

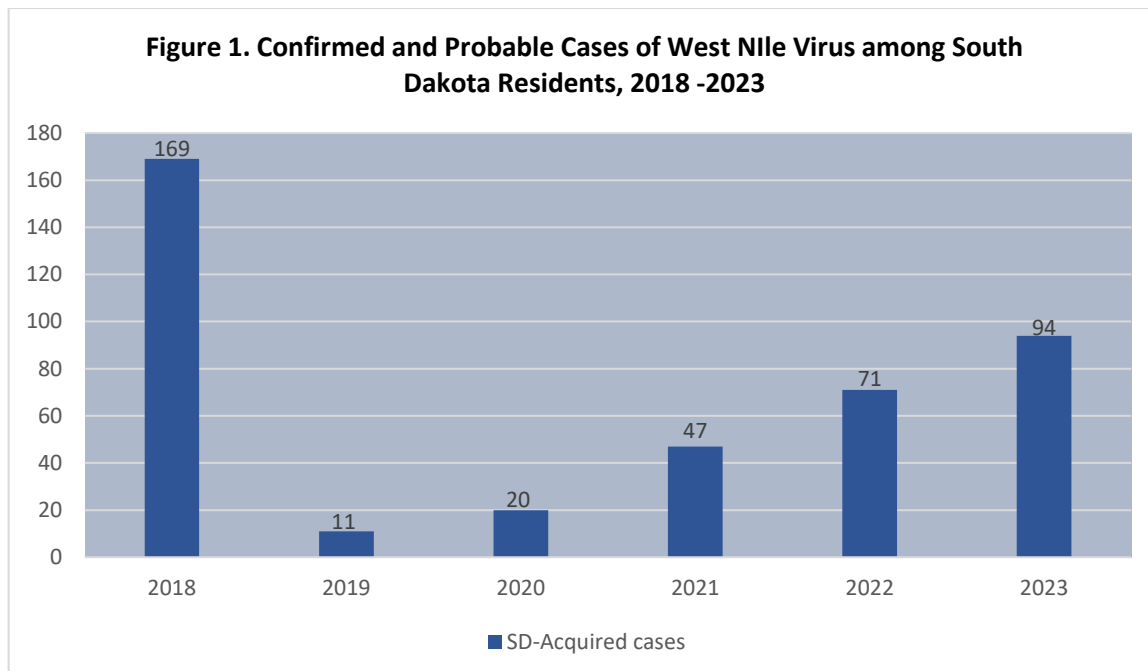
South Dakota Vector-Borne Disease Surveillance 2023 End of Year Summary

Mosquito-Borne Diseases

Mosquito-borne disease surveillance in South Dakota includes Confirmed and Probable cases of arboviral infections (West Nile, St. Louis, Eastern & Western Equine, Chikungunya, California serotype, Japanese, and Powassan) that meet CSTE case definitions and reported symptom onset between January 1 and December 31, 2023.

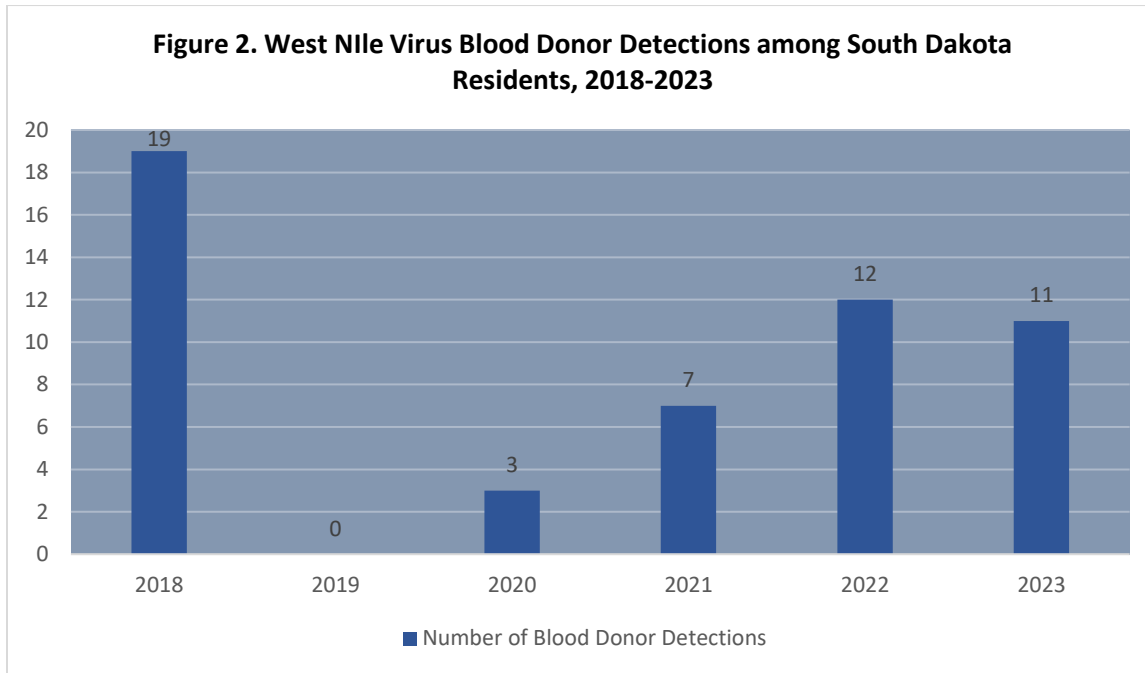
West Nile

West Nile virus (WNV), a mosquito-borne flavivirus, was first detected in South Dakota in 2002. *Culex tarsalis* mosquitoes are the primary insect vector of WNV in South Dakota and birds are the main reservoir of the virus. Humans are among the accidental mammalian hosts. While human infection with WNV is typically asymptomatic, around 20% of cases result in an acute febrile illness along with other symptoms such as headache, body aches, joint pains, vomiting, diarrhea, or rash. Approximately 1% of infections progress to more severe neuroinvasive syndromes, including meningitis, encephalitis, and acute flaccid paralysis or poliomyelitis. About 10% of WNV neuroinvasive cases are fatal. As of January 9, 2024, 2,406 West Nile Human cases were reported nationally in 2023. Of 2,406 cases, 1,599 cases were reported as West Nile virus neuroinvasive disease cases in 2023.

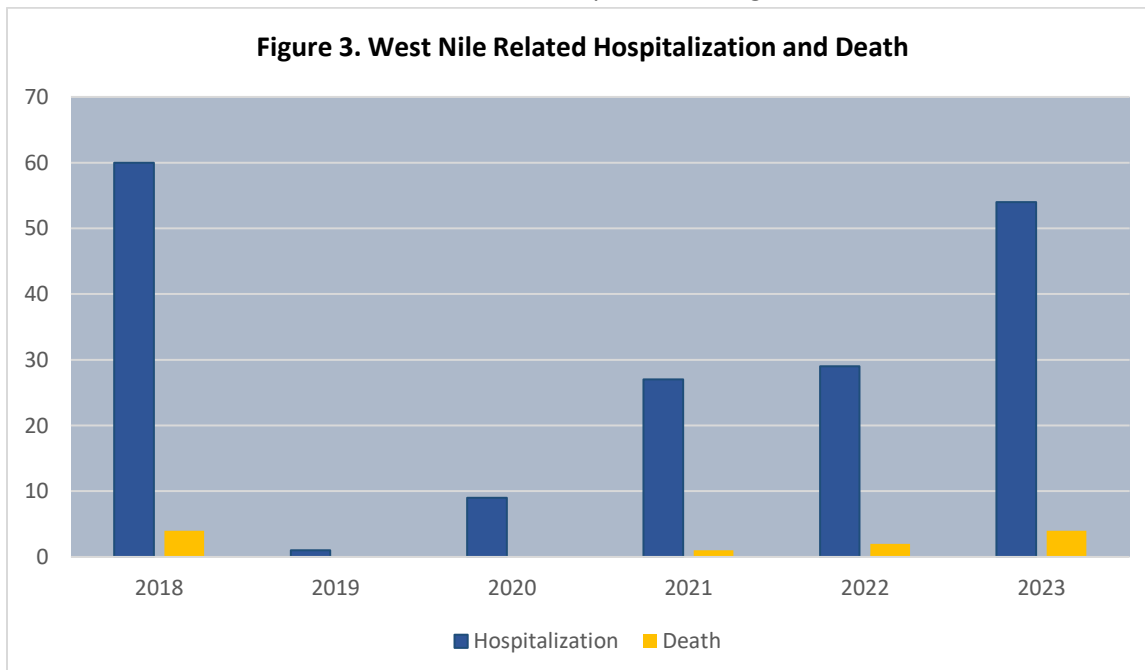


After an outbreak year in 2018, the number of reported WNV cases in South Dakota decreased dramatically in 2019 and then steadily increased into 2023 (Figure 1) with 94 total human WNV cases reported. The 94 cases were reported from the following counties: Beadle (4), Bon Homme (2),

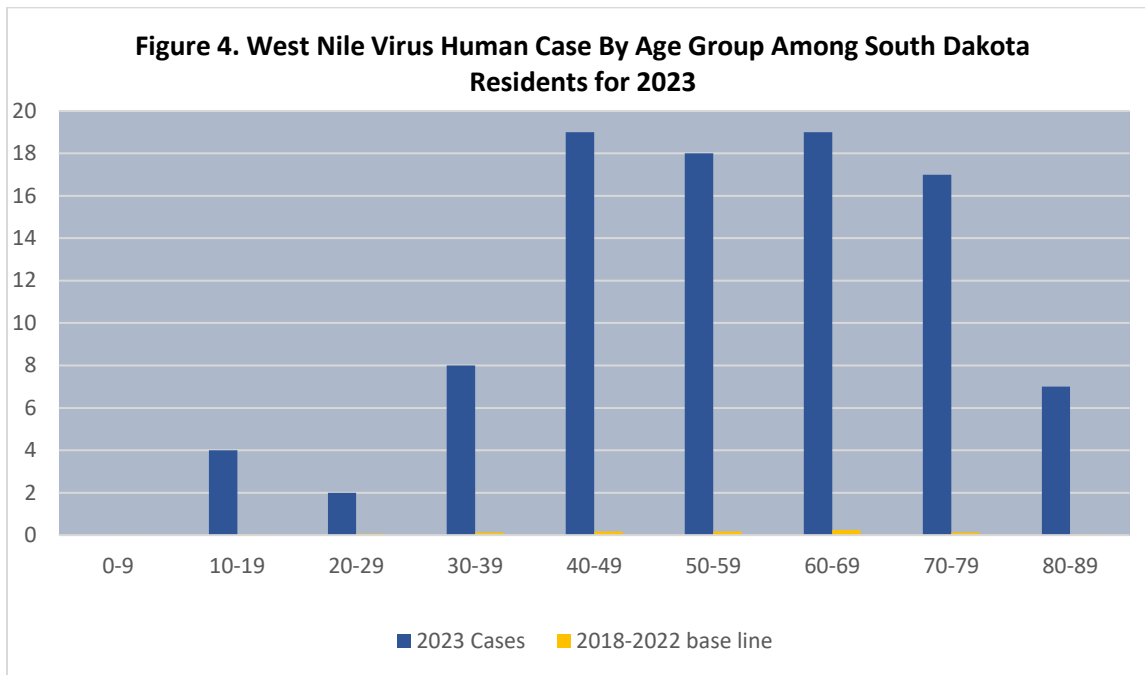
Brookings (1), **Brown (9)**, Buffalo(1), Campbell (1), Clark (2), Codington (2), Corson (1), Davison (4), Day(2), Deuel (2), Dewey (3), Edmunds (1), Fall River (1), Faulk (4), Hamlin (2), Hand (1), Hughes (5), Hutchinson (1), Jerauld (1), Kingsbury (3), Lake (1), Lincoln (5), Lyman (1), Marshall(1), McCook (1), Meade (2), Miner (1), **Minnehaha (11)**, Moody(1), Oglala Lakota (5), Pennington(1), Perkins (1), Sanborn(1), Spink (1), Union (1), Walworth (1), and Yankton (2).



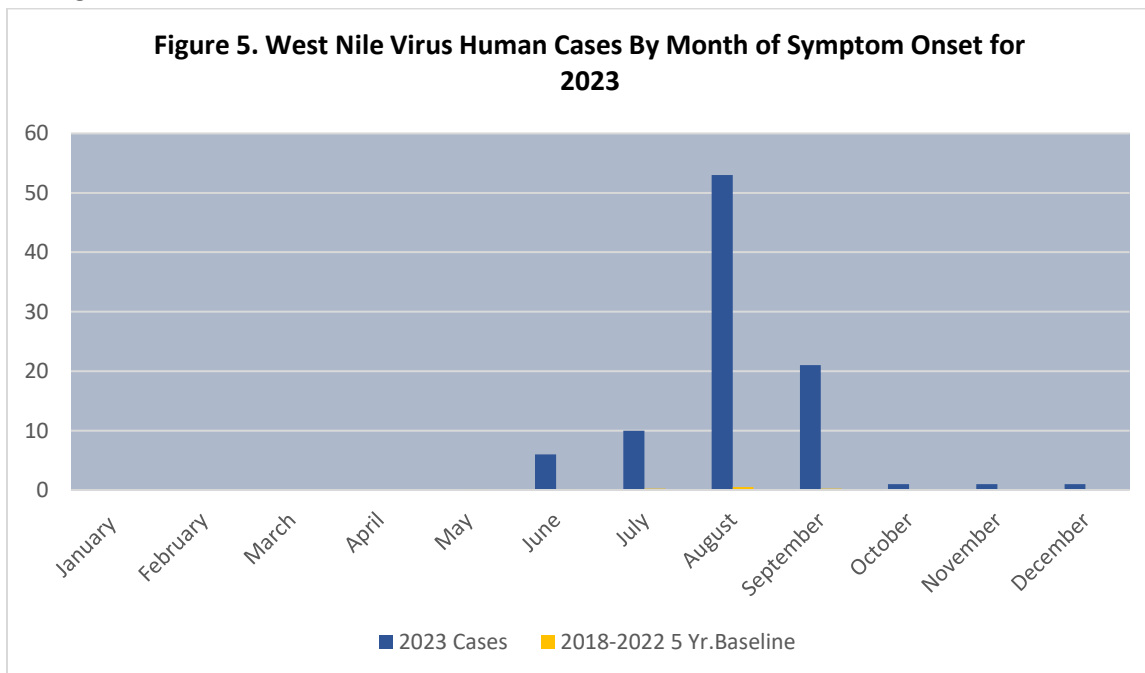
In 2023, 11 WNV blood donor detections were reported among South Dakota residents.



In 2023, 54 West Nile related hospitalizations and 4 deaths were reported. The number of hospitalizations rose 86% from 2022 to 2023.



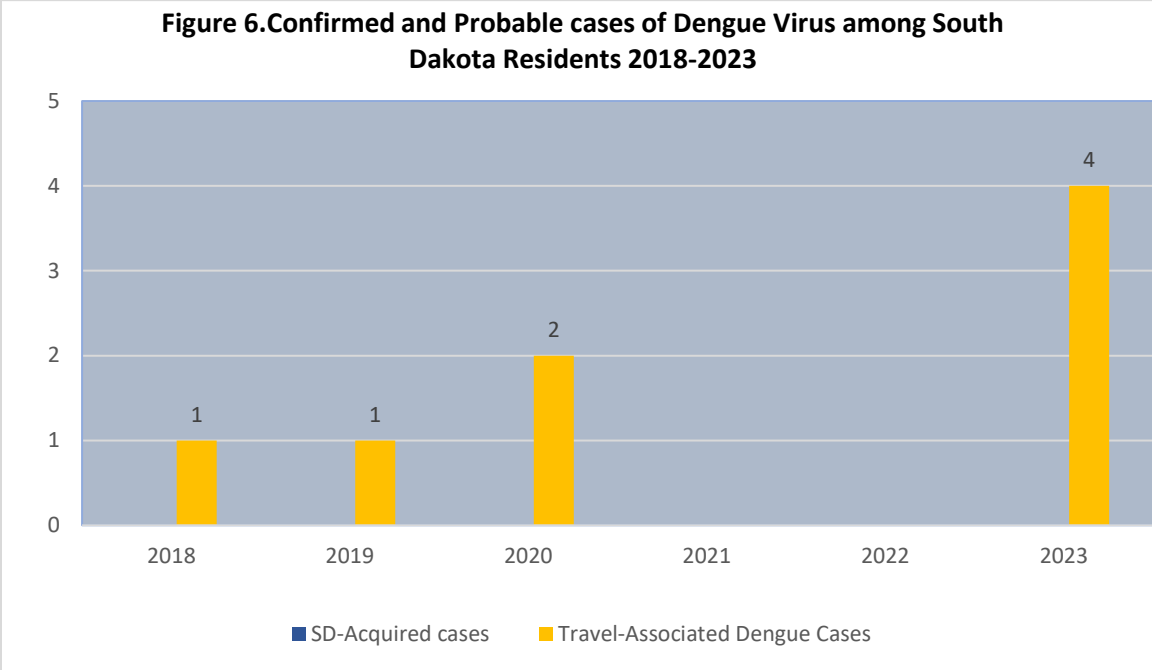
In 2023, the highest occurrence of West Nile was noted among individuals aged 40-49 years and 60-69 years. Over the past five years, cases were most observed in the age group of 60-69 years, followed by 40-49 years and 50-59 years. Males accounted for 65% of the cases in 2023, which is consistent with the average of 67% observed from 2018 to 2023.



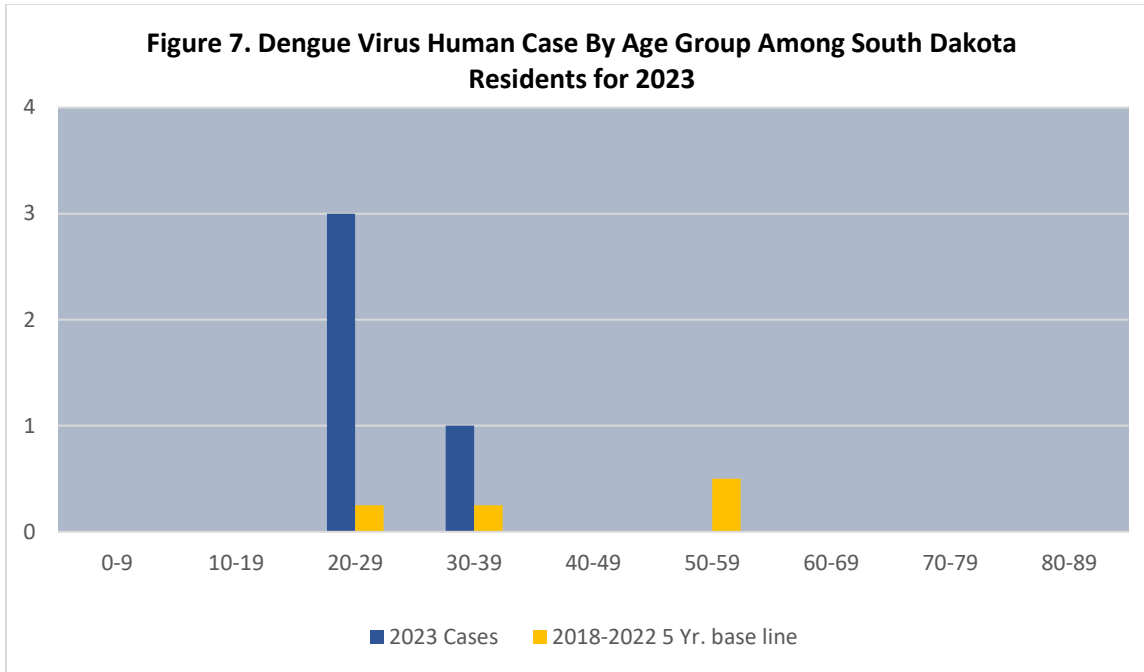
In 2023, 57 % of the cases with disease onset occurred in August, which is consistent with the seasonal trend seen in 2018-2022.

Dengue

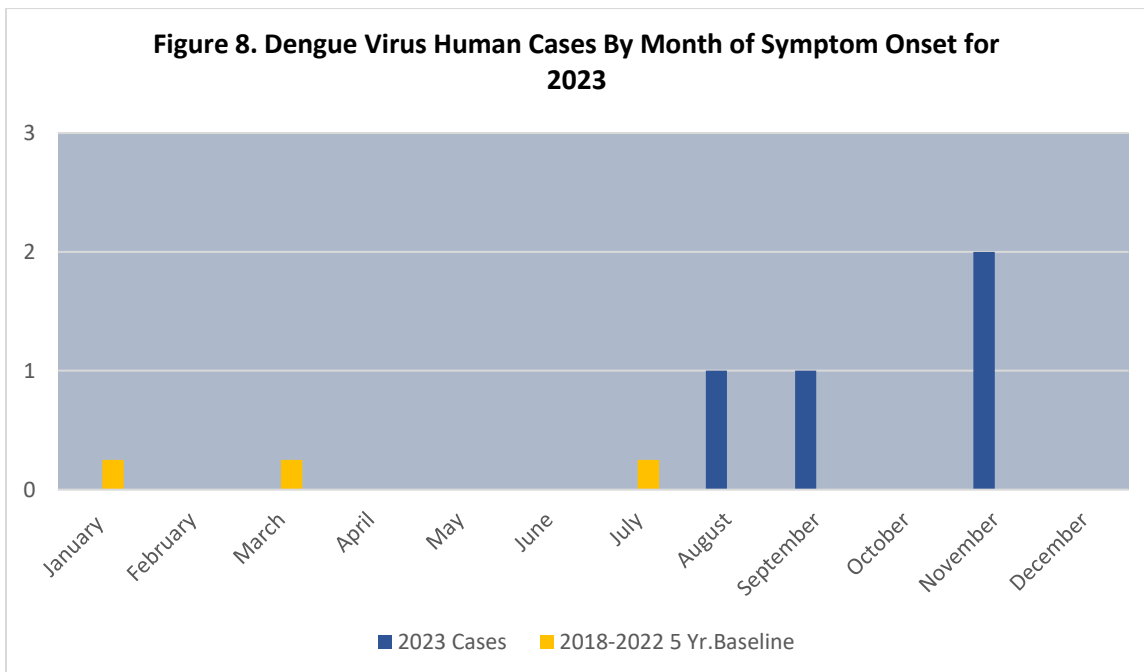
Dengue viruses are transmitted to humans via the bite of an infected *Aedes* species mosquito (*Ae. aegypti* or *Ae. albopictus*) mosquito carrying the infection. Common symptoms of dengue include fever, nausea, vomiting, rash, aches, and pains (eye pain, typically behind the eyes, muscle, joint, or bone pain). The mosquitoes responsible for spreading dengue are prevalent in numerous tropical and subtropical areas worldwide, including various regions of the United States. Approximately 4 billion people, nearly half of the global population, reside in regions where there is a risk of dengue (WHO,2021). There is a dengue vaccine accessible for use in certain parts of the world, including United States territories. In South Dakota, all dengue cases were associated with travel outside U.S. states or territories, and no local transmission has ever been reported.



Between 2018-2023, travel-associated dengue infections accounted for 100% of the cases. The dengue cases reported in 2023 had traveled to the Dominican Republic (2), Haiti (1), and India (1) within the two weeks preceding the onset of an acute febrile illness.



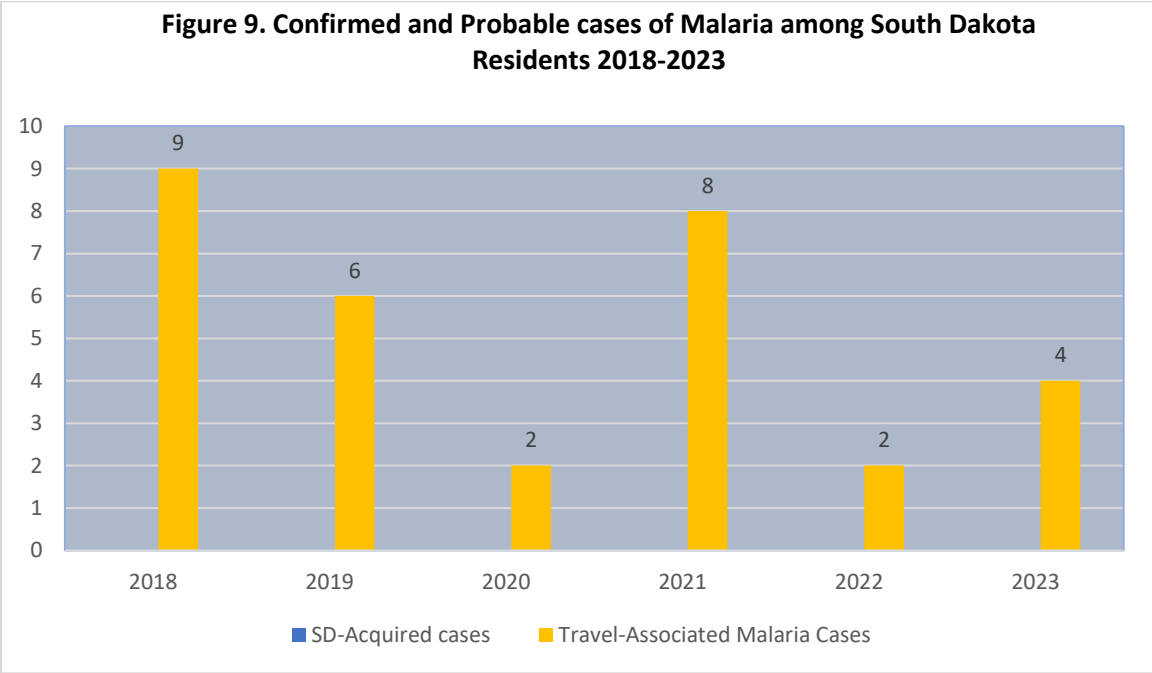
In 2023, most of the dengue cases were noted among aged 20-29 years. Over the past five years, cases were most observed in the age group of 50-59 years. Males accounted for 75% of the cases in 2023, which is consistent with the average of 75% observed from 2018 to 2022.



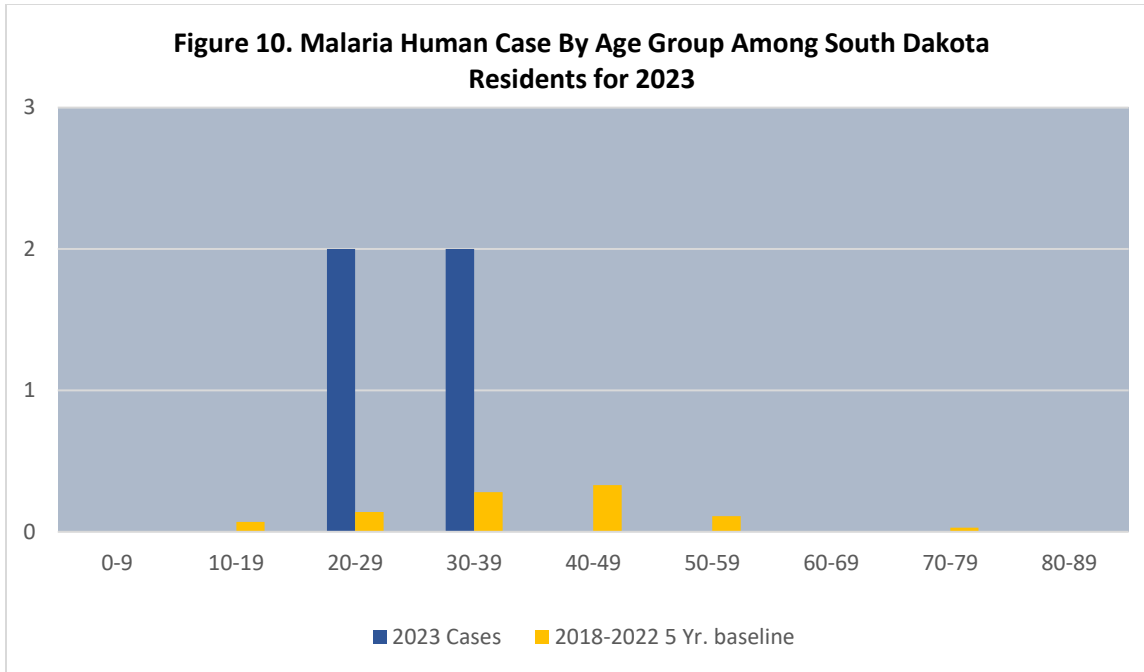
Although travel-associated dengue cases can be reported year-round, cases in 2023 had symptom onset in August, September, and November.

Malaria

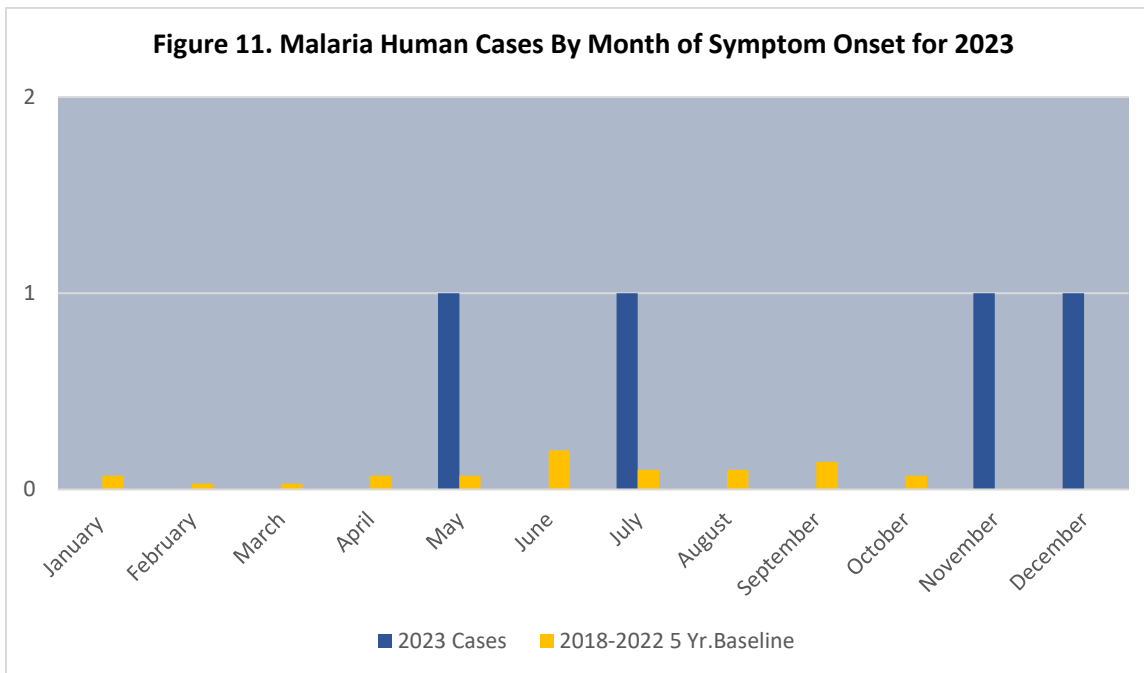
Malaria is spread to humans through the bites of infected *Anopheles* species mosquitoes that transmit infection from one person to another. Symptoms can be mild or life-threatening. Blood transfusion and contaminated needles may also transmit malaria. Mild symptoms are fever, chills, and headache. Severe symptoms include fatigue, confusion, seizures, and difficulty breathing. Globally there were 249 million cases and 608,000 malaria deaths reported in 2022. The geographical distribution of malaria is primarily influenced by climatic factors such as temperature, humidity, and rainfall. The highest transmission on malaria is found in Africa South of the Sahara and in parts of Oceania such as Papua New Guinea. In South Dakota, all dengue cases were linked to travel outside U.S. states or territories, and no instances of local transmission have ever been reported.



Between 2018-2023, travel-associated malaria infections accounted for 100% of the cases. The four malaria cases reported in 2023 had traveled outside the United States two or more weeks before the onset of symptoms. The destinations included China (1), Ethiopia (2), and Sudan (1).



In 2023, malaria cases were reported among aged 20-29 and 30-39 years. Over the past five years, cases were most observed in the age group of 40-49 years, followed by 30-39 years. Females accounted for 75% of the cases in 2023. Between 2018 and 2022, males accounted for 67% of the cases.



Travel-associated malaria cases can be reported year-round, cases in 2023 had symptom onset in May, July, November, and December.

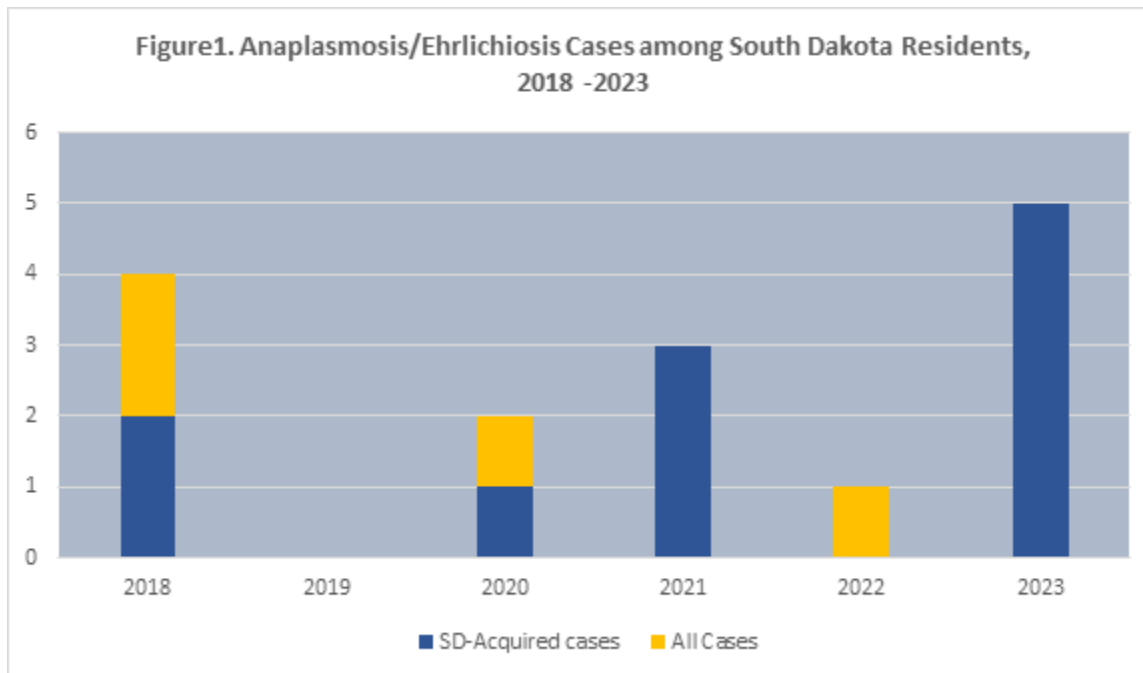
Tick-Borne Diseases

Tickborne disease surveillance in South Dakota includes Confirmed and Probable Cases of Anaplasmosis/Ehrlichiosis, Babesiosis, RMSF/SFR, Lyme Disease, and Tularemia that meet case definitions and reported symptom onset between January 1- December 31, 2023.

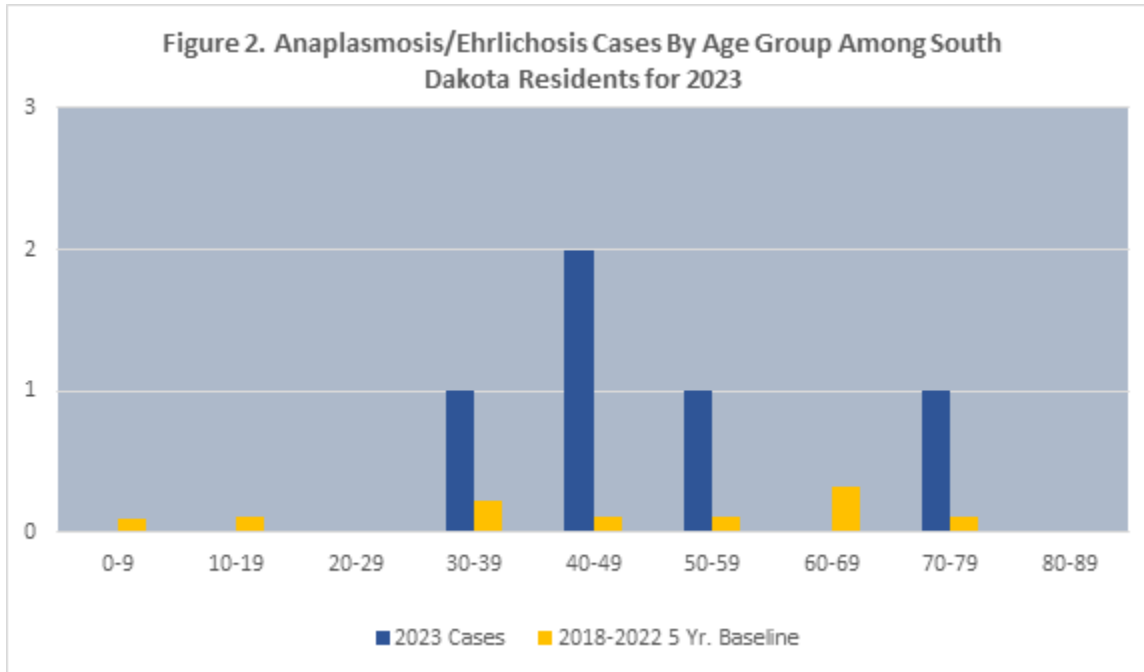
Anaplasmosis/Ehrlichiosis

Anaplasmosis, caused by the bacterium *Anaplasma phagocytophilum*, is a disease transmitted by the bite of an infected blacklegged tick (*Ixodes scapularis*). This tickborne illness is frequently reported in the Upper Midwest and Northeastern regions of the United States. In rare instances, *A. phagocytophilum* has been transmitted through blood transfusion.

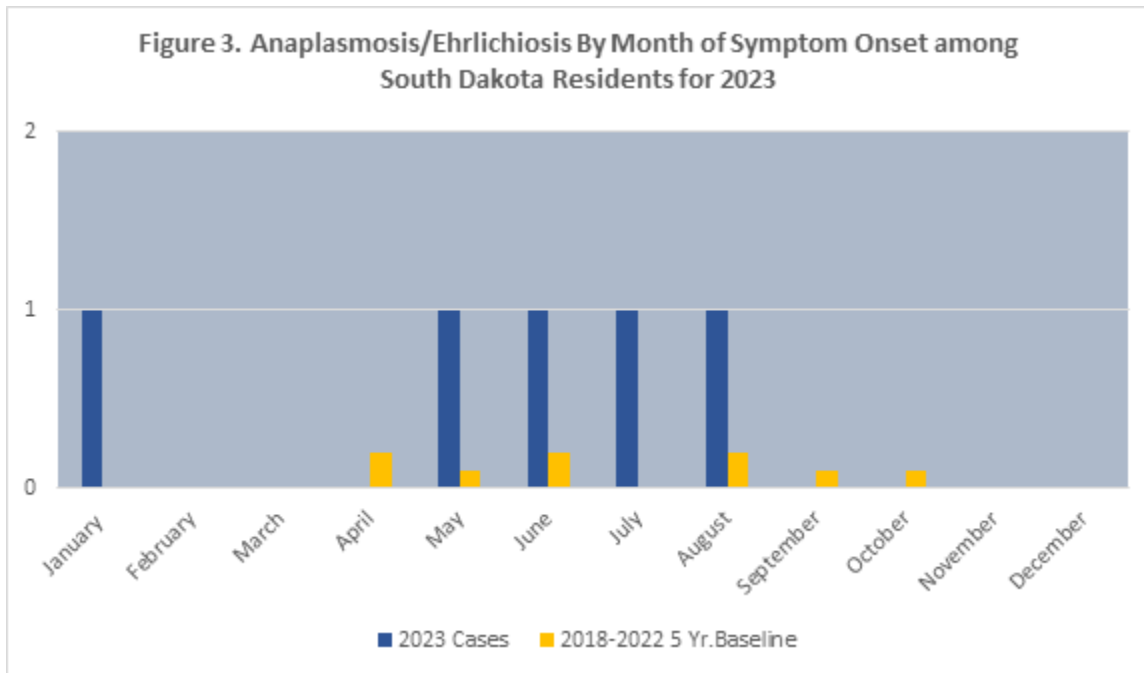
Ehrlichiosis, caused by the bacterium *Ehrlichia chaffeensis*, *E. ewingii*, or *E. muris euclairensis*, is a disease transmitted by the bite of an infected lone star tick (*Amblyomma americanum*) and the American dog tick (*Dermacentor variabilis*) in the United States. Cases mainly occur in the southeastern and south-central regions of the country but is present in South Dakota. Individuals with ehrlichiosis/anaplasmosis often experience symptoms such as fever, chills, headache, muscle aches, and, at times, upset stomach.



The number of Anaplasmosis/ Ehrlichiosis cases rose from 2018-2023 (Figure 1). The total number of cases rose 200% from 2022 to 2023, and the number of South Dakota-acquired cases was 400% higher in 2023 than in 2022. Five Anaplasmosis/ Ehrlichiosis cases were reported as South Dakota-acquired in 2023 including from: Brown (1), Minnehaha (2), Jerauld (1), Walworth (1) counties. Two cases reported being exposed to ticks in Charles Mix (1) and Jerauld (1) counties.



In 2023, the highest occurrence of Anaplasmosis/ Ehrlichiosis was noted among individuals aged 40-49 years. However, over the previous five years, cases mainly occurred in the age group of 60-69 years. Females accounted for 100% of 2023 cases compared to 18% on average from 2018-2023.

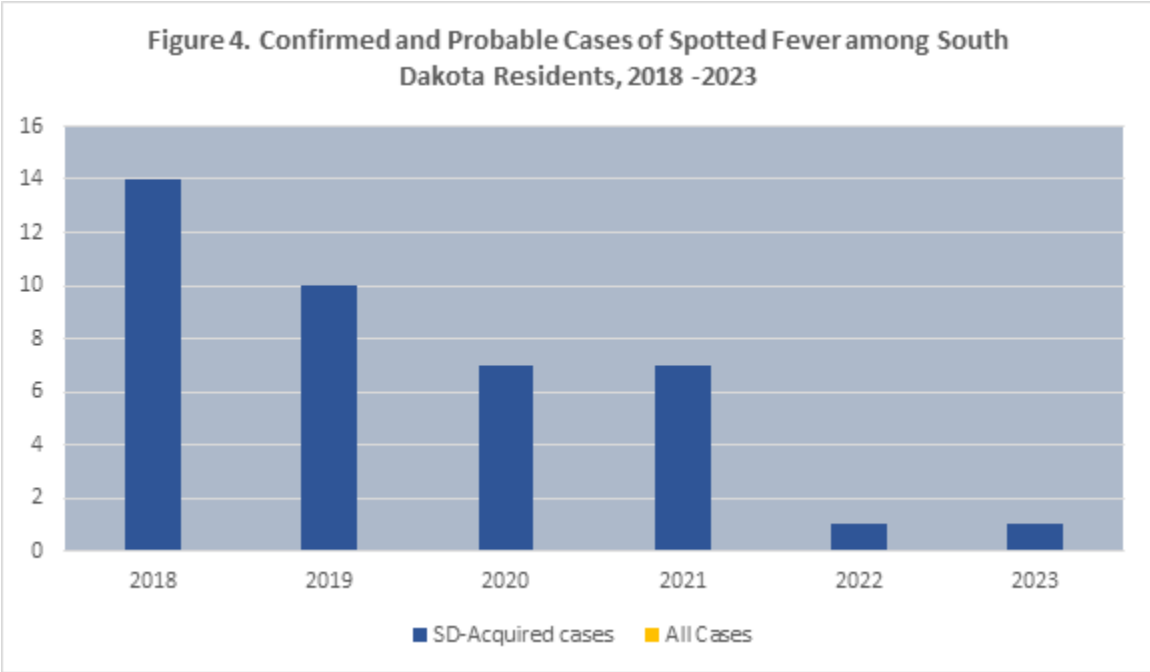


For 2023, 60% of the cases had an illness onset in the summer months, which is consistent with the seasonal trend seen from 2018–2022.

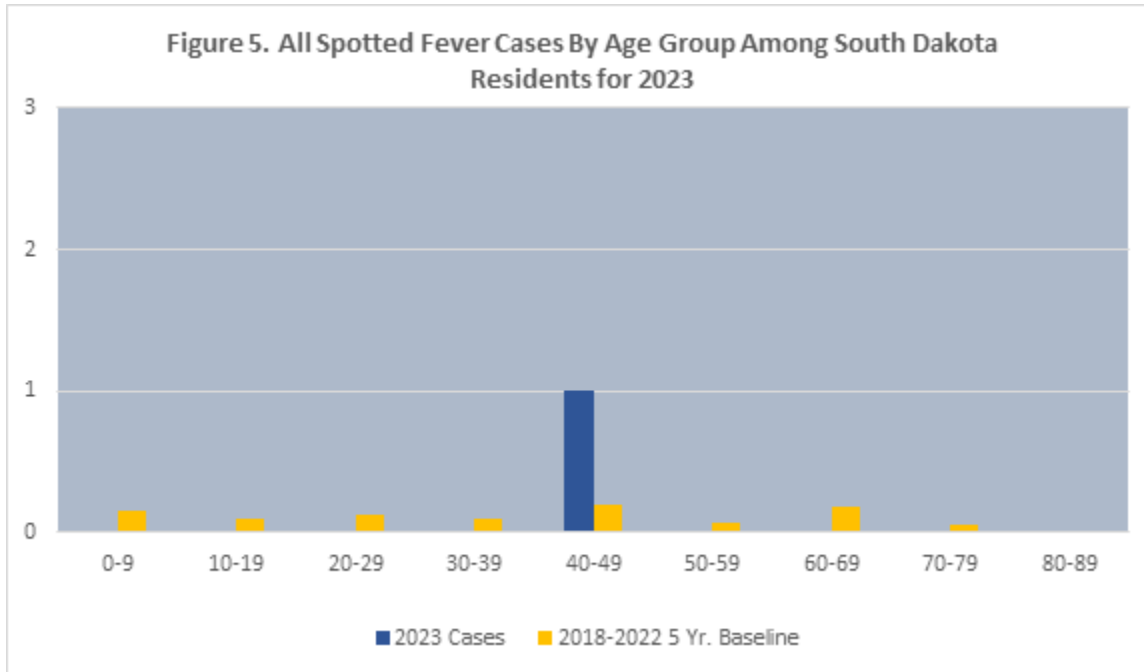
Rocky Mountain Spotted Fever

Rocky Mountain spotted fever (RMSF) is a bacterial disease transmitted by the bite of an infected American dog tick (*Dermacentor variabilis*). Symptoms of RMSF typically include fever, headache, and rash. Typically, the rash emerges 2-4 days after the onset of fever. *D. variabilis* is primarily located in the eastern, central, and Pacific coastal regions of the United States. RMSF can be rapidly fatal if not treated within the first 5 days of symptoms. As of December 20, 2023, one case has been reported to the South Dakota Department of Health with no international travel reported.

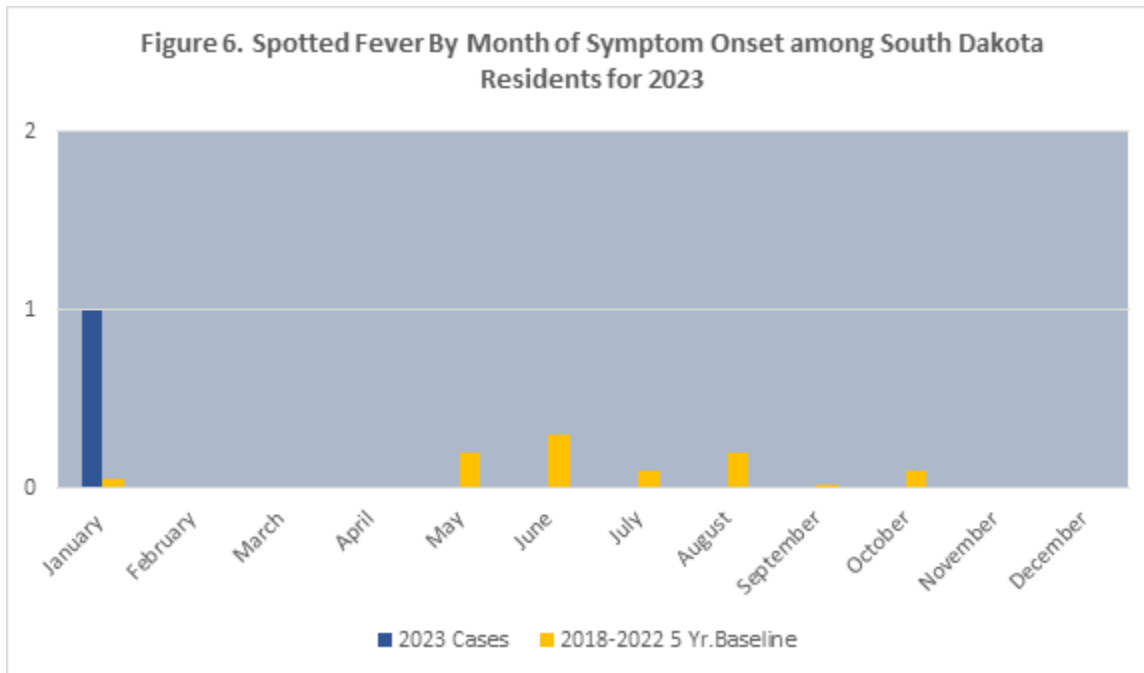
The Centers for Disease Control and Prevention released a Health Alert Network Health advisory, alerting healthcare providers and the public to an outbreak of Rocky Mountain Spotted Fever (RMSF) affecting individuals in the United States who recently traveled to or reside in Tecate, Baja California, Mexico. As of December 8, 2023, at least five cases in the U.S. (none in SD) had been diagnosed with RMSF following their travels to Mexico, resulting in three fatalities. Notably, four of the affected patients are children.



In 2022-2023, case numbers were lower than 2018-2021 case counts (Figure 1). The overall number of cases has remained constant since 2022, with one case reported each year. South Dakota-acquired infections accounted for 100% of all the cases between 2018-2023. There have been no instances of out-of-state or international travel-related cases since 2018. In 2023, one case reported as South Dakota-acquired from Minnehaha (1) county.



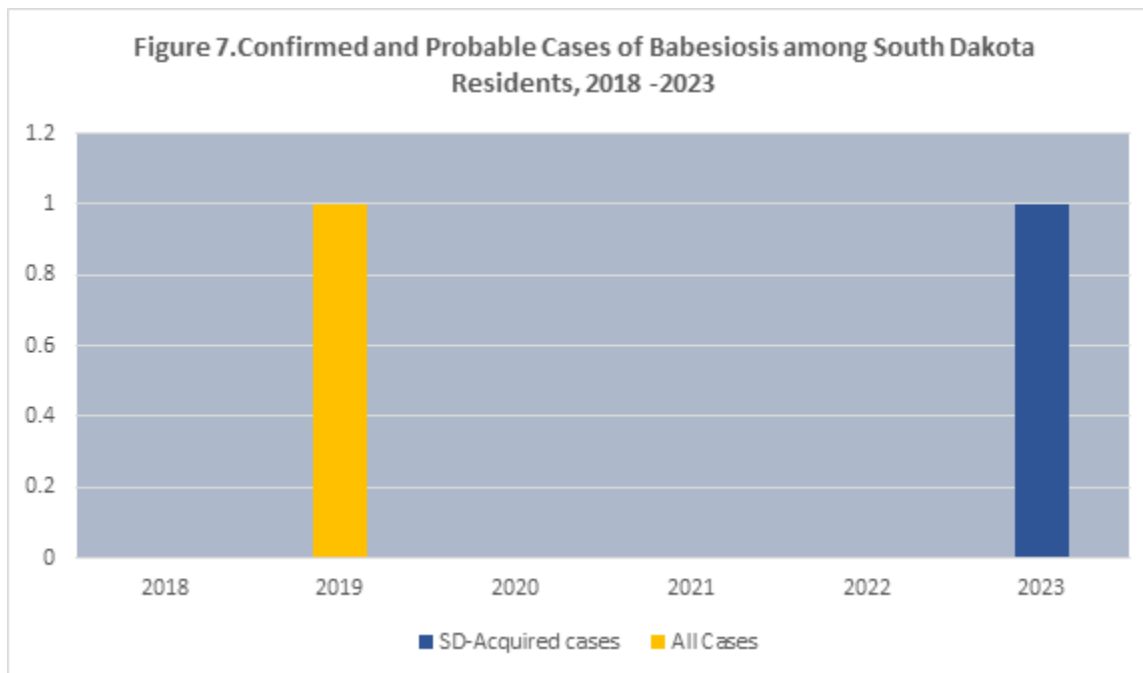
In 2023, one spotted fever case was reported in a person aged 40-49 years. Over the past five years, cases were most observed in the age group of 40-49 years. The percentage of cases among females and males were even at 50% from 2018-2022.



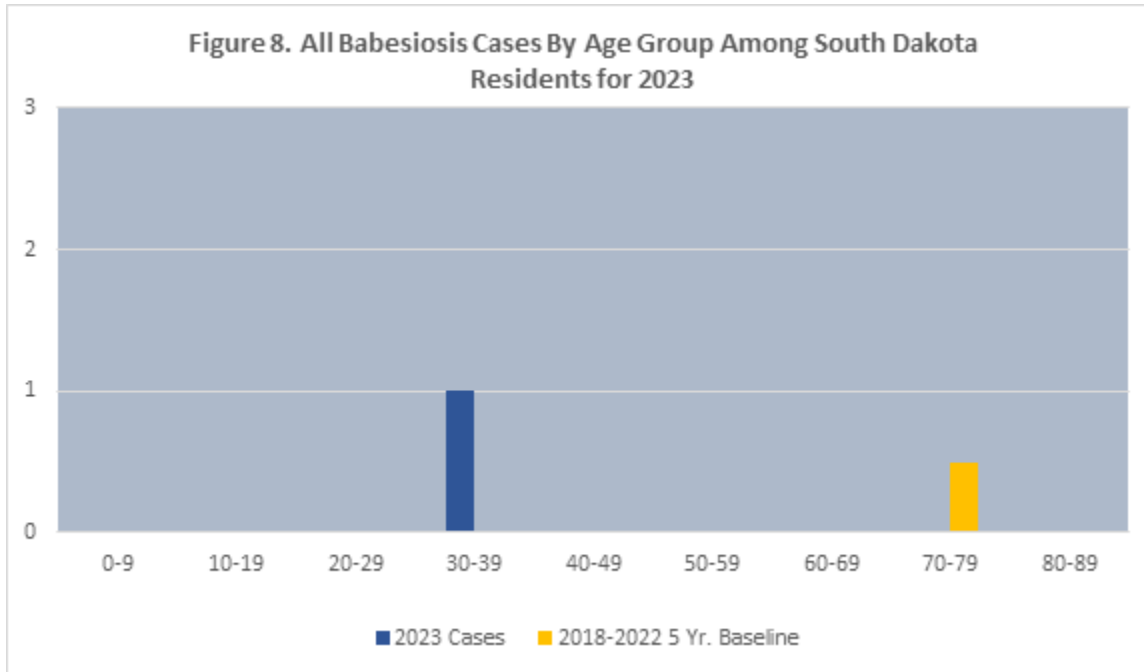
Although cases can occur during any month of the year, most cases occurred during May–August. In 2023, one case was reported in the month of January.

Babesiosis

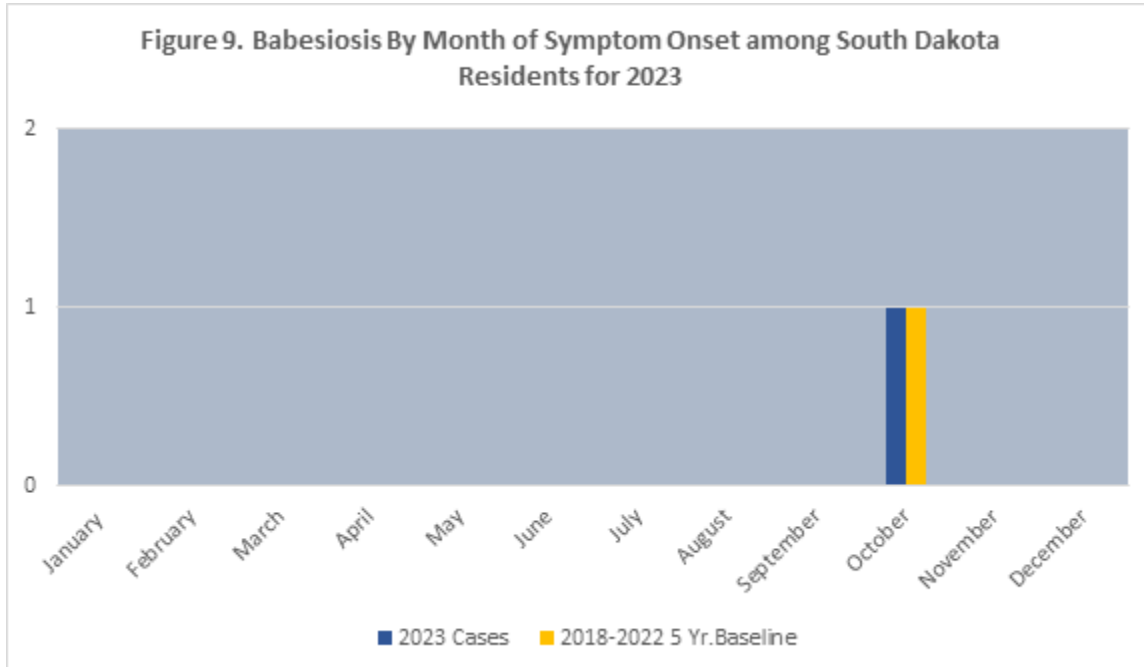
Babesiosis is a tick-borne infectious disease caused by parasites of the genus *Babesia*. These parasites infect red blood cells and can cause a range of symptoms, from mild to severe. The primary vector for transmitting *B. microti* to humans is the black-legged tick, also known as *Ixodes scapularis*. This tick species is prevalent in specific regions, particularly in the Northeast and Upper Midwest. *Babesia* parasites can also spread through blood transfusions, from mother to child during childbirth (perinatally), and through organ transplantation. Symptoms of babesiosis can vary and may include fever, chills, sweats, fatigue, muscle aches, and hemolytic anemia (destruction of red blood cells). Severe cases can occur, particularly in individuals with compromised immune systems or other underlying health conditions. Cases peak during spring and summer months.



Since 2018, South Dakota has documented two cases of babesiosis. The case reported in 2019 had traveled to New York during the incubation period but, there was no reported exposure to ticks during the trip. In 2023, one case reported as South Dakota-acquired from Todd (1) county.



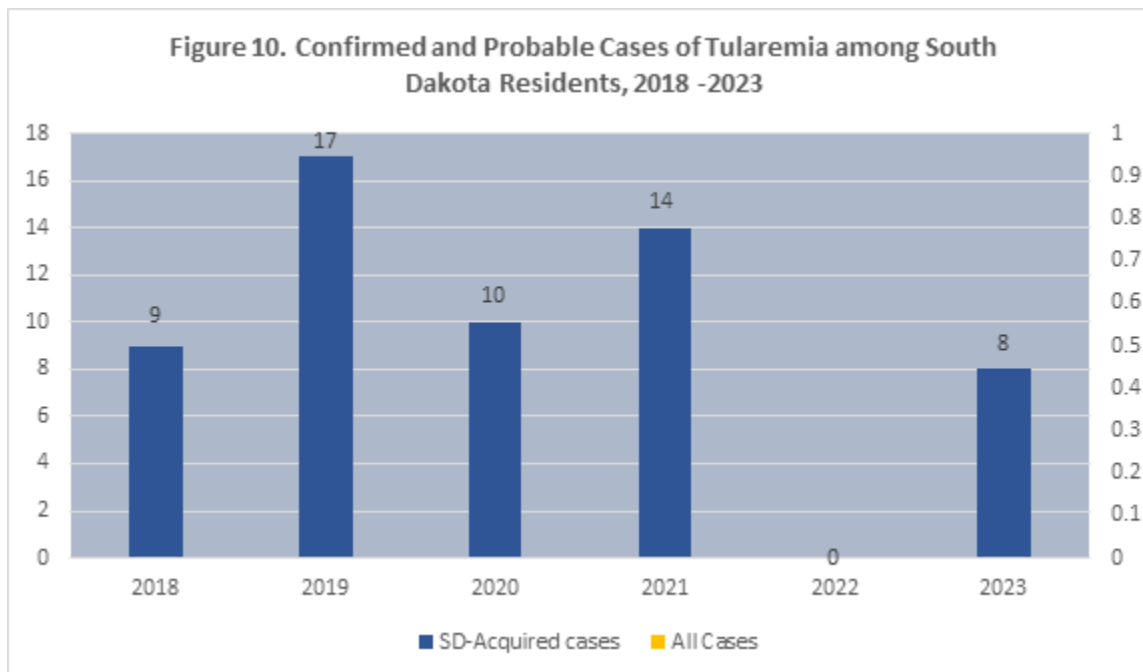
In 2023, the one babesiosis case occurred in a person aged 30-39 years. Over the past five years, one other case was noted in the age group of 70-79 years. Females accounted for 100 % of 2018-2023 cases.



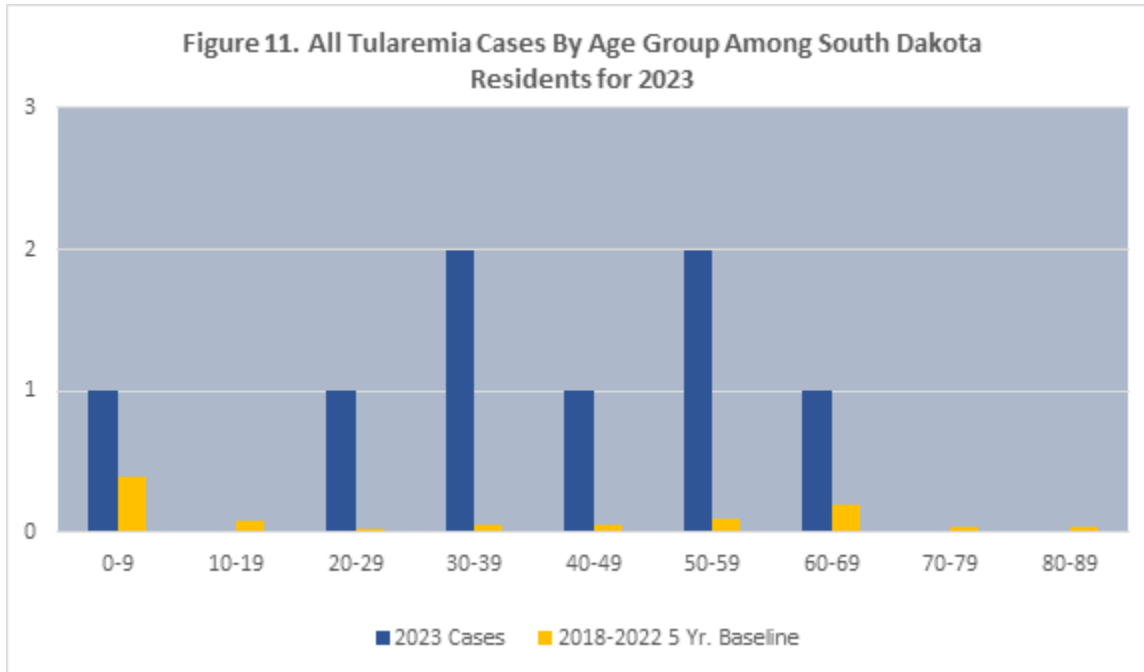
Although babesiosis cases peak during spring and summer months, the 2023 case had a disease onset date occurring in October.

Tularemia

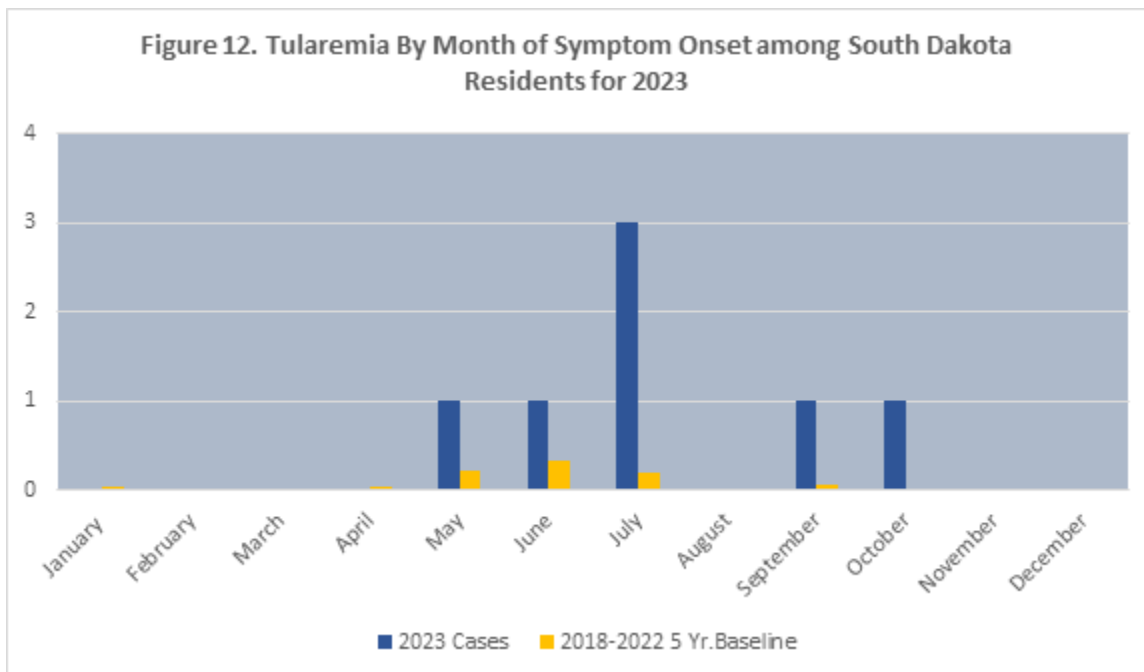
Tularemia is caused by the bacterium *Francisella tularensis*, which is a highly contagious gram-negative coccobacillus. Humans can contract tularemia through various means, including bites from infected ticks, deer flies, or other insects. Ticks that transmit tularemia to humans include the dog tick (*Dermacentor variabilis*), the wood tick (*Dermacentor andersoni*), and the lone star tick (*Amblyomma americanum*). Handling infected animals, consumption of contaminated water or undercooked meat, and inhalation of aerosolized bacteria are also potential modes of transmission. Tularemia can manifest in several forms, including ulceroglandular (skin ulcer and swollen lymph nodes), glandular (swollen lymph nodes without an ulcer), oculoglandular (eye infection), oropharyngeal (sore throat and mouth ulcers), pneumonic (respiratory symptoms), and typhoidal (severe systemic illness). Tularemia has been reported in every state except Hawaii, with the highest incidence observed in the southern central United States, the Pacific Northwest, and specific regions of Massachusetts.



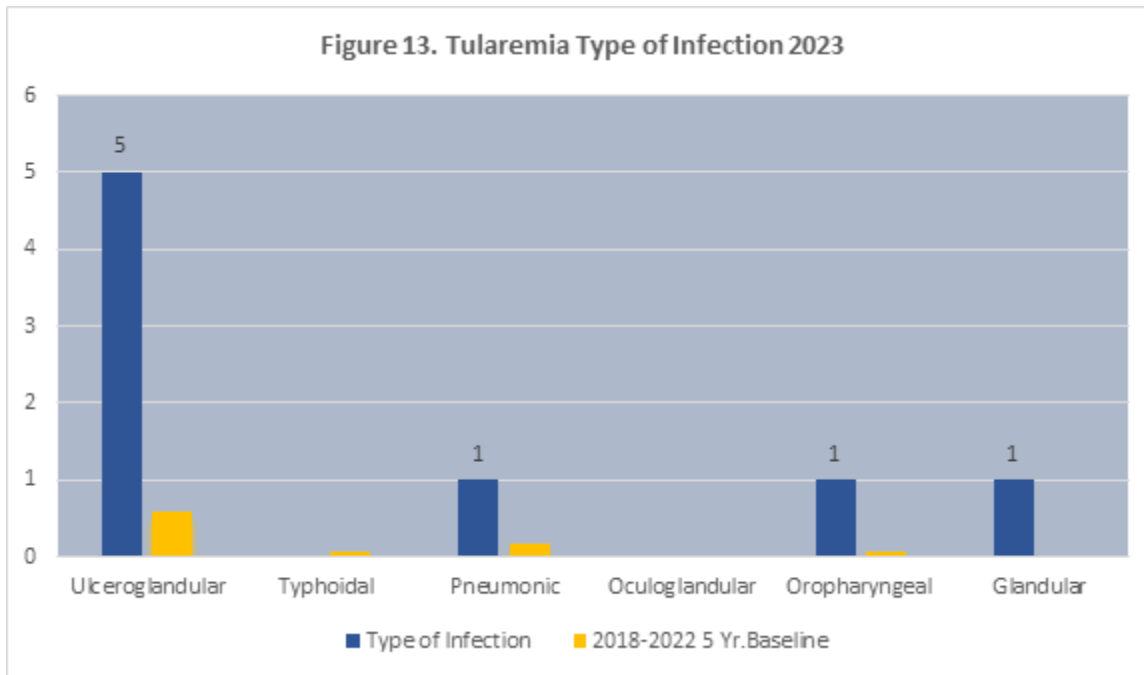
South Dakota-acquired infections accounted for 100% of all the cases between 2018-2023. There have been no instances of out-of-state or international travel-related cases since 2018. Tularemia case numbers remained stable between 2018-2021, ranging from 9 to 17 cases per year. In 2022, no cases of Tularemia were reported. In 2023, there were 8 tularemia cases reported from the following counties: Lincoln (1), Mead (1), Minnehaha (1), Oglala Lakota (1), Pennington (1), Sanborn (1), Todd (1), and Yankton (1).



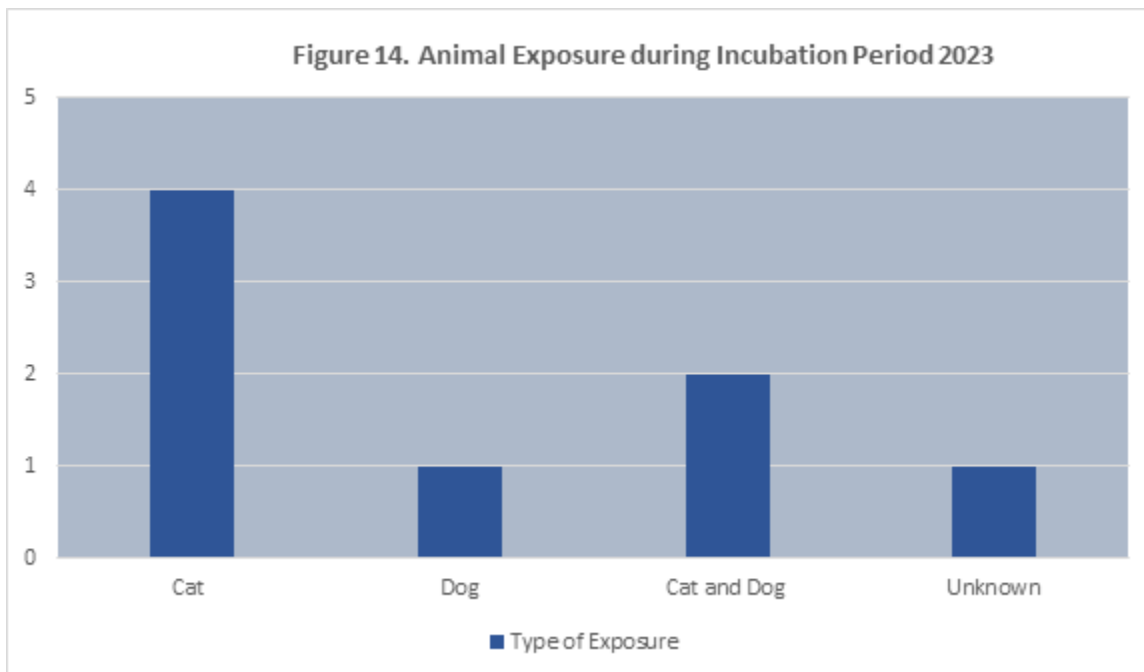
In 2023, tularemia was predominantly identified among individuals aged 30–39 and 50–59. Over the past five years, the highest incidence of tularemia occurred in the 0–9 age group, followed by the 60–69 age group. The percentage of cases among females and males were even at 50% in 2023.



Although transmission of tularemia can occur year-round, the peak transmission occurs during summer months. For 2023, 50% of the cases had disease onset occurred in June and July which is consistent with the seasonal trend seen in 2018-2022.



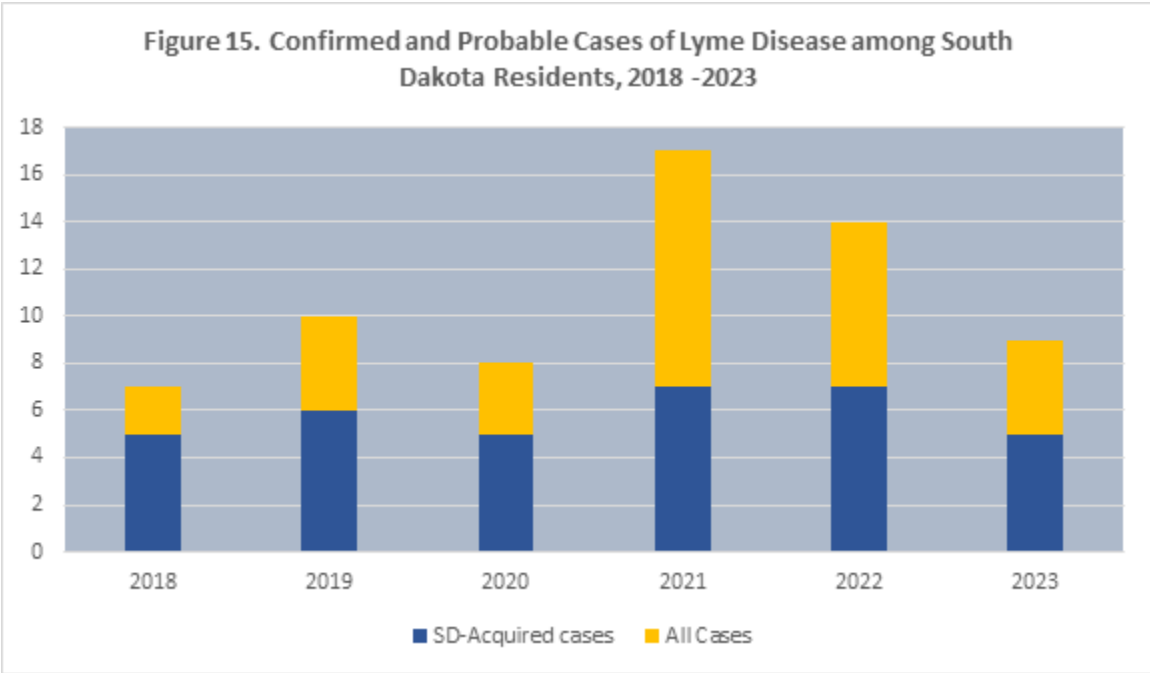
In 2023, the most commonly reported type of tularemia infection was ulceroglandular which is consistent with the 5-year baseline trend.



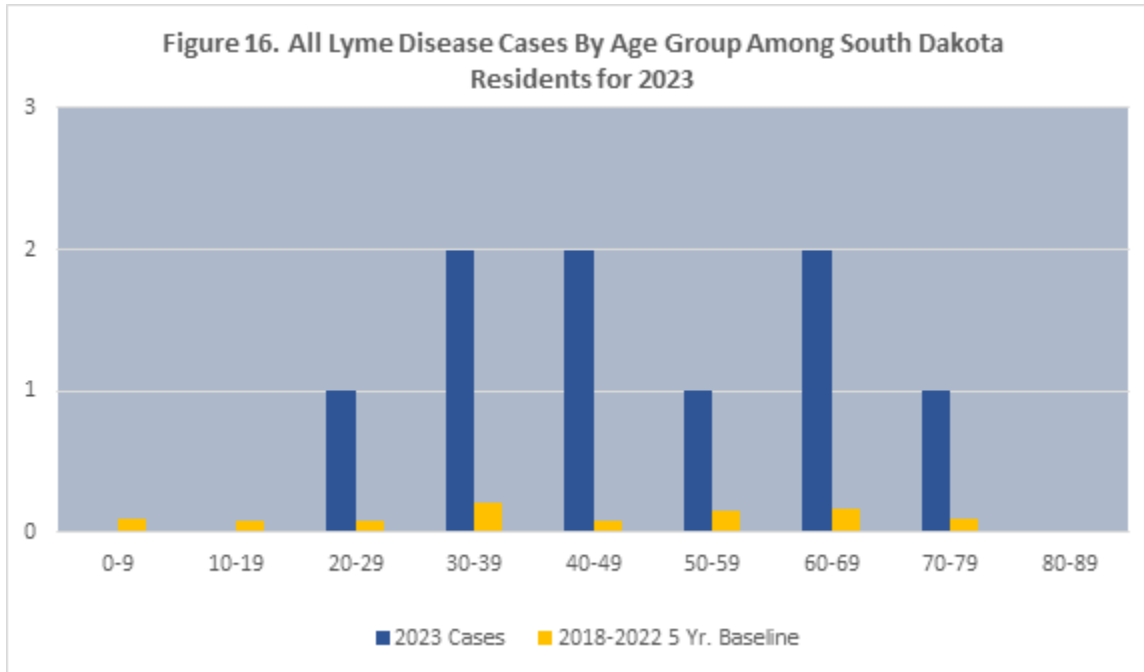
In 2023, 80% of the cases had exposure to cats during the incubation period.

Lyme Disease

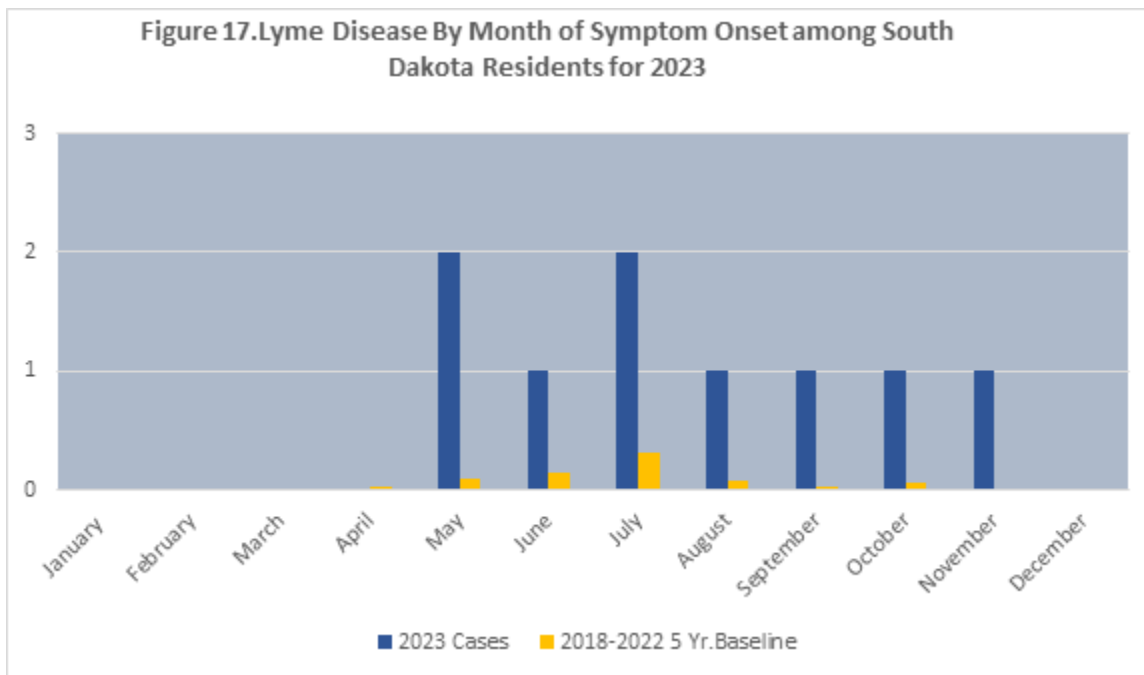
Lyme disease is an infectious illness caused by the bacterium *Borrelia burgdorferi*, which is transmitted to humans through the bite of infected black-legged ticks. The ticks become carriers of the bacteria after feeding on infected animals, usually small mammals like mice and deer. The incubation period of Lyme disease is typically 3–30 days. Typical symptoms include fever, headache, fatigue, and a characteristic skin rash called erythema migrans. If left untreated, infection can spread to joints, the heart, and the nervous system. Lyme disease is diagnosed based on symptoms, physical findings (e.g., rash), and the possibility of exposure to infected ticks. In United States, highly endemic areas include the northeastern and north central.



Lyme case numbers have remained stable between 2018-2023, ranging from 7 to 17 cases per year. In 2023, 6 cases were reported as South Dakota-acquired infections from Charles Mix (1), Hamlin (1), Hanson (1), Hughes (1), Lyman (1), Pennington (1) and 3 cases had travelled to Minnesota (2), New York (1), Connecticut (1) during the incubation period.



In 2023, Lyme disease was predominantly identified among individuals aged 30–39, 40–49, and 50–59. Over the past five years, the highest incidence of Lyme disease occurred in the 30–39 age group, followed by the 50–59 age group. Males accounted for 70% of Lyme cases in 2023.



For 2023, 50% of cases had an illness onset in the summer months which is consistent with the seasonal trend seen from 2018-2022.



ESIC
Epidemiology,
Surveillance,
and Informatics
Center