

Surveillance for
Trichinellosis —
United States, 2015
Annual Summary

Acknowledgments

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Summary compiled by:

Shannon M. Casillas and Jeffrey L. Jones

Centers for Disease Control and Prevention

Division of Parasitic Diseases and Malaria

1600 Clifton Road, Mail Stop A-06

Atlanta, GA 30329-4027

Telephone: 404-718-4745

E-mail: parasites@cdc.gov

Web: <https://www.cdc.gov/parasites/trichinellosis/data-statistics/index.html>

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Main findings for 2015

- In 2015, trichinellosis was a reportable condition in 48 states, the District of Columbia, and New York City.
- For 2015, 13 cases of trichinellosis (10 confirmed and 3 probable) were reported to CDC from 8 states, including Colorado (2 cases), Idaho (1 case), Indiana (1 case), Maryland (2 cases), Pennsylvania (1 case), Texas (4 cases), Utah (1 case), and Washington (1 case).
- During 2015, known or suspected sources of *Trichinella* infection were documented for 10 (77%) of the 13 cases reported, and included bear (7 cases), commercial pork (1 case), pork from an unspecified source (1 case), and pork consumed during international travel (1 case).
- Two outbreaks of 3 persons each were reported in 2015; each outbreak was attributed to meat from a bear hunted in Alaska.

Background

Trichinellosis

Trichinellosis is a foodborne parasitic disease caused by nematodes in the *Trichinella* genus (1). Infection in humans occurs through the consumption of raw or undercooked meat that contains *Trichinella* larvae. The parasite is found in both commercial meat and wild game, including pork products, bear, walrus, and other carnivorous or omnivorous game (2). Historically, the majority of reported trichinellosis cases were attributed to the consumption of *Trichinella*-infected pork. During the first 10-years of trichinellosis surveillance in the United States (1947-1956), a median of 360 cases were reported per year (range: 262-487). During the most recent 10-year surveillance period (2006-2015), a median of 14.5 cases were reported per year (range: 5-39). The number of reported trichinellosis cases has declined steadily since national surveillance began, likely due to multiple factors, including laws that prohibit the feeding of garbage to hogs, increased usage of home freezers, and improved knowledge regarding safe cooking practices for pork (3). Recent U.S. outbreaks of trichinellosis have been attributed to bear, wild boar, and unspecified pork. Historically, seasonal patterns for trichinellosis have been observed in the United States, with peaks during December and January.

The first symptoms of trichinellosis usually occur 1-2 days after a person consumes meat from an infected animal, and include nausea, diarrhea, vomiting, and abdominal pain (4). The classical symptoms of trichinellosis develop approximately 2-3 weeks post infection, and include eosinophilia, muscle pain, fever, swelling of the face (particularly the eyes), weakness or fatigue, headache, chills, itchy skin or rash, cough, diarrhea, and constipation (4). Symptoms can vary from mild to severe, and many infections are asymptomatic. Antiparasitic drugs (albendazole and mebendazole) are used to treat trichinellosis, and in severe cases, steroids may also be used. These drugs are most effective when given within 3-4 weeks post infection.

The best way to prevent trichinellosis is by cooking all meat to a safe temperature before consumption. The USDA recommendations for safe meat preparation are available online (<https://www.cdc.gov/parasites/trichinellosis/prevent.html>).

Surveillance

CDC has been conducting systematic surveillance for trichinellosis since 1947, and it became a nationally notifiable condition in 1966. As of 2015, trichinellosis is a reportable condition in 48 states, the District of Columbia, and New York City. Health departments notify CDC, through the **National Notifiable Disease**

Surveillance System (NNDSS), of cases that meet the case definition (**Table 1**). Additional case information is obtained using the trichinellosis case report form [**Trichinellosis CRF**;  **PDF, 1 page, 270 KB**].

Data and definitions

This summary focuses on cases reported for surveillance year 2015; data from previous years (2011–2014) are included to show annual differences. Case data are presented by state/area of residence, which may differ from where the exposure occurred. Of note, the year in which a case is counted is assigned by the health department; this may differ from the year of illness onset or diagnosis. Surveillance data for trichinellosis are also summarized in CDC’s **Morbidity and Mortality Weekly Report (MMWR)**, including in the annual summaries of nationally notifiable conditions. Data in this summary may differ from what have been previously published because of differences in the timeline for finalizing data.

Cases of trichinellosis were classified as confirmed or probable using the 2014 Council of State and Territorial Epidemiologists’ case definition (**Table 1**). Data for both confirmed and probable cases were included in this summary.

An outbreak is defined as two or more epidemiologically linked cases, at least one of which is laboratory-confirmed.

Table 1. National surveillance case definition for trichinellosis*

Clinical description	A disease caused by ingestion of <i>Trichinella</i> larvae, usually through consumption of <i>Trichinella</i> -containing meat—or food contaminated with such meat—that has been inadequately cooked prior to consumption. The disease has variable clinical manifestations. Common signs and symptoms among symptomatic persons include eosinophilia, fever, myalgia, and periorbital edema.
Laboratory criteria for diagnosis	Human specimens Demonstration of <i>Trichinella</i> larvae in tissue obtained by biopsy OR Positive serologic test for <i>Trichinella</i>
	Food specimens Demonstration of <i>Trichinella</i> larvae in the food item (probable)
Case classification	
Suspect†	Instances where there is no clinically compatible illness should be reported as suspect if the person shared an epidemiologically implicated meal, or ate an epidemiologically implicated meat product, and has a positive serologic test for trichinellosis (and no known prior history of <i>Trichinella</i> infection).
Probable	A clinically compatible illness in a person who shared an epidemiologically implicated meal or ate an epidemiologically implicated meat product. OR A clinically compatible illness in a person who consumed a meat product in which the parasite was demonstrated.
Confirmed	A clinically compatible illness that is laboratory confirmed in the patient.

* Available at: <https://wwwn.cdc.gov/nndss/conditions/trichinellosis/case-definition/2014/>

† Suspect cases were not included in this summary.

Epidemiologic Linkage

Persons who shared the implicated meat/meal should be investigated and considered for case status as described above.

Criteria to Distinguish a New Case from an Existing Case

Serial or subsequent cases of trichinellosis experienced by one individual should only be counted if there is an additional epidemiologically compatible exposure. Because the duration of antibodies to *Trichinella* spp. is not known, mere presence of antibodies without a clinically-compatible illness AND an epidemiologically compatible exposure may not indicate a new infection especially among persons with frequent consumption of wild game that is known to harbor the parasite.

Comments

Epidemiologically implicated meals or meat products are defined as a meal or meat product that was consumed by a person who subsequently developed a clinically compatible illness that was laboratory confirmed.

Negative serologic results may not accurately reflect disease status if blood was drawn less than 3-4 weeks from illness onset (5).

Surveillance Summary

During 2011–2015, 80 trichinellosis cases were reported by 24 states and the District of Columbia (**Table 2**). States reporting 5 or more cases during this surveillance period, include Alaska (9 cases), California (5 cases), Illinois (10 cases), Maryland (6 cases), Texas (9 cases), and Virginia (7 cases) (**Figure 1**). A confirmed or suspected source of infection was known for 71% of case-patients (n = 57/80); the three most commonly implicated meat products were bear (44%; n = 25/57), wild boar (23%, n = 13/57), and unspecified pork (16%, n = 9/57) (**Table 3**).

Among the 80 cases reported during the 5-year surveillance period, 41% (n = 33) were outbreak associated (**Table 4**). During this time, 10 outbreaks were identified, and were attributed to bear (6 outbreaks), wild boar (2 outbreaks), unspecified pork (1 outbreak), and an unknown source (1 outbreak) (**Table 5**).

Overall, the number of reported cases of trichinellosis has decreased since systematic surveillance began in 1947 (**Figure 2**).

Among the cases reported during 2011–2015, 64% (n = 51/80) were male, and the median age was 37 years old (range: 1-71) (**Figure 3**). Among case-patients for whom data were available, myalgia was the most commonly reported sign or symptom (91.3%, n = 63/69), followed by eosinophilia (77%, n = 48/62), fever (72%, n = 49/68), and periorbital edema (46%, n = 28/61) (note, these are the 4 signs or symptoms for which data are collected using the case report form).

Among the 69 cases for whom illness onset information were available, fall (Sept 22-Dec 20) was the season in which the highest number of case-patients reported illness onset (33%, n = 23/69), followed by winter (Dec 21-Mar 19; 28%, n = 19/69), summer (June 21-Sept 21; 23%, n = 16/69), and spring (March 20-June 20; 16%, n = 11/69).

	2011		2012		2013		2014		2015	
Oregon	0	0	0	0	0	0	0	0	0	0
Pennsylvania	0	0	0	0	0	0	0	0	1	0.08
Rhode Island	0	0	0	0	0	0	0	0	0	0
South Carolina	0	0	0	0	0	0	0	0	0	0
South Dakota	0	0	0	0	0	0	0	0	0	0
Tennessee	0	0	0	0	0	0	0	0	0	0
Texas	2	0.08	1	0.04	0	0	2	0.07	4	0.15
Utah	0	0	0	0	0	0	1	0.34	1	0.33
Vermont	0	0	0	0	0	0	0	0	0	0
Virginia	2	0.25	2	0.24	2	0.24	1	0.12	0	0
Washington	0	0	0	0	0	0	2	0.28	1	0.14
West Virginia	1	0.54	0	0	0	0	0	0	0	0
Wisconsin	0	0	1	0.17	0	0	0	0	0	0
Wyoming	0	0	0	0	0	0	0	0	0	0
Total††	15	0.05	18	0.06	21	0.07	13	0.04	13	0.04

* Year as reported by health department

† Cases were reported by state/area of residence, which may differ from location of exposure.

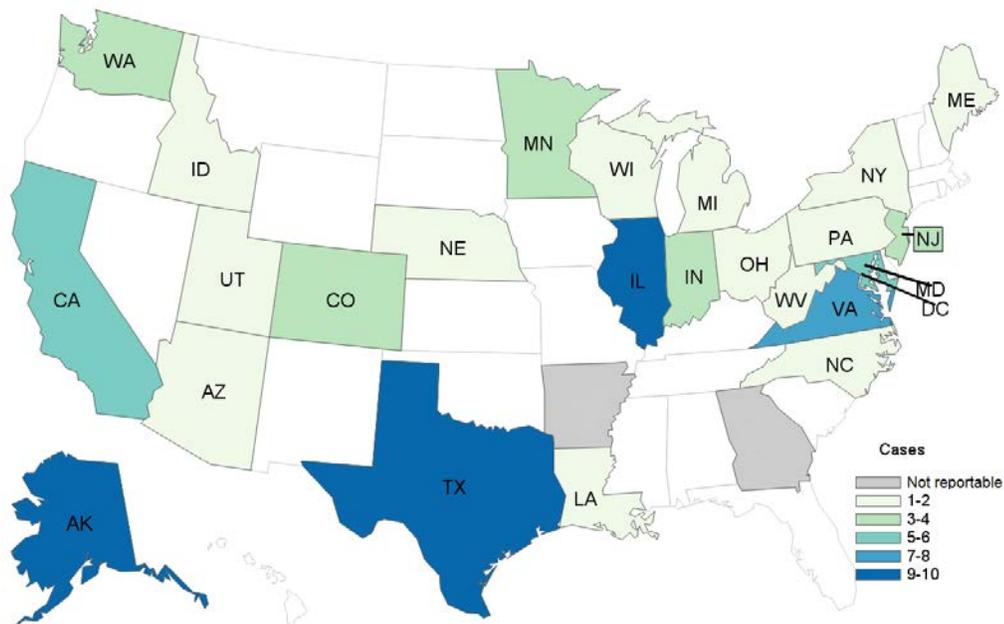
§ Rate per 1,000,000 population (6)

¶ Not reportable

** Including New York City, which did not report any cases during 2011–2015

†† For calculations of total incidence rates, the denominators included only the populations of states/areas in which trichinellosis was a reportable condition during the pertinent year.

Figure 1. Number of reported cases of trichinellosis, by state of residence,* 2011–2015†



* Not reportable in Arkansas or Georgia during 2011–2015; reportable in Kentucky beginning in 2014.

† Year as reported by health department

Table 3. Number of trichinellosis cases, by source of infection and year, 2011–2015*

Suspect meat	2011	2012	2013	2014	2015	Total
Pork products						
Wild boar	2	1	10	0	0	13
Farm-raised swine	1	0	0	1	0	2
U.S. commercial pork	0	1	0	0	1	2
Pork, foreign travel†	1	1	1	0	1	4
Pork, unspecified	2	4	1	1	1	9
Non-pork products						
Bear	1	5	6	6	7	25
Hamburger	0	0	0	1	0	1
Pork and non-pork products						
Pork and deer	1	0	0	0	0	1
Unknown	7	6	3	4	3	23
Total	15	18	21	13	13	80

* Year as reported by health department

† If the case-patient reported consuming the implicated pork product internationally, the suspect meat was classified as “pork, foreign travel.”

Table 4. Proportion of outbreak associated trichinellosis cases, by year, 2011–2015*

Outbreak Associated†	2011		2012		2013		2014		2015		Total	
	Cases	%	Cases	%								
Yes	2	13%	7	39%	12	57%	6	46%	6	46%	33	41%
No/Unknown	13	87%	11	61%	9	43%	7	54%	7	54%	47	59%
Total	15		18		21		13		13		80	

* Year as reported by health department

† Cases were classified as outbreak associated if there were two or more case-patients that were epidemiologically linked to the same meat product.

Table 5. Outbreaks of trichinellosis, 2011–2015*

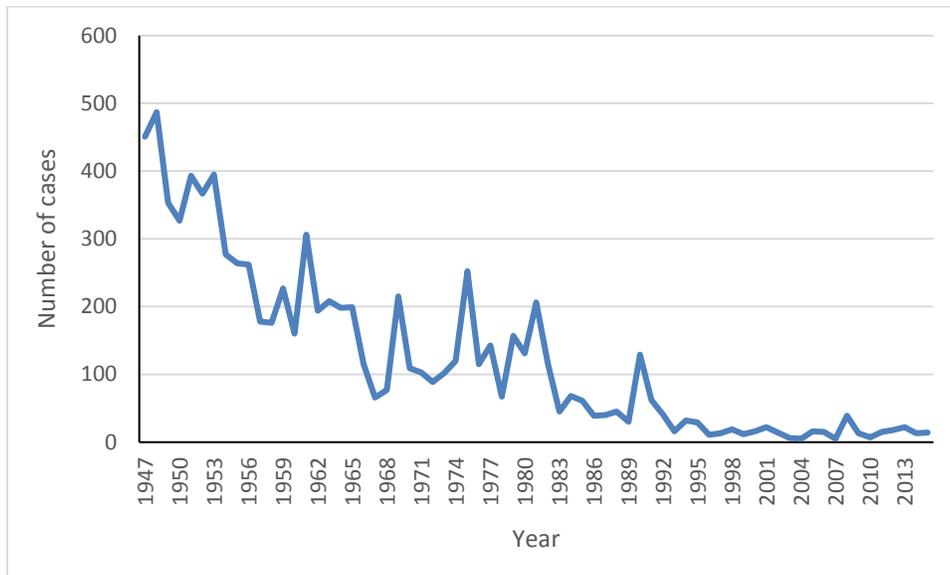
Year	State†	No. of cases	Month of illness onset	Implicated meat
2011	Minnesota	2	March-April	Wild boar
2012	Virginia	2	January	Pork, unspecified
2012	Alaska	3	August	Unknown
2012	Minnesota, Illinois	2	October	Bear
2013	Illinois	9	February-March	Wild boar
2013	Maryland	3	October-November	Bear
2014	Colorado, Texas, Utah, Washington	4	July	Bear
2014	Alaska	2	October-November	Bear
2015	Texas	3	January-February	Bear
2015§	Colorado, Idaho	3	October	Bear

* Year as reported by health department

† State of residence, which may be different than the location of exposure.

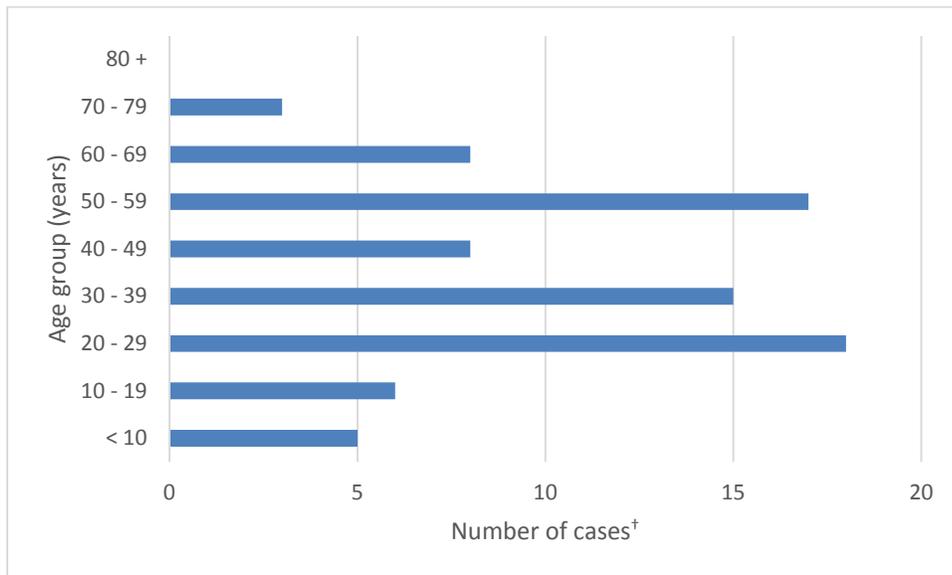
§ Two cases were residents of Colorado, and one was a resident of Idaho.

Figure 2. Number of reported cases of trichinellosis, by year, 1947–2015*



* Year as reported by health department

Figure 3. Number of reported cases of trichinellosis, by age group, 2011–2015*



* Year as reported by health department

† N = 80

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