NC DEPARTMENT OF
HEALTH AND
HUMAN SERVICES

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Lyme Disease Surveillance Summary from 2018—2023

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. The top ten states of reported cases by year include: Connecticut, Maine, Maryland, Massachusetts, Minnesota, New Jersey, New York, Pennsylvania, Virginia, and Wisconsin.[1] The reported national incidence rate in 2020 was 5.43 **confirmed and probable** cases per 100,000 residents.[2]

North Carolina

In North Carolina, the reported number of confirmed and probable cases of Lyme disease has remained stable over the past five years. The highest incidence of Lyme disease in 2023 is largely clustered in the northwestern portion of the state, particularly in Ashe, Alleghany, Madison, Mitchell, Watauga, and Yancey counties. The 5-year reported average incidence rate of Lyme disease in North Carolina between 2018—2022 was 2.82 **confirmed and probable** cases per 100,000 residents, which is significantly lower than the national average. The estimated incidence of Lyme disease in 2023 was 2.39 **confirmed and probable** cases per 100,000 residents. In 2022 and 2023, there were a significant increases in confirmed Lyme disease cases in North Carolina. While the cause it unclear, this may be attributed to increased awareness among physicians leading to increased testing via Modified Two-Tiered Testing (MTTT). In 2022, the national case definition for Lyme disease was amended, which may have had an impact on increased Lyme disease reporting.

Diagnosis

Lyme disease can be diagnosed by a physician with the use of serological testing. Serological tests are effective when used correctly. For the purposes of surveillance and diagnosis, FDA approved Standard Two Tier Test (STTT) or Modified Two Tier Test (MTTT) are appropriate. An initial (first tier) positive or equivocal enzyme immunoassay (EIA) or immunofluorescent assay (IFA) followed by a second positive IgM or IgG EIA (MTTT) or a positive Immunoglobulin M1 (IgM) or Immunoglobulin G2 (IgG) western immunoblot (STTT) 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.
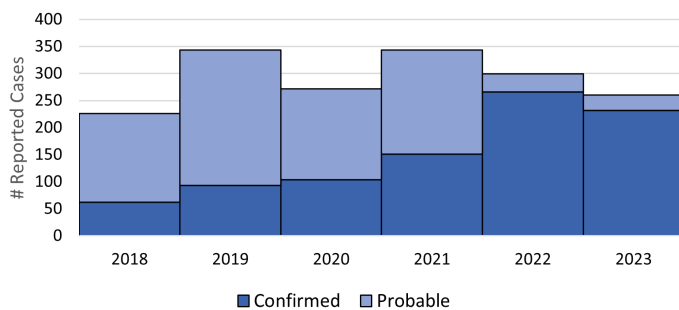
Case Demographics (Confirmed & Probable)

Sex	5 Year Avg (2018-22)		2023	
	No. of Cases	*% of total*	No. of Cases	*% of total*
Male	*162*	*54.7%*	*158*	*60.8%*
Female	134	*45.2%*	102	*39.2%*

Race	5 Year Avg (2018-22)		2023	
	No. of Cases	*% of total*	No. of Cases	*% of total*
White	160	54.0%	193	74.2%
Black or African Amer.	7	2.5%	4	1.5%
Asian or Pac. Islander	1	0.5%	2	0.8%
Amer. Indian or Alaskan	0	0.0%	1	0.4%
Other	3	0.9%	8	3.1%
Unknown	125	42.1%	52	20.0%

Hispanic Ethnicity	5 Year Avg (2018-22)		2023	
	No. of Cases	*% of total*	No. of Cases	*% of total*
Yes	5	1.8%	8	3.1%
No	131	44.0%	100	38.5%
Unknown	161	54.2%	152	58.5%

Confirmed and Probable Cases of Lyme Disease by Year, NC, 2018-2023; n= 1743
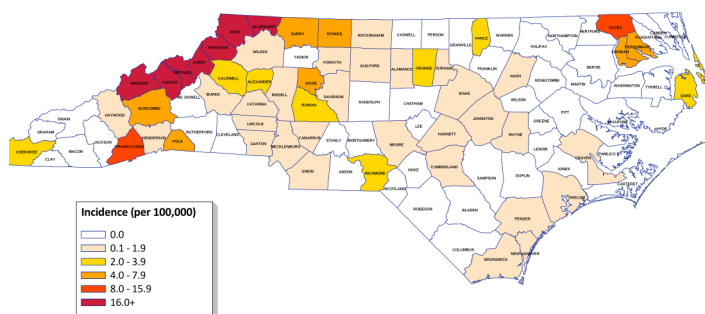

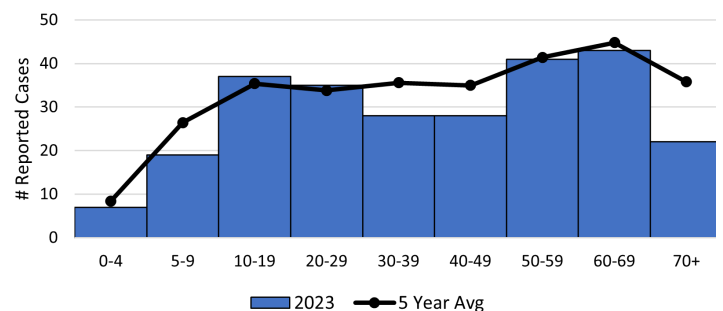Confirmed and Probable Lyme Disease Cases by Month of Illness Onset, NC
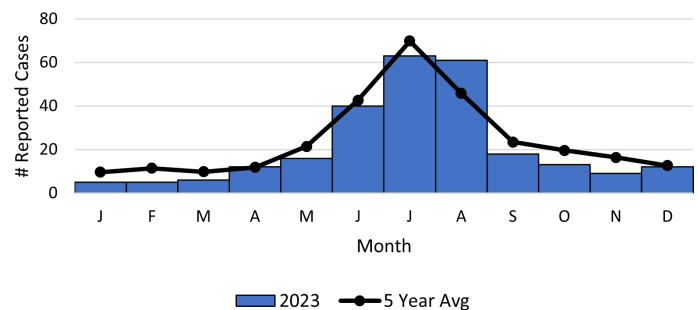
Geographic Distribution

Confirmed and Probable Incidence of Lyme Disease Cases by County of Residence, NC, 2023

Cases by Age

Confirmed and Probable Lyme Disease Cases by Age Range, NC

[1]These data are based on a national surveillance data found at: https://www.cdc.gov/lyme/datasurveillance/surveillance-data.html

[2]CDC Lyme Disease Data Tables: https://wonder.cdc.gov/nndss/static/2020/annual/2020-table2j.html

[3]Modified Two-Tiered Testing: https://www.aphl.org/aboutAPHL/publications/Documents/ID-2021-Lyme-Disease-Serologic-Testing-Reporting.pdf