CRYPTOSPORIDIOSIS
SUMMARY REPORT

2016
NATIONAL NOTIFIABLE DISEASES
SURVEILLANCE SYSTEM, UNITED STATES

Centers for Disease
Control and Prevention
National Center for Emerging and
Zoonotic Infectious Diseases

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Data are presented for cases of cryptosporidiosis for the year 2016 reported to CDC through October 9, 2018.

Findings and conclusions from this report do not necessarily represent the official position of the Centers for Disease Control and Prevention.

Contents

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 748,000 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 states, territorial, District of Columbia (DC), and New York City health departments, in turn, voluntarily notify CDC of cases via the National Notifiable Diseases Surveillance System (NNDSS). Some states conduct enhanced molecular surveillance of cryptosporidiosis through participation in CryptoNet; CryptoNet data are not presented here.

State, DC, US 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, and 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 2016 were analyzed using R version 3.5.1 and SAS version 9.4. Data cleaning processes included case deduplication and the verification of case status (e.g., 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. Rates were calculated by dividing the number of cryptosporidiosis cases by mid-year census estimates (*5*–*7*) and multiplying by 100,000. 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 rates were calculated by year (1995–2016) and case status (confirmed or nonconfirmed). Average annual cryptosporidiosis rates were calculated by demographic variables (e.g., age and sex). Rates were not calculated neither for race and ethnicity because 17.8% of race data and 25.7% of ethnicity data were missing nor by month of symptom onset. One case reported by Puerto Rico in 2016 was excluded from analysis, because detailed demographic census data are not available to calculate rates by age and sex.

Acknowledgements

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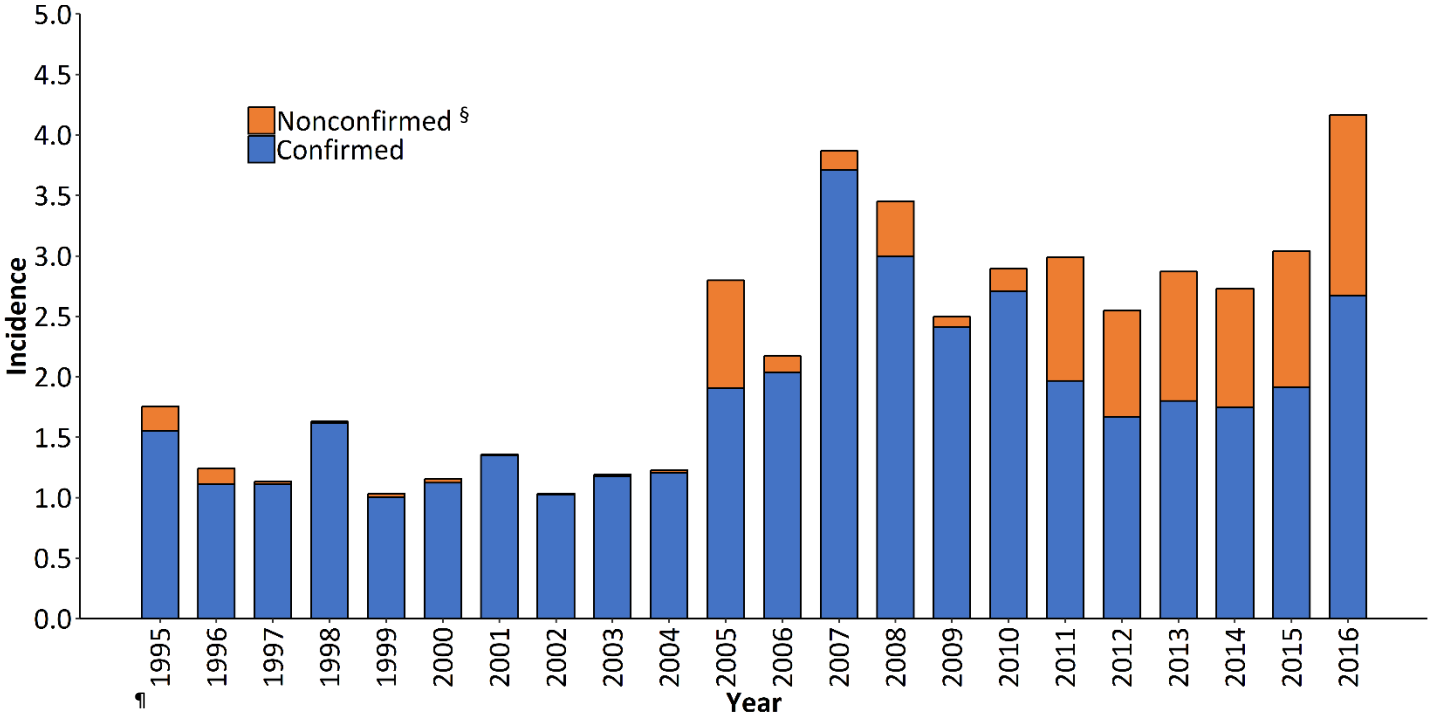
Tables and Figures

Figure 1. Incidence* of cryptosporidiosis cases, by year and case classification — National Notifiable Diseases Surveillance System, United States, 1995–2016 (n=143,681) - Download raw data.



* Cases per 100,000 population per year

§ Probable, suspect, or unknown cases

¶ First full year of national reporting

After 2004, the overall annual incidence rate of cryptosporidiosis has remained greater than 2.0 per 100,000 population. It is unclear if this reflects a true increase or one or more of the following: U.S. Food and Drug Administration's 2005 approval of nitazoxanide to treat cryptosporidiosis in immunocompetent patients ages ≥12 years and substantial outbreaks (each resulting in ≥2,000 cases) that occurred in 2005 (NYS), 2007 (UT), 2008 (TX), and 2016 (OH). After 2015, testing for *Cryptosporidium* increased due to increasing use of diagnostic multiplex PCR panels for gastrointestinal illness. Additionally, the incidence of cryptosporidiosis outbreaks substantially increased in 2016. The consistently increased rate of nonconfirmed cases after 2010 likely reflects changes in the national case definition.

Table 1. Number, percentage*, and incidence§ of cryptosporidiosis cases, by region and jurisdiction — National Notifiable Diseases Surveillance System, United States, 2016 (n=13,470)

Region/Jurisdiction	No.	%	Incidence	No. of outbreak-associated cases
Northeast	**1,659**	**12.3**	**2.9**	**55**
Connecticut	63	0.5	1.8	5
Maine	57	0.4	4.3	
Massachusetts	198	1.5	2.9	4
New Hampshire	53	0.4	4.0	
New Jersey	198	1.5	2.2	3
New York City¶	193	1.4	2.2	
New York State¶	342	2.5	3.0	13
Pennsylvania	467	3.5	3.7	30
Rhode Island	18	0.1	1.7	
Vermont	70	0.5	11.2	
Midwest	**6,026**	**44.7**	**8.9**	**957**
Illinois	335	2.5	2.6	53
Indiana	214	1.6	3.2	
Iowa	753	5.6	24.1	1
Kansas	133	1.0	4.6	3
Michigan	434	3.2	4.4	10
Minnesota	464	3.4	8.4	63
Missouri	420	3.1	6.9	
Nebraska	263	2.0	13.8	25
North Dakota	37	0.3	4.9	
Ohio	1,941	14.4	16.7	792
South Dakota	158	1.2	18.3	
Wisconsin	874	6.5	15.1	10
South	**3,659**	**27.2**	**3.0**	**250**
Alabama	335	2.5	6.9	42
Arkansas	76	0.6	2.5	
Delaware	24	0.2	2.5	
District of Columbia	23	0.2	3.4	
Florida	582	4.3	2.8	113
Georgia	364	2.7	3.5	
Kentucky	139	1.0	3.1	
Louisiana	129	1.0	2.8	1
Maryland	117	0.9	1.9	
Mississippi	47	0.3	1.6	
North Carolina	293	2.2	2.9	35
Oklahoma	223	1.7	5.7	36
South Carolina	111	0.8	2.2	6
Tennessee	173	1.3	2.6	2
Texas	735	5.5	2.6	12
Virginia	244	1.8	2.9	
West Virginia	44	0.3	2.4	3
Northwest	**672**	**5.0**	**4.4**	**112**
Alaska	10	0.1	1.3	
Idaho	123	0.9	7.3	18
Montana	62	0.5	6.0	

Oregon	325	2.4	8.0	94
Washington	131	1.0	1.8	
Wyoming	21	0.2	3.6	
Southwest	**1,454**	**10.8**	**2.4**	**494**
Arizona	549	4.1	7.9	445
California	429	3.2	1.1	4
Colorado	206	1.5	3.7	10
Hawaii	12	0.1	0.8	7
Nevada	15	0.1	0.5	2
New Mexico	74	0.5	3.5	7
Utah	169	1.3	5.6	19
Total	**13,470**	**100.0**	**4.2**	**1,868**

* Percentages might not total 100% because of rounding

§ Cases per 100,000 population

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

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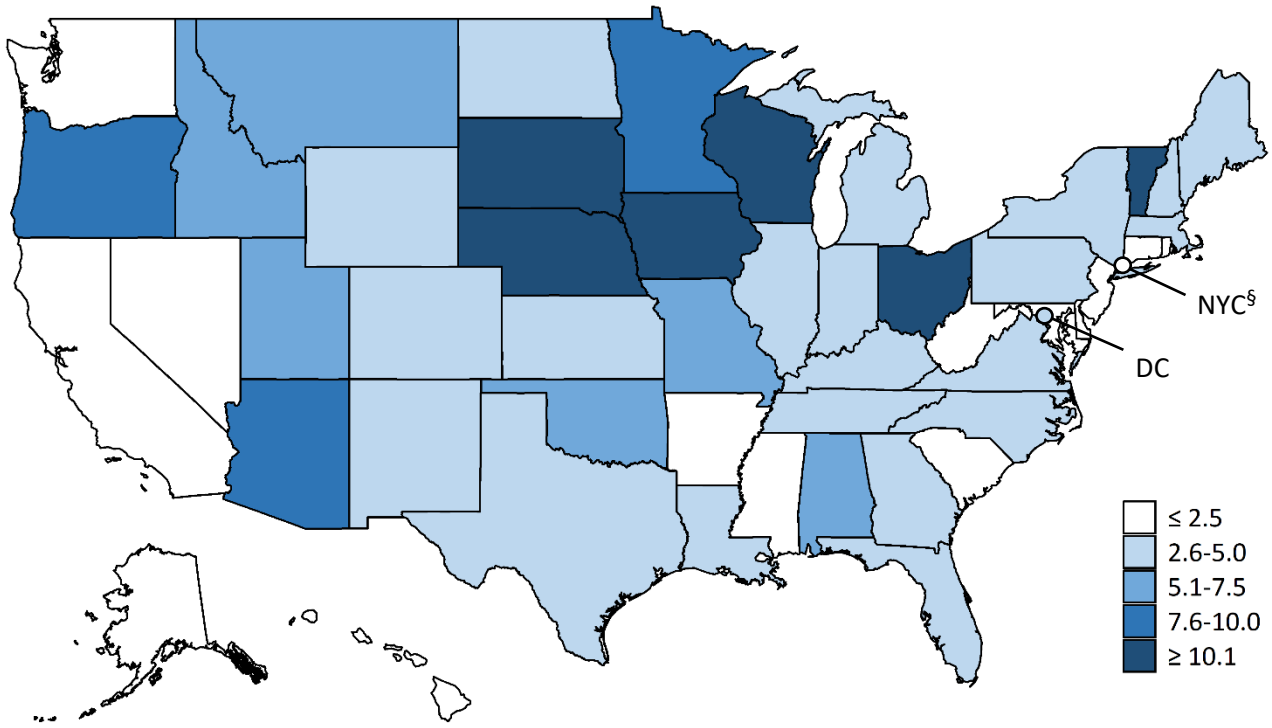
By jurisdiction, incidence ranged from 24.1 per 100,000 population in Iowa to 0.5 per 100,000 population in Nevada. As a region, the Midwest has the greatest overall incidence of 8.9 per 100,000 population. This coincides with this region having some of the highest incidence by jurisdiction. Differences 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 cryptosporidiosis cases, by jurisdiction — National Notifiable Diseases Surveillance System, United States, 2016 (n=13,470) - Download raw data.



* Cases per 100,000 population

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

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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 cryptosporidiosis cases, by selected patient demographic characteristics — National Notifiable Diseases Surveillance System, United States, 2016 (n=13,470)

Characteristic	No.	%
Sex		
Male	6,466	48.0
Female	6,909	51.3
Missing	95	0.7
Race		
American Indian/Alaska Native	106	0.8
Asian/Pacific Islander	154	1.1
Black	1,283	9.5
White	9,064	67.3
Other	471	3.5
Missing	2,392	17.8
Ethnicity		
Hispanic	1,137	8.4
Non-Hispanic	8,876	65.9
Missing	3,457	25.7
Total	**13,470**	**100.0**

* Percentages might not total 100% because of rounding

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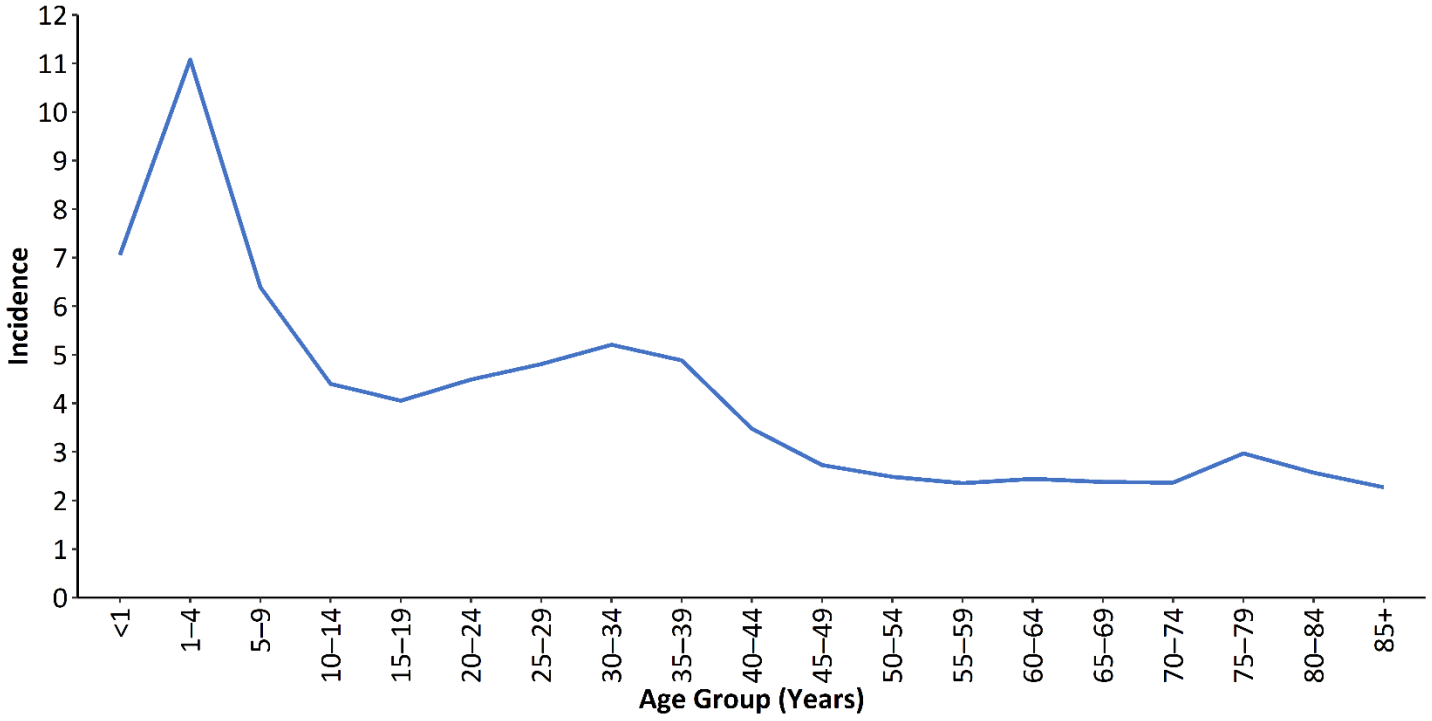
More than half of patients (6,909 [51.3%]) were female. Of the 11,078 patients for whom race was reported, 81.8% were white. Of the 10,013 patients for whom ethnicity was reported, 11.4% were Hispanic.

Figure 3. Incidence* of cryptosporidiosis cases, by age group — National Notifiable Diseases Surveillance System, United States, 2016 (n=13,409§) - Download raw data.

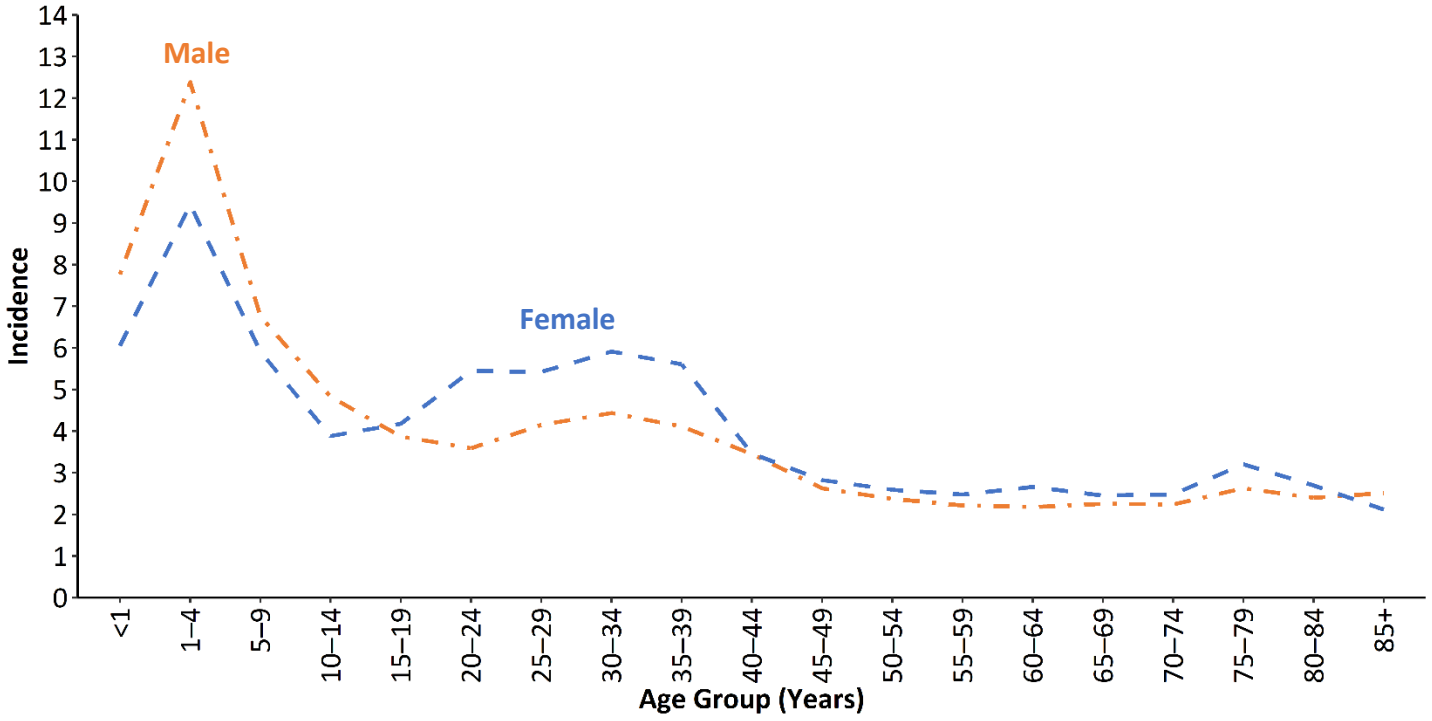


* Cases per 100,000 population

§ Age data missing for 61 patients

The incidence of cryptosporidiosis cases was highest among patients ages 1–4 years (11.1 cases per 100,000 population), <1 year (7.1), 5–9 years (6.4), and 30–34 years (5.2). 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 cryptosporidiosis cases, by sex and age group — National Notifiable Diseases Surveillance System, United States, 2016 (n=13,318§) - Download raw data.

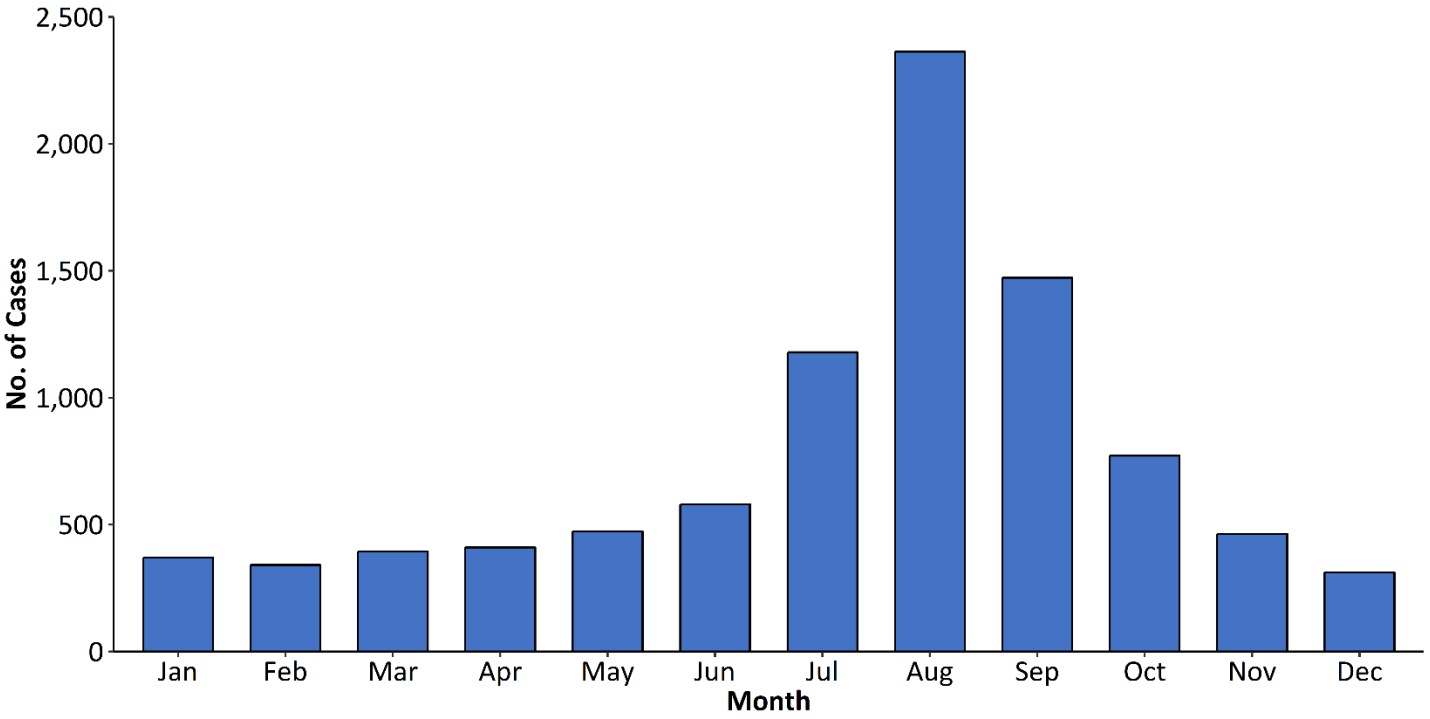


* Cases per 100,000 population

§ Age or sex data missing for 152 patients

Among both males and females, the highest incidence of cryptosporidiosis was among those ages 1–4 years. Among those ages 15–39 and 45–84 years, rates for females were higher than for males. 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 cryptosporidiosis cases, by month of symptom onset — National Notifiable Diseases Surveillance System, United States, 2016 (n=9,127*) - Download raw data.



*Month of symptom onset data missing for 4,343 patients

The number of cryptosporidiosis cases was greatest in August (n=2,363) and lowest in December (n=311). The number of cases by month of symptom onset reflect seasonal differences in exposure, such as summertime swimming.