GIARDIASIS
SUMMARY
REPORT

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

2013
NATIONAL NOTIFIABLE DISEASES
SURVEILLANCE SYSTEM, UNITED STATES

Data are presented for cases of giardiasis for the year 2013 reported to CDC through October 9, 2018.

Contents

Background

Surveillance Overview: National Giardiasis Case Surveillance

Giardiasis is an illness caused by the protozoan parasite *Giardia duodenalis* (formerly called *G. lamblia* or *G. intestinalis*), which causes gastrointestinal symptoms such as diarrhea, abdominal cramps, bloating, weight loss, or malabsorption (*1, 2*). Each year in the United States, it is estimated that *Giardia* causes more than 1.2 million illnesses (*3*). Giardiasis is a nationally notifiable disease; the first full year of reporting was 1993. National data are collected through passive surveillance. Healthcare providers and laboratories that diagnose confirmed giardiasis cases report to the local or state health departments. State and territorial health departments, the District of Columbia (DC), and the New York City health departments, in turn, voluntarily notify CDC of cases via the National Notifiable Disease Surveillance System (NNDSS). The number of health departments submitting can vary from year to year depending on which states have designated giardiasis as reportable in their jurisdictions.

State, DC, US territory, and Freely Associated State public health agencies voluntarily notify CDC of giardiasis outbreaks via the National Outbreak Reporting System (NORS). NORS data are not presented here; however, summaries of data on waterborne disease outbreaks are published elsewhere.

Methods

Case Definition

The definition of a confirmed case of giardiasis has changed over time; the first national case definition was published in 1997 (*4*), and a revised case definition was published in 2011 (*5*). The current (2011) case definition differs from the 1997 definition in clarifying that clinical symptoms are necessary for categorizing giardiasis cases as confirmed.

A confirmed case of giardiasis is defined as a case that meets the clinical description and the criteria for laboratory confirmation. Laboratory-confirmed giardiasis is defined as the detection of *Giardia* organisms, antigen, or DNA in stool, intestinal fluid, tissue samples, biopsy specimens, or other biological samples (*5*). Nonconfirmed cases of giardiasis include probable, suspected, and unknown cases. A probable case of giardiasis meets the clinical description and is epidemiologically linked to a confirmed case. A national case definition for suspected cases of giardiasis does not exist; the definition varies by state. Cases not classified as confirmed, probable, or suspect are classified as unknown.

Analysis

National giardiasis surveillance data for 2013 were analyzed using R version 3.5.1 and SAS 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 giardiasis were calculated in aggregate for the United States and separately for each reporting jurisdiction. Rates were calculated by dividing the number of giardiasis cases by each year's mid-year census estimates (*6, 7*) and multiplying by 100,000. Region and total population estimates included only jurisdictions that reported (Supplemental Table 1). 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, giardiasis rates were calculated by year (1995 to 2013) and case status (confirmed or nonconfirmed). Average annual giardiasis rates were calculated by demographic variables (e.g., age and sex) and jurisdiction. Rates were not calculated for race, ethnicity, or month of onset due to large proportion of missing data for these variables (i.e., 39.1%, 44.9%, and 48.0%, respectively). Cases reported by territories were excluded from the analysis, because detailed demographic census data are not available to calculate rates by age and sex.

Acknowledgements

References

1. Huang DB, White AC. An updated review on *Cryptosporidium* and *Giardia*. *Gastroenterol Clin North Am.* 2006;35(2):291-314, viii. DOI: https://www.sciencedirect.com/science/article/pii/S0889855306000252?via%3Dihub.

2. Eberhard M, Gabrielli A, Montresor A, et al. Giardiasis (*Giardia enteritis*). In: Control of communicable diseases manual, 20th Edition. Heymann DL, Ed. Washington, DC; 2014:234-36.

3. Scallan E, Hoekstra RM, Angulo FJ, et al. Foodborne illness acquired in the United States—major pathogens. Emerg Infect Dis 2011;17:7–15. DOI: 10.3201/eid1701.P11101.

4. CDC. Giardiasis: 1997 case definition. Atlanta, GA: US Department of Health and Human Services, CDC; 1997. Available at http://wwwn.cdc.gov/nndss/script/casedef.aspx?CondYrID=683&DatePub=1997-01-01.

5. CDC. Giardiasis: 2011 case definition. Atlanta, GA: US Department of Health and Human Services, CDC; 2011. Available at http://wwwn.cdc.gov/nndss/script/casedef.aspx?CondYrID=685&DatePub=1/1/2011.

6. United States Department of Health and Human Services (US DHHS), Centers for Disease Control and Prevention (CDC), National Center for Health Statistics (NCHS), Bridged-Race Population Estimates, United States July 1st resident population by state, county, age, sex, bridged-race, and Hispanic origin. Compiled from 1990-1999 bridged-race intercensal population estimates (released by NCHS on 7/26/2004); revised bridged-race 2000-2009 intercensal population estimates (released by NCHS on 10/26/2012); and bridged-race Vintage 2017 (2010-2017) postcensal population estimates (released by NCHS on 6/27/2018). Available on CDC WONDER Online Database. Accessed at http://wonder.cdc.gov/bridged-race-v2017.html on Apr 18, 2019.

7. US Census Bureau. Annual Estimates of the Resident Population for Incorporated Places of 50,000 or More, Ranked by July 1, 2017 Population: April 1, 2010 to July 1, 2017. Washington, DC: US Census Bureau; Release Date: May 2018. Available at https://www.census.gov/content/census/en/data/tables/time-series/demo/popest/2010s-total-cities-and-towns.html.

8. US Census Bureau. Census regions and divisions of the United States. Washington, DC: US Census Bureau. Available at https://www2.census.gov/geo/pdfs/maps-data/maps/reference/us_regdiv.pdf.

Tables and Figures

Figure 1. Incidence[*] of giardiasis cases, by year and case classification — National Notifiable Diseases Surveillance System, United States, 1995–2013 (n = 389,713) - Download raw data.
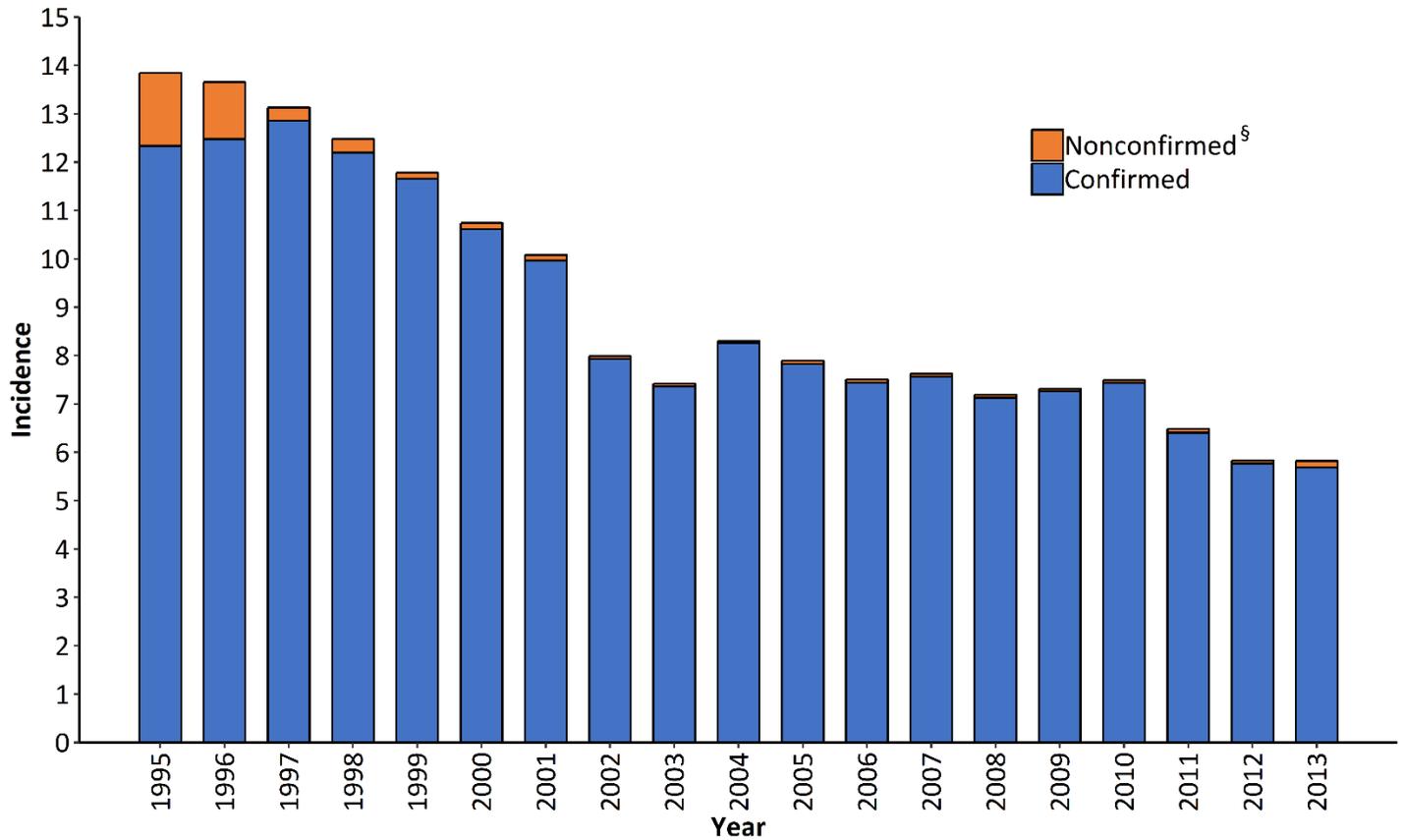
[*] Cases per 100,000 population per year
[§] Probable, suspect, and unknown cases

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Since 2011, the incidence of reported, confirmed giardiasis cases has remained < 7.0 cases per 100,000 population. In 2013, there were 15,267 reported giardiasis cases in the United States (97.6% confirmed and 2.4% nonconfirmed).

Table 1. Number, percentage[*], and incidence[§] of giardiasis cases, by region and jurisdiction — National Notifiable Diseases Surveillance System, United States, 2013 (n = 15,267)

Region/Jurisdiction	No.	%	Incidence	No. of outbreak associated cases
Northeast	**4,421**	**29**	**7.9**	**100**
Connecticut	230	1.5	6.4	
Maine	218	1.4	16.4	
Massachusetts	664	4.3	9.9	3
New Hampshire	117	0.8	8.8	
New Jersey	336	2.2	3.8	
New York City[¶]	764	5.0	9.0	
New York State[¶]	1,113	7.3	9.9	59
Pennsylvania	765	5.0	6.0	38
Rhode Island	41	0.3	3.9	
Vermont	173	1.1	27.6	
Midwest	**3,551**	**23.3**	**5.3**	**35**
Illinois	311	2.0	2.4	18
Indiana	229	1.5	3.5	2
Iowa	273	1.8	8.8	
Kansas	102	0.7	3.5	1
Michigan	547	3.6	5.5	
Minnesota	622	4.1	11.5	
Missouri	244	1.6	4.0	
Nebraska	169	1.1	9.0	
North Dakota	44	0.3	6.1	
Ohio	513	3.4	4.4	14
South Dakota	111	0.7	13.2	
Wisconsin	386	2.5	6.7	
South	**3,097**	**20.3**	**4.8**	**96**
Alabama	174	1.1	3.6	
Arkansas	119	0.8	4.0	
Delaware	20	0.1	2.2	
District of Columbia	84	0.6	12.9	
Florida	1,114	7.3	5.7	96
Georgia	641	4.2	6.4	
Kentucky	NR			
Louisiana	255	1.7	5.5	
Maryland	228	1.5	3.8	
Mississippi	NR			
North Carolina	NR			
Oklahoma	NR			
South Carolina	133	0.9	2.8	
Tennessee	NR			
Texas	NR			
Virginia	279	1.8	3.4	
West Virginia	50	0.3	2.7	
Northwest	**1,256**	**8.2**	**8.5**	**7**
Alaska	82	0.5	11.1	
Idaho	139	0.9	8.6	6
Montana	91	0.6	9.0	

	Number	Percentage*	§	
Oregon	364	2.4	9.3	1
Washington	548	3.6	7.9	
Wyoming	32	0.2	5.5	
Southwest	**2,942**	**19.3**	**5.0**	**5**
Arizona	115	0.8	1.7	
California	1,991	13.0	5.2	
Colorado	355	2.3	6.7	5
Hawaii	60	0.4	4.3	
Nevada	91	0.6	3.3	
New Mexico	102	0.7	4.9	
Utah	228	1.5	7.9	
Total	**15,267**	**100**	**5.8**	**243**

Abbreviation NR = Not Reportable

* 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, giardiasis incidence ranged from 1.7 per 100,000 population in Arizona to 27.6 per 100,000 population in Vermont. By region, incidence of reported giardiasis cases ranged from 4.8 cases per 100,000 population in the South to 8.5 in the Northwest. Differences in incidence might reflect differences in risk factors or mode of transmission of *Giardia*; the magnitude of outbreaks; or the capacity or requirements to detect, investigate, and report cases.

Figure 2. Incidence[*] of giardiasis cases, by reporting jurisdiction — National Notifiable Diseases Surveillance System, United States, 2013 (n=15,267[§]) - Download raw data.
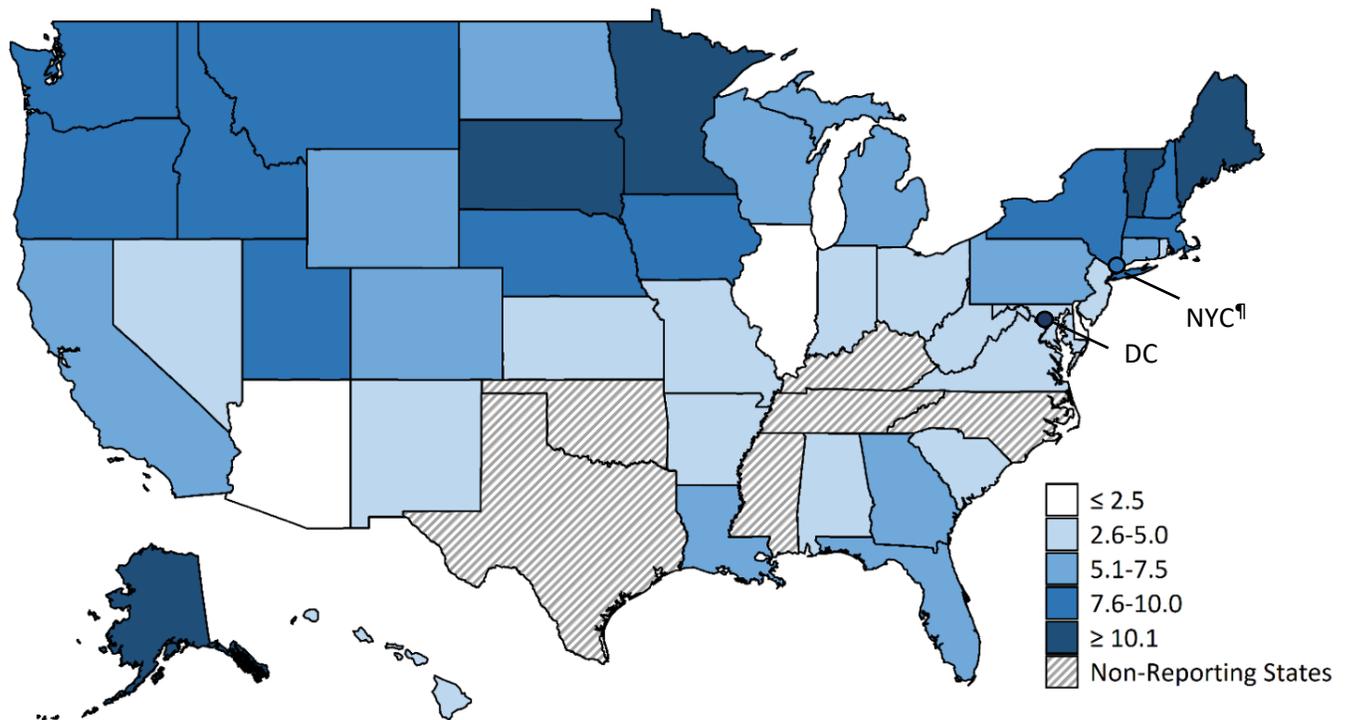
[*] Cases per 100,000 population

[§] Non-reporting states included Kentucky, Mississippi, North Carolina, Oklahoma, Tennessee, and Texas

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

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

Table 2. Number and percentage* of giardiasis cases, by selected patient demographic characteristics — National Notifiable Diseases Surveillance System, United States, 2013 (n = 15,267)

Characteristic	No.	%
Sex		
Male	9,125	59.8
Female	6,061	39.7
Missing	81	0.5
Race		
American Indian/Alaska Native	52	0.3
Asian/Pacific Islander	698	4.6
Black	1,112	7.3
White	6,888	45.1
Other	545	3.6
Missing	5,972	39.1
Ethnicity		
Hispanic	1,064	7
Non-Hispanic	7,344	48.1
Missing	6,859	44.9
Total	**15,267**	**100.0**

* Percentages might not total 100% because of rounding

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During 2013, a total of 9,125 patients were male (59.8%) and 6,061 (39.7%) were female; 81 (0.5%) were missing data on sex. The majority of cases for whom data on race were available occurred among the classifications white (74.1%), black (12.0%), and Asian/Pacific Islander (7.5%). Data on race were not included for 39.1% of total annual case reports, and data on ethnicity were missing for 44.9% of case reports. The majority of patients for whom data on ethnicity were available were non-Hispanic (87.3%).

Figure 3. Incidence[*] of giardiasis cases, by age group — National Notifiable Diseases Surveillance System, United States, 2013 (n = 14,882[§]) - Download raw data.
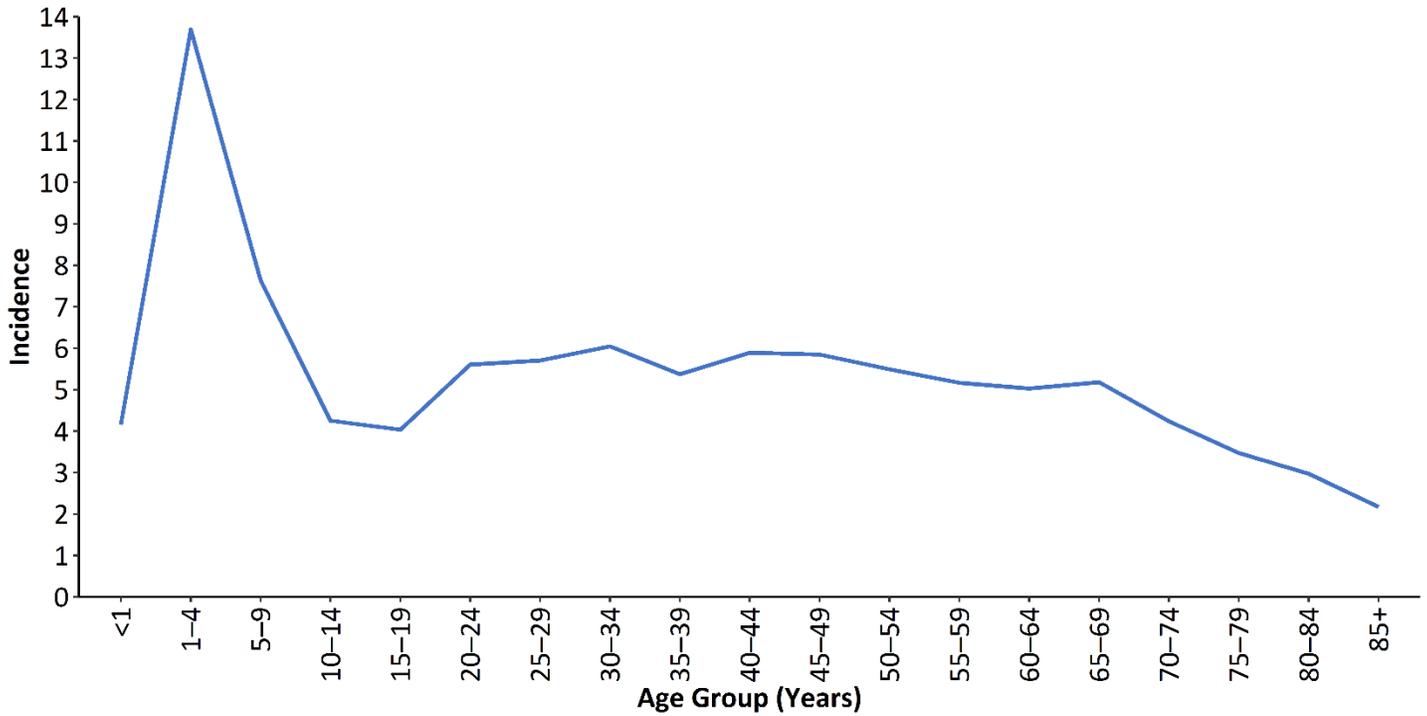
[*] Cases per 100,000 population
[§] Age data missing for 385 patients

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In 2013, the incidence of reported giardiasis cases was highest among patients aged 1-4 years, 5-9 years, and 30-34 years (Incidence = 13.7, 7.6, and 6.0 cases per 100,000 population, respectively).

Figure 4. Incidence[*] of giardiasis cases, by sex and age group — National Notifiable Diseases Surveillance System, United States, 2013 (n = 14,807[§]) - Download raw data.
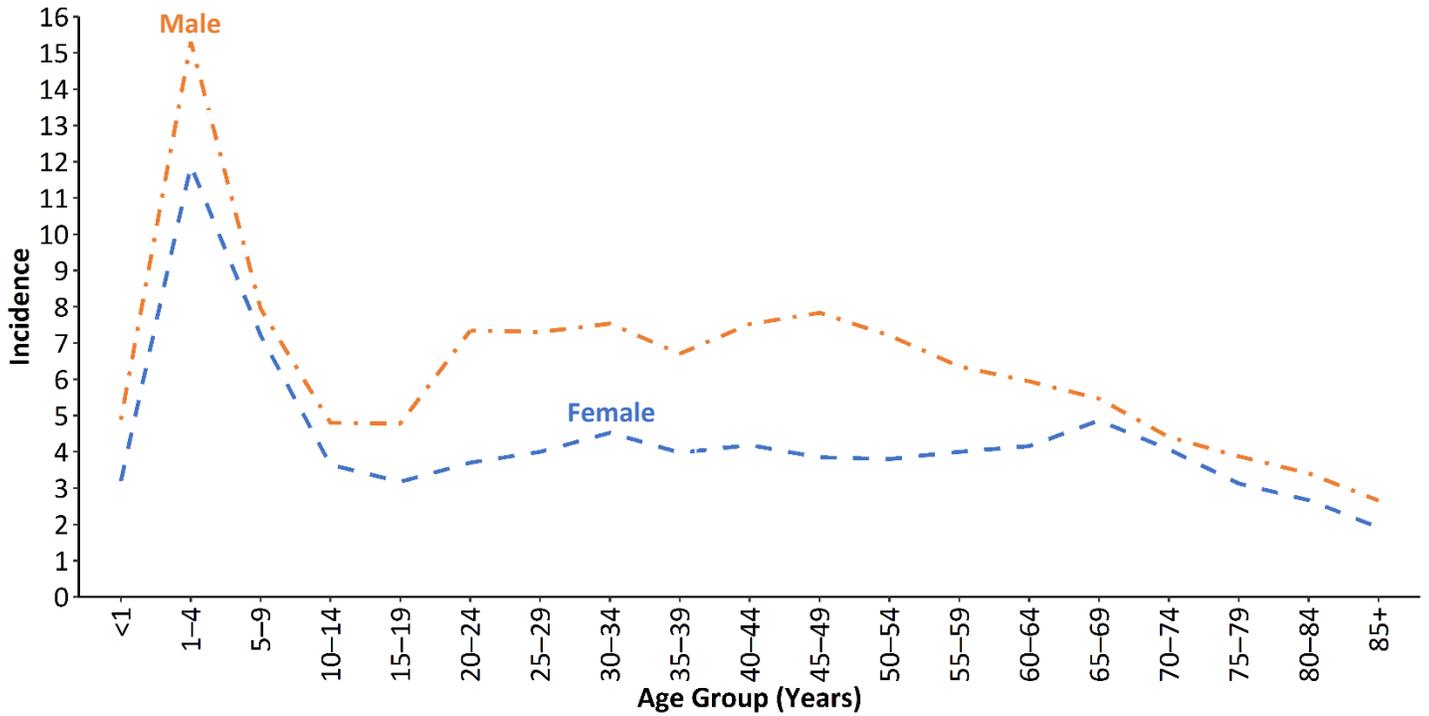
[*] Cases per 100,000 population
[§] Age or sex data missing for 460 patients

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Rates were highest among males in every age group. The difference was most pronounced between sexes aged 45-49 years.

Figure 5. Number of giardiasis cases, by date of symptom onset — National Notifiable Diseases Surveillance System, United States, 2013 (n = 7,936[*]) - Download raw data.
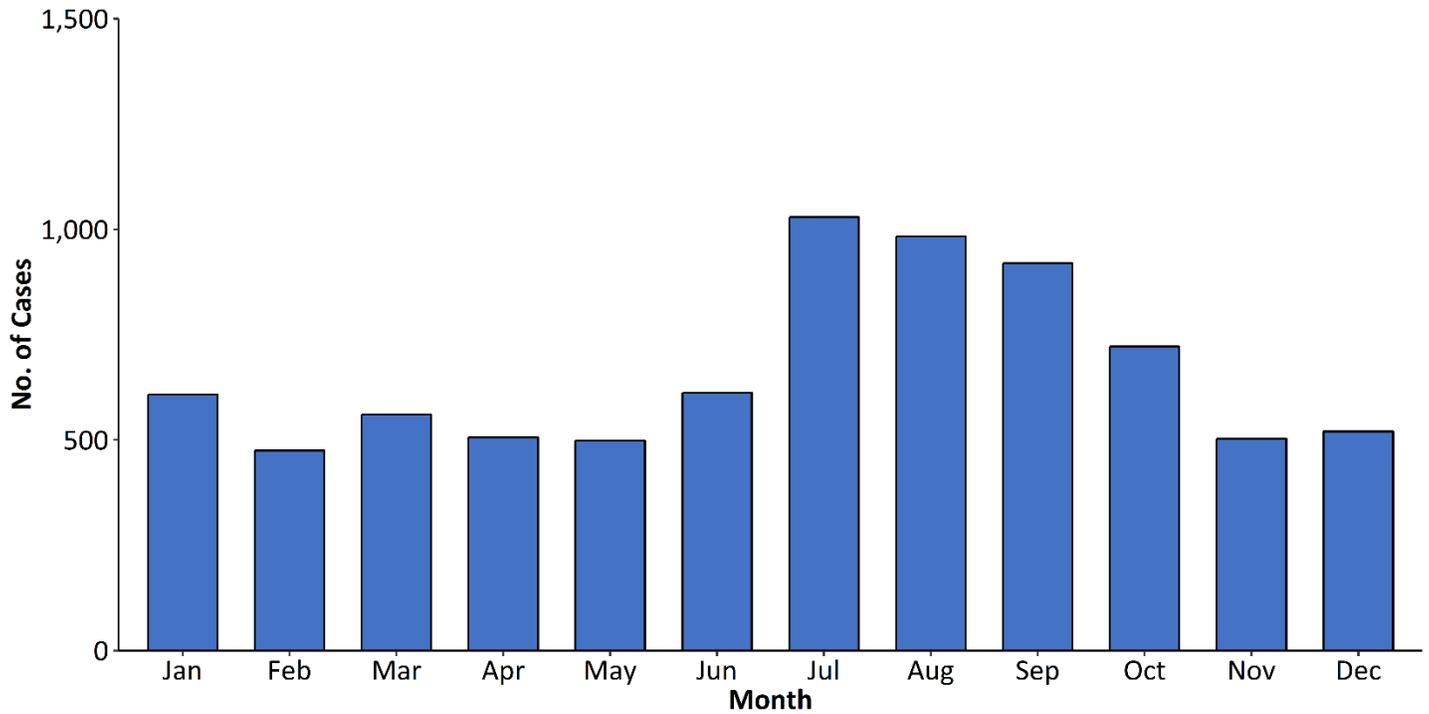
[*] Date of symptom onset data missing for 7,331 patients

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In 2013, the majority of cases by symptom onset occurred between July and October, with a peak in July (n=1,029).

Supplemental Table

Table S1. Giardiasis reporting and non-reporting states (gray shading) — National Notifiable Diseases Surveillance System, United States, 1995–2013

State	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
AK																			
AL	■																		
AR																			
AZ																			
CA	■	■	■	■	■	■	■												
CO																			
CT	■	■	■	■	■														
DE																			
FL																			
GA																			
HI																			
IA																			
ID																			
IL																			
IN							■	■	■	■	■	■	■						
KS																			
KY			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
LA				■															
MA																			
MD				■			■												
ME																			
MI																			
MN																			
MO																			
MS							■	■	■	■	■	■	■	■	■	■	■	■	■
MT																			
NC	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
ND																			
NE																			
NH																			
NJ			■		■	■													
NM																			
NV																			
NY																			
OH																			
OK							■									■	■	■	■
OR																			
PA	■																		
RI																			
SC	■	■	■	■	■	■	■												
SD																			
TN																■	■	■	■
TX	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
UT																			
VA																			
VT																			
WA																			
WI																			
WV																			
WY																			