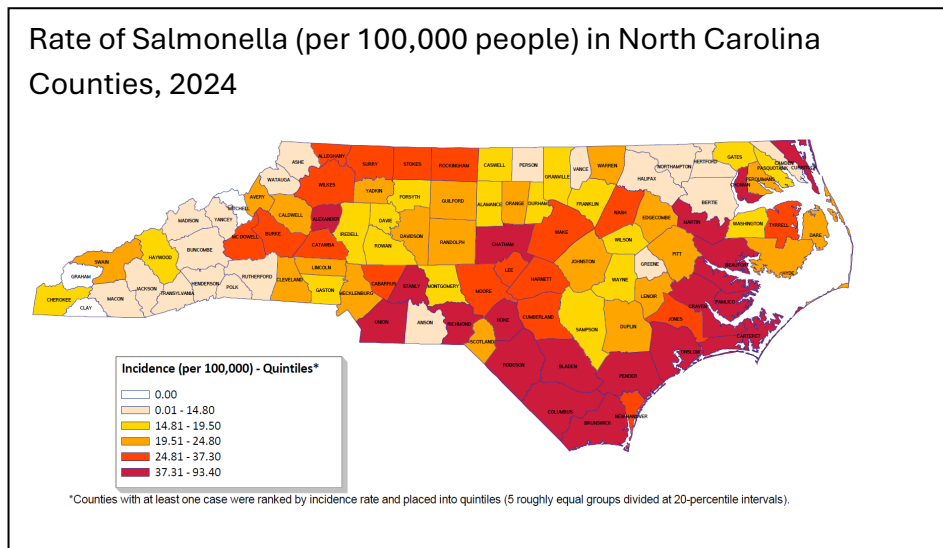
Confirmed cases declined annually until 2024, while probable *Salmonella* cases remained steady after a jump in 2022. The percentage of confirmed cases remained between 60 and 75% since 2019.



There has been a steady increase in reported probable cases over time. Most cases are confirmed, but an increasing number of cases without an isolate are being identified. Isolates are important for serotyping and outbreak detection.



Like many enteric pathogens, there is a clear seasonal trend with more cases reported in the summer months. This is generally attributed to transmission through unsafe food practices.



The distribution of reported cases of salmonellosis is not uniform across NC. The reasons for this are not clear and need further study. For a condition with a large number of cases, and multiple risk factors we would expect a more uniform distribution.

Annual Summary					
	2019	2020	2021	2022	2023
Cases	2,677	2,338	2,241	2,430	2,294
Rate*	25.5	22.4	21.2	22.7	21.2
Case Statistics, 2024					
Sex	Cases	%	Rate *	95% CI	
Male	1,345	46%	25.4	24.4 , 26.8	
Female	1,581	54%	28.5	27.1 , 30.0	
Unknown	9	0%	--	--	
Age Group					
Under 5 yrs.	686	23%	113.1	104.8 , 121.9	
5-19 yrs.	296	10%	14.6	13.0 , 16.4	
20-49 yrs.	674	23%	16.0	14.8 , 17.2	
50+ yrs.	1,279	44%	32.1	30.3 , 33.9	
Unknown	0	0%	--	--	
Race					
White	1,886	64%	24.9	23.8 , 26.1	
Black or African American	397	14%	16.6	15.0 , 18.3	
Other	304	10%	51.6	46.0 , 57.8	
Multiple or Unknown	348	12%	--	--	
Hispanic Ethnicity					
Yes	277	9%	22.4	19.9 , 25.2	
No	2,049	70%	21.4	20.4 , 22.3	
Unknown	609	21%	--	--	
Disease Severity					
Hospitalized	774	26%			
Died	20	1%			



Cases are generally evenly distributed by gender, with slightly more cases among females.

The largest number of cases was reported among those over 50, but children under 5 had the highest reported rate. This underscores the need for ensuring safe animal handling and handwashing in that population.

While salmonellosis is rarely fatal, over 25% of reported cases in 2024 required hospitalization.

*Incidence rate calculated per 100,000 North Carolina residents

How can Salmonellosis Surveillance be Improved?

Salmonellosis is the most common reported foodborne illness in the US and NC. It is commonly associated with outbreaks and clusters, many of which are linked to contaminated food products, and many infected people become sick enough to require hospitalization. For these reasons it is essential that our state and local health departments perform thorough case investigations.

1. **Increase the proportion of confirmed cases (serotype identified) to facilitate better identification of outbreaks and contaminated food products.** This can be done by increasing the number of clinical specimens submitted to the NC State Laboratory of Public Health for culture (recovery of the organism) or encouraging the use of culture as a diagnostic technique. This latter method is less likely though, as the health care industry is moving away from culture in favor of quicker and less expensive CDT.
2. **Analyze data to identify which serotypes most commonly occur in NC.** Identifying serotypes frequency involved in infection could help determine if there are any unique risk factors or clinical presentations among them, which could reduce disease occurrence.
3. **Evaluate and identify the reasons for the non-uniform distribution of cases across NC.** By identifying factors related to disease distribution, improved information and prevention measures can be targeted to communities of increased risk. This phenomenon is well established for certain vectorborne diseases but is less well characterized for STEC and other foodborne diseases in general.

Shigellosis

474

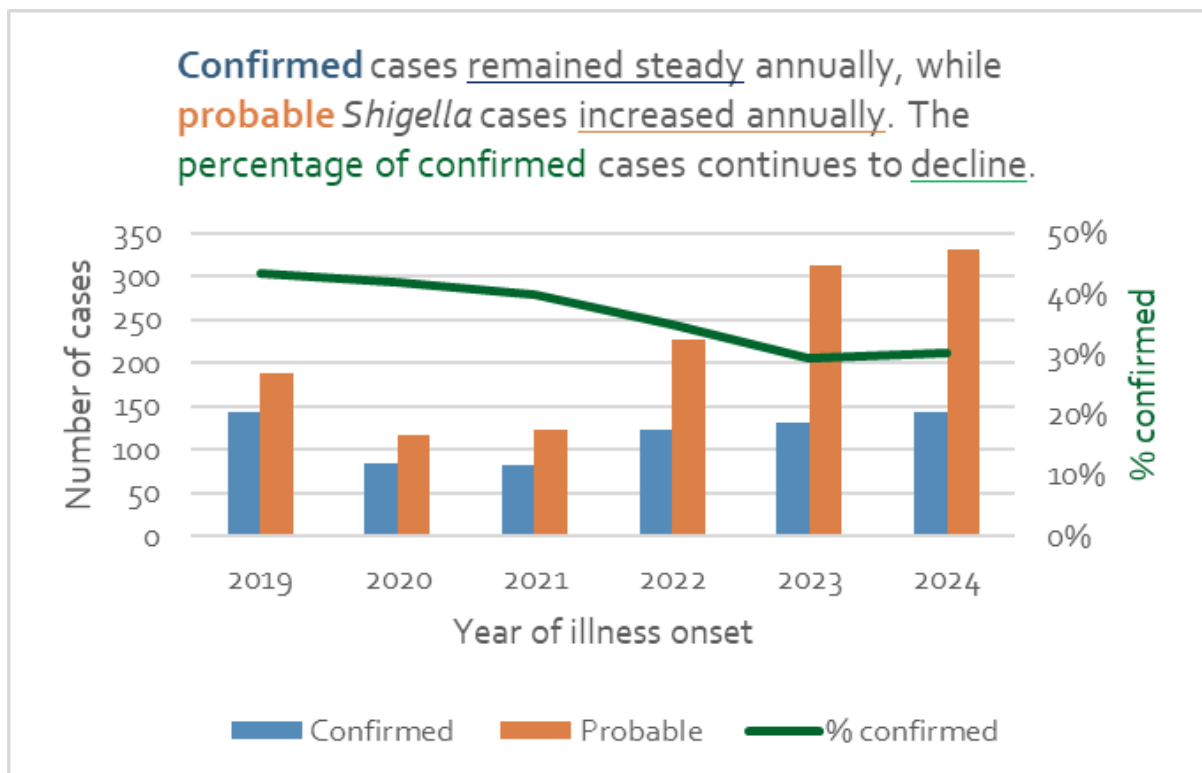
cases reported in
2024

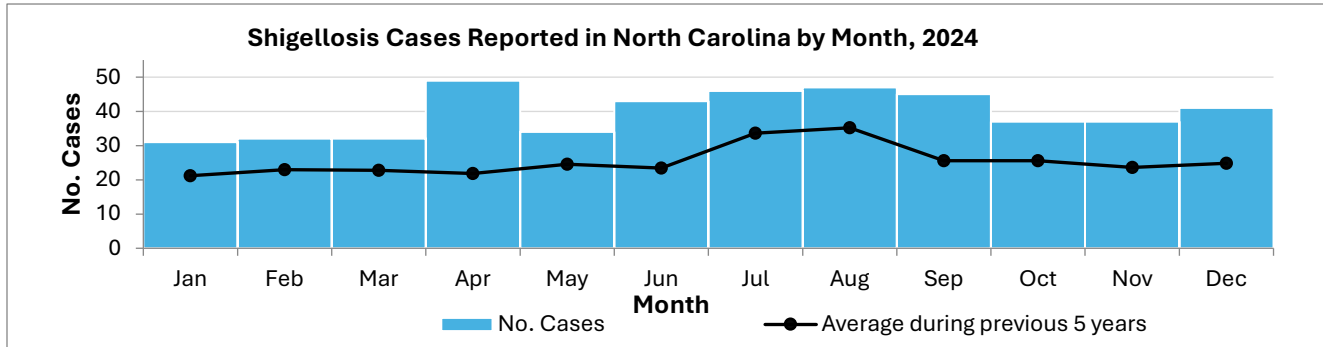
- Reported cases of shigellosis have been increasing for the past several years
- As with many enteric pathogens, an increasing percentage of cases are not confirmed due to increasing use of CIDT
- Due to the rise of multidrug resistant cases of shigellosis in the US, more isolates are needed to effectively track this in NC

Shigellosis is an infectious diarrheal disease caused by bacteria in the Genus *Shigella*. The CDC [estimates](#) there are 450,000 cases of shigella infection in the US every year, though most are not reported. There are four species of *Shigella* (*sonnei*, *boydii*, *flexneri*, and *dysenteriae*). Like STEC, Salmonellosis and Vibriosis, the use of Culture Independent Diagnostic Testing (CIDT) does not allow for the differentiation between the species or serotypes. In the US, infection due to *S. sonnei* is believed to be the most common, compared to infection of *S. dysenteriae* and *S. boydii* that are most likely to be acquired overseas.

Like other enteric pathogens, *Shigella* bacteria are transmitted by the fecal-oral route. [Prevention](#) of infection is related to handwashing and taking care when changing diapers, and consuming safe food and water, especially while travelling overseas.

Since 2015, the CDC has noted a dramatic increase in extensively [multidrug resistant](#) *Shigella* infections in the US. It is essential that clinicians consider this when treating shigellosis, and request that diagnostic laboratories submit CIDT positive results for culture and isolation. This will allow state public health laboratories and CDC to identify drug resistant strains.

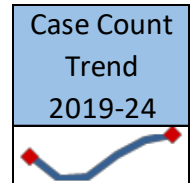




Reported Cases in NC

Over the past 10 years, reported cases have fluctuated, but there has been a steady increase since 2020. However, what is **most significant** is the decreasing proportion of cases that are confirmed with culture. In the absence of an isolate, whole genome sequencing (molecular fingerprinting) cannot be performed. This hinders public health's ability to link cases to confirm outbreaks and evaluate isolates for antibiotic resistance.

Annual Summary						
	2019	2020	2021	2022	2023	2024
Cases	330	200	204	349	443	474
Rate*	3.1	1.9	1.9	3.3	4.1	4.4
Case Statistics, 2024						
Sex	Cases	%	Rate*	95% CI	Annual Summary - Most cases occurred among... - Most cases occurred among... - The highest case rates were reported in... - Case rates were even higher in North...	
Male	305	64%	5.8	5.1 , 6.4		
Female	168	35%	3.0	2.6 , 3.5		
Unknown	1	0%	--	--		
Age Group						
Under 5 yrs.	47	10%	7.7	5.7 , 10.3		
5-19 yrs.	65	14%	3.2	2.5 , 4.1		
20-49 yrs.	214	45%	5.1	4.4 , 5.8		
50+ yrs.	148	31%	3.7	3.1 , 4.3		
Unknown	0	0%	--	--		
Race						
White	225	47%	3.0	2.6 , 3.4		
Black or African American	142	30%	5.9	5.0 , 7.0		
Other	70	15%	11.9	9.3 , 15.0		
Multiple or Unknown	37	8%	--	--		
Hispanic Ethnicity						
Yes	104	22%	8.4	6.9 , 10.2		
No	304	64%	3.2	2.8 , 3.5		
Unknown	66	14%	--	--		
Disease Severity						
Hospitalized	141	30%				
Died	3	1%				



Annual Summary Key Points

- Most reported cases occur among males.
- Most cases are reported among 20–49-year-olds, but the highest incidence rate occurs among children under 5 years of age.
- The highest reported rate of case occurs in people who report race as “other.”
- Cases of shigellosis are evenly distributed across North Carolina.

Shigella Incidence Rate (per 100,000 people) in North Carolina Counties, 2024

Incidence (per 100,000)

- 0.0
- 0.1 - 1.9
- 2.0 - 3.9
- 4.0 - 7.9
- 8.0 - 15.9

What should be done to improve surveillance for shigellosis in NC?

1. **Thoroughly evaluate travel history of all cases.** This can be done by completing in-depth interviews among travel associated cases that could help identify species, risk factors, and antibiotic resistance.
2. **Analyze species frequency in NC.** Identifying the frequency of species in NC could help determine if there are any unique risk factors or clinical presentations among them, which may reduce disease occurrence.

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Vibrio infection (other than *cholera* and *vulnificus*)

125

cases reported
in 2024

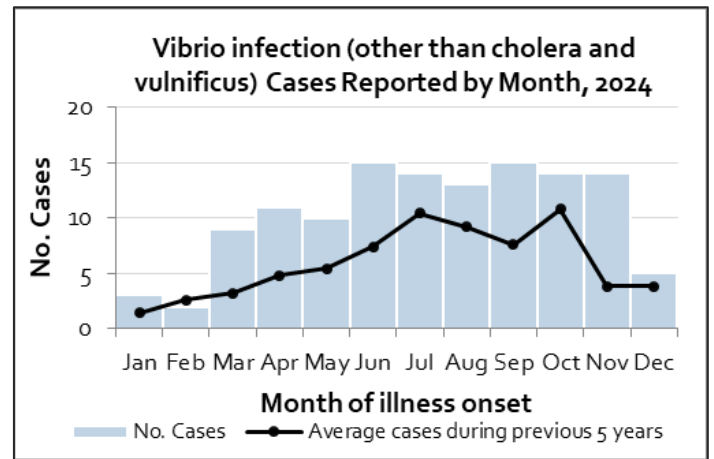
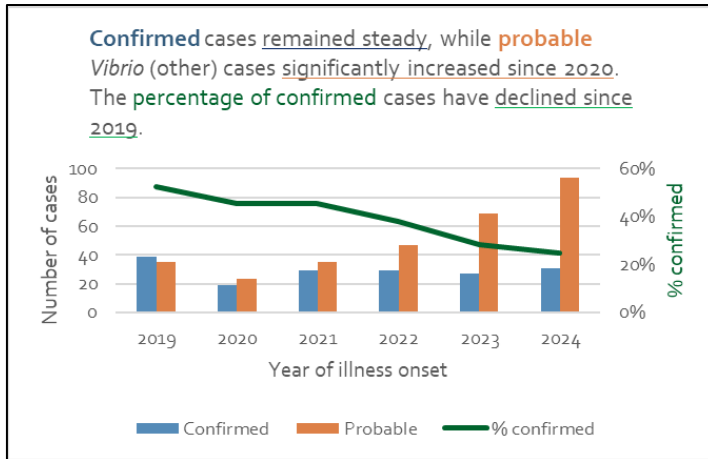
- North Carolina has seen a steady increase in *Vibrio* infections (other than *cholera* and *vulnificus*)
- *Vibrio* infections peak July through October
- *Vibrio* infections are preventable through proper cooking of food, and protection of wounds prior to entering salt or brackish water.

Illness due to infection with *Vibrio* spp. can be broadly categorized into three main types:

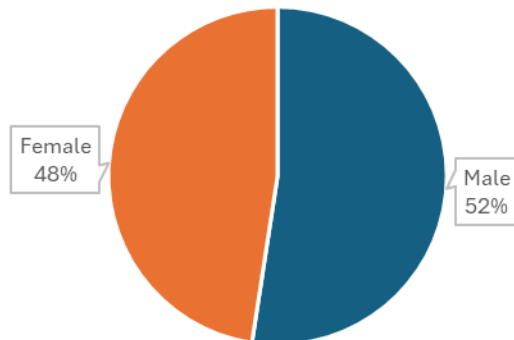
1. **Cholera.** This illness caused by infection with toxigenic *Vibrio cholera*. This does not occur in the US but does cause epidemic outbreaks in other countries. Cholera is generally spread person-to-person via the fecal oral route. It is a very serious illness but is not covered in this report. There were zero cases of cholera reported in NC in 2024.
2. **Infection with *Vibrio vulnificus* (Vv).** This organism is naturally found in low salt marine environments (estuaries and brackish water) in coastal areas of the US and NC. Vv can be transmitted through consumption of undercooked or raw shellfish, and through wounds or broken skin exposed to water containing the organism. Vv can cause severe illness including sepsis and necrotizing fasciitis and is associated with a high case fatality rate.
3. **Infection with other *Vibrio* species such as *parahaemolyticus*, *alginolyticus*, *hollisae*, and *fluvialis*.** These species also occur naturally in marine environments. While they may cause severe illness, they are much more likely to be associated with mild illness such as gastroenteritis. They are most likely to be transmitted through consumption of undercooked or raw shellfish.

Most infections caused by *Vibrio* spp. in the United States can be prevented by thoroughly cooking seafood, especially oysters. Wound infections can be prevented by avoiding exposure of open wounds to warm seawater, showering well after being in the water, and by promptly tending to any new wounds by immediately washing well with clean, potable (drinkable) freshwater and soap.

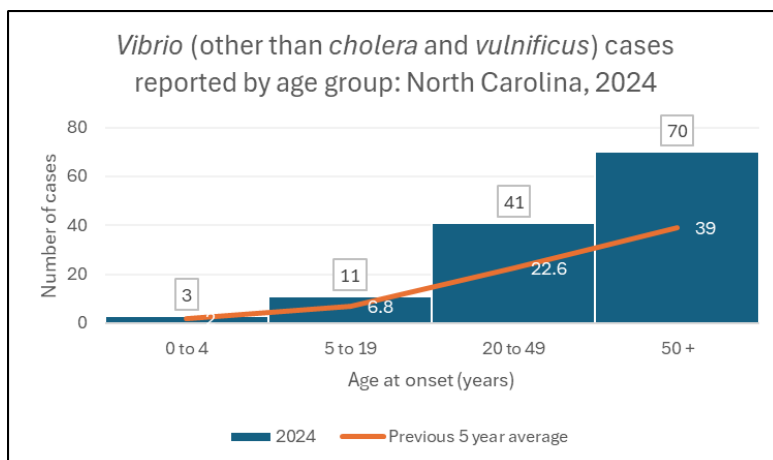
Cases reported in 2024 were significantly higher than previous years. While the number of confirmed cases remained relatively stable over the years, probable cases, which are most often identified using a CIDT or PCR test, have increased annually.



Vibrio (other than *cholera* and *vulnificus*) cases reported by gender: North Carolina, 2024



While not statistically significant, more cases occur among men than women. This is in contrast to reported Vv infections, of which over 75% occur in men.



The number of cases reported in each age group during 2024 was higher than the five-year average from the previous five years.

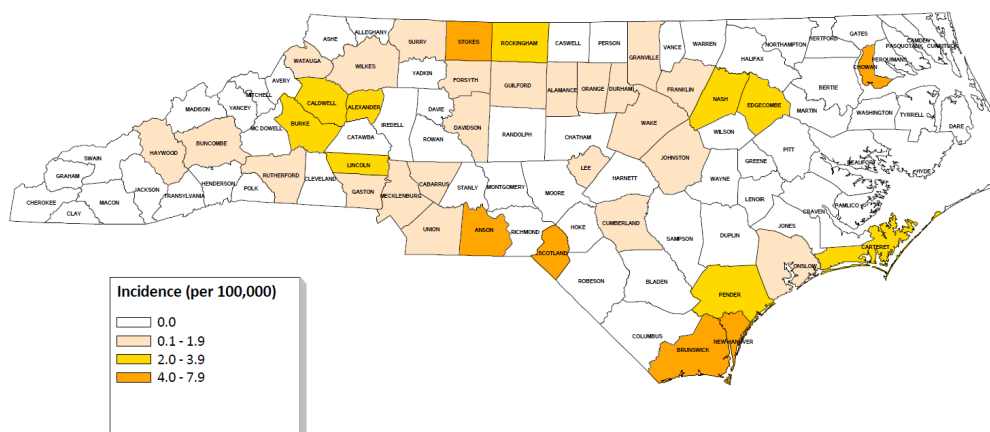
Annual Summary (<i>Vibrio other than cholera and vulnificus</i>)						
	2019	2020	2021	2022	2023	2024
Cases	74	42	64	76	96	125
Rate*	0.7	0.4	0.6	0.7	0.9	1.2
Case Statistics, 2024						
Sex	Cases	%	Rate*	95% CI		
Male	64	51%	1.2	0.9 , 1.5		
Female	60	48%	1.1	0.8 , 1.3		
Unknown	1	1%	--	--		
Age Group	Cases	%	Rate*	95% CI		
Under 5 yrs.	3	2%	0.5	0.1 , 1.5		
5-19 yrs.	11	9%	0.5	0.3 , 1.0		
20-49 yrs.	41	33%	1.0	0.7 , 1.3		
50+ yrs.	70	56%	1.8	1.3 , 2.2		
Unknown	0	0%	--	--		
Race	Cases	%	Rate*	95% CI		
White	82	66%	1.1	0.8 , 1.3		
Black or African American	15	12%	0.6	0.4 , 1.0		
Other	8	6%	1.4	0.6 , 2.7		
Multiple or Unknown	20	16%	--	--		
Hispanic Ethnicity	Cases	%	Rate*	95% CI		
Yes	11	9%	0.9	0.4 , 1.6		
No	84	67%	0.9	0.7 , 1.0		
Unknown	30	24%	--	--		
Disease Severity	Cases	%	Rate*	95% CI		
Hospitalized	32	26%				
Died	2	2%				



Annual Summary Key Points

- 49% of cases report exposure to shellfish. This serves as a reminder to always cook shellfish prior to consumption. They should not be eaten raw.
- Older adults are at risk for severe infection. Both fatalities occurred in people over 65, and two thirds of hospitalized cases were over 55 years old.
- A quarter of cases from 2024 were hospitalized.

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



Geography

While cases are often associated with saltwater and seafood, cases are reported statewide. Exposure to undercooked shellfish can occur anywhere, and people often travel to the coast resulting in exposure.

Key Points about Vibriosis

- Of all the foodborne infections, Vibriosis may be the most preventable.
- Shellfish should **ONLY** be consumed after it is fully cooked. Intentional consumption of raw shellfish is a well-established risk factor for vibriosis.
- Cases are reported from across NC, not just the coastal counties.
- If you have an open wound, you should cover it prior to entering salt or brackish water, or do not enter the water. If you sustain a cut in salt or brackish water, immediately clean the wound with soap and potable water and seek medical attention if signs of infection (fever, redness) occur.
- While cases of *Vibrio vulnificus* are less common in NC, they do occur and can be fatal.
- Major risk factors for *Vibrio vulnificus* infection include:
 - Any chronic disease
 - Liver disease
 - Alcoholism
 - Diabetes

How do NC State Agencies Work to Protect You?

- Vibrio infections are reportable to your **state and local health department** and investigated for risk factors, such as consumption of raw shellfish
- Local **Environmental Health** departments can assist with shellfish traceback to the source or harvest area of the shellfish, if it is implicated
- If a source for the shellfish is identified it is reported to the [NC Shellfish Sanitation Program](#)
- Our state program will investigate and if a harvest area is implicated, Shellfish Sanitation partners may close the harvest area. If the harvest area of the implicated shellfish is in another state, our program will work with our partners in the state of origin

Vibrio vulnificus

12

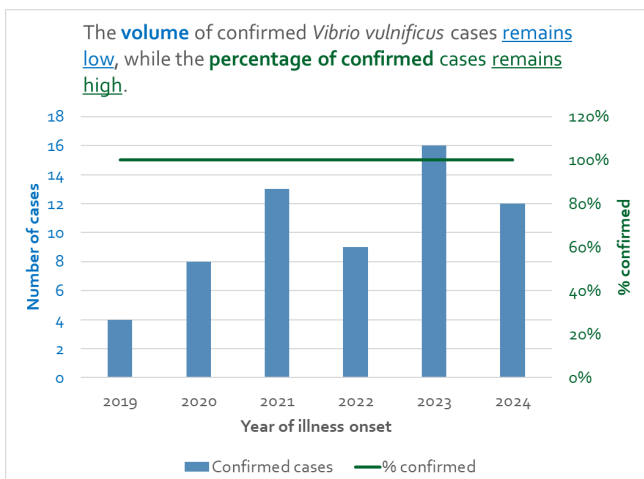
cases reported
in 2024

- While there is an overall increase in annual *Vibrio vulnificus* case reports over the past five years, there were fewer cases during 2024
- *Vibrio vulnificus* infections usually peak July through October
- *Vibrio vulnificus* infections, the second most fatal waterborne illnesses, are preventable through avoiding open wound exposure to brackish water.

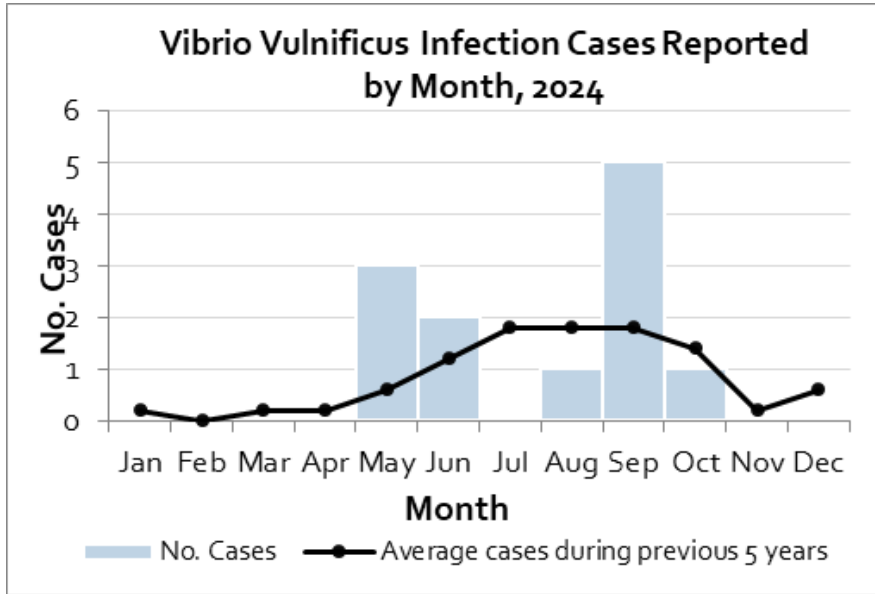
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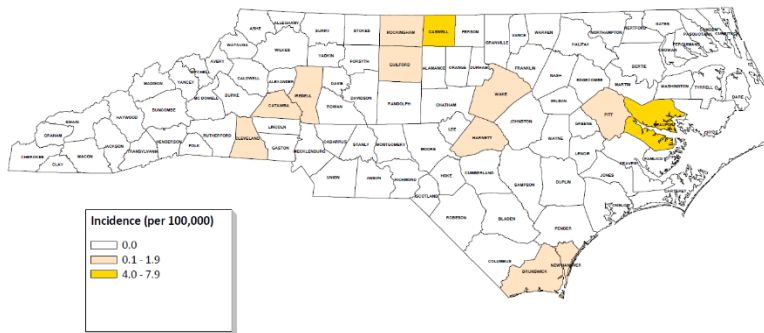


Vibrio vulnificus cases are a low volume but can be quite severe in terms of the proportion hospitalized and those resulting in fatalities. All (100%) of NC's cases have been tested by having their blood cultured while being hospitalized.



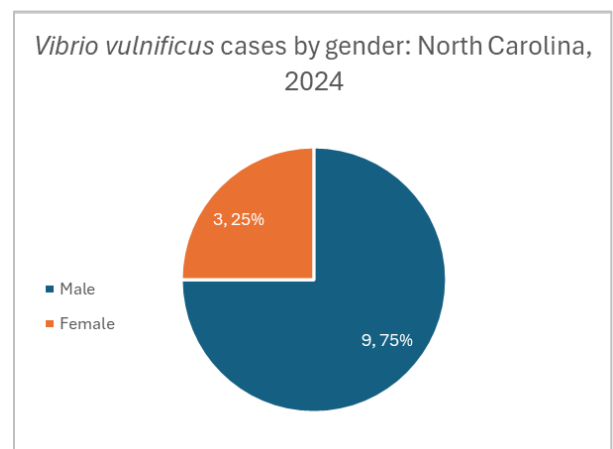
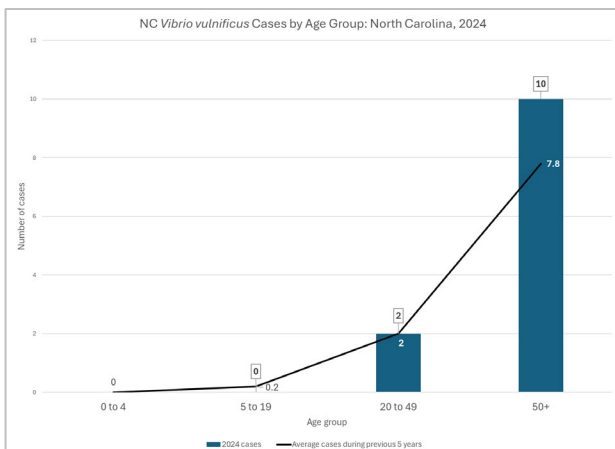
Most *Vibrio vulnificus* cases occur during July through September. There was a peak in September during 2024.

Rate of *Vibrio vulnificus* (per 100,000 people) by county of residence:North Carolina, 2024



No specific geographic distribution appears for *Vibrio vulnificus* cases reported during 2024 and previous years.

Males ages 50+ with liver disease are most often affected by *Vibrio vulnificus* infections.



Annual Summary (<i>Vibrio vulnificus</i>)						
	2019	2020	2021	2022	2023	2024
Cases	4	8	13	9	16	12
Rate*	0.04	0.1	0.1	0.1	0.1	0.1
Case Statistics, 2024						
Sex	Cases	%	Rate*	95% CI		
Male	9	75%	0.2	0.06 , 0.28		
Female	3	25%	0.1	-0.01 , 0.12		
Unknown	0	0%	--	--		
Age Group						
Under 5 yrs.	0	0%	0.0	0.0 , 0.6		
5-19 yrs.	0	0%	0.0	0.0 , 0.2		
20-49 yrs.	2	17%	0.0	0.0 , 0.2		
50+ yrs.	10	83%	0.3	0.1 , 0.4		
Unknown	0	0%	--	--		
Race						
White	12	100%	0.2	0.1 , 0.3		
Black or African American	0	0%	0.0	0.0 , 0.2		
Other	0	0%	0.0	0.0 , 0.6		
Multiple or Unknown	0	0%	--	--		
Hispanic Ethnicity						
Yes	2	17%	0.2	0.0 , 0.6		
No	9	75%	0.1	0.0 , 0.2		
Unknown	1	8%	--	--		
Disease Severity						
Hospitalized	8	67%				
Died	2	17%				

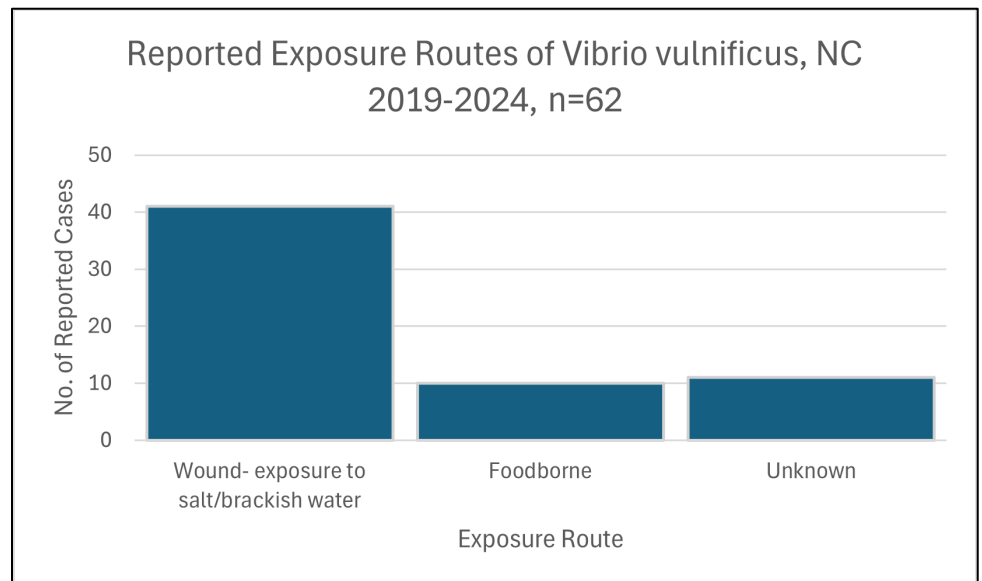
Case Count
Trend
2019-24



- Fewer cases were reported in 2024 compared to 2023.
- The average number of cases reported per year during 2019 – 2023 is 11 cases per year.
- *Vibrio vulnificus* is one of the more severe foodborne/waterborne pathogens, with about a quarter of reported cases resulting in a fatality each year, on average.
- White males age 50+ years are most often affected by *Vibrio vulnificus*.

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

Most *Vibrio vulnificus* cases (67%), since 2019, report a wound exposure to salt/brackish water. Some cases also report exposure to raw or undercooked shellfish.



Key Points about Vibriosis

- Of all the foodborne infections, Vibriosis may be the most preventable.
- Shellfish should **ONLY** be consumed after it is fully cooked. Intentional consumption of raw shellfish is a well-established risk factor for vibriosis.
- Cases are reported from across NC, not just the coastal counties.
- If you have an open wound, you should cover it prior to entering salt or brackish water, or do not enter the water. If you sustain a cut in salt or brackish water, immediately clean the wound with soap and potable water and seek medical attention if signs of infection (fever, redness) occur.
- While cases of *Vibrio vulnificus* are less common in NC, they do occur and can be fatal.
- Major risk factors for *Vibrio vulnificus* infection include:
 - Any chronic disease
 - Liver disease
 - Alcoholism
 - Diabetes

How do NC State Agencies Work to Protect You?

- Vibrio infections are reportable to your **state and local health department** and investigated for risk factors, such as consumption of raw shellfish
- Local **Environmental Health** departments can assist with shellfish traceback to the source or harvest area of the shellfish, if it is implicated
- If a source for the shellfish is identified it is reported to the [NC Shellfish Sanitation Program](#)
- Our state program will investigate and if a harvest area is implicated, Shellfish Sanitation partners may close the harvest area. If the harvest area of the implicated shellfish is in another state, our program will work with our partners in the state of origin

Appendix

Within this final section of the 2024 North Carolina Enterics Annual Report:

- **Cluster information**
- **CIDT**
- **Limitations and Other diseases**
- **Helpful resources**

Cluster Investigations:

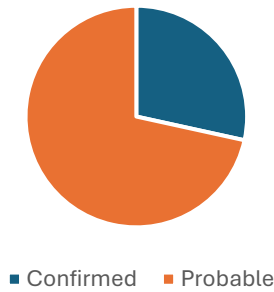
[Clusters](#) of foodborne disease occur when multiple people become ill after a similar exposure. Before molecular analysis of isolates from patients, cluster detection relied on local identification of a group of cases with a similar serotype, or with a similar exposure (everyone became sick after a party). These types of clusters (or outbreaks) are still detected, but now most clusters are identified by linking isolates with a similar [genetic code](#). This allows CDC and state health departments to identify clusters where each state may have only one case! But this requires an isolate, a CIDT will not suffice. Once a cluster is identified we can interview patients and identify common exposures, and possibly the vehicle (contaminated [cucumbers](#) for example). If it is a food product it may then be subject to a recall to ensure safety of consumers.

NC investigates both local clusters of disease, those defined by geographical region, or space and time within NC state borders as well as national clusters identified by CDC partners. NC investigated **40** state clusters and participated in **36** national cluster investigations in 2024.

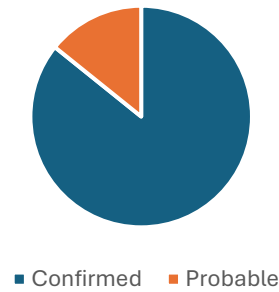
These investigations require the collaboration of multiple partners including NCDA&CS, CDC, FDA, and state and local Environmental Health. It is a laborious process, but ultimately beneficial if a source of infection is in commercial distribution and can be removed or recalled. This is how public health fulfills one of its key functions through basic surveillance.

CIDT Testing and Classification

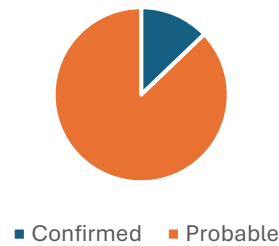
Campylobacteriosis, 2024



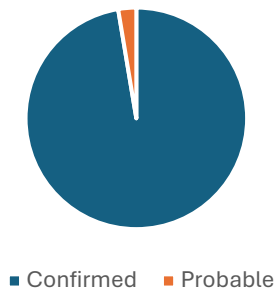
Cryptosporidiosis, 2024



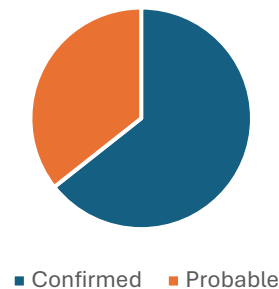
Cyclosporiasis, 2024

Shiga toxin-producing *E. coli* (STEC) Infection, 2024

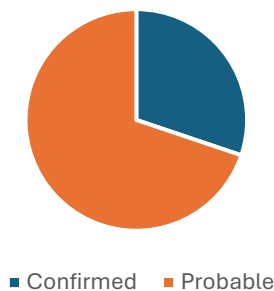
Listeriosis, 2024



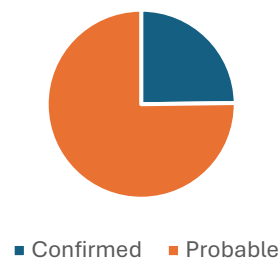
Salmonellosis, 2024



Shigellosis, 2024



Vibriosis (other than cholera and vulnificus), 2024





[Preventing Salmonella Infection | Salmonella Infection | CDC](#)

Other Diseases of Public Health Significance:

NC has had two outbreaks of *Trichinellosis* in as many years (2023 and 2024). *Trichinellosis* is a parasitic infection associated with the consumption of wild game meat. Both the outbreak in 2023 and 2024 occurred in the western part of NC, where bear hunting is prevalent, and were linked to undercooked bear meat. Diagnosis and treatment for infected individuals is often cost prohibitive. These outbreaks serve as reminders for local health departments and wildlife management to communicate safe wild game meat preparation.

Prevention of trichinellosis involves cooking wild game meat to an internal temperature $\geq 165^{\circ}\text{F}$ ($\geq 74^{\circ}\text{C}$), which will kill *Trichinella* parasites. The 2023 outbreak, "A Suspected Outbreak of Trichinellosis Associated with Undercooked Bear Meat — North Carolina, November 2023," was published in [MMWR](#).

Limitations of Public Health Surveillance:

It is well established that passive public health surveillance does not capture the true burden of illness or infection. This is true of virtually all conditions which are reportable by law in NC. However, researchers at the CDC have developed estimates of the [number of cases](#) that likely occur.

Additional Resources:

- **NCD3 Dashboard – Interactive Data Dashboard**
 - The NCD3 dashboard was created to provide case counts of confirmed and probable reportable infectious diseases between 2015 and 2024. [NC DPH: Communicable Disease Facts & Figures](#)
- **CDC Enteric Disease Surveillance**
 - [About National Enteric Disease Surveillance | National Surveillance of Bacterial Foodborne Illnesses \(Enteric Diseases\) | CDC](#)
- **CDC Waterborne Disease Surveillance**
 - [Waterborne Disease in the United States | Waterborne Disease and Outbreak Surveillance Reporting | CDC](#)
- [Cook to a Safe Minimum Internal Temperature | FoodSafety.gov](#)