

Surveillance for Babesiosis —

United States, 2021

Annual Summary

Acknowledgments

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Main Findings for 2021

- For 2021, CDC received reports of 2,664 cases of babesiosis in the U.S., a 46% increase over 2020 cases (1,827).
- Babesiosis was a reportable disease in 40 states and the District of Columbia (DC) in 2021 (41 jurisdictions). There was an increase in jurisdictions reporting babesiosis cases in 2021; 73% (30/41) of jurisdictions notified CDC of at least 1 case compared to 59% (24/41) of jurisdictions in 2020.
- Most of the reported cases (97%; n = 2,575/2,664) were in residents of 10 jurisdictions where tickborne transmission of *Babesia* parasites is well established in the Northeast and upper Midwest (Connecticut, Maine, Massachusetts, Minnesota, New Hampshire, New Jersey, New York (including New York City), Rhode Island, Vermont, and Wisconsin).
- The COVID-19 pandemic likely impacted case identification and transmission rates due to disruption of routine public health activities.

Background

Babesiosis

Babesiosis is caused by protozoan parasites of the genus *Babesia*, which infect red blood cells. *Babesia* parasites are usually transmitted to humans by tick bites but can also be transmitted by blood transfusion or congenitally (mother to child) [1-3].

Most human cases of *Babesia* infection in the United States are caused by the parasite *Babesia microti*. Occasional U.S. cases caused by other species (types) of *Babesia* have been found [4, 5]. *Babesia microti* is typically spread by *Ixodes scapularis* ticks (also called blacklegged ticks or deer ticks) primarily in Northeastern and upper Midwestern states, especially in New England, New York State (including New York City), New Jersey, Wisconsin, and Minnesota [6]. Babesiosis is spread by young nymphal ticks which are often found in woods, brushy areas, or grass during warmer months (spring and summer). The ticks are very small (about the size of a poppy seed); because of their small size, infected people might not remember having a tick bite.

Many people who are infected with *Babesia microti* are asymptomatic. Some people develop flu-like symptoms, such as fever, chills, sweats, headaches, body aches, loss of appetite, nausea, or fatigue. Babesiosis can also cause severe complications such as hemolytic anemia, a very low platelet count (thrombocytopenia), malfunction of the vital organs (acute respiratory failure, congestive heart failure, and renal failure) and death [7].

Babesiosis can be a severe, life-threatening disease [7, 8], particularly in people who:

- do not have a spleen or have had their spleen removed;
- have a weakened immune system due to other reasons (such as cancer, lymphoma, or HIV/AIDS);
- have other serious health conditions (such as liver or kidney disease); or,
- are older (>50 years old)

Surveillance

CDC has conducted surveillance for babesiosis in the United States since January 2011, when babesiosis became a nationally notifiable condition. The babesiosis case definition used for 2021 surveillance is available online (<http://wwwn.cdc.gov/nndss/conditions/babesiosis/case-definition/2011/>) and is summarized in **Table 1**. Health departments in states where babesiosis is reportable notify CDC of cases that meet the case definition via the **National Notifiable Diseases Surveillance System (NNDSS)**.

Health departments submit additional information about reported cases using the CDC Case Report Form (CRF) [Babesiosis CRF](#)  [\[PDF, 2 pages, 650 KB\]](#); data are requested about risk factors for infection, clinical manifestations, and laboratory results. Of note, for some cases, requested data elements may be incomplete or missing. For example, data regarding clinical manifestations are collected as distinct questions, resulting in differences in the denominator across each sign/symptom. For more information, visit [babesiosis surveillance and case reporting](#). Healthcare providers, laboratories, and the public should contact their state health department for information about reporting cases of babesiosis.

The number of states in which babesiosis is a reportable condition may change from year to year as additional states begin conducting surveillance. Cases are reported by state and county of residence, which is not necessarily where the exposure occurred. Changes in the number of reported cases do not necessarily represent true changes in disease incidence; ascertainment, reporting, and investigation of cases are subject to clinician awareness and public health agency resources, which may vary from year to year in and among states.

This summary focuses on babesiosis cases reported for surveillance year 2021; some data from previous years (2011–2020) are included to show differences from year to year. Annual summaries of surveillance data are presented on CDC's [National Notifiable Disease Surveillance System's Annual Summary Data](#) [9] reports along with other nationally notifiable diseases. National surveillance data for 2011 and a 5-year summary (2011–2015) were published previously [10, 11], and an analysis of trends in reported babesiosis cases from 2011–2019 has been previously published [12]. Because of differences in the timeline for finalizing data in the annual surveillance datasets, data provided in this summary may differ slightly from those previously published. Of note, the year in which a case is counted in national surveillance summaries is assigned by the health department and might reflect the year of symptom onset, diagnosis, or of reporting to or by the health department.

2021 babesiosis surveillance summary

Geographic distribution

In 2021, CDC was notified of a total of 2,664 cases of babesiosis by 30 of 40 states and the District of Columbia (73%) where babesiosis was a reportable condition (**Table 2**). This was a 46% increase from the total of 1,827 cases for 2020 (**Figure 1**). For 2021, 97% (n=2,575/2,664) of the reported cases were residents of 10 states (Connecticut, Maine, Massachusetts, Minnesota, New Hampshire, New Jersey, New York, Rhode Island, Vermont, and Wisconsin). Tickborne transmission of *Babesia* parasites is well established in these states. Differences within and among states in the distributions of reported cases by place of residence are evident in the county-level maps for 2021 (**Figure 2**) and prior years (2011–2020) in which national surveillance was conducted (**Appendix**). Among the 250 counties with at least 1 reported case of babesiosis, 171 counties (67.9%) reported 1–5 cases, 18 counties (7%) reported 6–10 cases, 24 counties (9.5%) reported 11–20 cases, and 39 counties (15.5%) reported >20 cases in 2021. In contrast, only 26 counties reported >20 cases in 2020. The states with counties reporting >20 cases in 2021 included New York (n=12), Massachusetts (n=9), Connecticut (n=6), Maine (n=4), New Jersey (n=4), and Rhode Island (n=4). In 2021, Arizona and Kansas reported travel-related cases, three and two, respectively, to the National Notifiable Disease Surveillance System for the first time.

Babesiosis by demographics

Most case-patients in the United States were older, with a median age of 65 years old (range: 1–101 years; n=2,664). The age distributions for 2021 and the 9 previous years were similar (**Figure 3**), with the largest number of cases reported in persons aged 60–69 years. As in previous years, among the 2,658 case-patients for whom data on sex were available in 2021, 64% (n=1,704) were male.

Race data were available for 72% (1,907/2,664) of reported cases with 92% identifying as white (n=1,754), 4% as Asian/Pacific Islander (n=83), 3% as black/African American (n=57), and <1% as Alaska Native/American Indian (n=10). Ethnicity data were available for 66% (1,750) of cases with most cases, 79% identifying as non-Hispanic white (n=1,374) and 4% as Hispanic white (n=74); 4% as non-Hispanic Asian/Pacific Islander (n=65); 2% as non-Hispanic black/African American (n=40) and 0.2% as non-Hispanic Alaska Native or American Indian (n=4).

Seasonality

Most cases reported getting sick during the spring or summer months, which is consistent with tick activity. Data on month of symptom onset were available for 77% of cases (n=2,055/2,664). The proportion of cases with reported symptom onset during June–August has remained consistent from year to year since 2011 (**Figure 4**).

Symptoms and fatal cases

Among the cases for whom data were available, fever was the most frequently reported sign or symptom (78%; n=1,544/1,981), followed by myalgia or muscle aches (63%; n=1,080/1,715), chills (58%; n=1,013/1,716), thrombocytopenia or low platelet count (58%; n=767/1,333), headache (56%; n=956/1,721), anemia (53%; n=692/1,309), and arthralgia or joint pain (46%; n=737/1,619).

In 2021, hospitalization data were available for 2,236 cases and 43% (n=959) were hospitalized for at least 1 day. These data are consistent with previous years; overall for 2011–2021, data were available for 17,162 cases (82% of the total of 20,953), 7,779 (45%) of whom had reportedly been hospitalized for at least 1 day. In 2021, 12 cases from seven states died including New York (3), Connecticut (2), Massachusetts (2), Wisconsin (2), Rhode Island (1), Maine (1), Minnesota (1), with an overall case fatality rate of 0.45%. The deceased ranged in age from 37 to 90 years with a median age of 70. Comparatively, there were 11 deaths from five states in 2020 with a case fatality rate of 0.6%. There were no congenital cases reported in 2021.

Epidemiologic factors

Babesiosis is primarily transmitted via tick bites but can also be transmitted through blood transfusions, transplants, and from mother to child (congenitally). In 2021, of the 949 cases for whom data were available, 385 (41%) recalled having had a tick bite in the 8 weeks before symptom onset. Additionally, in 2021, 26 cases were reported as transfusion-associated babesiosis in blood recipients.

COVID-19 and case reporting

During the 2021 reporting year, jurisdictions faced challenges related to the COVID-19 pandemic that could have impacted reported case counts, onset dates, symptoms, risk factors and overall data completeness due to the diversion of staff and other resources from babesiosis surveillance activities, and/or the disruption of routine health department activities.

Table 1. National surveillance case definition for babesiosis*

Clinical evidence	Objective One or more of the following: fever, anemia, or thrombocytopenia. Subjective One or more of the following: chills, sweats, headache, myalgia, or arthralgia.
Epidemiologic evidence for transfusion transmission	For the purposes of surveillance, epidemiologic linkage between a transfusion recipient and a blood donor is demonstrated if all of the following criteria are met: In the transfusion recipient Received one or more red blood cell (RBC) or platelet transfusions within 1 year before the collection date of a specimen with laboratory evidence of <i>Babesia</i> infection; and At least one of these transfused blood components was donated by the donor described below; and Transfusion-associated infection is considered at least as plausible as tickborne transmission; and In the blood donor Donated at least one of the RBC or platelet components that was transfused into the above recipient; and The plausibility that this blood component was the source of infection in the recipient is considered equal to or greater than that of blood from other involved donors. (More than one plausible donor can be linked to the same recipient.)
Laboratory criteria for diagnosis	Laboratory confirmatory Identification of intraerythrocytic <i>Babesia</i> organisms by light microscopy in a Giemsa, Wright, or Wright-Giemsa–stained blood smear; or Detection of <i>Babesia microti</i> DNA in a whole blood specimen by polymerase chain reaction (PCR); or Detection of <i>Babesia</i> spp. genomic sequences in a whole blood specimen by nucleic acid amplification; or Isolation of <i>Babesia</i> organisms from a whole blood specimen by animal inoculation. Laboratory supportive Demonstration of a <i>Babesia microti</i> indirect fluorescent antibody (IFA) total immunoglobulin (Ig) or IgG antibody titer of $\geq 1:256$ (or $\geq 1:64$ in epidemiologically linked blood donors or recipients); or Demonstration of a <i>Babesia microti</i> immunoblot IgG positive result; or Demonstration of a <i>Babesia divergens</i> IFA total Ig or IgG antibody titer of $\geq 1:256$; or Demonstration of a <i>Babesia duncani</i> IFA total Ig or IgG antibody titer of $\geq 1:512$.

Case classification	
Confirmed	A case that has confirmatory laboratory results and meets at least one of the objective or subjective clinical evidence criteria, regardless of the mode of transmission (can include clinically manifest cases in transfusion recipients or blood donors).
Probable	A case that has supportive laboratory results and meets at least one of the objective clinical evidence criteria (subjective criteria alone are not sufficient); or A case that is in a blood donor or recipient epidemiologically linked to a confirmed or probable babesiosis case (as defined above) and Has confirmatory laboratory evidence but does not meet any objective or subjective clinical evidence criteria; or Has supportive laboratory evidence and might or might not meet any subjective clinical evidence criteria but does not meet any objective clinical

*Available at <http://wwwn.cdc.gov/nndss/conditions/babesiosis/case-definition/2011/>

New Hampshire	13	1	19	1.4	22	1.7	42	3.2	53	4	13	1	78	5.8	37	2.7	63	4.6	28	2.0	80	5.8
New Jersey	166	1.9	92	1	171	1.9	159	1.8	281	3.1	174	1.9	193	2.1	247	2.8	236	2.6	237	2.6	254	2.7
New Mexico [¶]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
New York	418	2.1	253	1.3	534	2.7	471	2.4	581	2.9	430	2.2	696	3.5	641	3.3	663	3.4	461	2.3	793	4
North Carolina [¶]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0	0	
North Dakota	1	0.1	0	0	1	0.1	0	0	3	0.4	1	0.1	0	0	1	0.1	0	0.0	0	0.0	0	0
Ohio	—	—	—	—	—	—	1	<0.1	2	<0.1	—	—	1	<0.1	4	<0.1	4	<0.1	1	<0.1	3	<0.1
Oklahoma [¶]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Oregon	1	<0.1	0	0	0	0	1	<0.1	2	<0.1	2	<0.1	5	0.1	2	<0.1	2	<0.1	4	0.1	3	0.1
Pennsylvania [¶]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Rhode Island	73	6.9	56	5.3	142	13.5	172	16.3	190	18	155	14.7	161	15.2	165	15.6	158	14.9	193	17.6	195	17.8
South Carolina	—	—	—	—	1	<0.1	3	0.1	2	<0.1	2	<0.1	2	<0.1	1	<0.1	0	0	0	0	3	0.1
South Dakota	—	—	—	—	1	0.1	1	0.1	0	0	0	0	0	0	0	0	0	0	1	<0.1	0	0
Tennessee	1	<0.1	0	0	0	0	0	0	1	<0.1	1	<0.1	1	<0.1	1	<0.1	1	<0.1	1	<0.1	2	<0.1
Texas	—	—	—	—	1	<0.1	1	<0.1	1	<0.1	1	<0.1	0	0	2	<0.1	2	<0.1	3	<0.1	1	<0.1
Utah	—	—	—	—	—	—	0	0	0	0	0	0	1	<0.1	1	<0.1	0	0	0	0	0	0
Vermont	2	0.3	2	0.3	6	1	3	0.5	9	1.4	15	2.4	22	3.5	21	3.4	34	5.4	16	2.5	2	0.3
Virginia	—	—	—	—	—	—	—	—	—	—	—	—	0	0	5	<0.1	1	<0.1	3	<0.1	11	0.1
Washington	0	0	0	0	1	<0.1	4	0.1	2	<0.1	0	0	1	<0.1	0	0	1	<0.1	0	0	0	0
West Virginia	—	—	—	—	0	0	0	0	0	0	0	0	1	0.1	1	<0.1	0	<0.1	0	0	0	0
Wisconsin	80	1.4	45	0.8	76	1.3	43	0.7	56	1	68	1.2	88	1.5	64	1.1	58	1.0	57	1.0	99	1.7
Wyoming	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	<0.1	0	0
Total [#]	1,126	0.8	911	0.6	1,761	1	1,742	0.8	2,074	0.9	1,909	0.8	2,358	0.9	2,161	0.77	2,418	0.86	1827	0.65	2664	0.80

* Year as reported by the health department.

† Cases were reported by state of residence, which was not necessarily the state of exposure.

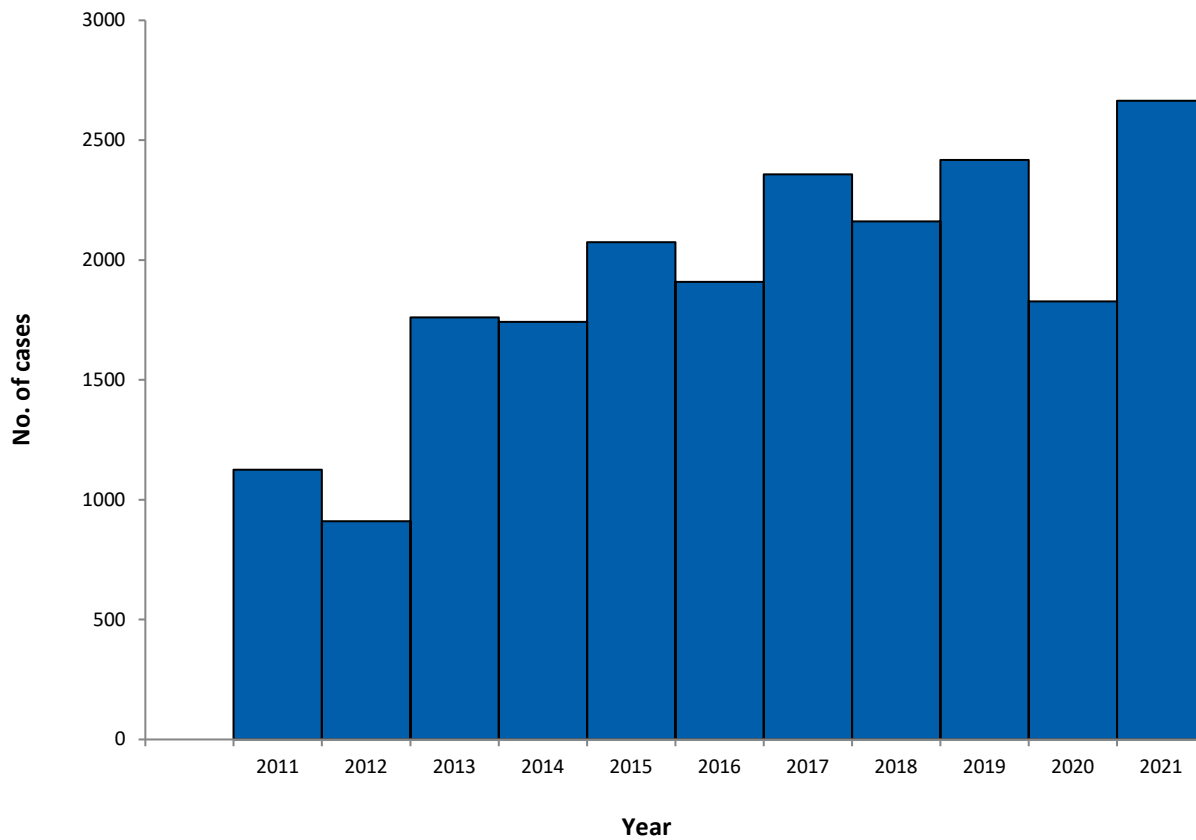
‡ Rate per 100,000 population. [13]

§ Babesiosis is not a reportable condition by law in these states.

¶ The denominators for calculations of total incidence rates included only the populations of states in which babesiosis was a reportable condition during the pertinent year.

2021 data may be lower or higher than previous years. This may reflect the impact of isolation and prevention measures, whether people sought health care when they were ill, and other changes in behavior during the COVID-19 pandemic period.

Figure 1. Number* of reported cases of babesiosis, by year, United States, 2011–2021†

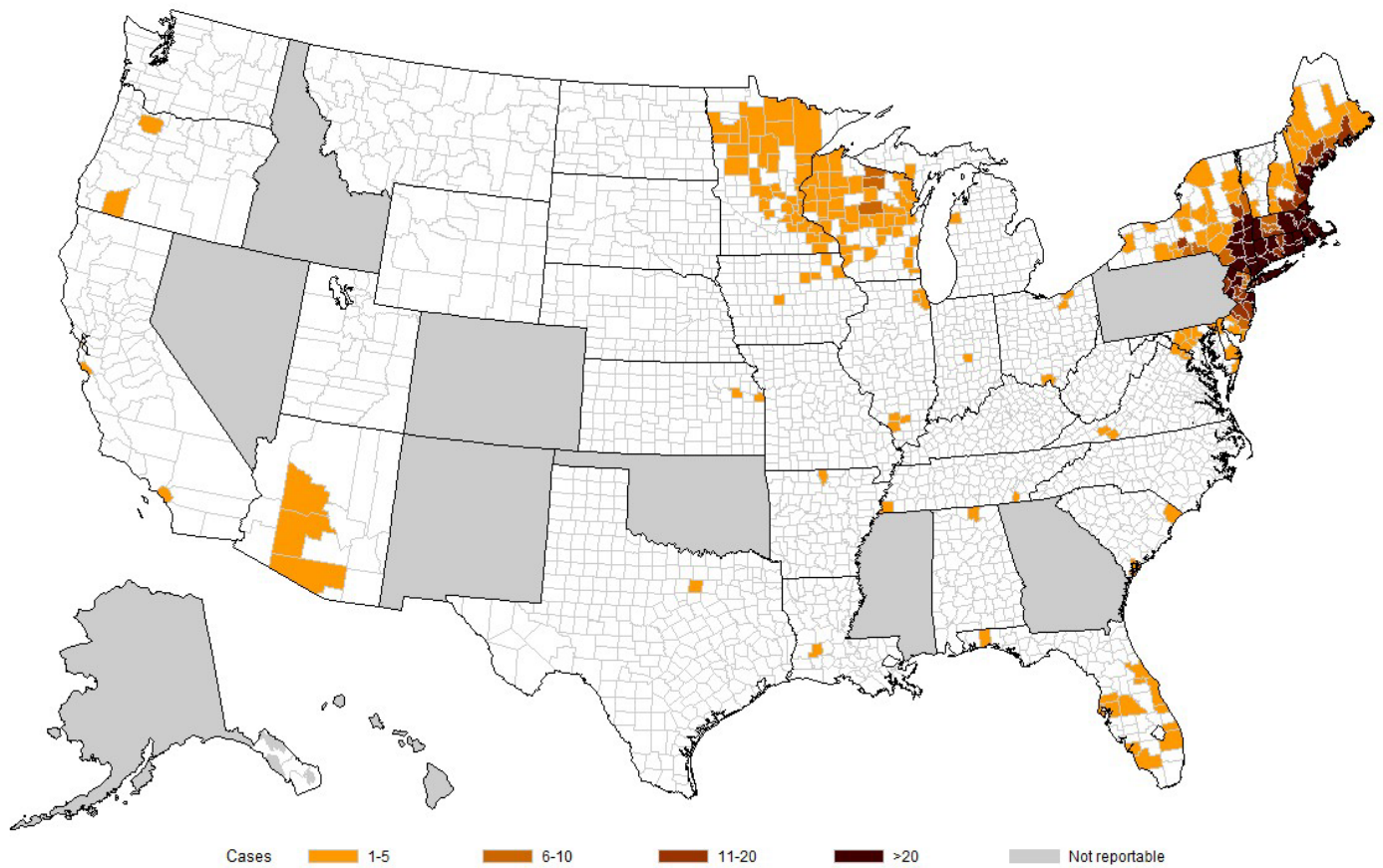


* A total of 20,953 cases of babesiosis were reported (2011, n=1,126; 2012, n=911; 2013, n=1,761; 2014, n=1,744; 2015, n=2,074; 2016, n=1,909; 2017, n=2,358; 2018, n=2,161; 2019, n=2,418; 2020, n=1,834; 2021, n=2,664).

† Year as reported by the health department.

‡ 2021 data may have been impacted by COVID-19.

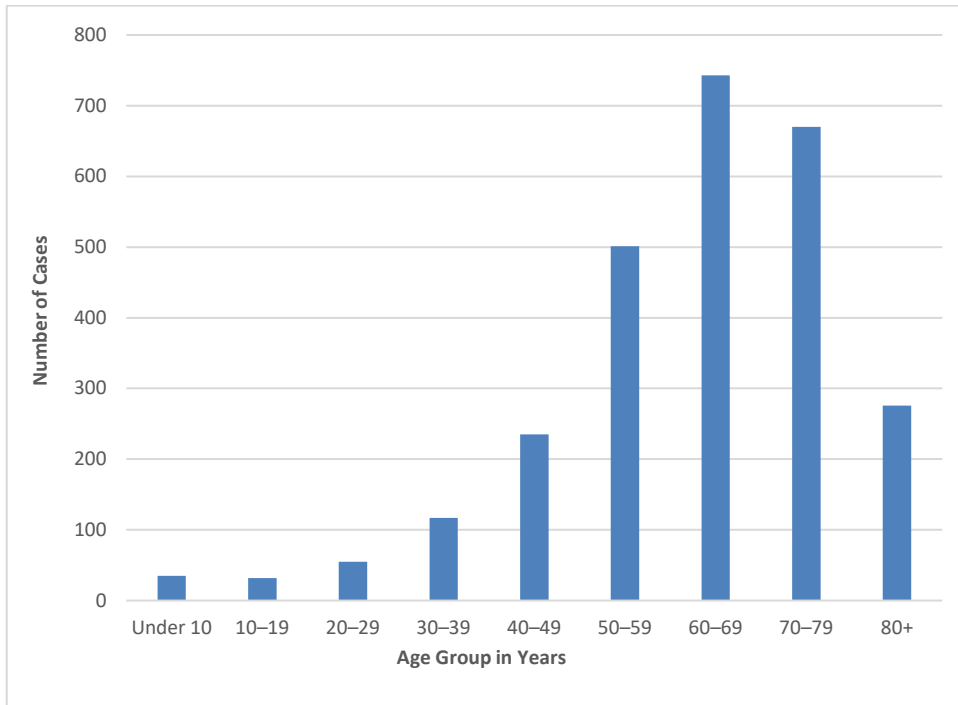
Figure 2. Number* of reported cases of babesiosis, by county of residence — 40 states, 2021†



* N = 2,663; county of residence was known for all but 1 (0.04%) of the 2,664 total cases.

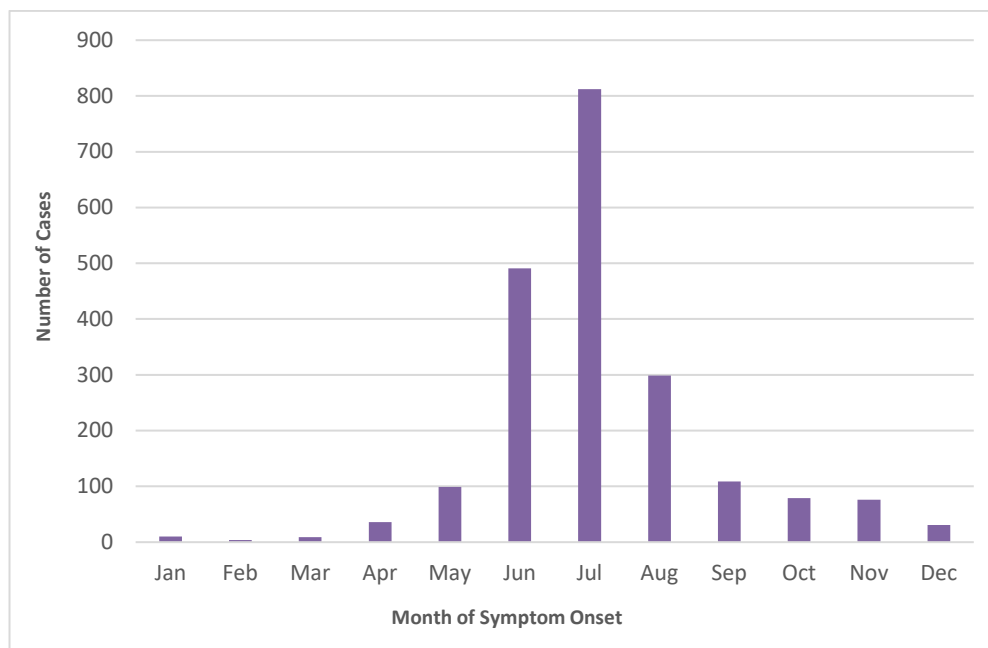
† Year as reported by the health department.

See the Appendix for the maps for surveillance years 2011–2020.

Figure 3. Number of reported cases of babesiosis, by age group*, United States, 2021†

* Data on age were available for all cases (2021, n=2,664).

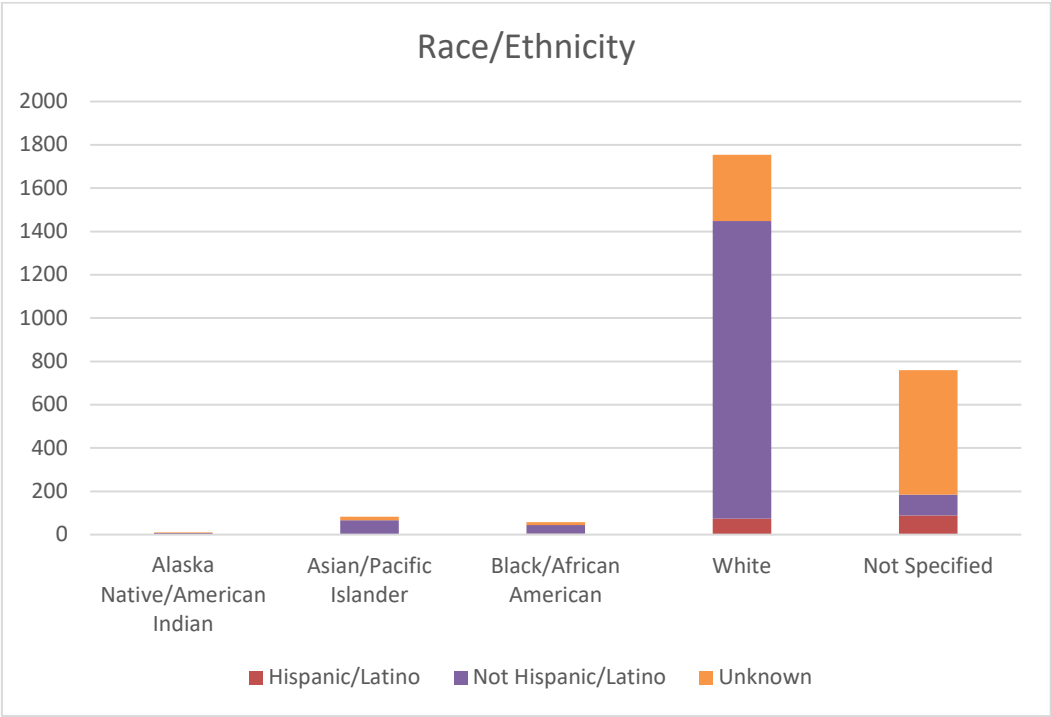
† Year as reported by the health department.

Figure 4. Number of reported cases of babesiosis, by month of symptom onset*, United States, 2021†

* Data on month of symptom onset were available for most case-patients (2021, n=2055/2,664).

† Year as reported by the health department.

Figure 5. Babesiosis Cases by Reported Race/Ethnicity, United States, 2021

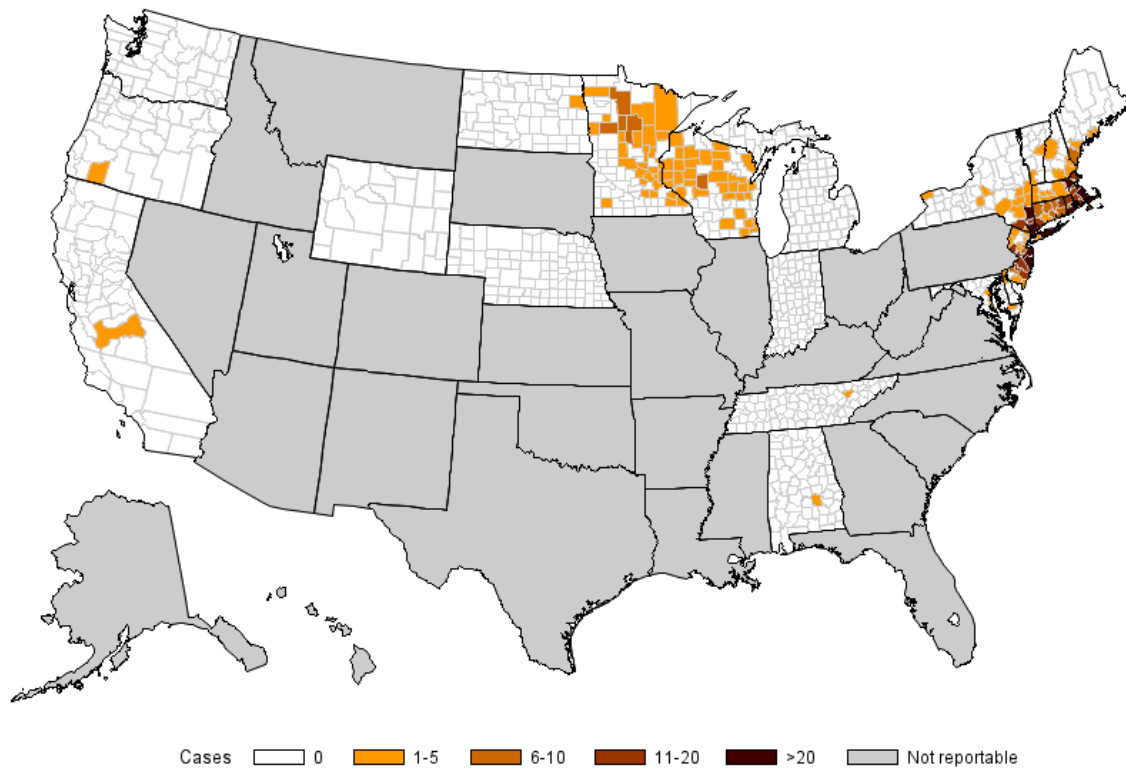


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Appendix. Maps for surveillance years 2011–2021

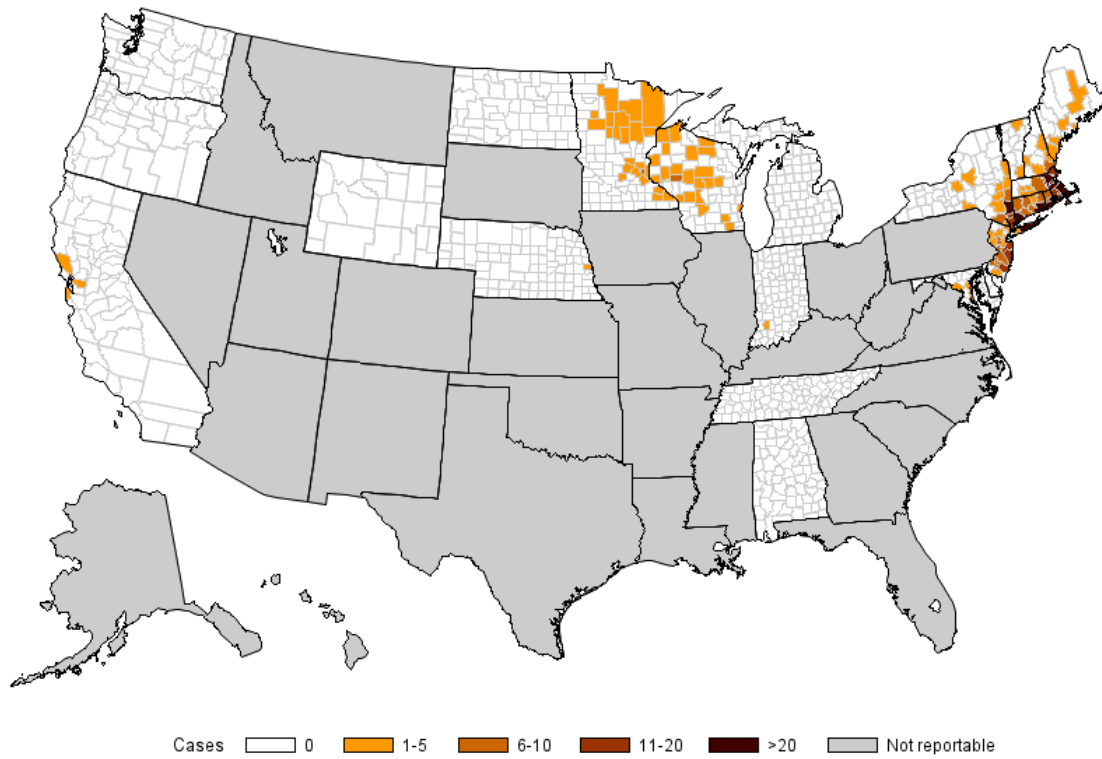
2011: Number* of reported cases of babesiosis, by county of residence — 22 states†



* N = 1,117; county of residence was known for all but 9 (1%) of the 1,126 total case-patients.

† Year as reported by the health department.

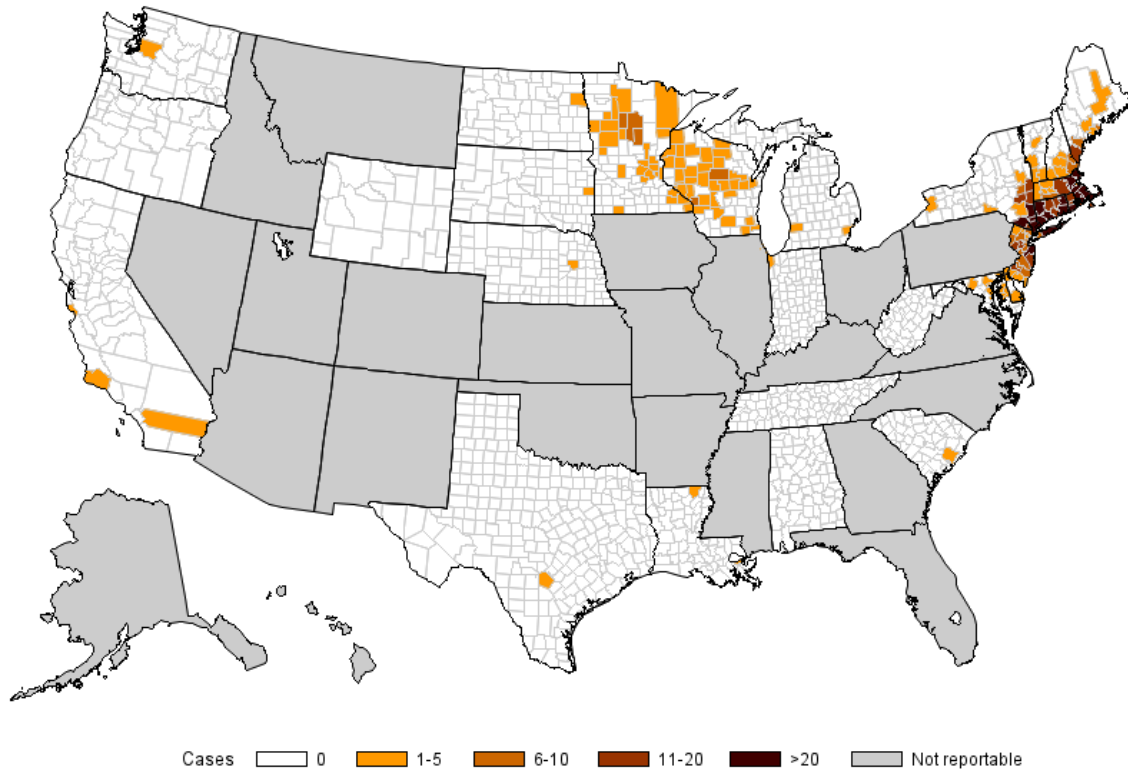
2012: Number* of reported cases of babesiosis, by county of residence — 22 states†



* N = 904; county of residence was known for all but 7 (1%) of the 911 total case-patients.

† Year as reported by the health department.

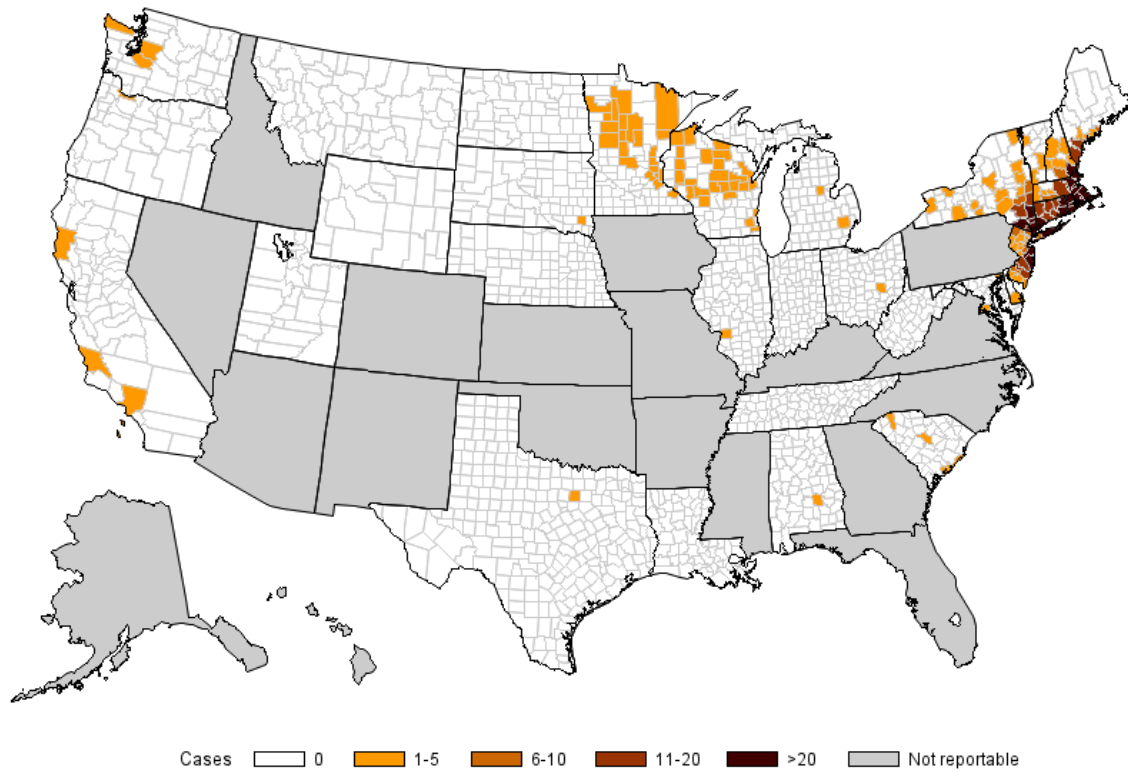
2013: Number* of reported cases of babesiosis, by county of residence — 27 states†



* N = 1,749; county of residence was known for all but 12 (1%) of the 1,761 total case-patients.

† Year as reported by the health department.

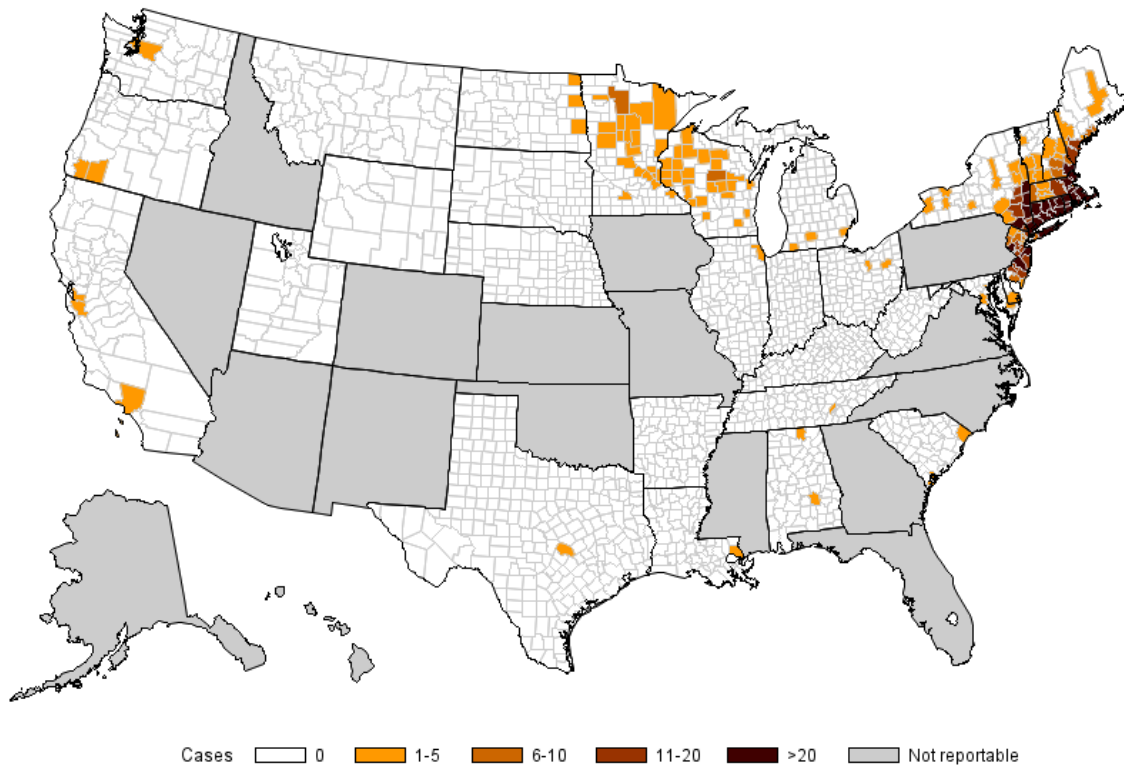
2014: Number* of reported cases of babesiosis, by county of residence — 31 states†



* N = 1,731; county of residence was known for all but 13 (1%) of the 1,744 total case-patients.

† Year as reported by the health department.

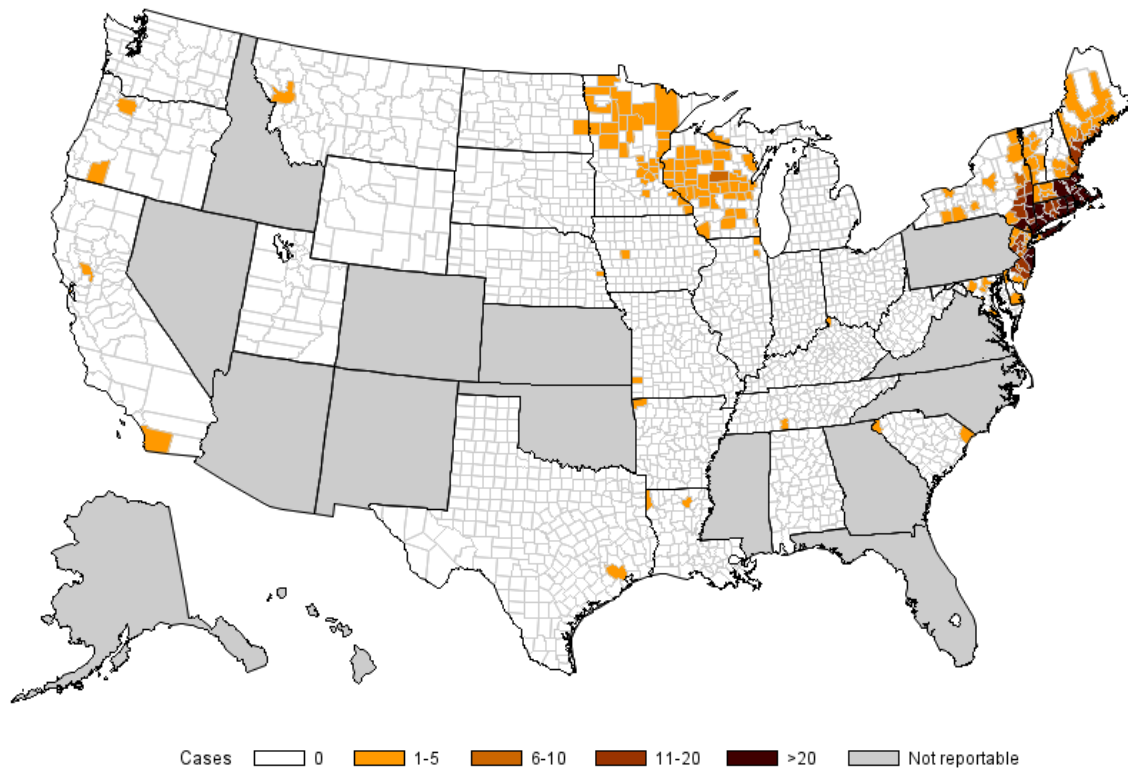
2015: Number* of reported cases of babesiosis, by county of residence — 33 states†



* N = 2,070; county of residence was known for all but 4 (<1%) of the 2,074 total case-patients.

† Year as reported by the health department.

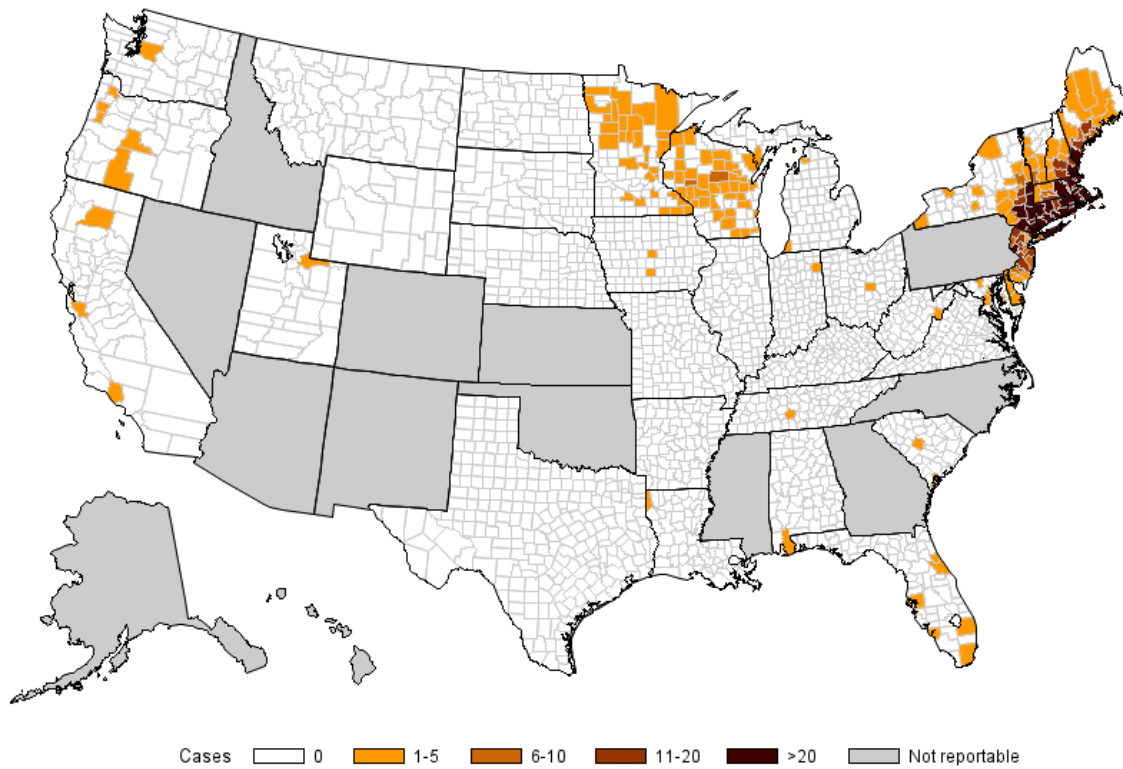
2016: Number* of reported cases of babesiosis, by county of residence — 35 states†



* N = 1,889; county of residence was known for all but 20 (1%) of the 1,909 total case-patients.

† Year as reported by the health department.

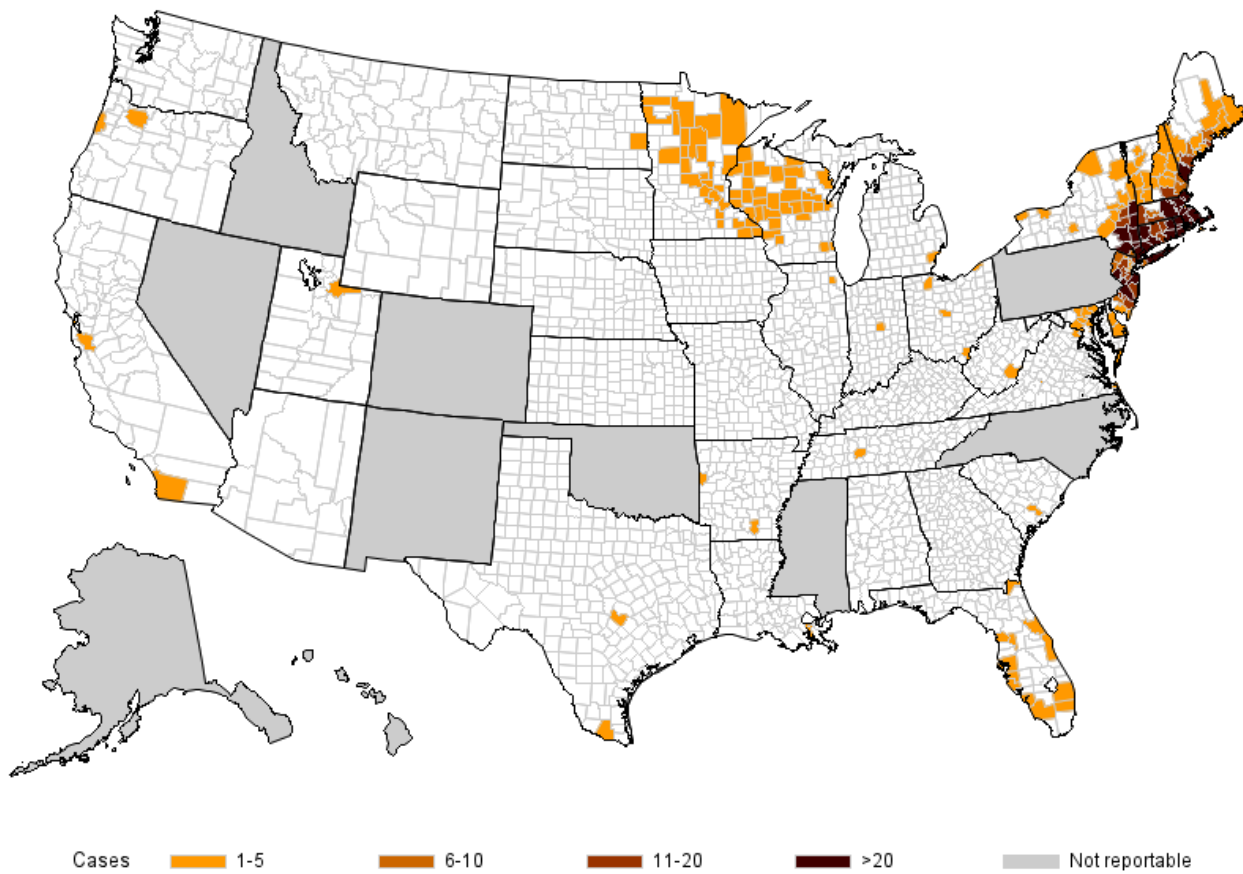
2017: Number* of reported cases of babesiosis, by county of residence — 37 states†



* N = 2,324; county of residence was known for all but 34 (1%) of the 2,358 total case-patients

† Year as reported by the health department.

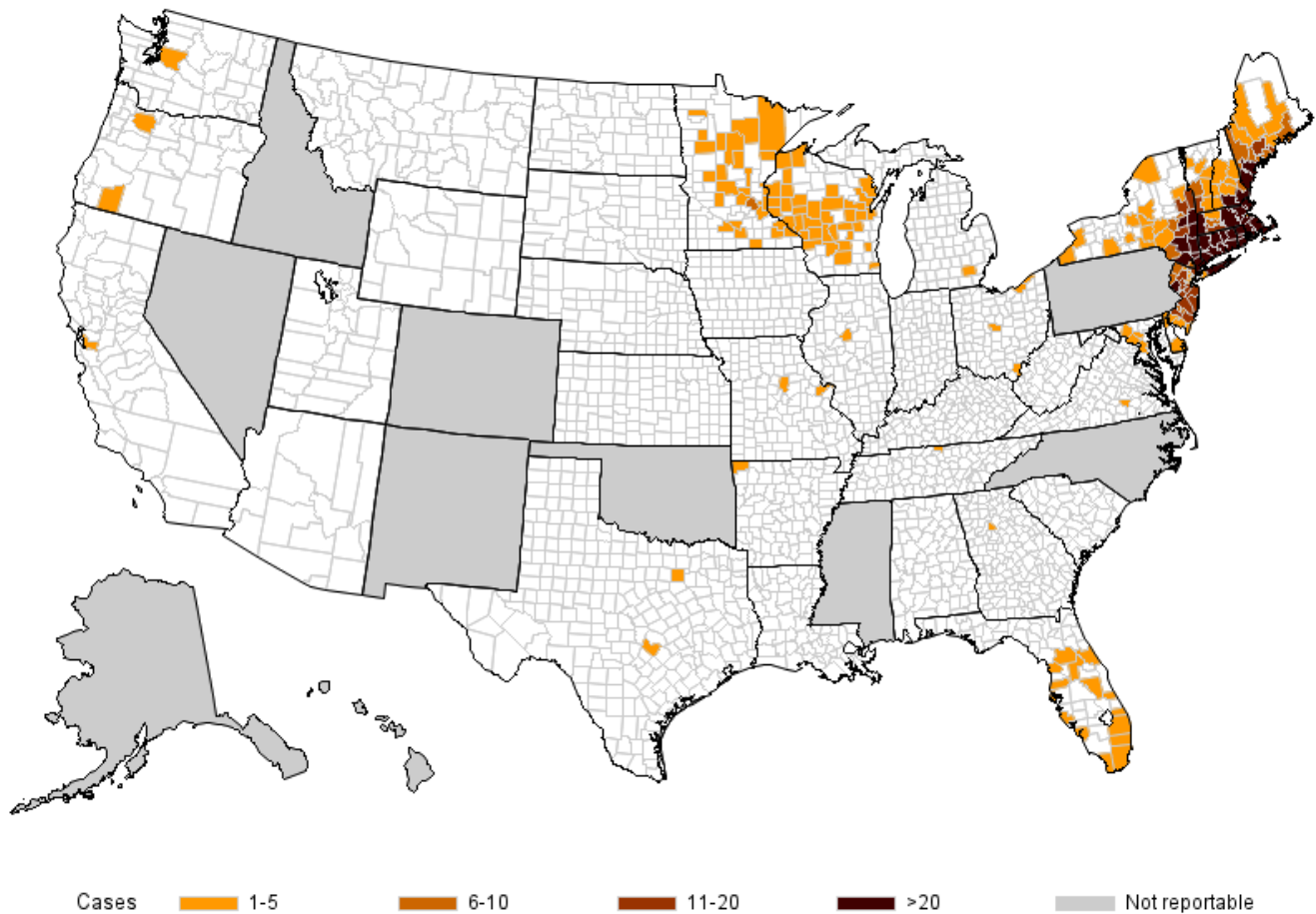
2018: Number* of reported cases of babesiosis, by county of residence — 40 states†



* N = 2,144; county of residence was known for all but 17 (1%) of the 2,161 total case-patients.

† Year as reported by the health department.

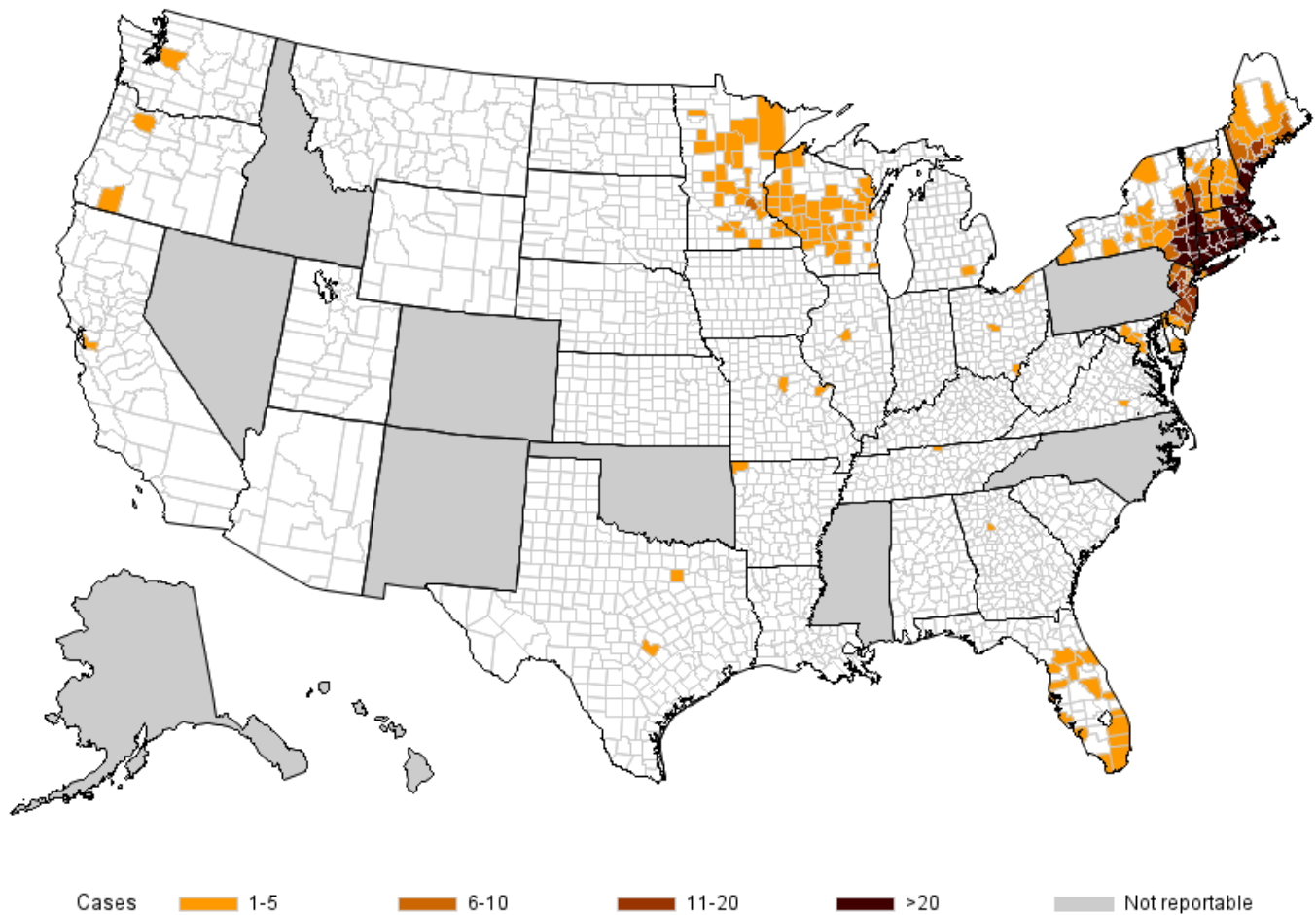
2019: Number* of reported cases of babesiosis, by county of residence — 40 states†



* N = 2,417; county of residence was known for all but 1 (<1%) of the 2,418 total case-patients.

† Year as reported by the health department.

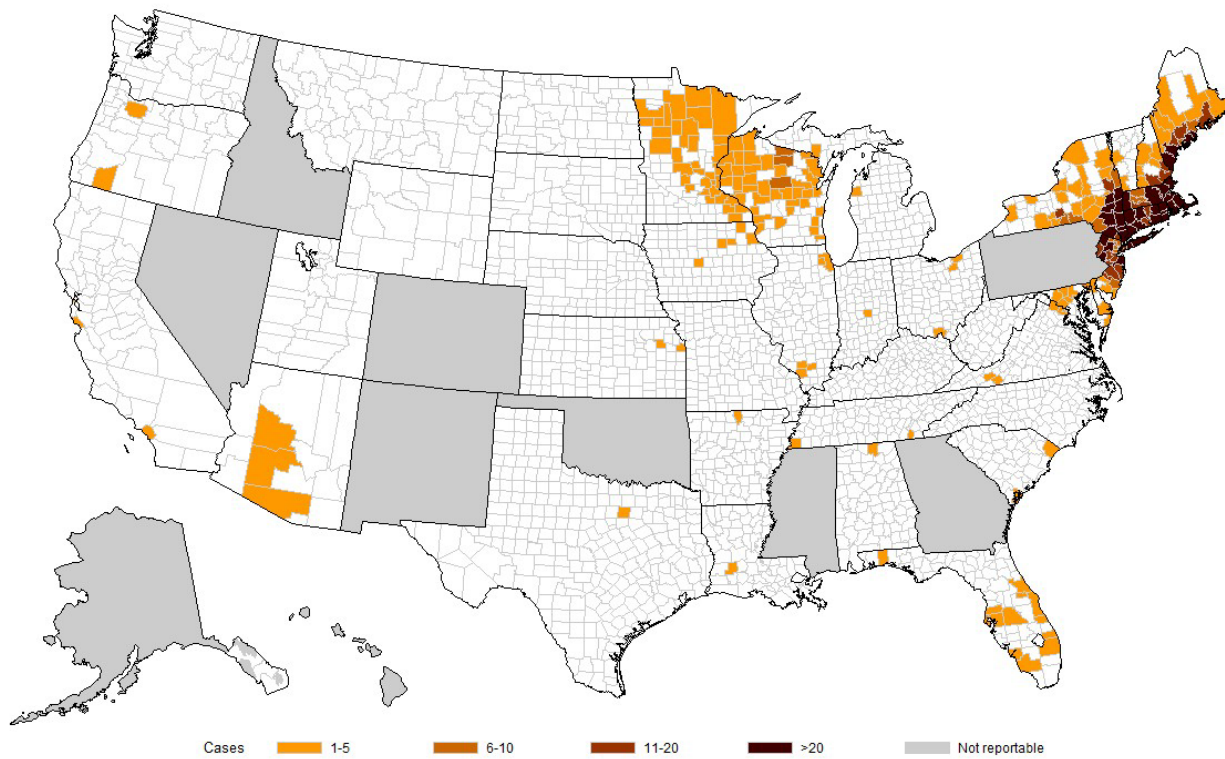
2020: Number* of reported cases of babesiosis, by county of residence — 40 states†



*N = 2,417; county of residence was known for all but 1 (<1%) of the 2,418 total case-patients.

† Year as reported by the health department.

2021: Number* of reported cases of babesiosis, by county of residence — 40 states†



*N = 2,663; county of residence was known for all but 1 (0.04%) of the 2,664 total cases.

† Year as reported by the health department.