Cryptosporidiosis NNDSS Summary Report for 2019

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Background

Surveillance Overview: National Cryptosporidiosis Case Surveillance

Cryptosporidiosis is a gastrointestinal illness caused by protozoa of the genus *Cryptosporidium*, the leading cause of U.S. waterborne disease outbreaks (*1*) and the third leading cause of U.S. zoonotic enteric illness (*2*). An estimated 823,000 cryptosporidiosis cases occur annually; this means <2% of cases are nationally notified (*3*). *Cryptosporidium* infection can be symptomatic or asymptomatic. Immunocompetent patients can experience frequent, non-bloody, watery diarrhea typically lasting up to 2–3 weeks (*4*). Additional symptoms can include vomiting, nausea, abdominal pain, fever, anorexia, fatigue, and weight loss. Immunocompromised patients can experience profuse watery diarrhea lasting weeks to months or even life-threatening malnutrition and wasting.

Cryptosporidiosis is a nationally notifiable disease; the first full year of reporting was 1995. National data are collected through passive surveillance. Healthcare providers and laboratories that diagnose cryptosporidiosis are mandated to report cases to the local or state health department. The 50 state, District of Columbia (DC), New York City (NYC), and territorial public health agencies, in turn, voluntarily notify CDC of cases via the National Notifiable Disease Surveillance System (NNDSS). Some states conduct enhanced molecular surveillance of cryptosporidiosis through participation in CryptoNet; CryptoNet data are not presented here.

State, DC, NYC, U.S. territory, and freely associated state public health agencies voluntarily notify CDC of cryptosporidiosis outbreaks via the National Outbreak Reporting System (NORS). NORS data are not presented here; however, summaries of data on waterborne disease outbreaks are reported elsewhere.

Methods

Case Definition

The definition of a confirmed case of cryptosporidiosis has changed over time. The first national case definition was published in 1995; the current case definition was published in 2012. The pre-2011 case definitions classified a case with any laboratory evidence of *Cryptosporidium* infection as a confirmed case.

The 2012 confirmed case definition requires evidence of *Cryptosporidium* organisms or DNA in stool, intestinal fluid, tissue samples, biopsy specimens, or other biological sample by certain laboratory methods with a high positive predictive value (e.g., direct fluorescent antibody [DFA] test, polymerase chain reaction [PCR], enzyme immunoassay [EIA], or light microscopy of stained specimen).

A probable case of cryptosporidiosis is defined as 1) having supportive laboratory test results for *Cryptosporidium* spp. infection using a screening test method, such as immunochromatographic card or rapid card test, or a laboratory test of unknown method or 2) meeting clinical criteria (i.e., diarrhea and one or more of the following: diarrhea duration of >72 hours, abdominal cramping, vomiting, or anorexia) and being epidemiologically linked to a confirmed case.

A suspect case is defined as having a diarrheal illness and being epidemiologically linked to a probable case. Cases not classified as confirmed, probable, or suspect are classified as unknown.

Analysis

National cryptosporidiosis surveillance data for 2019 were analyzed using R version 4.0.3. Data cleaning processes included case deduplication and the verification of case status (confirmed, nonconfirmed). Numbers, percentages, and incidence (cases per 100,000 population) of cryptosporidiosis were calculated in aggregate for the United States and separately for each reporting jurisdiction. Incidence was calculated by dividing the number of cryptosporidiosis cases by mid-year census estimates (*5*) and multiplying by 100,000. U.S. Census Bureau data were obtained using their Application Programming Interface and the R censusapi package (*6*–*7*). In addition to analyzing data nationally and by reporting jurisdiction, data were analyzed by region (Northeast, Midwest, South, and West regions), as defined by the U.S. Census Bureau (*8*). To account for differences in the seasonal use of recreational water, the West region was further subdivided into Northwest and Southwest.

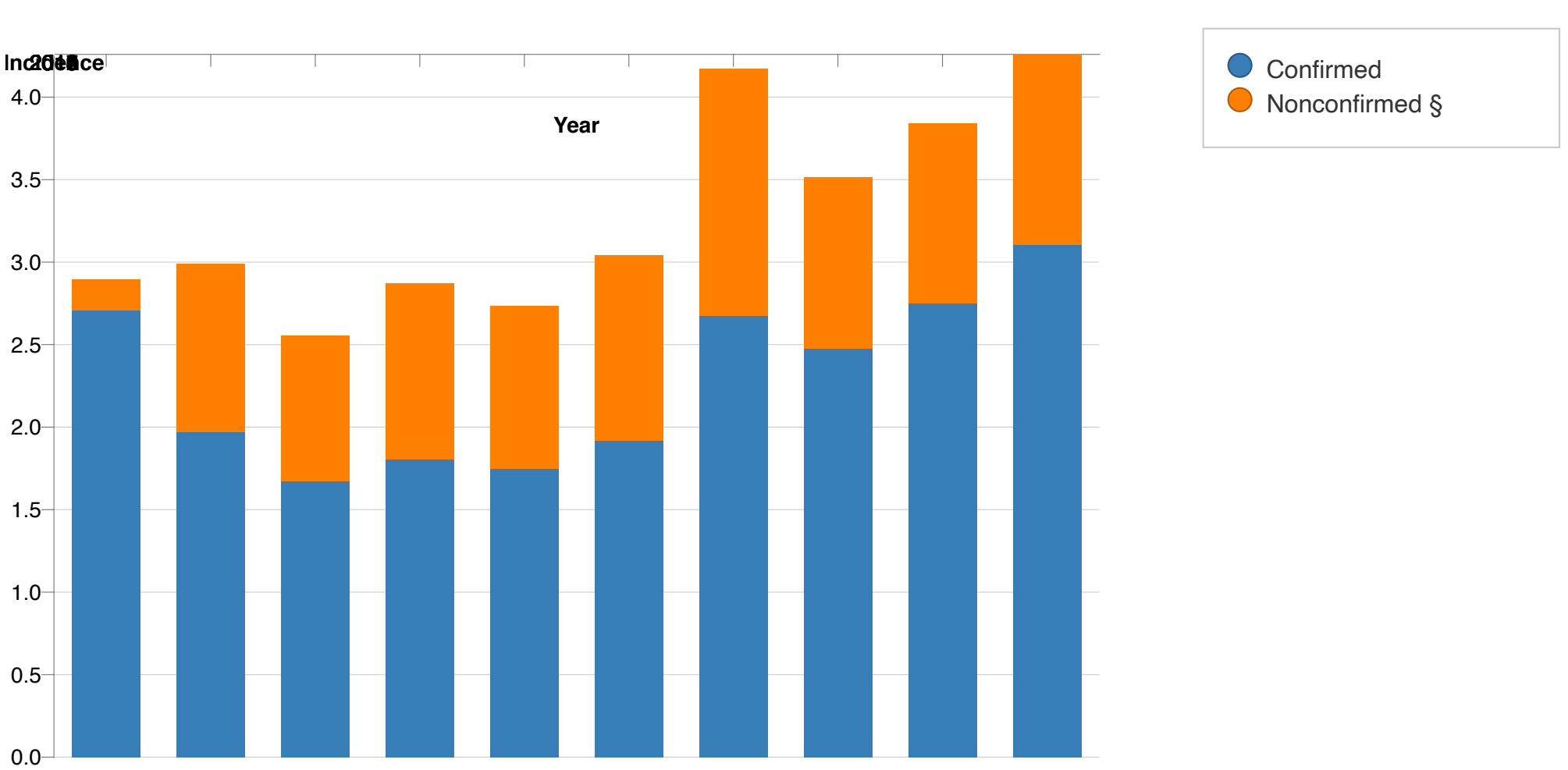
To examine reporting over time, cryptosporidiosis incidence was calculated by year (2010–2019) and case status. Average annual cryptosporidiosis incidence was calculated by demographic variables (e.g., age and sex). Incidence was not calculated for race, ethnicity, or month of onset, due to large proportion of missing data for these variables (i.e., 16.4%, 24.9%, and 20.2%, respectively). One case reported by Puerto Rico for 2016 was excluded from analysis, because detailed demographic census data are not available to calculate incidence by age and sex.

Acknowledgements

The authors thank the Surveillance and Data Branch, Division of Health Informatics and Surveillance, Center for Surveillance, Epidemiology, and Laboratory Services; Office of Public Health Scientific Services, Centers for Disease Control and Prevention for preparing and aggregating state-based NNDSS data for dissemination.

Tables and Figures

Figure 1. Incidence* of reported cryptosporidiosis cases, by year and case classification — National Notifiable Diseases Surveillance System, United States, 2010–2019 (N=105,211)



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* Cases per 100,000 population per year
§ Probable, suspect, or unknown cases

During the last decade, incidence of cryptosporidiosis has increased 47.2%. This continues a marked increase of 241% since 2004. This increase could be related to increased testing for *Cryptosporidium* due to increasing use of diagnostic multiplex PCR panels for gastrointestinal illness. This could also reflect true increases in cryptosporidiosis incidence. The consistently increased incidence of reported nonconfirmed cases after 2010 likely reflects changes in the national case definition.

Table 1. Number, percentage*, and incidence§ of reported cryptosporidiosis cases, by region and jurisdiction — National Notifiable Diseases Surveillance System, United States, 2019 (N=13,979)

Region/Jurisdiction	No.	%	Incidence	No. of outbreak-associated cases
Northeast	**2,224**	**15.9**	**4**	**113**
Connecticut	80	0.6	2.2	N/A
Maine	71	0.5	5.3	11
Massachusetts	231	1.7	3.4	3
New Hampshire	65	0.5	4.8	N/A
New Jersey	288	2.1	3.2	N/A
New York City¶	397	2.8	4.8	60
New York State¶	486	3.5	4.4	5
Pennsylvania	514	3.7	4	11
Rhode Island	63	0.5	5.9	23
Vermont	29	0.2	4.6	N/A
Midwest	**4,540**	**32.5**	**6.6**	**114**
Illinois	407	2.9	3.2	31
Indiana	322	2.3	4.8	1
Iowa	558	4.0	17.7	N/A
Kansas	139	1	4.8	2
Michigan	415	3	4.2	23
Minnesota	487	3.5	8.6	22

Missouri	400	2.9	6.5	N/A
Nebraska	193	1.4	10	1
North Dakota	38	0.3	5	N/A
Ohio	685	4.9	5.9	26
South Dakota	167	1.2	18.9	8
Wisconsin	729	5.2	12.5	N/A
South	**5,014**	**35.9**	**4**	**360**
Alabama	226	1.6	4.6	N/A
Arkansas	142	1	4.7	N/A
Delaware	39	0.3	4	N/A
District of Columbia	31	0.2	4.4	N/A
Florida	662	4.7	3.1	41
Georgia	364	2.6	3.4	N/A
Kentucky	341	2.4	7.6	6
Louisiana	355	2.5	7.6	N/A
Maryland	107	0.8	1.8	1
Mississippi	124	0.9	4.2	N/A
North Carolina	286	2	2.7	3
Oklahoma	194	1.4	4.9	N/A
South Carolina	111	0.8	2.2	N/A
Tennessee	247	1.8	3.6	N/A
Texas	1,190	8.5	4.1	204
Virginia	521	3.7	6.1	105
West Virginia	74	0.5	4.1	N/A
Northwest	**723**	**5.2**	**4.5**	**20**
Alaska	12	0.1	1.6	N/A
Idaho	131	0.9	7.3	12
Montana	72	0.5	6.7	N/A
Oregon	254	1.8	6	6

Washington	232	1.7	3	2
Wyoming	22	0.2	3.8	N/A
Southwest	**1,478**	**10.6**	**2.4**	**7**
Arizona	143	1	2	N/A
California	727	5.2	1.8	N/A
Colorado	269	1.9	4.7	7
Hawaii	9	0.1	0.6	N/A
Nevada	50	0.4	1.6	N/A
New Mexico	83	0.6	4.0	N/A
Utah	197	1.4	6.1	N/A
Total	**13,979**	**100**	**4.3**	**614**

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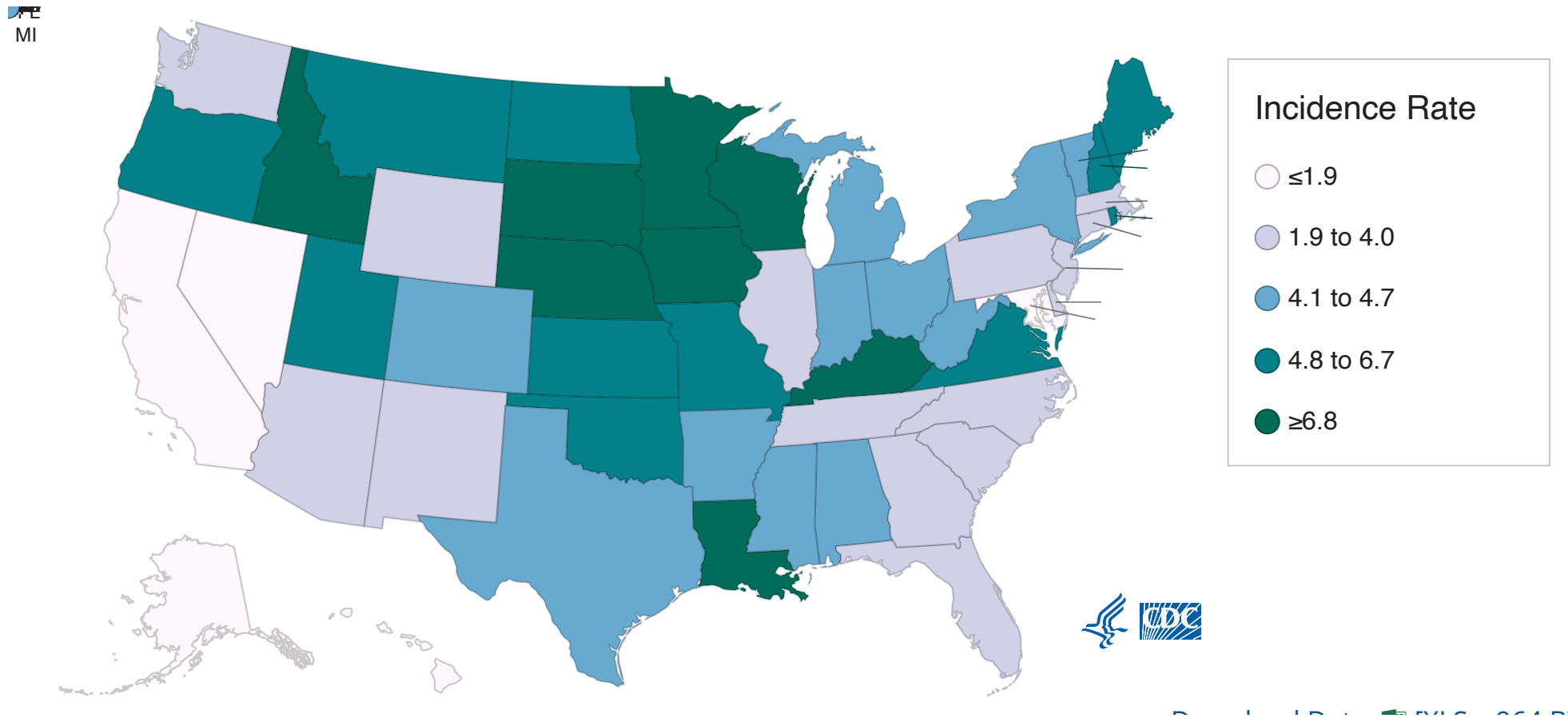
* Percentages might not total 100% because of rounding
§ Cases per 100,000 population
¶ New York State and New York City data are mutually exclusive

By jurisdiction, incidence ranged from 19.2 per 100,000 population in South Dakota through 0.6 per 100,000 population in Hawaii. As a region, the Midwest has the greatest overall incidence of 6.7 per 100,000 population. This coincides with this region having some of the highest incidence by jurisdiction. Differences in incidence might reflect differences in risk factors or mode of transmission of *Cryptosporidium*; the magnitude of outbreaks; or the capacity or requirements to detect, investigate, and report cases.

Figure 2. Incidence* of reported cryptosporidiosis cases, by jurisdiction — National Notifiable Diseases Surveillance System, United States, 2019 (N=13,979)



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* Cases per 100,000 population

¶ New York State and New York City data are mutually exclusive

Cryptosporidiosis is geographically widespread across the United States. Although incidence appears to be consistently higher in the northern Midwest states, differences in incidence might reflect differences in risk factors or modes of transmission of *Cryptosporidium*; the magnitude of outbreaks; or the capacity or requirements to detect, investigate, and report cases.

Table 2. Number and percentage* of reported cryptosporidiosis cases, by selected patient demographic characteristics — National Notifiable Diseases Surveillance System, United States, 2019 (N=13,979)

Characteristic	No.	%
Sex		
Male	6,775	48.5
Female	7,088	50.7
Unknown	116	0.8
Race		
American Indian or Alaska Native	66	0.5
Asian or Pacific Islander	365	2.6
Black	1,106	7.9
White	9,263	66.3
Other	889	6.4
Unknown	2,290	16.4
Ethnicity		
Hispanic or Latino	1,450	10.4
Not Hispanic or Latino	9,051	64.7
Unknown	3,478	24.9
Total	**13,979**	**100.0**

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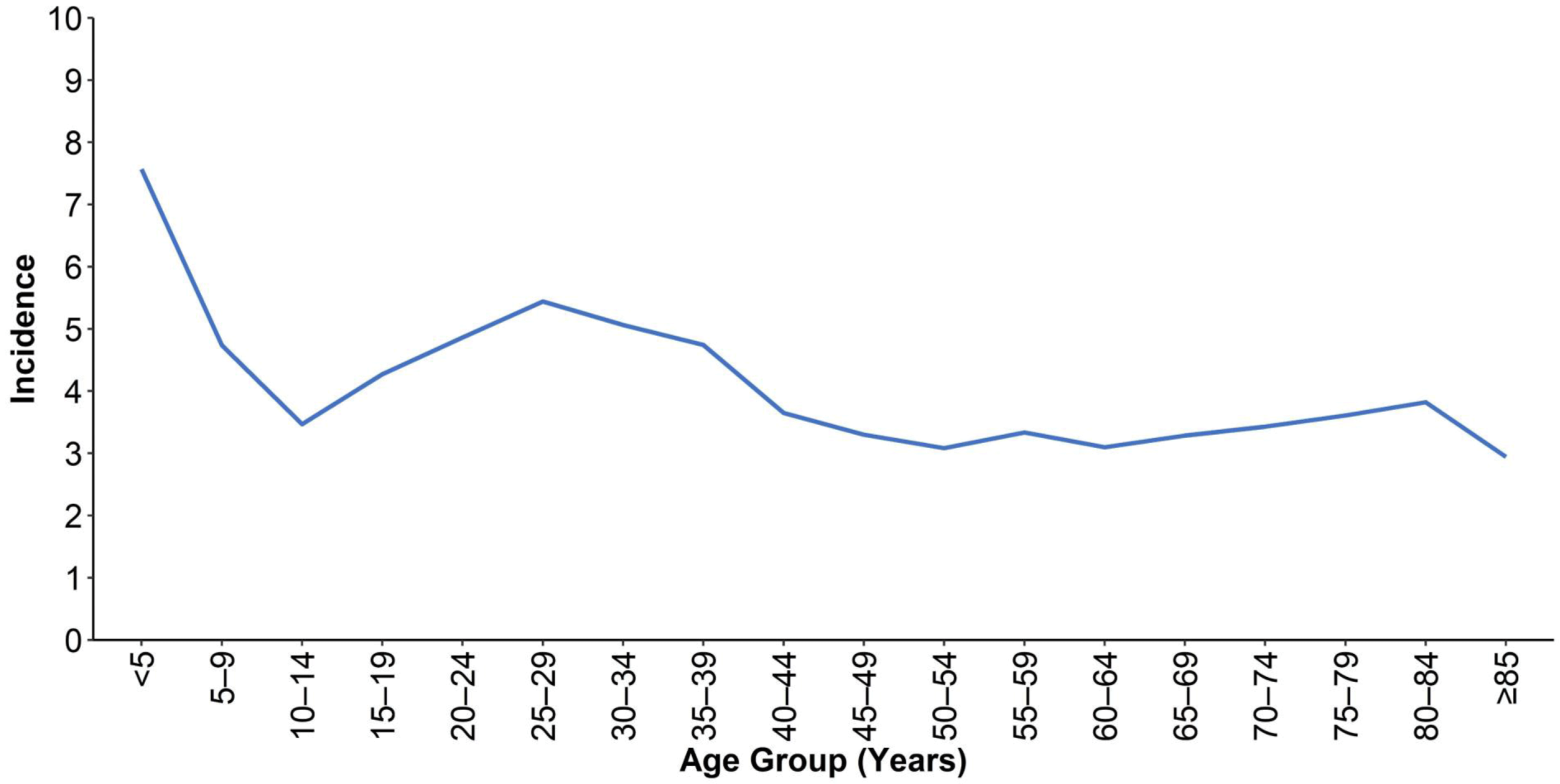
* Percentages might not total 100% because of rounding

More than half (7,088 [51.1%]) of patients for whom gender was reported were female. Of the 11,689 patients for whom race was reported, 79.2% were white. Of the 10,501 patients for whom ethnicity was reported, 13.8% were Hispanic.

Figure 3. Incidence* of reported cryptosporidiosis cases, by age group — National Notifiable Diseases Surveillance System, United States, 2019 (N=13,924§)



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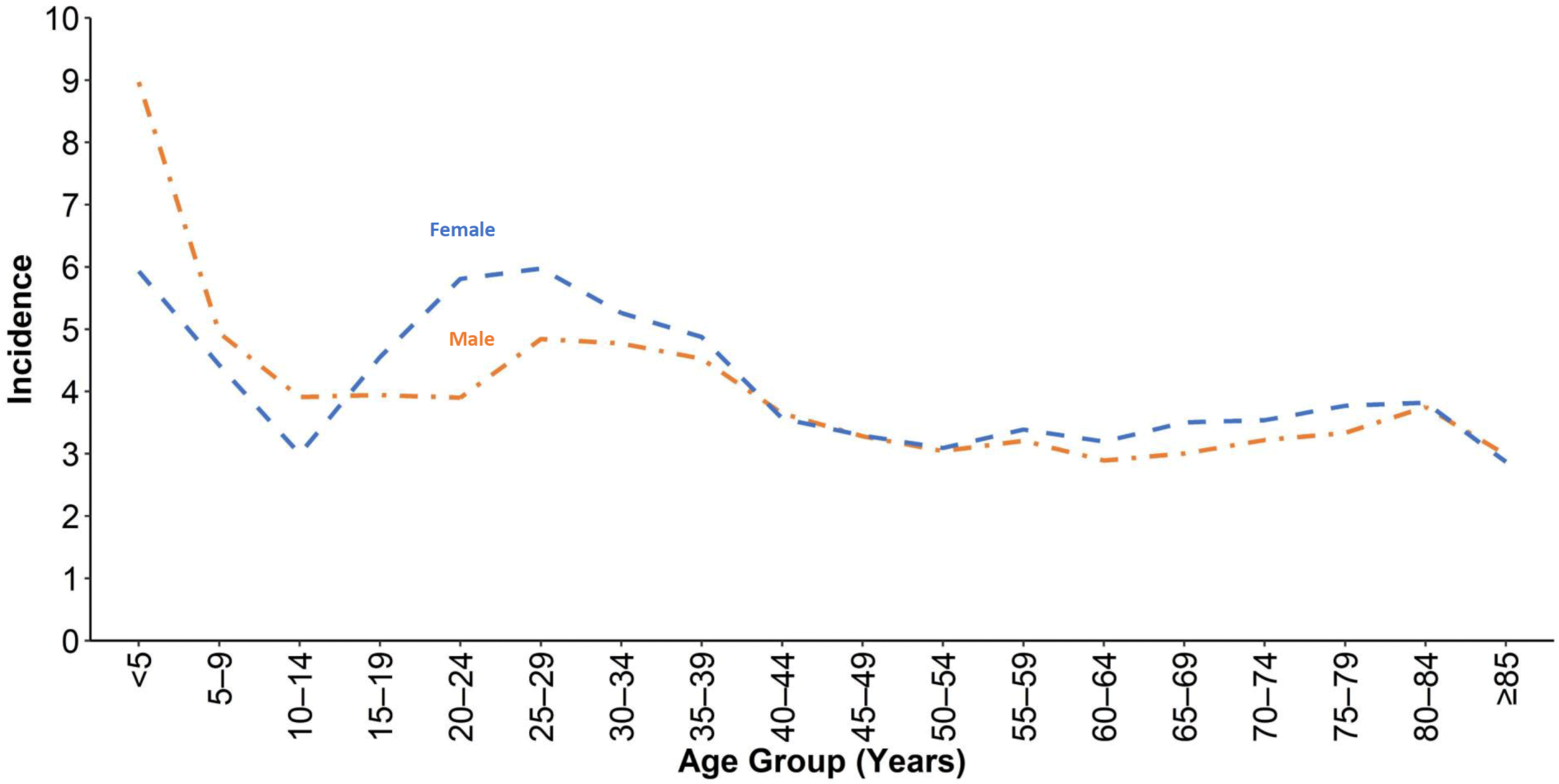
* Cases per 100,000 population
§ Age data missing for 55 patients

The incidence of reported cryptosporidiosis, by age group, was highest among patients ages <5 years (7.6 cases per 100,000 population), 25–29 years (5.4), 30–34 years (5.1), and 20–24 years (4.9). This might reflect young children becoming infected and ill and their caregivers subsequently becoming infected after changing diapers of young children or helping them with toileting.

Figure 4. Incidence* of reported cryptosporidiosis cases, by sex and age group — National Notifiable Diseases Surveillance System, United States, 2019 (N=13,808§)



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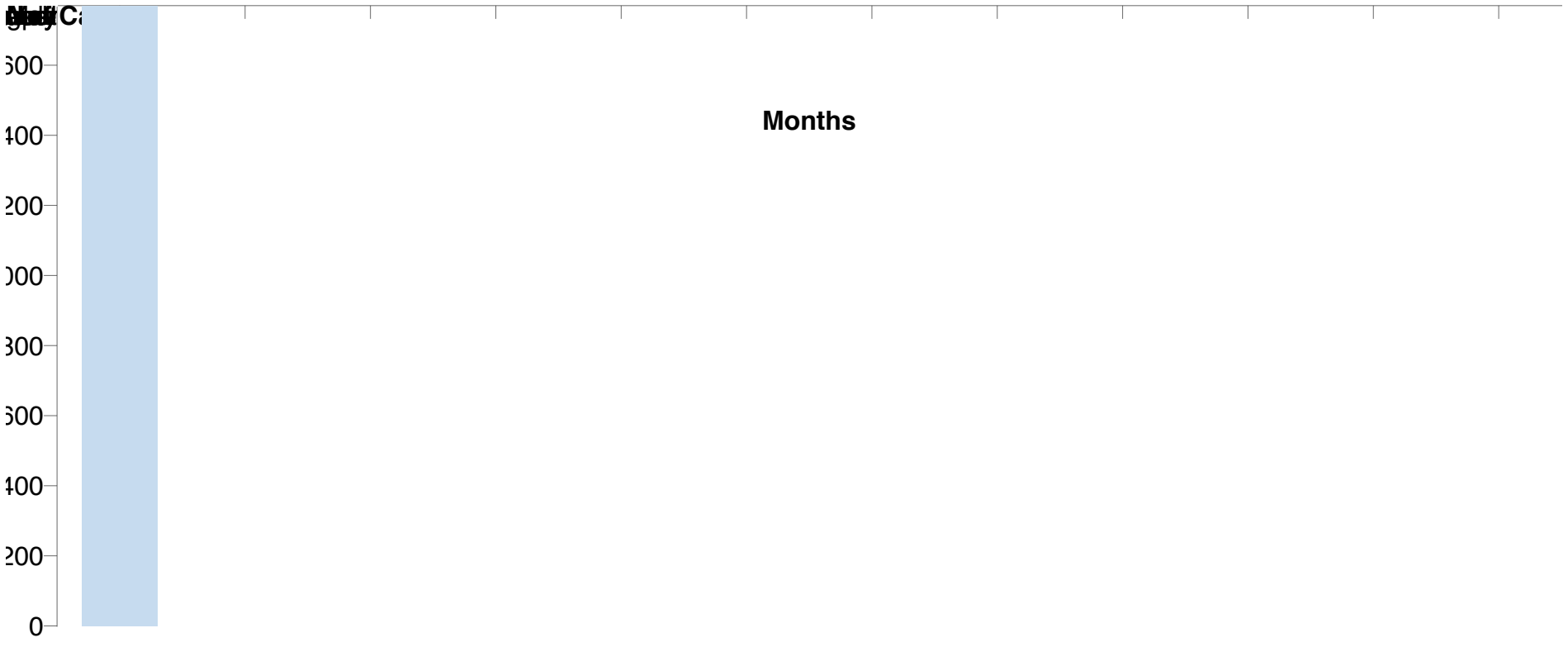
* Cases per 100,000 population
§ Age or sex data missing for 171 patients

The highest incidence of cryptosporidiosis, by sex and age group, was among males ages <5 years (9.0 cases per 100,000 population) and females ages 25–29 years (6.0 cases per 100,000). Incidence for females were higher than for males for all age groups >19 years, except those 40–44 years and 80–84 years. The incidence is essentially the same for females and males ages 45–54 years. Differences in age-specific incidence might be due to age-specific differences in risk factors or modes of transmission of *Cryptosporidium*. For example, compared with males, females might be more likely to change diapers of young children or help them with toileting, and thus, more likely to be exposed to *Cryptosporidium*. Additionally, compared with males, females might be more likely to seek healthcare, and thus, more likely to have illness diagnosed and reported as cryptosporidiosis.

Figure 5. Number of reported cryptosporidiosis cases, by month of symptom onset — National Notifiable Diseases Surveillance System, United States, 2019 (N=11,157*)



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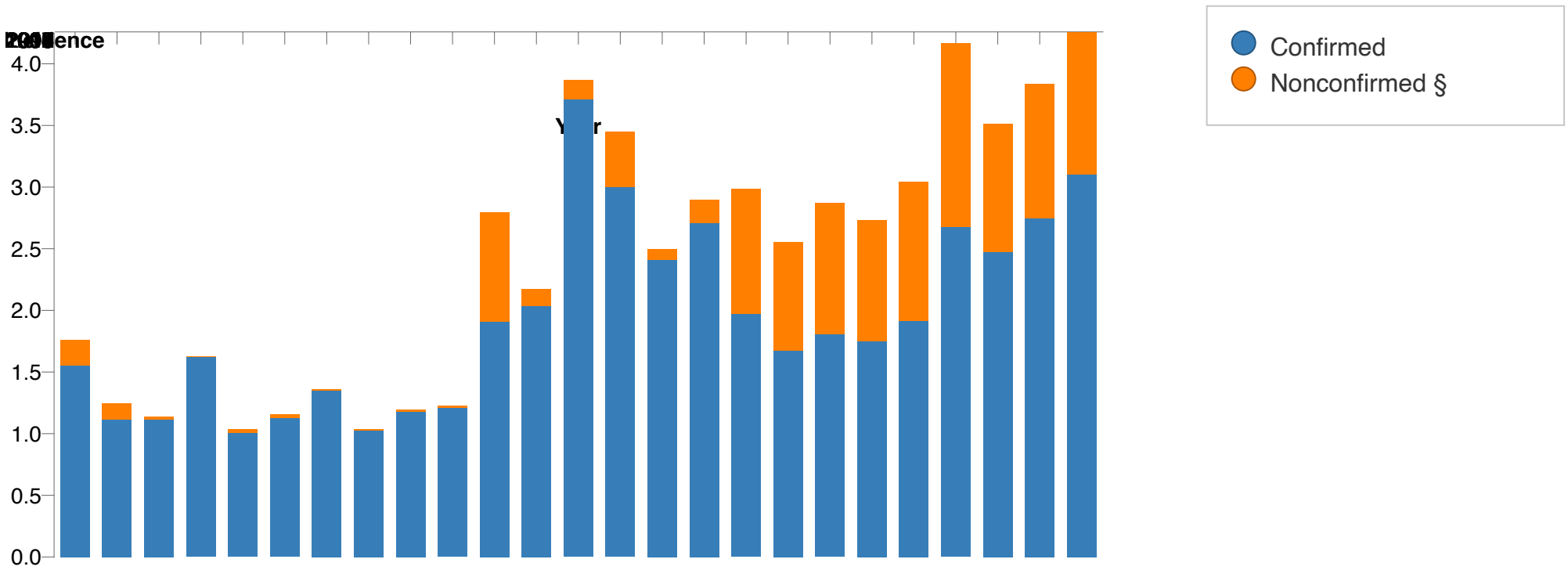
* Age data missing for 2,822 patients

The number of cryptosporidiosis cases was greatest in August (N=1,770) and lowest in February (N=498). The number of cases, by month of symptom onset, reflects seasonal differences in exposure, such as summertime swimming.

Supplemental Figure 1. Incidence* of reported cryptosporidiosis cases, by year and case classification — National Notifiable Diseases Surveillance System, United States, 1995¶–2019 (N=181,621)



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* Cases per 100,000 population per year

§ Probable, suspect, or unknown cases

¶ First full year of national reporting

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