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

Spotted Fever Rickettsiosis Surveillance Summary from 2017—2022

Background

Spotted fever rickettsioses (SFR), including Rocky Mountain spotted fever (RMSF), are a group of bacterial infections caused by *Rickettsia* spp. including *R. rickettsii* and *R. parkeri*, among others. Spotted fevers are transmitted to humans through the bite of an infected tick. In North Carolina the most common vectors of spotted fevers include the American dog tick, *Dermacentor variabilis*, and the Lone star tick, *Amblyomma americanum*. The brown dog tick, *Rhipicephalus sanguineus* and the Rocky Mountain wood tick, *D. andersoni*, has been implicated in transmission in other parts of the US. If left untreated, illness can become serious, even leading to death.

Symptomology

Early signs of SFR are non-specific, including fever and headache. Symptoms may appear 3–12 days following a tick bite. Other signs and symptoms can include nausea, vomiting, stomach pain, muscle pain, lack of appetite, and rash (may be present or absent). Rash is a common sign among those infected with *R. rickettsii*, the causative agent of RMSF, and usually develops 2–4 days following fever onset. Rashes can look like red splotches or pinpoint dots.

Epidemiology

National

Incidence varies considerably by geographic area. Between 2008–2012, 63% of reported SFR cases originated from five states: Arkansas, Missouri, North Carolina, Oklahoma, and Tennessee¹. Thousands of cases of SFR occur every year, but it is unknown how many cases are RMSF. Case fatality rates vary annually, but have decreased overall from 28% in 1944 to < 1% in 2001. The national average incidence of **confirmed and probable** SFGR cases in 2019 was 1.59 cases per 100,000.²

North Carolina

The number of confirmed and probable cases of spotted fever rickettsiosis decreased significantly in North Carolina since 2020. In January 2020, the case definition of SFR was amended to require an elevated IgG antibody titer of $\geq 1:128$ within 60 days of illness onset³, which resulted in a sharp decrease in SFGR cases nationwide. The decline in SFGR cases in 2022 may also be linked to the large number of events that were closed as “suspect.” Suspected events occur when a patient has a positive laboratory test, but no accompanying clinical data can be gathered. The 5-year average incidence rate of SFGR in North Carolina between 2017—2021 was 3.99 **confirmed and probable** cases per 100,000 residents, which is higher than the national average². The incidence of **confirmed and probable** SFGR cases in North Carolina in 2022 was 1.91 cases per 100,000 residents (using 2021 population data).

Diagnosis

Delay in diagnosis and treatment is the most important factor associated with poor outcomes, and early treatment based on clinical impression is the best way to prevent RMSF progression. Both acute and convalescent serum specimens are needed to confirm the rickettsial infection. Serological tests are often negative during the acute phase of illness, however, physicians may diagnose patients based on the symptoms outlined above.

Prevention

Reducing exposure to ticks is the best defense against SFGR. 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.

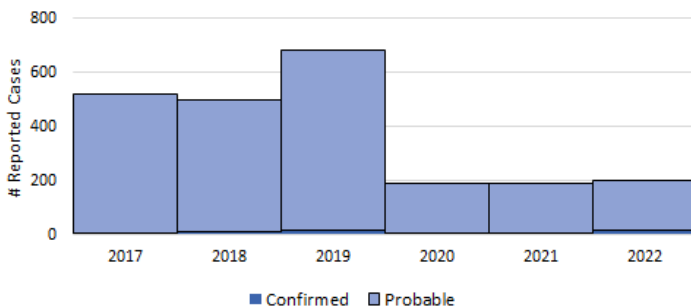
Case Demographics (Confirmed and Probable)

Sex	5 Year Avg (2017-21)		2022	
	No. of Cases	% of total	No. of Cases	% of total
Male	280	67.3%	144	72%
Female	136	32.7%	57	28%

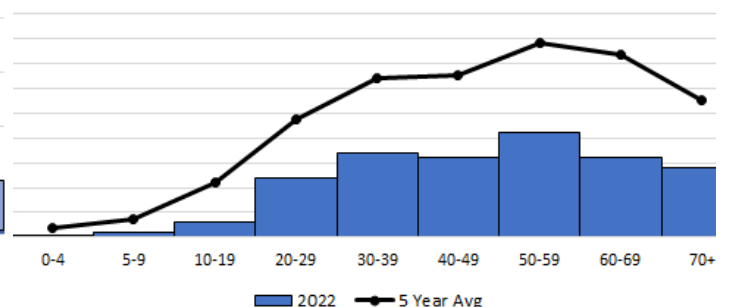
Race	5 Year Avg (2017-21)		2022	
	No. of Cases	% of total	No. of Cases	% of total
White	243.4	58.5%	139	69.2%
Black or African Amer.	22.2	5.3%	17	8.5%
Amer. Indian or Alaskan	1	0.2%	2	0.0%
Asian	3	0.7%	4	2.0%
Other	8.4	2.0%	12	6.0%
Unknown	164.8	39.6%	27	13.4%

Hispanic Ethnicity	5 Year Avg (2017-21)		2022	
	No. of Cases	% of total	No. of Cases	% of total
Yes	12	3.0%	10	5.0%
No	228	54.8%	125	62.2%
Unknown	176	42.3%	66	32.8%

Confirmed and Probable Spotted Fever Rickettsiosis by Year, NC, 2017-2022; n= 2283

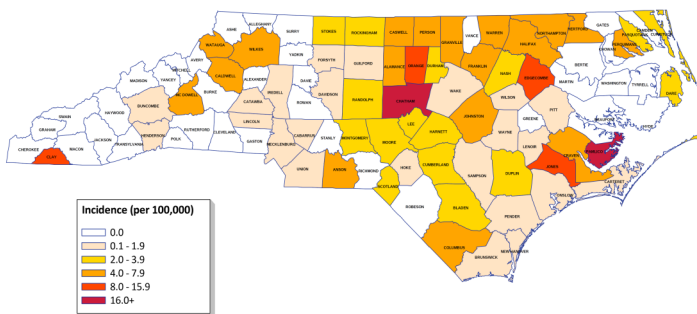


Confirmed and Probable Spotted Fever Rickettsiosis by Age Range, NC



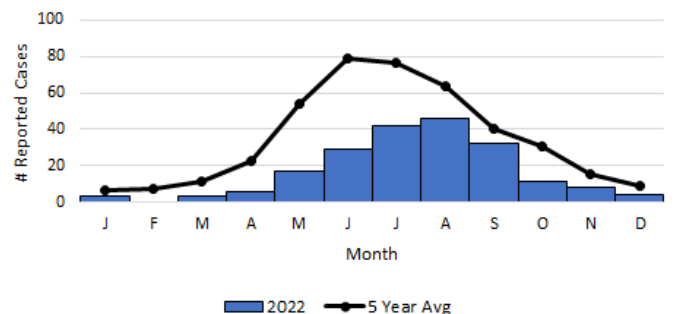
Geographic Distribution

Confirmed and Probable Incidence of Spotted Fever Group Rickettsiosis Cases by County of Residence, NC, 2022



Cases by Age

Confirmed and Probable Spotted Fever Rickettsiosis cases by Month of Illness Onset, NC



¹ Rocky Mountain Spotted Fever Facts: <https://www.cdc.gov/rmsf/stats/index.html>

² Data are based on a national surveillance data found at: <https://wonder.cdc.gov/nndss/static/2019/annual/2019-table2p-H.pdf>

³ CDC Spotted Fever Group Rickettsiosis Case Definition: <https://ndc.services.cdc.gov/case-definitions/spotted-fever-rickettsiosis-2020/>