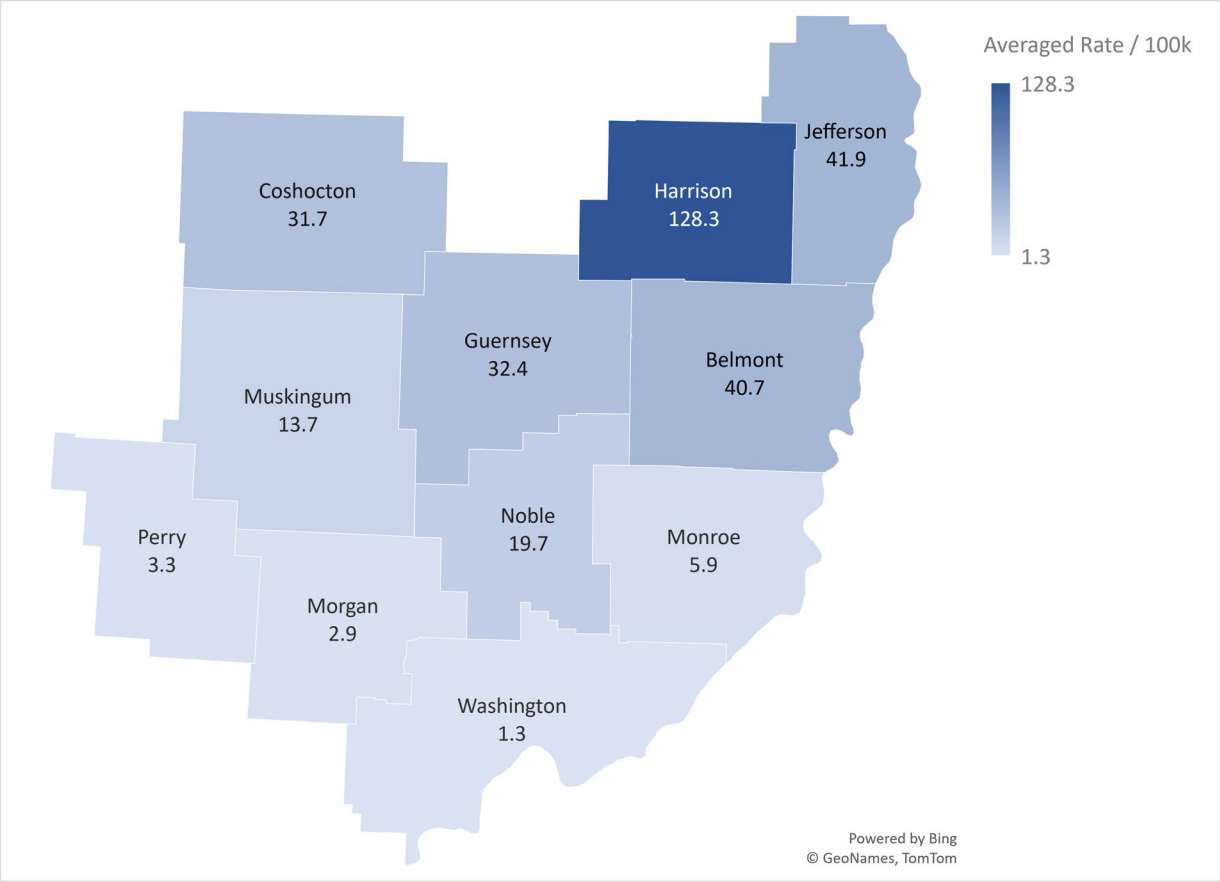
Southeastern Ohio Epidemiology Region

2022 Tickborne Disease Report

Southeastern Ohio Lyme Disease Averaged 5 – Year Rates

Confirmed and Probable Case Rates per 100,000 Persons



ODH Annual Summary of Infectious Disease; Ohio Vectorborne Disease Surveillance Update (2020; 2021)

The 2022 Tickborne Disease Report was developed through collaborative efforts of the Noble County Health Department and the Zanesville-Muskingum County Health Department

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Introduction

The Southeastern Ohio 2022 Regional Tickborne Disease Report provides infectious disease data for 11 counties and approximately 440,000 residents of southeastern Ohio. The review includes the county and city health districts of Belmont, Coshocton, Guernsey, Harrison, Jefferson, Monroe, Morgan, Muskingum, Noble, Perry, and Washington counties. For the remainder of this report, this 11-county area will be referred to as the epidemiology region.

Rates of tickborne diseases are on the rise in Ohio, with just over 68 confirmed cases of tickborne disease in Ohio reported to the Centers for Disease Control in 2010, compared to approximately 350 cases reported in 2018[1]. CDC National Center for Emerging and Zoonotic Infectious Diseases has cited elevating temperatures during the winter months as a potential contributor to the expansion of tick habitats and populations[2], which may contribute in part to this rise. Furthermore, new tick species have become established in Ohio in recent years, introducing new illnesses to the population and contributing to the growing prevalence of tickborne illness. Residents of rural Ohio may experience disproportionate impact of these illnesses due to their proximity to tick habitats.

Ticks of Southeastern Ohio

Several species of tick are present in Southeastern Ohio. These include the Blacklegged "Deer" tick, the carrier for the Lyme Disease causing bacteria of the *Borrelia* genus, parasites of the genus *Babesia*, the cause of babesiosis, bacteria *Anaplasma phagocytophilum* and of genus *Ehrlichia*, the cause of anaplasmosis and ehrlichiosis, respectively[3]. Also common in Ohio is the American Dog Tick, known for carrying *Rickettsia rickettsii*, the bacteria that causes Rocky Mountain Spotted Fever, as well as *Francisella tularensis*, the cause of the rare tickborne disease tularemia[3].

Two tick species which have been more recently introduced to Ohio are the Lonestar tick and the Asian Longhorned tick. The Lonestar tick is connected to a variety of illnesses including ehrlichiosis, Heartland virus disease, Bourbon virus disease, Southern Tick-Associated Rash Illness (STARI) and tularemia[3]. This tick is also considered a potential cause of Alpha-Gal Syndrome, a unique illness resulting in a potentially life-threatening allergy animal products[4]. The Asian Longhorned tick was first reported in the U.S. in 2017 and has since been found in seventeen states, including Ohio[5]. Though this tick is primarily considered a livestock pest, it's movement into the state is concerning due to it's potential for transmitting tickborne disease to human hosts[5].

American Dog Tick (*Dermacentor variablis*)

The lifecycle for the American Dog tick is generally not considered in local public health as humans are most often bitten by adult female ticks. The larva, nymph, and adult can be infected with the bacterium which causes Rocky Mountain Spotted Fever (RMSF) when feeding on a blood meal from a host, then infect a human via a bite[6]. RMSF symptoms can include: fever, headache, rash, nausea, vomiting, stomach pain, muscle pain, and lack of appetite[7]. From 2017 to 2021, fewer than fifty suspected cases of RMSF were identified and reported within the epidemiology region. None of these cases were classified as confirmed cases of RMSF.

Lone Star Tick (*Amblyomma americanum*)

The lifecycle of the Lone Star tick is a three-year life cycle. In the first year the larva feed off their first host and then molt into nymphs. By fall of the second year, the nymphs have their second feed and molt into adult ticks. In the third year, the adult female ticks have their feeding off a third host and lay their eggs within 7-16 days[8]. The Lone Star tick can be infected via its host with bacteria that may cause Ehrlichiosis in a human. Symptoms can include fever, chills, headache, rash, and vomiting[9]. The rate of Ehrlichiosis is low in the epidemiology region, with fewer than ten suspected cases reported from 2017 to 2021. None of these cases were classified as confirmed cases of Ehrlichiosis.

Blacklegged "Deer" Tick (*Ixodes scapularis*)

The lifecycle for the deer tick lasts two to three years, starting with the eggs hatching in the spring[6]. These newly hatched ticks are considered a larva and will develop into a nymph the next spring or summer if they receive a blood meal prior to that time. Nymphs can be as small as a poppy seed, making them difficult to identify when attached. Nymphs will again collect a blood meal to mature further into adults, which are able to lay eggs during following spring[6]. Bites from nymphal stage ticks are considered responsible for most of the cases of Lyme Disease, Babesiosis, and Anaplasmosis, but these illnesses can be spread by ticks at any stage. The rates of Babesiosis and Anaplasmosis are low in the epidemiology region, with fewer than ten suspected cases of each disease reported from 2017 to 2021. None of these cases were classified as confirmed cases of Babesiosis or Anaplasmosis.

Lyme Disease

The Centers for Disease Control estimates from 2010 to 2018 approximately 476,000 people in the U.S. were diagnosed with Lyme Disease and treated each year, with the economic burden of Lyme Disease in the U.S. falling between $345 million and $968 million annually[10]. In Ohio, Lyme Disease has become more prevalent since the early 2010s with only 67 confirmed cases of the illness reported in 2012 compared to 590 confirmed cases reported in 2021[11].

Lyme Disease cases are represented in the following tables based upon the case classification system outlined within the Ohio Department of Health Infectious Disease Control Manual. Case classification is determined by epidemiologic criteria, laboratory evidence of infection, and clinical presentations. Furthermore, considerations are made for the incidence of Lyme Disease within the reporting state jurisdiction, with Ohio considered as a low-incidence jurisdiction by the CDC.

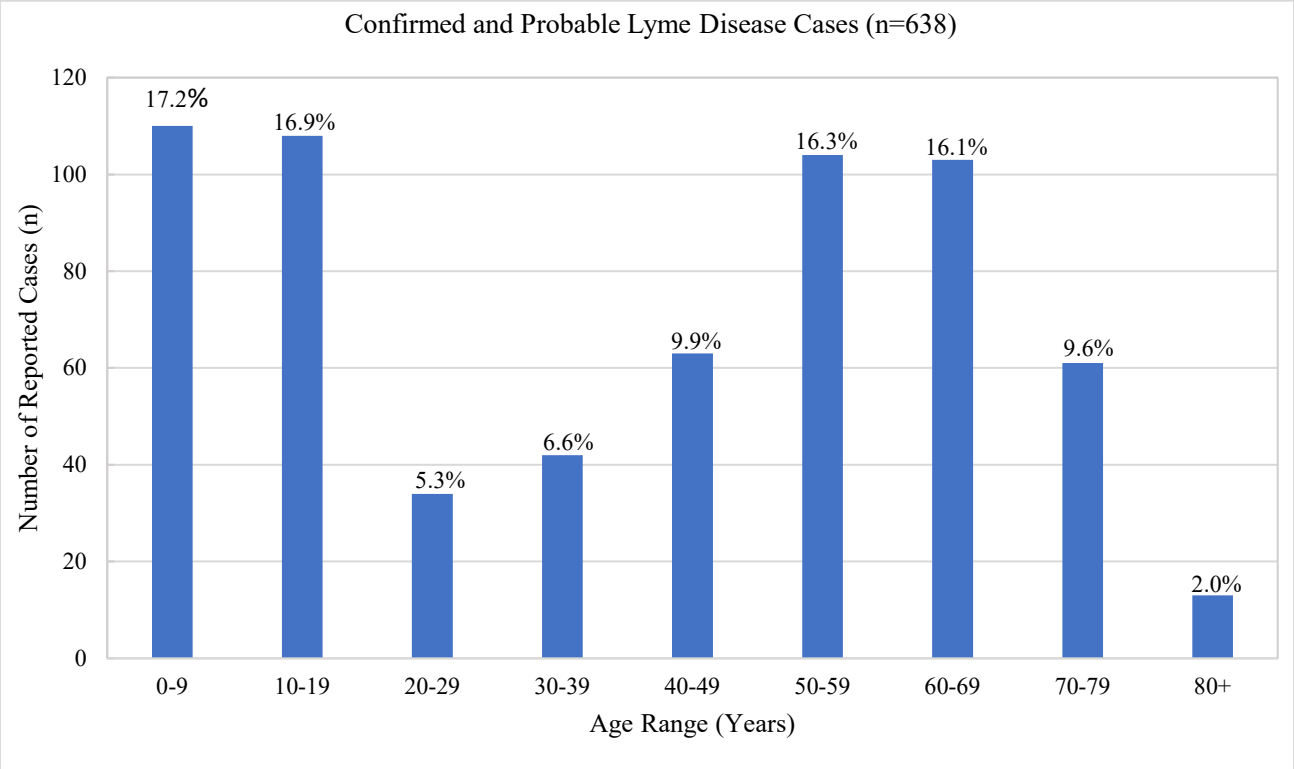
Table 1 displays the yearly incidence rate of confirmed & probable Lyme Disease infections in each county. Confirmed and probable cases rates are reported to the public as these cases have the follow-up testing and clinical evidence necessary to offer the required evidence of infection.

Table 2 displays the yearly incidence rate of suspected Lyme Disease infections in each county. Suspected cases are **not included in reporting** of Lyme Disease case rates in a community. Though these cases may offer some laboratory evidence of infection or show the presence of erythema migrans, they often lack the necessary testing, clinical evidence, and patient follow-up required to be considered as current confirmed or probable cases of the disease, leading to low data reliability. However, suspected case rates have been provided in this report as they may offer greater understanding of the burden of tickborne disease to local health departments.

The following data were collected from the Ohio Disease Reporting System, the ODH Annual Summaries of Infectious Disease, and the Ohio Vectorborne Disease Surveillance Update. Reporting years 2020 and 2021 may be impacted by the COVID-19 pandemic due to barriers in patient access to healthcare services and limitations in LHDs ability to conduct follow-up investigations of reported Lyme Disease cases.

Case Demographics

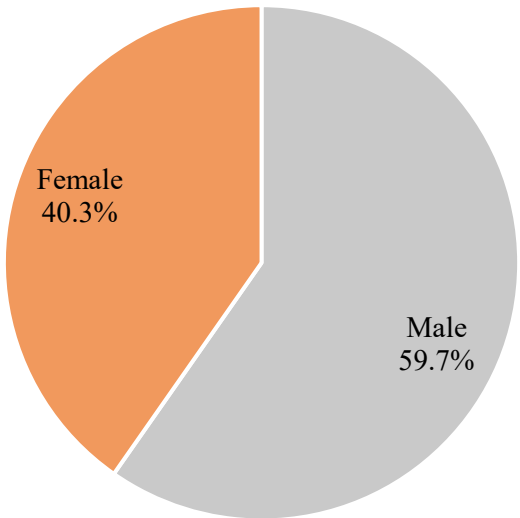
Figure 1: Lyme Disease Cases by Age in SE OH



Ohio Disease Reporting System (2017 – 2021)

Figure 2: Lyme Disease Cases by Sex in SE OH

Confirmed and Probable Lyme Disease Cases, n=638



Ohio Disease Reporting System (2017 – 2021)

Case Incidence

Data are organized by year based on the date the case was reported to the local health district in which the person resides. Six of the counties in the epidemiology region experienced increases in confirmed and probable Lyme diseases cases from 2020 to 2021. All counties in the epidemiology region experienced increases in suspected Lyme disease cases between 2020 and 2021.

Table 1: Confirmed and Probable Lyme Disease Cases by County (per 100,000 persons)

	2017	2018	2019	2020*	2021*
Ohio	**2.3**	**2.5**	**3.9**	**3.5**	**4.6**
Belmont	33.8	31.1	41.8	33.4	63.2
Coshocton	16.4	16.4	46.4	22.0	57.4
Guernsey	17.9	33.3	61.7	41.3	7.8
Harrison	190.6	59.3	139.6	93.3	158.8
Jefferson	21.1	36.5	52.0	50.8	49.0
Monroe	7.2	--	--	--	22.4
Morgan	--	--	--	--	14.5
Muskingum	2.3	9.3	11.6	24.3	20.8
Noble	6.9	--	20.8	--	70.9
Perry	5.6	--	2.8	5.5	2.8
Washington	--	3.3	3.3	--	--

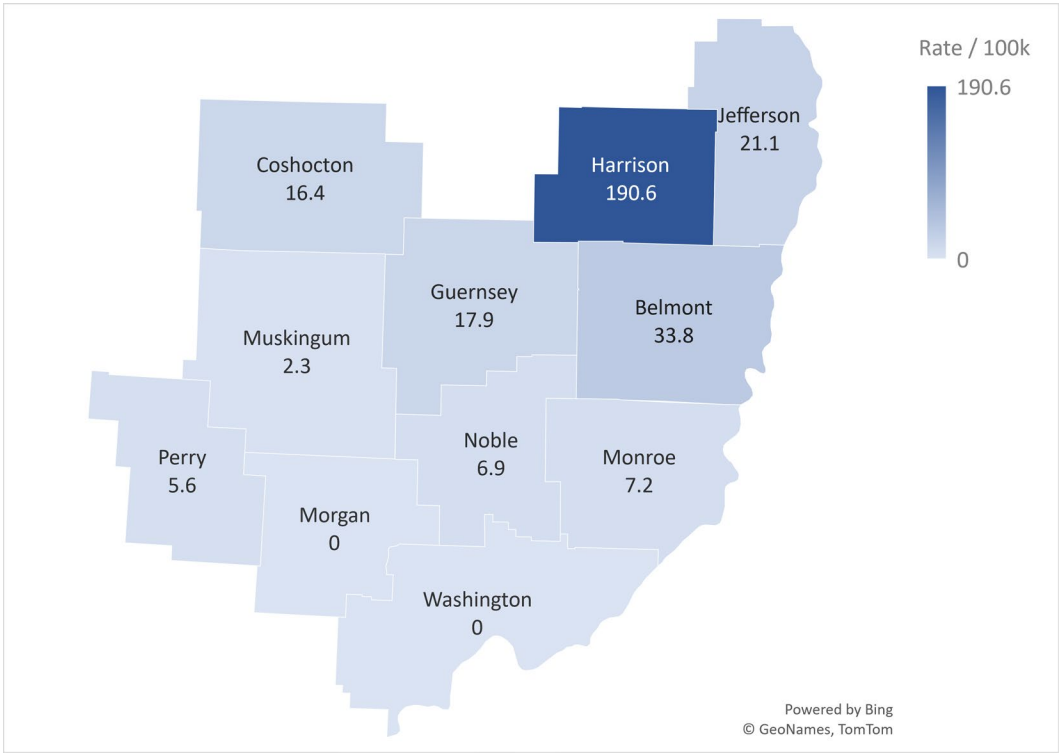
*Data for years 2020 and 2021 are preliminary at this time.
ODH Annual Summary of Infectious Disease; Ohio Vectorborne Disease Surveillance Update (2020, 2021)

Table 2: Suspected* Lyme Disease Cases by County (per 100,000 persons)

	2017	2018	2019	2020	2021
Belmont	48.5	19.2	50.7	97.7	147.3
Coshocton	30.1	32.8	35.5	54.6	79.2
Guernsey	28.2	59.0	59.2	158.7	318.6
Harrison	131.6	164.8	139.6	338.3	559.5
Jefferson	134.2	206.8	147.0	191.6	282.7
Monroe	86.1	101.5	168.4	209.2	420.1
Morgan	20.5	20.6	20.7	58.0	116.9
Muskingum	17.4	11.6	32.5	33.6	82.2
Noble	6.9	27.9	27.7	120.4	190.5
Perry	27.8	8.3	30.4	39.5	62.0
Washington	21.5	15.0	30.0	65.2	117.8

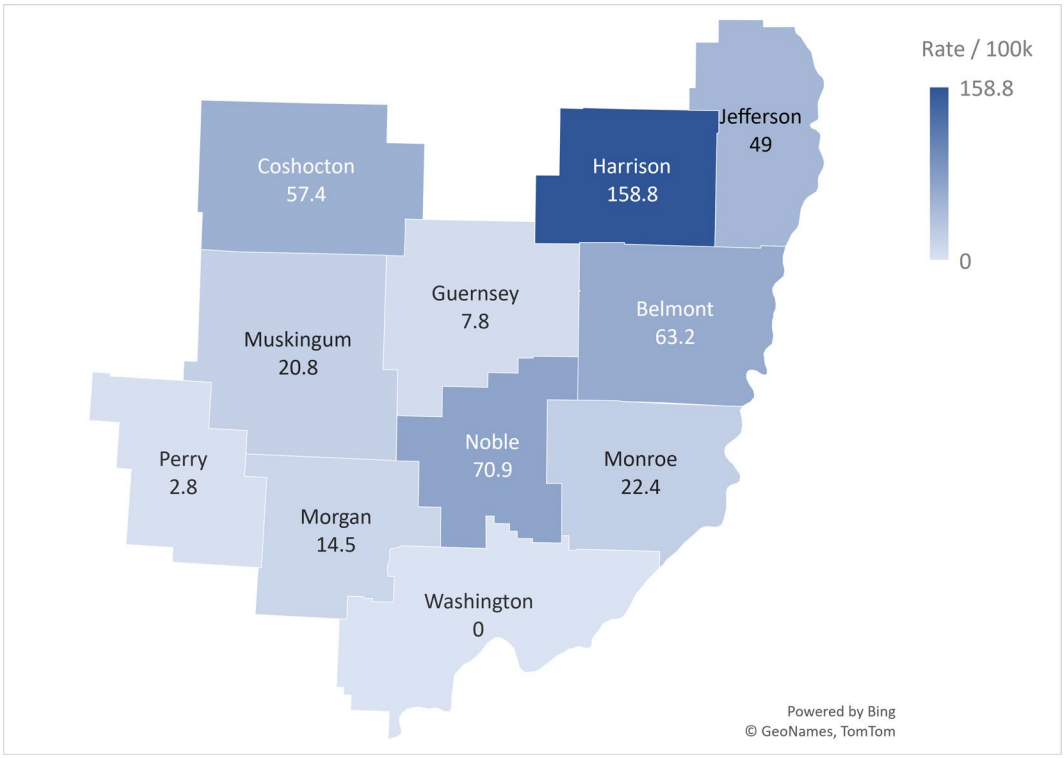
*Data on suspected cases **are not recommended** for reporting due to low data reliability
Ohio Disease Reporting System (2017 – 2021)

Figure 3: Confirmed and Probable Lyme Disease Incidence Map, 2017



ODH Annual Summary of Infectious Disease (2017)

Figure 4: Confirmed and Probable Lyme Disease Incidence Map, 2021



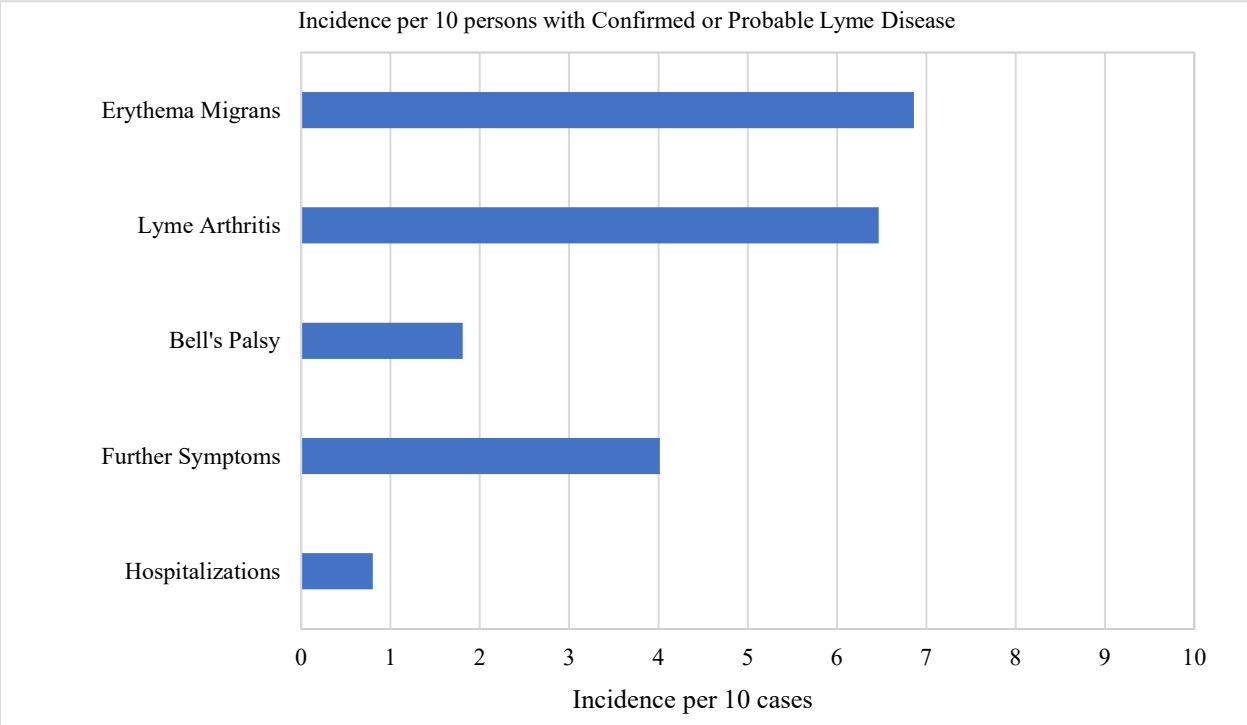
Ohio Vectorborne Disease Surveillance Update (2021)

Clinical Presentations

Lyme Disease may vary in clinical presentation. Many individuals develop erythema migrans (rash in the shape of a bullseye) around the area of the bite. Severe symptoms include neurological (face drooping, limb tingling), carditis (when Lyme disease enters the heart), and arthritis (when Lyme disease enters joints)[12]. Less severe symptoms may include fever, chills, fatigue, joint and muscle pain, headache, and swollen lymph nodes[12].

Among the confirmed and probable Lyme disease cases identified in the Southeastern Ohio Epidemiology region from 2017 - 2021, 6.9 out of 10 cases presented with erythema migrans (EM), the bullseye rash that often presents with Lyme Disease. Furthermore, 6.5 out of 10 presented with Lyme arthritis, 1.8 out of 10 presented with Bell's Palsy, and 4.0 out of 10 presented with symptoms not classified as EM, Lyme arthritis, or Bell's Palsy. Approximately 0.8 out of 10 cases were reported to be hospitalized for their illness.

Figure 5: Lyme Disease Clinical Presentations in SE OH, 2017 - 2021

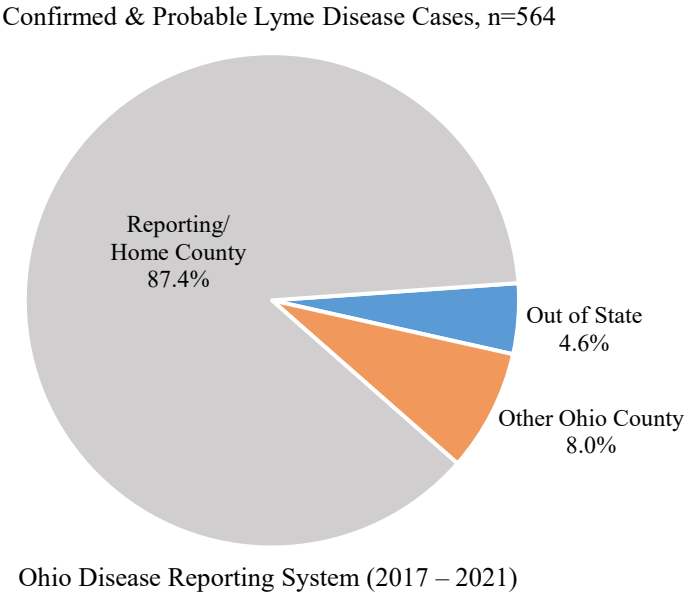


Ohio Disease Reporting System (2017 – 2021)

Exposure

Lyme Disease cases in Ohio are reported to the local health jurisdiction in which the patient resides, even if the patient may have been exposed to the illness outside of this area. During follow-up investigations with Lyme Disease cases, the most likely location of exposure is reported by the patient and recorded within the Ohio Disease Reporting System.

Figure 6: Self-Reported Probable Location of Exposure, 2017 – 2021



Data Selection

Incidence data were collected from the Ohio Disease Reporting System, the Ohio Department of Health Annual Summaries of Infectious Disease, and the Ohio Vectorborne Disease Surveillance Update. Data on clinical presentation and exposure among southeastern Ohio cases of Lyme Disease was collected from the Ohio Disease Reporting System.

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Table Citations

Table 1

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