



NC DEPARTMENT OF HEALTH AND HUMAN SERVICES

ROY COOPER • Governor
KODY H. KINSLEY • Secretary
MARK T. BENTON • Deputy Secretary for Health
Division of Public Health

Developed by the North Carolina Division of Public Health, Communicable Disease Branch

Lyme Disease Surveillance Summary from 2016—2021

Background

Lyme disease is a bacterial infection caused by *Borrelia burgdorferi*, and is transmitted to humans and animals through the bite of infected *Ixodes scapularis* (blacklegged) ticks. Symptoms of Lyme disease include fever, headache, fatigue, and a characteristic bull's-eye rash called erythema migrans (EM). If left untreated, infection can spread to the joints, heart, and nervous system. Diagnosis is based on the presence of symptoms, clinical findings (like an EM rash), exposure to ticks, and serological testing. Most cases of Lyme disease are effectively treated with antibiotics.

Symptomology

Early signs of Lyme disease include fever, chills, headache, fatigue, muscle and joint aches, swollen lymph nodes, and EM rash. It is important to note that an EM rash only occurs in 70—80% of patients, and can take up to 30 days to appear. Untreated Lyme disease can cause a variety of symptoms including severe headaches and neck stiffness, additional EM rashes, arthritis with severe joint pain and swelling, particularly in the knees and other large joints, facial palsy and heart conditions associated with Lyme carditis.

Epidemiology

National

Reported cases of Lyme disease are centered in the Northeast and upper Midwest of the United States, with 15 states designated as high incidence states: Connecticut, Delaware, Maine, Maryland, Massachusetts, Minnesota, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia, West Virginia, and Wisconsin. The reported average incidence rate of Lyme disease between 2013—2016 was 8.1 **confirmed** cases per 100,000 residents, with incidence rates of the highest states reaching >50 cases per 100,000.¹ The reported national incidence rate in 2019 was 7.1 **confirmed** cases per 100,000 residents.²

North Carolina

In North Carolina, the reported number of confirmed and probable cases of Lyme disease has increased over the past five years. The highest incidence of Lyme disease in 2021 is largely clustered to the northwestern portion of the state, particularly in Ashe, Alleghany, Buncombe, Madison, Mitchell, Surry, Wilkes, and Yancey counties.³ The 5-year reported average incidence rate of Lyme disease in North Carolina between 2016—2020 was 2.72 **confirmed and probable** cases per 100,000 residents, which is significantly lower than the national average. The estimated incidence of Lyme disease in 2021 was 3.24 **confirmed and probable** cases per 100,000 residents (2020 population data).

Diagnosis

Lyme disease can be physician diagnosed based on the symptoms outlined above, a history of tick exposure and serological testing. Serological tests are effective when used correctly. A positive two-tier test, defined as a positive or equivocal enzyme immunoassay (EIA) or immunofluorescent assay (IFA) followed by a positive Immunoglobulin M¹ (IgM) or Immunoglobulin G² (IgG) western immunoblot (WB) can help to determine active infection. Lab tests are not recommended for patients who do not have symptoms of typical Lyme disease.

Prevention

Reducing exposure to ticks is the best defense against Lyme disease. There are a number of methods that can be used to prevent tickborne illness:

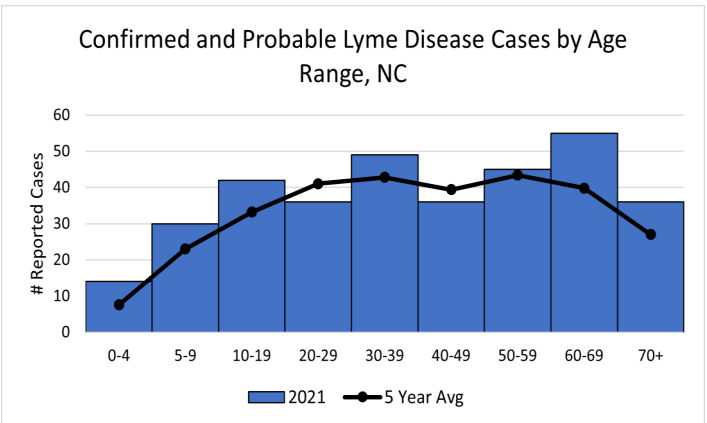
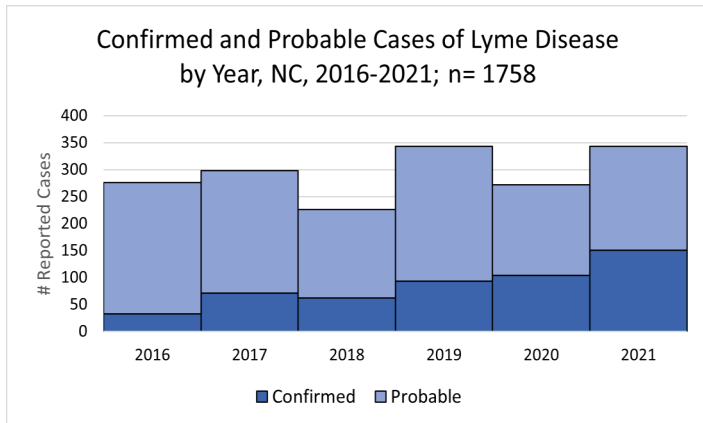
- Wear permethrin treated clothing (0.5%) when exploring the outdoors.
- Use EPA registered insect repellents containing DEET or picaridin to deter ticks.
- Avoid ticks in wooded/brushy areas with high grasses and leaf litter by walking in the center of trails.
- Check clothing and skin for ticks you may have encountered while outdoors; shower soon after returning indoors.

Case Demographics (Confirmed and Probable)

Sex	5 Year Avg (2016-20)		2021	
	No. of Cases	% of total	No. of Cases	% of total
Male	139	49.1%	207	60.3%
Female	144	50.9%	136	39.7%

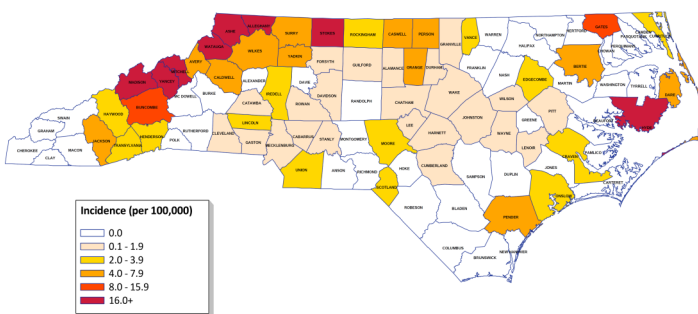
Race	5 Year Avg (2016-20)		2021	
	No. of Cases	% of total	No. of Cases	% of total
White	140	49.5%	167	48.7%
Black or African Amer.	9	3.2%	6	1.7%
Asian or Pac. Islander	1	0.4%	2	0.6%
Amer. Indian or Alaskan	0	0.0%	0	0.0%
Other	3	1.1%	0	0.0%
Unknown	130	45.9%	168	49.0%

Hispanic Ethnicity	5 Year Avg (2016-20)		2021	
	No. of Cases	% of total	No. of Cases	% of total
Yes	5	1.9%	8	2.3%
No	142	50.1%	150	43.7%
Unknown	136	48.0%	188	54.8%



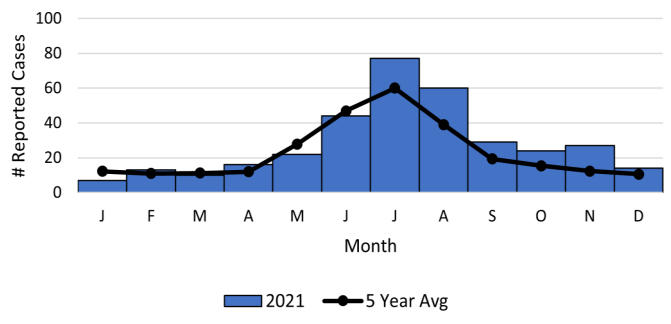
Geographic Distribution

Confirmed and Probable Incidence of Lyme Disease Cases by County of Residence, NC, 2021



Cases by Age

Confirmed and Probable Lyme diseases cases by Month of Illness Onset, NC



¹These data are based on a national surveillance data found at: https://www.cdc.gov/mmwr/volumes/64/wr/mm6453a1.htm?cid=mm6453a1_w

²CDC Lyme Disease Data Tables: <https://www.cdc.gov/lyme/stats/tables.html>

³CDC Case Definition for Lyme Disease: <https://ndc.services.cdc.gov/case-definitions/lyme-disease-2017/>