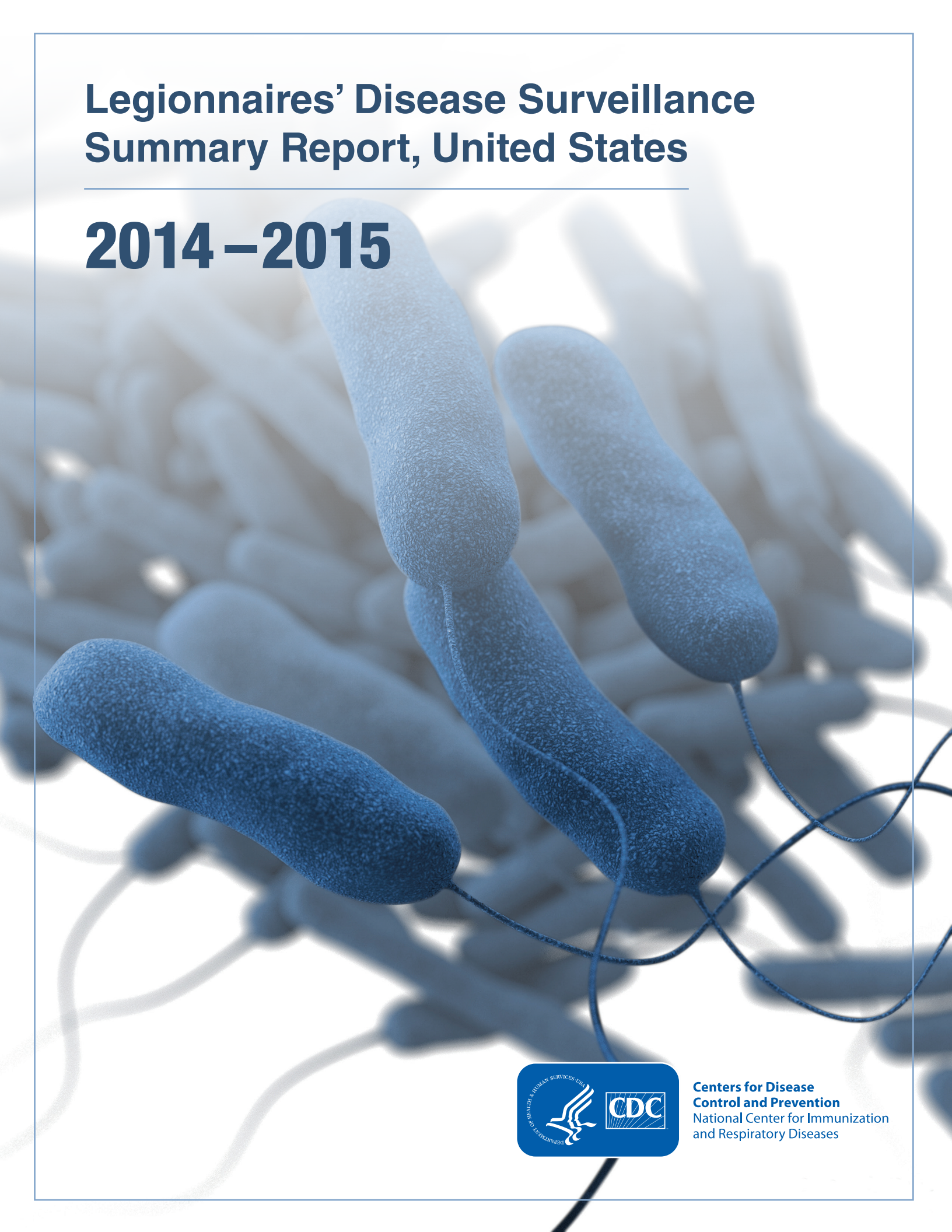
Legionnaires' Disease Surveillance Summary Report, United States

2014 – 2015



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The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

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*Cases of disease due to *Legionella* are reported to NNDSS as legionellosis, which includes Legionnaires' disease, Pontiac fever, and disease due to *Legionella* infection at extrapulmonary sites, but are referred to as Legionnaires' disease in this figure or table (because almost all legionellosis cases reported in the United States are due to Legionnaires' disease).

§ Only cases of Legionnaires' disease reported to SLDSS are included in this figure or table.

± All cases of legionellosis (i.e., Legionnaires' disease, Pontiac fever, and "Other") reported to SLDSS are included in this figure.

NOTE: For accessible versions of tables in this report, visit https://www.cdc.gov/legionella/health-depts/surv-reporting/2014-15-report-tables/

Background

The objective of this report is to provide a descriptive summary of the reporting and burden of Legionnaires' disease within the United States in 2014 and 2015. Legionellosis is a disease caused by the bacterium *Legionella* that most commonly presents as Legionnaires' disease, a severe pneumonia. Pontiac fever, a milder illness without pneumonia, is less commonly reported. Extrapulmonary infection with *Legionella* is rare. In combination with clinical findings, Legionnaires' disease must be confirmed with a laboratory test, most commonly with a positive urinary antigen test (UAT) or less commonly, by other tests, such as isolation of *Legionella* by culture (1,2). The epidemiology of Legionnaires' disease in the United States is not fully described.

Legionella typically is transmitted to people through inhalation of aerosolized water containing *Legionella*, or less commonly via aspiration of water containing *Legionella* (3, 4). *Legionella* usually affects susceptible hosts, including persons with advanced age, weakened immune systems, or chronic medical conditions. Collecting and reporting information about Legionnaires' disease case exposures is important for finding the source of infection and helping prevent additional cases. Exposure to large, complex building water systems that are not adequately managed increases a person's risk for acquiring Legionnaires' disease (5).

The majority of recognized Legionnaires' disease outbreaks are associated with travel (e.g., hotels, resorts, cruise ships) or healthcare settings (e.g., hospitals, long-term care facilities) (6). Approximately 10%–15% of all reported cases of Legionnaires' disease occur in people who traveled during the 10 days before symptom onset. Healthcare facilities frequently undergo construction and plumbing changes, and they often have aerosol-producing devices such as cooling towers, decorative fountains, and other devices unique to healthcare facilities (e.g., respiratory therapy equipment, hydrotherapy tubs, heater-cooler units) (5). Other potential settings for exposure to *Legionella* include assisted or senior living facilities, workplace environments, and the community.

Approximately 9% of Legionnaires' disease cases are fatal (7). Among the 27 waterborne disease outbreaks reported in the United States during 2013–2014, *Legionella* was implicated in 17 (63%) outbreaks and all 17 deaths (8).

Case definition

Legionellosis case criteria are defined in the 2005 Council of State and Territorial Epidemiologists (CSTE) Position Statement (1). Legionnaires' disease is characterized by fever, myalgia, cough, and clinical or radiographic pneumonia. Pontiac fever is characterized by a milder influenza-like illness without pneumonia. "Other" legionellosis indicates *Legionella* infection at an extrapulmonary site, such as endocarditis or a wound infection. To be considered confirmed, a case must be clinically compatible and fulfill at least one of the confirmatory laboratory criteria (i.e., positive UAT, isolation of *Legionella* by culture, or a 4-fold or greater rise in specific serum antibody titer to *Legionella pneumophila* serogroup 1). Please refer to **Definitions** for additional case status and laboratory criteria.

Data sources

For this surveillance summary, data from two surveillance systems were combined to provide a more comprehensive understanding of the national burden of Legionnaires' disease.

The Centers for Disease Control and Prevention (CDC) coordinates collection of data of all notifiable diseases, including Legionnaires' disease, from across the United States through the National Notifiable Diseases Surveillance System (NNDSS). NNDSS is a passive surveillance system for case-level data. Clinicians and laboratories report cases to local or state health departments, who then investigate the cases and report selected data to CDC. For this report, NNDSS data are limited to Legionnaires' disease case counts, basic demographics, date of disease occurrence, and jurisdiction of residence.

LEGIONNAIRES' DISEASE VS. LEGIONELLOSIS

Because NNDSS does not capture type of legionellosis diagnosis, it cannot distinguish clinical syndromes (Legionnaires' disease vs Pontiac fever vs *Legionella* infection at an extrapulmonary site). For this reason, CDC has used the term "legionellosis" historically for surveillance purposes (when referring to NNDSS data). However, approximately 98% of legionellosis cases reported to SLDSS are Legionnaires' disease (9). Furthermore, because Legionnaires' disease can be associated with substantial mortality (while Pontiac fever is self-limited), prevention efforts are often designed with Legionnaires' disease in mind. Accordingly, we refer here to cases of legionellosis reported to NNDSS as "Legionnaires' disease" instead of "legionellosis" unless otherwise specified.

While NNDSS does not capture type of legionellosis diagnosis, SLDSS distinguishes among Legionnaires' disease, Pontiac fever, and "Other" legionellosis. Therefore, unless otherwise specified, SLDSS data in this report are limited to cases of Legionnaires' disease.

Please note that despite this decision, Pontiac fever deserves attention, as outbreaks of Pontiac fever can be large and can place burden on the medical system. Furthermore, Pontiac fever can signal the presence of conditions that support *Legionella* growth and transmission, and environmental sources that lead to cases of Pontiac fever are often also associated with cases of Legionnaires' disease.

The Summary of Notifiable Infectious Diseases—United States (hereafter referred to as the *MMWR* annual report) reports the official statistics for U.S. Legionnaires' disease cases reported to NNDSS (10). While provisional NNDSS data on reported notifiable infectious diseases are published weekly on CDC WONDER (https://wonder.cdc.gov/nndss/nndss_weekly_tables_menu.asp), finalized and reconciled data are published annually through a Morbidity and Mortality Weekly Report (*MMWR*) annual report. CDC's Office of Public Health Scientific Services is responsible for finalizing NNDSS Legionnaires' disease data for the *MMWR* annual report (10). Jurisdictions may report cases of any case status to NNDSS, but only confirmed cases of Legionnaires' disease were published in *MMWR* annual reports from 2000 through 2015, with the following exceptions:

- During 2000–2003, Legionnaires' disease cases with probable, suspect, and unknown case status were also published.
- During 2000–2001, Legionnaires' disease cases were not reportable in Oregon and West Virginia.
- During 2004–2012, Legionnaires' disease cases with unknown case status reported from California were also published.
- During 2011–2012, Legionnaires' disease cases were not reportable in the District of Columbia.

Learn more about reported cases of Legionnaires' disease at https://wwwn.cdc.gov/nndss/infectious-tables.html.

CDC's Supplemental Legionnaires' Disease Surveillance System (SLDSS), a voluntary, passive surveillance system for case-level data, provides additional epidemiologic information not reported to NNDSS. SLDSS was created in 2005 to improve outbreak detection of Legionnaires' disease cases in patients with common travel exposures. SLDSS' scope has expanded over time to capture and describe other *Legionella* exposures beyond travel, in particular information on healthcare exposures. While not all jurisdictions consistently report to SLDSS, reporting completeness has improved over time. SLDSS facilitates rapid recognition of cases that occur in patients in similar locations or with similar exposures and facilitates detection of outbreaks.

Highlights

Case count and incidence

From 2000 through 2015, a total of 49,930 confirmed Legionnaires' disease cases were reported to NNDSS from 52 U.S. jurisdictions. The crude national incidence rate increased 4.5-fold from 0.42 per 100,000 persons in 2000 to 1.89 per 100,000 in 2015 (Figure 1). There were 5,166 confirmed Legionnaires' disease cases (1.62/100,000 persons) reported to NNDSS in 2014 and 6,079 cases (1.89/100,000 persons) in 2015.

Seasonality and geographic distribution

Case month was based on *MMWR* week (determined variably by reporting jurisdictions based on disease onset date, date of case report to state or local public health, date of case report to CDC, or some other jurisdiction-defined date), and was unevenly distributed, with more cases assigned to weeks in summer and early fall versus winter and spring (Figure 2). For 2014 and 2015, the incidence of reported Legionnaires' disease cases tended to be higher in jurisdictions in the East North-Central (Illinois, Indiana, Michigan, Ohio, Wisconsin) and Mid-Atlantic (New Jersey, New York City, New York State, Pennsylvania) regions. (Figures 3a/3b).

- **2014:** The jurisdictions with the highest number of confirmed Legionnaires' disease cases reported to NNDSS included California, Florida, New York State, Ohio, and Pennsylvania (Table 1).
- **2015:** The jurisdictions with the highest number of confirmed Legionnaires' disease cases reported to NNDSS included California, New York City, New York State, Ohio, and Pennsylvania (Table 1).

Demographic characteristics

Demographic characteristics highlighted below use NNDSS data because that system includes Legionnaires' disease cases reported from all jurisdictions (Table 2).

Age

Most cases occurred in persons ≥50 years of age, and incidence increased with age (Table 2 and Figure 4a).

- **2014:** The majority (81%) of reported cases occurred in persons ≥50 years of age; persons ≥85 years of age had the highest rate of disease, with an incidence rate of 7.32 cases per 100,000 persons (Table 2).
- **2015:** Similar to 2014, the majority (81%) of reported cases occurred in persons ≥50 years of age, and the highest rate of disease was for persons ≥85 years of age (8.16 per 100,000 persons) (Table 2).

Sex

Males accounted for the majority of the confirmed cases reported to NNDSS and also had a higher rate of disease (Table 2 and Figure 4b).

- **2014**: Males accounted for 59% of cases, with a rate of 1.94 per 100,000 persons (Table 2).
- **2015:** Males accounted for 62% of cases, with a rate of 2.37 per 100,000 persons (Table 2).

Race

Most cases reported to NNDSS occurred in persons reporting white race; however, incidence was higher in persons reporting black or African-American race (Table 2 and Figure 4c).

- **2014:** 61% of reported cases were in persons of white race, with an incidence rate of 1.26 per 100,000 persons. In contrast, 17% were in those of black or African-American race, with an incidence rate of 2.03 per 100,000 persons (Table 2).
- **2015:** 62% of reported cases were in persons of white race, with an incidence rate of 1.49 per 100,000 persons. In contrast, 18% were in those of black or African-American race, with an incidence rate of 2.48 per 100,000 persons (Table 2).

Ethnicity

Of cases reported to NNDSS from the 52 jurisdictions in 2014 and 2015, 22%–25% were missing ethnicity data. For this reason, incidence rates by ethnicity are not presented. Non-Hispanic persons accounted for the majority of the cases for which this information was available (Table 2 and Figure 4d). Of cases for which this information was reported:

- **2014:** 69% were in persons of non-Hispanic ethnicity (Table 2).
- **2015:** 72% were in persons of non-Hispanic ethnicity (Table 2).

The distributions of demographic characteristics were similar for persons with confirmed Legionnaires' disease reported to both NNDSS and SLDSS (Figures 4a–4d).

Legionellosis syndrome

Nearly all cases submitted to SLDSS were categorized as Legionnaires' disease (97%–98%) rather than Pontiac fever or "Other" (disease due to *Legionella* infection at extrapulmonary sites) (Figures 5a/5b). Some case reports did not include legionellosis syndrome.

- **2014:** 3,668 confirmed legionellosis cases were reported to SLDSS from 52 jurisdictions; 3,545 (97%) were Legionnaires' disease, 80 (2%) were Pontiac fever, 25 (<1%) were "Other", and 18 (<1%) did not specify legionellosis syndrome (Figure 5a).
  - The case fatality rate (CFR) was 8% for Legionnaires' disease cases, 6% for Pontiac fever cases, 16% for "Other" cases, and 22% for cases that did not specify legionellosis syndrome (Figure 5a).
- **2015:** 4,401 confirmed legionellosis cases were reported to SLDSS from 52 jurisdictions; 4,318 (98%) were Legionnaires' disease, 60 (1%) were Pontiac fever, 20 (<1%) were "Other", and 3 (<1%) did not specify legionellosis syndrome (Figure 5b).
  - The CFR was 7% for Legionnaires' disease cases, 5% for Pontiac fever cases, 10% for "Other" cases, and 0% for cases that did not specify legionellosis syndrome (Figure 5b).

Complete reporting jurisdictions

- **2014:** The following 31 jurisdictions reported ≥90% of confirmed NNDSS legionellosis cases to SLDSS: Alabama, Alaska, Colorado, Connecticut, Florida, Georgia, Iowa, Kansas, Kentucky, Maine, Maryland, Michigan, Minnesota, Mississippi, Missouri, New Hampshire, New York City, New York State, North Dakota, Ohio, Pennsylvania, Rhode Island, South Carolina, Texas, Utah, Vermont, Virginia, Washington, West Virginia, Wisconsin, and Wyoming.
  - 3,263 confirmed Legionnaires' disease cases were reported to SLDSS from these 31 complete reporting jurisdictions, accounting for 92% of all 3,545 confirmed Legionnaires' disease cases reported to SLDSS from the 52 U.S. jurisdictions in 2014 (Figure 5a).
- **2015:** The following 31 jurisdictions reported ≥90% of their confirmed NNDSS legionellosis cases to SLDSS: Alabama, Colorado, Connecticut, Florida, Georgia, Hawaii, Iowa, Kansas, Kentucky, Maine, Maryland, Michigan, Minnesota, Mississippi, Missouri, New Hampshire, New Mexico, New York City, New York State, North Dakota, Ohio, Pennsylvania, Rhode Island, South Carolina, Texas, Vermont, Virginia, Washington, West Virginia, Wisconsin, and Wyoming. Alaska did not report any cases to NNDSS.
  - 4,001 confirmed Legionnaires' disease cases were reported to SLDSS from these 31 complete reporting jurisdictions, accounting for 93% of all 4,318 confirmed Legionnaires' disease cases reported to SLDSS from the 52 U.S. jurisdictions in 2015 (Figure 5b).

Sources of exposure

SLDSS captures detailed exposure history within the 10 days before symptom onset, including exposure to a healthcare setting, travel history, and exposure to an assisted or senior living facility (See **Definitions** for more detail).

- **2014:** 3,263 confirmed Legionnaires' disease cases were reported to SLDSS from the 31 complete reporting jurisdictions: 656 patients (20%) had a healthcare exposure, 449 patients (14%) had a travel exposure, 129 patients (4%) had assisted or senior living exposure, and 2,153 patients (66%) had "none of these" exposures (Figure 6a and Table 3).
  - SLDSS data showed variation in demographic characteristic distribution by exposure category (Table 4a).
- **2015:** 4,001 confirmed Legionnaires' disease cases were reported to SLDSS from the 31 complete reporting jurisdictions: 763 patients (19%) had a healthcare exposure, 565 patients (14%) had a travel exposure, 116 patients (3%) had assisted or senior living exposure, and 2,683 patients (67%) had "none of these" exposures (Figure 6b and Table 3).
  - SLDSS data showed variation in demographic characteristic distribution by exposure category (Table 4b).

Healthcare exposure

Of the Legionnaires' disease cases reported to SLDSS from the 31 complete reporting jurisdictions in 2014 and 2015, 19%–20% were in patients who reported healthcare exposure (Figure 6a, Figure 6b, and Table 3) (See **Definitions** for more detail).

- **2014**: Of the 656 confirmed Legionnaires' disease cases in patients with any healthcare exposure reported to SLDSS from the 31 complete reporting jurisdictions, 150 (23%) were definite healthcare-associated cases, and 506 (77%) were possible healthcare-associated cases (Figure 6a and Table 5a).
  - Of the 150 confirmed Legionnaires' disease cases in patients with definite healthcare association, 100 (67%) were in patients who reported exposure to a long-term care facility and 31 (21%) were in patients who reported exposure to a hospital (Table 5a).
  - Of the 506 confirmed Legionnaires' disease cases in patients with possible healthcare association, 251 (50%) were in patients who reported exposure to a hospital, 128 (25%) were in patients who reported exposure to a clinic, and 72 (14%) were in patients who reported exposure to a long-term care facility (Table 5a).
- **2015:** Of the 763 confirmed Legionnaires' disease cases in patients with any healthcare exposure reported to SLDSS from the 31 complete reporting jurisdictions, 119 (16%) were definite healthcare-associated cases, and 644 (84%) were possible healthcare-associated cases (Figure 6b and Table 5b).
  - Of the 119 confirmed Legionnaires' disease cases in patients with definite healthcare association, 87 (73%) were in patients who reported exposure to a long-term care facility and 21 (18%) were in patients who reported exposure to a hospital (Table 5b).
  - Of the 644 confirmed Legionnaires' disease cases in patients with possible healthcare association, 307 (48%) were in patients who reported exposure to a hospital, 184 (29%) were in patients who reported exposure to a clinic, and 83 (13%) were in patients who reported exposure to a long-term care facility (Table 5b).

Travel exposure

Of the Legionnaires' disease cases reported to SLDSS from the 31 complete reporting jurisdictions in 2014 and 2015, 14% were in patients who reported travel exposure (Figure 6a, Figure 6b, and Table 3) (see **Definitions** for more detail).

- **2014:** Of the 449 confirmed Legionnaires' disease cases in patients with travel exposure reported by the 31 complete reporting jurisdictions, 291 patients (65%) reported at least one commercial accommodation, 130 patients (29%) reported non-commercial accommodations only, and 28 patients (6%) reported travel to accommodations of unknown type (Table 3).
- **2015:** Of the 565 confirmed Legionnaires' disease cases in patients with travel exposure by the 31 complete reporting jurisdictions, 371 patients (66%) reported at least one commercial accommodation, 170 patients (30%) reported non-commercial accommodations only, and 24 patients (4%) reported travel to accommodations of unknown type (Table 3).

Assisted or senior living exposure

Of the Legionnaires' disease cases reported to SLDSS from the 31 complete reporting jurisdictions in 2014 and 2015, 3%–4% were in patients who reported assisted or senior living exposure (Figure 6a, Figure 6b, and Table 3) (see **Definitions** for more detail).

- **2014:** Of the 129 confirmed Legionnaires' disease cases in patients with assisted or senior living exposure reported to SLDSS from the 31 complete reporting jurisdictions, 82 patients (64%) had exposure to an assisted living facility and 38 patients (30%) had exposure to a senior living facility (Table 3).
- **2015**: Of the 116 confirmed Legionnaires' disease cases in patients with assisted or senior living exposure reported to SLDSS from the 31 complete reporting jurisdictions, 69 patients (60%) had exposure to an assisted living facility and 39 patients (34%) had exposure to a senior living facility (Table 3).

Hospitalizations and outcomes

Overall, nearly all patients diagnosed with Legionnaires' disease were hospitalized for treatment regardless of age or exposure (Tables 6a/6b and Figure 7). Overall, the CFR for Legionnaires' disease was 7%–8% (Figures 5a/5b) and varied by age and exposure (Figures 6a/6b, Tables 6a/6b, and Figure 8).

Hospitalizations

By exposure category

- **2014:** The rate of hospitalization for treatment of Legionnaires' disease was 95% for Legionnaires' disease cases in patients with a healthcare exposure, 94% for Legionnaires' disease cases in patients with a travel exposure, 98% for Legionnaires' disease cases in patients with an assisted or senior living exposure, and 97% for Legionnaires' disease cases in patients with "none of these" exposures (Table 6a).
- **2015:** The rate of hospitalization for treatment of Legionnaires' disease was 95% for Legionnaires' disease cases in patients with a healthcare exposure, 95% for Legionnaires' disease cases in patients with a travel exposure, 95% for Legionnaires' disease cases in patients with an assisted or senior living exposure, and 96% for Legionnaires' disease cases in patients with "none of these" exposures (Table 6b).

By age group

- **2014:** Of the 3,263 confirmed Legionnaires' disease cases reported to SLDSS from the 31 complete reporting jurisdictions in 2014, 3,132 (96%) occurred in patients who were hospitalized for Legionnaires' disease treatment, ranging from 75%–97% across different age groups. No confirmed cases of Legionnaires' disease were reported to SLDSS in patients within the 0–9 age group from the 31 complete reporting jurisdictions (Figure 7).

- **2015:** Of the 4,001 confirmed Legionnaires' disease cases reported to SLDSS from the 31 complete reporting jurisdictions in 2015, 3,836 (96%) occurred in patients who were hospitalized for Legionnaires' disease treatment, ranging from 83%–100% across different age groups (Figure 7).

Outcomes

By exposure category

- **2014:** The CFR was 12% for Legionnaires' disease cases in patients with a healthcare exposure (23% for definite and 9% for possible healthcare-associated Legionnaires' disease) (Figure 6a), 4% for Legionnaires' disease cases in patients with a travel exposure, 10% for Legionnaires' disease cases in patients with an assisted or senior living exposure, and 7% for Legionnaires' disease cases in patients with "none of these" exposures (Table 6a).
- **2015:** The CFR was 12% for Legionnaires' disease cases in patients with a healthcare exposure (23% for definite and 10% for possible healthcare-associated Legionnaires' disease) (Figure 6b), 4% for Legionnaires' disease cases in patients with a travel exposure, 10% for Legionnaires' disease cases in patients with an assisted or senior living exposure, and 6% for Legionnaires' disease cases in patients with "none of these" exposures (Table 6b).

By age group

- **2014:** Of the 3,263 confirmed Legionnaires' disease cases reported to SLDSS from the 31 complete reporting jurisdictions in 2014, the overall CFR was 8% (Figure 5a), ranging from 0%–17% across different age groups. No confirmed cases of Legionnaires' disease were reported to SLDSS in patients within the 0–9 age group from the 31 complete reporting jurisdictions (Figure 8).
- **2015:** Of the 4,001 confirmed Legionnaires' disease cases reported to SLDSS from the 31 complete reporting jurisdictions in 2015, the overall CFR was 7% (Figure 5b), ranging from 0%–18% across different age groups (Figure 8).

Diagnostic methods

Most confirmed Legionnaires' disease cases (98%) were diagnosed by UAT (Table 7). Among the Legionnaires' disease cases confirmed through positive culture, *Legionella pneumophila* was the most common species identified.

Technical Notes

Table organization

Tables and figures in this report are organized by surveillance system and content. Tables 1–2 and Figures 1–3 were created using data from NNDSS exclusively. Cases of legionellosis in these tables and figures are referred to as Legionnaires' disease (for further explanation refer to text box in the **Background**). Figures 4a–4d were created using data from both NNDSS and SLDSS. Cases of legionellosis from NNDSS in Figures 4a–4d are referred to as Legionnaires' disease for the reasons discussed above; because syndrome of legionellosis is specified for SLDSS, data for SLDSS in Figures 4a–4d are limited to cases of Legionnaires' disease. Figures 5–8 and Tables 3–7 were created using data from SLDSS exclusively. These tables and figures present SLDSS data limited to cases of Legionnaires' disease. Only data for confirmed cases are presented in this report.

Figures 5a–5b include all cases of legionellosis (i.e., Legionnaires' disease, Pontiac fever, "Other") to illustrate the distribution of reporting by cases of different legionellosis syndrome and by completeness of reporting by jurisdiction.

Methods

Data collection

This surveillance summary presents descriptive epidemiologic findings from NNDSS and SLDSS. Data were compiled from cases reported to both surveillance systems from the 50 U.S. state, District of Columbia, and New York City health departments. The surveillance population includes residents of these 52 U.S. jurisdictions diagnosed with Legionnaires' disease in 2014 and 2015.

Public health officials electronically report cases to NNDSS. For 2014 and 2015, NNDSS includes data from cases reported as of June 30 the following year (i.e., data close out for 2014 cases occurred on June 30, 2015). Cases reported after June 30 contribute to case counts for the following year regardless of the year in which they occurred (i.e., cases with symptom onset in 2014 reported to CDC after June 30, 2015 contributed to 2015 case count).

Public health officials use the SLDSS Legionellosis Case Report Form (available at https://www.cdc.gov/legionella/downloads/case-report-form.pdf), or the equivalent state-specific case report form, to capture demographic, clinical, exposure, and reporting details for routine surveillance purposes. For 2014 and 2015, SLDSS includes data from cases reported as of February 22, 2018.

Data from NNDSS are used to describe Legionnaires' disease trends by year, seasonal patterns by month, regional differences by state or jurisdiction of residence, and incidence rates by demographic characteristics. Incidence rate was calculated by dividing the number of confirmed Legionnaires' disease cases reported to NNDSS by the total resident population estimate or by a specific demographic population estimate as the denominator for 2014 or 2015, multiplied by 100,000. CDC's National Center for Health Statistics, in collaboration with the U.S. Census Bureau, determines postcensal estimates of resident population by year, jurisdiction, county, age, sex, race, and ethnicity. Population estimates for jurisdictions as of June 28, 2016, are available through the National Vital Statistics System (available at https://www.cdc.gov/nchs/nvss/bridged_race/data_documentation.htm).

Data from SLDSS are used to describe potential sources of Legionnaires' disease exposures (i.e., healthcare, travel, assisted or senior living) that may have occurred during the 10 days before symptom onset; clinical categorization of legionellosis (i.e., Legionnaires' disease, Pontiac fever, extrapulmonary legionellosis); CFRs;

hospitalization; patient outcome; and diagnostic methods. CFRs were calculated as the number of reported confirmed Legionnaires' disease case deaths divided by the number of patients with Legionnaires' disease and the same exposure history (See **Definitions** for more detail).

SAS 9.4 was used for data analysis for both systems (SAS Institute, Cary, NC).

Complete reporting jurisdictions

NNDSS is considered the "gold standard" because almost all diagnosed Legionnaires' disease cases are reported to NNDSS (6); however, NNDSS captures only basic demographic information. SLDSS collects additional epidemiologic data including exposure history, disease severity indicators, and diagnostic laboratory testing results. Completeness of reporting of cases to SLDSS varies by jurisdiction. Because data from the jurisdictions with more complete reporting are more representative, this report restricts most SLDSS analyses to jurisdictions that reported at least 90% of confirmed NNDSS cases to SLDSS (Figures 6–8, Tables 3–6). These jurisdictions are referred to as complete reporting jurisdictions.

Time period and setting

Reported confirmed cases of Legionnaires' disease in NNDSS are based on case entry into the database as of June 30 of the following year (Figures 1–2). Cases reported after a given year's NNDSS database is closed can no longer be added to that year's database and can only contribute to case counts for the following year, regardless of the year in which that case occurred. In NNDSS, month is calculated based on the *MMWR* week assigned to that case by the reporting jurisdiction (available at http://wwwn.cdc.gov/nndss/document/MMWR_Week_overview.pdf) (Figure 2). Jurisdictions can assign *MMWR* week based on disease onset date, date the case was first reported to any public health department, date the case was reported to CDC, or some other date.

Reported cases in SLDSS are based on case year, defined as the year of symptom onset, when available. Date of symptom onset is self-reported by the patient as the date signs and symptoms of Legionnaires' disease first occurred, or deferred to the judgement of the clinicians providing care and the public health officials performing the interviews. If onset date is not stated, case year for confirmed cases is determined by the following dates (in order of reporting): date of positive laboratory test (by either UAT, culture, or 4-fold rise in antibody titer to *Legionella pneumophila* serogroup 1); date patient was hospitalized for treatment of Legionnaires' disease; or date case was first reported to public health at any level.

The population for this report includes residents from 52 U.S. jurisdictions (50 U.S. states, District of Columbia, and New York City). Resident jurisdiction is defined as the state, or jurisdiction, of usual residence of each case at the time of disease onset as reported to NNDSS (Figures 3a/3b) (available at https://wwwn.cdc.gov/nndss/document/11-SI-04.pdf). New York City and New York State health departments report independently to both surveillance systems; data from these jurisdictions are mutually exclusive in this report, such that New York City data are not included in the New York State data. Incidence of confirmed cases of Legionnaires' disease reported to NNDSS by resident jurisdiction was determined by calculating individual jurisdictions' incidence rates and reporting rate by quintile of the distribution (Figures 3a/3b).

Definitions

Case status

In this report, case status is defined as confirmed and not-confirmed. To be considered confirmed, a case must occur in a person with a clinically compatible illness and at least one of the confirmatory laboratory criteria (i.e., positive UAT, isolation of *Legionella* by culture, or a 4-fold or greater rise in specific serum antibody titer to *Legionella pneumophila* serogroup 1) (1). CSTE defines a suspect case as a clinically compatible illness that meets

at least one of the presumptive (suspect) laboratory criteria (i.e., a 4-fold or greater rise in antibody titer to multiple species or specific species or serogroups of *Legionella* other than *Legionella pneumophila* serogroup 1 or a positive detection of specific *Legionella* antigen or staining of the organism by direct fluorescent antibody staining, or immunohistochemistry, or by a validated nucleic acid assay) (1). Most cases submitted to NNDSS and SLDSS were categorized as confirmed (98%–99%).

Demographic characteristics

Selected demographic characteristics include age, sex, race, and ethnicity. For both surveillance systems, age is categorized in 10-year periods until age 85 (Tables 2 and 4a/4b and Figure 4a). Sex is reported by the health department completing the case investigation as either female or male (Tables 2 and 4a/4b and Figure 4b). NNDSS uses bridged-race categories that include American Indian or Alaska Native, Asian or Pacific Islander, black or African American, or white (Table 2 and Figure 4d) (available at https://www.cdc.gov/nchs/nvss/bridged_race/data_documentation.htm). SLDSS categorizes race as American Indian or Alaska Native, Asian, black or African American, Hawaiian Islander or Pacific Islander, white, or multiple races (Figure 4c). For both systems, Hispanic ethnicity is restricted to Hispanic or Latino, or not Hispanic or Latino, and is independent of race (Tables 2, Table 4a/4b, and Figure 4d).

Exposure categories

To assess potential sources of *Legionella* infection, SLDSS data were limited to reported confirmed Legionnaires' disease cases from complete reporting jurisdictions in 2014 and 2015 (Table 3).

SLDSS captures Legionnaires' disease-specific data including exposure history within the 10 days before symptom onset. Exposure to a healthcare setting, travel history, and exposure to an assisted or senior living facility are captured. The exposures are not mutually exclusive; multiple exposure types can occur during the exposure period. Cases without reported exposure to a healthcare setting, travel history, and exposure to an assisted or senior living facility are categorized as "none of these" (Figures 6a/6b and Table 3).

Healthcare exposure

Cases in patients who reported visiting, working in, or staying in a healthcare setting during the 10 days before date of symptom onset are classified as cases with a healthcare exposure. Because healthcare facilities often have large, complex water systems and aerosol-generating medical devices, healthcare exposure is a risk factor for Legionnaires' disease. Patients in healthcare settings often also have personal risk factors for Legionnaires' disease, such as advanced age, weakened immune systems, and chronic medical conditions (9). For the purpose of Legionnaires' disease surveillance, the CDC definition for healthcare facility does not include assisted living facilities, senior living facilities, prisons, or group homes.

Cases in patients with healthcare exposure are categorized by healthcare setting and exposure type. Healthcare setting includes the following mutually exclusive categories: hospital, long-term care facility, clinic, other, or more than one type of setting. "Other" healthcare settings include diagnostic centers, disability service centers, eye centers, laboratories, and pharmacies. Healthcare exposure type includes the following mutually exclusive categories: inpatient, outpatient, visitor or volunteer, employee, or more than one type of healthcare exposure (Figures 6a/6b and Table 3).

For confirmed Legionnaires' disease cases in patients with healthcare exposure, cases are classified as definite or possible healthcare-associated. Definite healthcare-associated cases include Legionnaires' disease in patients who spent the entire 10 days before date of symptom onset in a healthcare facility. Possible healthcare-associated cases include Legionnaires' disease in patients and non-patients (e.g., visitors, employees) who spent a portion of the 10 days before date of symptom onset in a healthcare facility, and thus exposures could have occurred elsewhere (Tables 5a/5b).

A patient with Legionnaires' disease who spent the entire exposure period in multiple healthcare facilities (i.e., someone transferred between healthcare facilities) would be considered to have a definite healthcare-associated case for surveillance purposes. Cases in patients who reported a visit to a healthcare setting in the 10 days before date of symptom onset and did not indicate definite or possible healthcare associations were categorized as possible healthcare-associated.

Travel exposure

Cases in persons who reported spending at least one night away from home (e.g., in the state of residence, another state, or another country) in the 10 days before date of symptom onset, not including nights spent in a healthcare facility, are classified as having a travel exposure.

Travel exposure is further classified at CDC as either commercial or non-commercial. Commercial travel includes spending at least one night away from home in the 10 days before symptom onset in a commercial accommodation (e.g., hotel, motel, resort, cruise, short-term vacation rental, RV park). Because hotels, resorts, and cruise ships often use large, complex water systems and aerosol-generating devices, travel to commercial accommodations is a known risk factor for exposure to *Legionella*. Non-commercial travel includes spending at least one night away from home in the 10 days before symptom onset in a non-commercial accommodation (e.g., in the home of family or friends).

Cases may occur in patients with multiple travel locations during the exposure period. If any exposure to a commercial accommodation occurs, the case is categorized as commercial travel. Non-commercial travel represents exposure to non-commercial accommodations only. If a patient has exposure to both non-commercial and unknown accommodations, the case is categorized as unknown travel (Figures 6a/6b and Table 3).

Assisted or senior living exposure

Cases in patients who reported visiting or staying in an assisted or senior living facility in the 10 days before symptom onset are classified as having assisted or senior living exposure. Assisted living facilities, by the SLDSS case report form definition, provide custodial care without skilled nursing (e.g., assistance with activities of daily living, like bathing and dressing). Senior living facilities provide independent living for the elderly. Although assisted and senior living facilities are not considered healthcare facilities for Legionnaires' disease surveillance purposes, they often house populations at increased risk for Legionnaires' disease and can have large, complex water systems. For those reasons, these facilities should be considered as likely sources in outbreak investigations and should have water management programs in place.

Assisted or senior living cases are categorized by assisted or senior living setting and exposure type. Setting includes the following mutually exclusive categories: assisted living facility or senior living facility. Exposure type includes the following mutually exclusive categories: resident, visitor or volunteer, or employee. No confirmed Legionnaires' disease cases from complete reporting jurisdictions occurred in patients who reported multiple assisted or senior living setting or exposure types in 2014 or 2015 (Figures 6a/6b and Table 3).

"None of these"

"None of these" exposures includes confirmed Legionnaires' disease cases in patients who did not report healthcare, travel, or assisted or senior living facility exposures in the 10 days before symptom onset (Figures 6a/6b and Table3).

Hospitalization

Health department staff indicate on the SLDSS case report form whether the patient was hospitalized during treatment for Legionnaires' disease as yes, no, or unknown (Tables 6a/6b and Figures 6 and 7). If the patient was admitted to a hospital prior to date of Legionnaires' disease symptom onset, the hospitalization information also contributed to the case having a healthcare exposure.

Outcome

Health department staff indicate on the SLDSS case report form if the patient survived, died, or was still ill at time of reporting. If this information is unknown, case outcome is indicated as "unknown" (Tables 6a/6b and Figures 7 and 8). This data element may not represent the final case outcome, as a patient's condition may change after submission of case data to SLDSS. Deaths may not have resulted from Legionnaires' disease or Legionnaires' disease alone. CFR refers to the number of reported confirmed Legionnaires' disease case deaths at time of case report divided by the number of patients with Legionnaires' disease and the same exposure history.

Diagnostic methods

Frequencies for the three diagnostic methods used to confirm cases of Legionnaires' disease (i.e., UAT, culture, serology) according to the CSTE definition are listed in Table 7. The preferred diagnostic tests for Legionnaires' disease are culture of lower respiratory secretions (e.g., sputum, bronchoalveolar lavage) on selective media and the *Legionella* UAT.

Interpreting data

The purpose of this surveillance report is to present descriptive information regarding Legionnaires' disease. Some data from this report can be used to assess disease trends and case counts, but they are not intended to suggest any causal or correlative relationships between exposures and Legionnaires' disease. NNDSS data were reported by the jurisdiction of the patient's usual residence at the time of disease onset, which does not necessarily represent the source of exposure to *Legionella*. Since NNDSS and SLDSS are independent surveillance systems, state public health offices report Legionnaires' disease cases separately to both systems. Data published in this report may be different from previously published data in *MMWR* for many reasons, including differences in the timing of reports, the data source, or methodology of surveillance (10).

While the incidence of reported cases of Legionnaires' disease in the United States has increased 4.5-fold from 2000 through 2015, these numbers may underestimate the true incidence, because Legionnaires' disease is likely underdiagnosed. Incomplete reporting to SLDSS makes interpretation of data difficult; findings may not represent the entire country. Only the numbers of cases reported to NNDSS and SLDSS were considered when determining which jurisdictions reported ≥90% of their NNDSS cases to SLDSS. It was assumed that SLDSS data were a subset of NNDSS data; this assumption was not verified for all jurisdictions. Determining complete reporting jurisdictions in SLDSS allowed for better interpretation of SLDSS data. However, due to the different number of jurisdictions that were considered to have complete reporting in 2014 and 2015, interpretations of trends in SLDSS data are challenging, and data may not be directly comparable from year to year. More complete reporting to SLDSS would enhance surveillance.

Importance of reporting

Strong surveillance facilitates timely identification of epidemiological links and prompt outbreak investigations. It also allows for early detection of sources of transmission and monitoring effectiveness of control measures. CDC is uniquely positioned to identify connections between cases that occur in residents of different jurisdictions. However, state and local public health officials are best positioned to systematically track Legionnaires' disease cases and efficiently detect outbreaks within their respective jurisdictions. Most cases of Legionnaires' disease are not associated with a known outbreak. Improved ascertainment and reporting of exposure information helps identify potential sources of exposure and can increase detection of outbreaks.

Limitations

In addition to incomplete reporting, another limitation is the timing of reporting to NNDSS and SLDSS. For cases reported to NNDSS, the case year is determined by the year's dataset to which the case is reported, whereas for SLDSS, the case year is determined by the onset date. To remain consistent with case counts published in the *MMWR*, NNDSS analyses in this report include cases by the year of the dataset to which they were reported, rather than the earliest year associated with the case. However, the rate at which cases contributed to the following year's case counts in NNDSS was consistent over the years, and so this may not result in a significant skewing of data. In addition, SLDSS case reports are usually submitted at time of investigation and are not consistently updated for time-dependent variables such as case outcome.

Prevention

Regardless of setting or source of exposure to *Legionella*, a comprehensive approach to prevention requires an understanding of the mechanisms by which *Legionella* growth and transmission can occur in building water systems (5). Implementing and maintaining effective water management programs are the principal prevention measures. Rapid case identification with appropriate laboratory testing and prompt intervention may prevent additional cases from occurring (9).

Future steps

This is the first surveillance summary focusing on Legionnaires' disease. Future reports may be modified with additional data from enhanced surveillance systems, with the goal of allowing the public and CDC's partners to better understand the burden, impact, and trends of Legionnaires' disease over time.

Acknowledgements

The findings in this report are based on contributions from the 50 U.S. state, District of Columbia, and New York City health departments along with Alison Albert, Angela Jiles, Sandy Roush, Rachel Gorwitz, and Barbara Mahon from CDC NCIRD.

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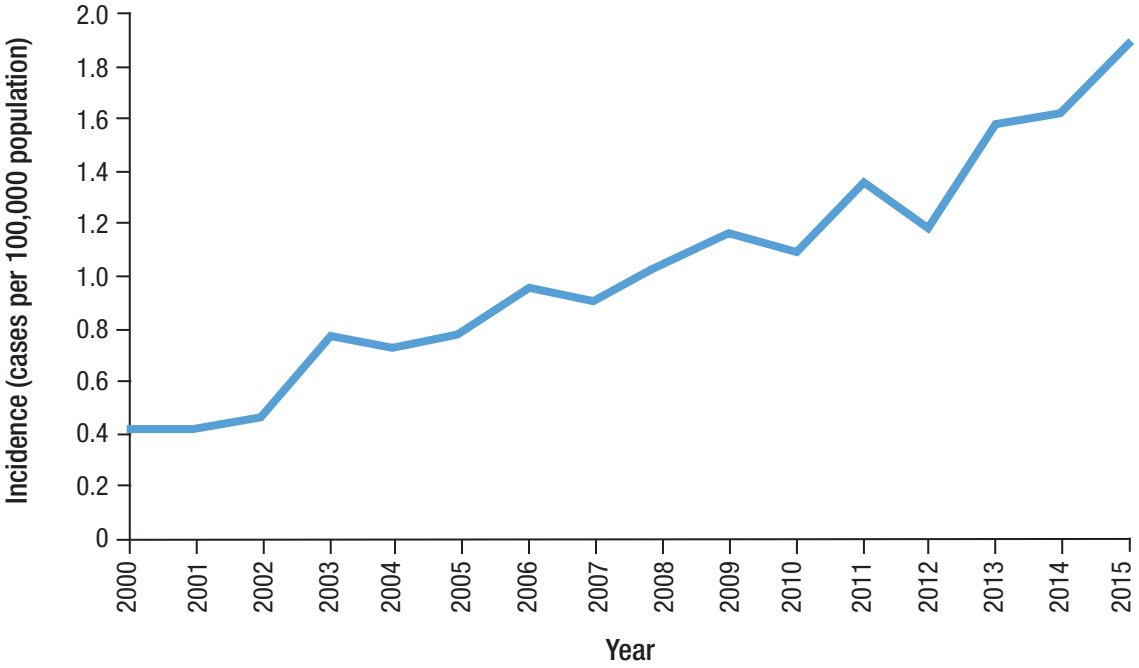
Section 1: National Notifiable Diseases Surveillance System

NOTE: For accessible versions of tables in this report, visit https://www.cdc.gov/legionella/health-depts/surv-reporting/2014-15-report-tables/

Figure 1. Crude incidence[a] rates of reported confirmed cases of Legionnaires' disease[b] by year[c]—NNDSS,[d,e] United States, 2000–2015.



[a] Crude incidence of cases per 100,000 population (number of confirmed Legionnaires' disease cases reported that year divided by postcensal population estimate for that year times 100,000 population).

[b] Cases of disease due to *Legionella* are reported to NNDSS as legionellosis, which includes Legionnaires' disease, Pontiac fever, and disease due to *Legionella* infection at extrapulmonary sites, but are referred to as Legionnaires' disease in this figure (because almost all legionellosis cases reported in the United States are due to Legionnaires' disease).

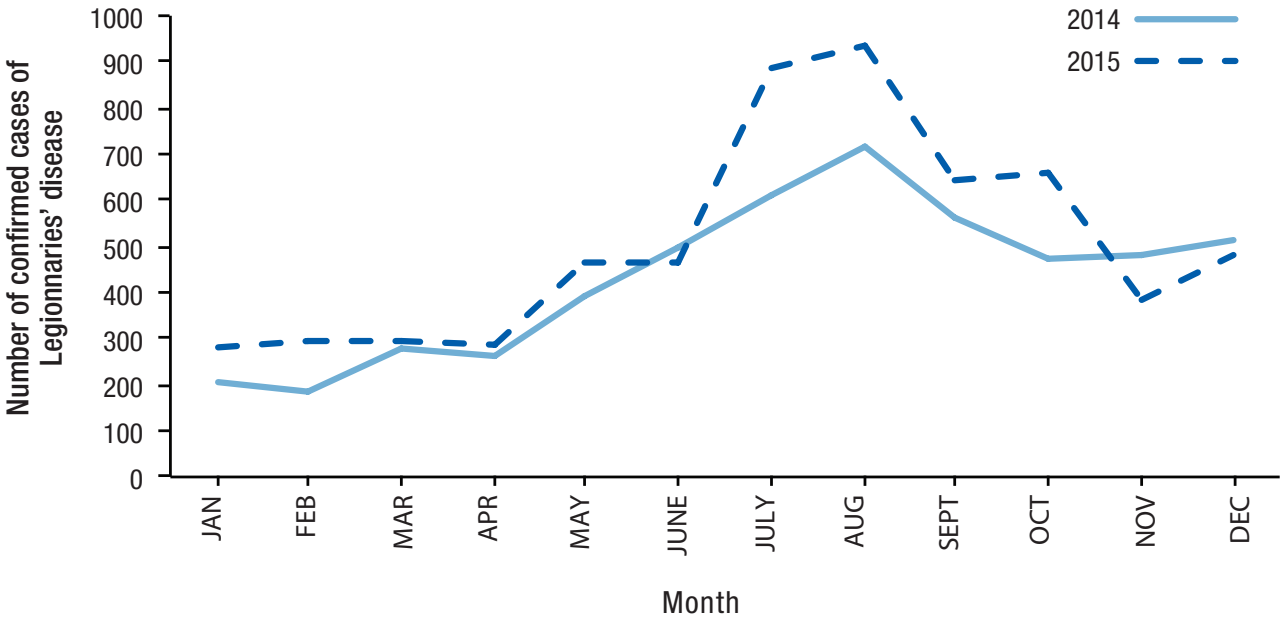
[c] Based on year case was reported to CDC.

[d] National Notifiable Diseases Surveillance System (NNDSS).

[e] Jurisdictions may report cases of any case status to NNDSS, but only confirmed cases of Legionnaires' disease are included in this figure, with the exceptions noted below. National case counts published in the *MMWR* use the same criteria and exceptions.

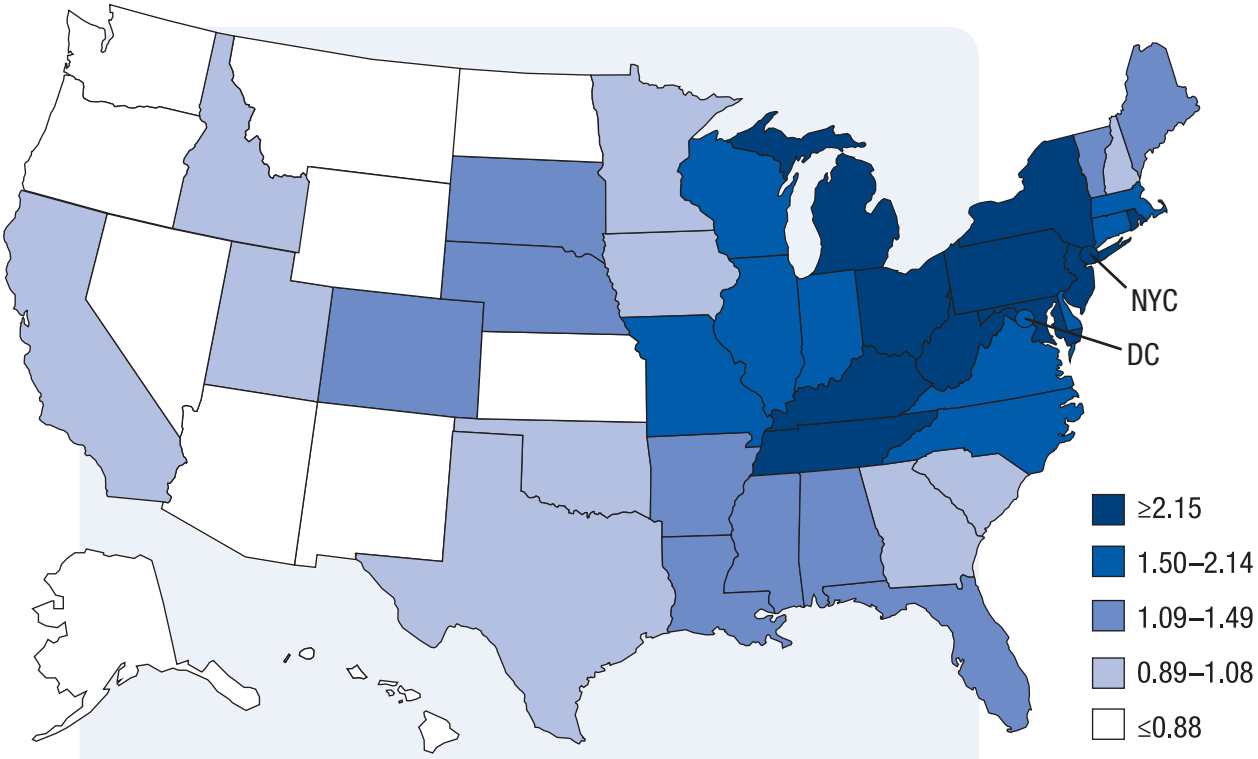
2000–2003: Legionnaires' disease cases with probable, suspect, and unknown case status were also published.
2000–2001: Legionnaires' disease cases were not reportable in Oregon and West Virginia.
2004–2012: Legionnaires' disease cases with unknown case status reported from California were also published.
2011–2012: Legionnaires' disease cases were not reportable in the District of Columbia.

Figure 2. Number of reported confirmed cases of Legionnaires' disease[a] by month[b] and year[c]—NNDSS,[d] United States, 2014 and 2015.



[a] Cases of disease due to *Legionella* are reported to NNDSS as legionellosis, which includes Legionnaires' disease, Pontiac fever, and disease due to *Legionella* infection at extrapulmonary sites, but are referred to as Legionnaires' disease in this figure (because almost all legionellosis cases reported in the United States are due to Legionnaires' disease).
[b] Month is based upon *Morbidity and Mortality Weekly Report* year and week (available at http://wwwn.cdc.gov/nndss/document/MMWR_Week_overview.pdf).
[c] Based on year case was reported to CDC.
[d] National Notifiable Diseases Surveillance System (NNDSS).

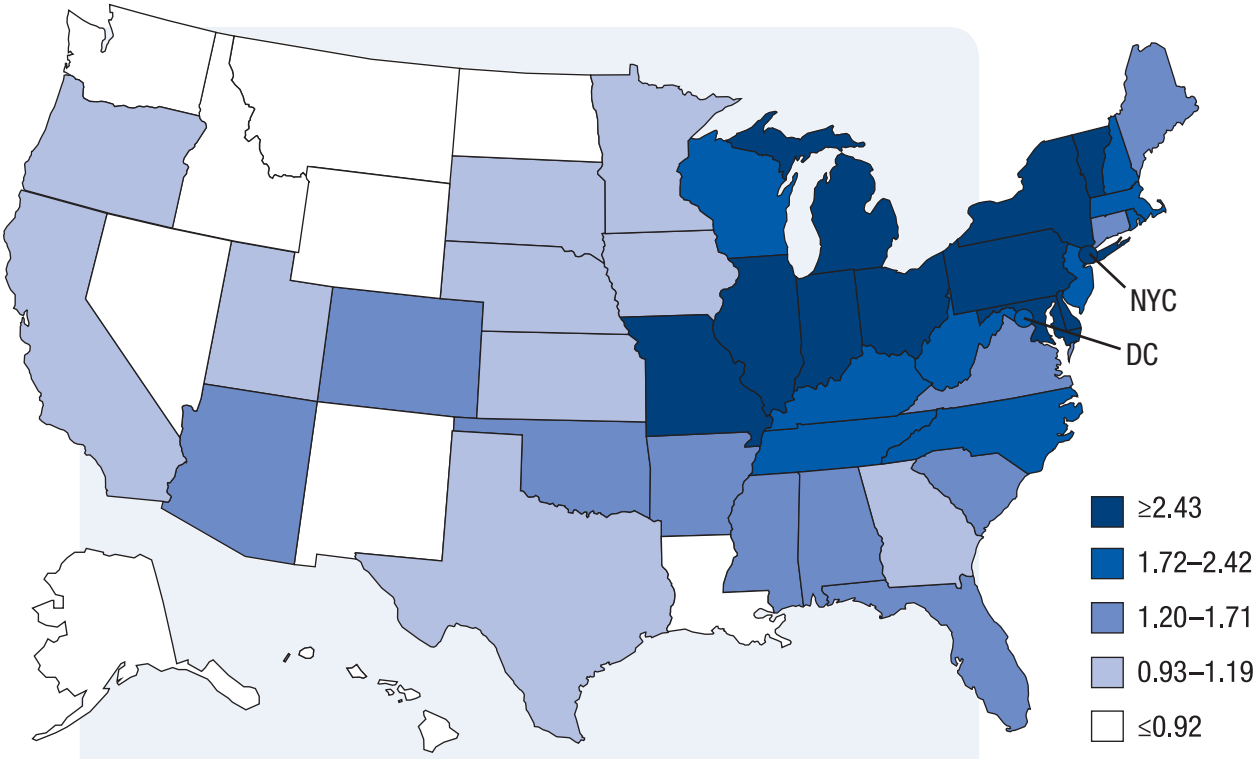
Figure 3a. Crude incidence[a] rates of reported confirmed cases of Legionnaires' disease[b] by jurisdiction of residence[c]—NNDSS,[d] United States, 2014.[e,f]



Alabama	1.30	Louisiana	1.38	Ohio	3.50
Alaska	0.27	Maine	1.43	Oklahoma	0.93
Arizona	0.88	Maryland	2.41	Oregon	0.83
Arkansas	1.28	Massachusetts	2.13	Pennsylvania	2.53
California	0.90	Michigan	2.31	Rhode Island	2.65
Colorado	1.21	Minnesota	1.08	South Carolina	0.93
Connecticut	1.67	Mississippi	1.10	South Dakota	1.17
Delaware	2.14	Missouri	1.75	Tennessee	2.46
D.C.	1.97	Montana	0.39	Texas	0.95
Florida	1.41	Nebraska	1.22	Utah	0.95
Georgia	0.92	Nevada	0.88	Vermont	1.12
Hawaii	0.49	New Hampshire	0.90	Virginia	1.55
Idaho	1.04	New Jersey	2.23	Washington	0.78
Illinois	1.93	New Mexico	0.38	West Virginia	2.59
Indiana	1.96	New York	3.75	Wisconsin	1.65
Iowa	1.06	New York City	2.69	Wyoming	0.34
Kansas	0.65	North Carolina	1.88		
Kentucky	2.15	North Dakota	0.54		

[a] Crude incidence of cases per 100,000 population (number of confirmed Legionnaires' disease cases reported that year divided by postcensal resident jurisdiction population estimate for that year times 100,000 population).
[b] Cases of disease due to *Legionella* are reported to NNDSS as legionellosis, which includes Legionnaires' disease, Pontiac fever, and disease due to *Legionella* infection at extrapulmonary sites, but are referred to as Legionnaires' disease in this figure (because almost all legionellosis cases reported in the United States are due to Legionnaires' disease).
[c] Jurisdiction of the patient's "usual residence" at the time of disease onset.
[d] National Notifiable Diseases Surveillance System (NNDSS).
[e] Based on year case was reported to CDC.
[f] Shading represents quintiles of incidence rates.

Figure 3b. Crude incidence[a] rates of reported confirmed cases of Legionnaires' disease[b] by jurisdiction of residence[c]—NNDSS,[d] United States, 2015.[e,f]



Alabama	1.21	Louisiana	0.90	North Dakota	0.66
Alaska	0.00	Maine	1.20	Ohio	4.93
Arizona	1.36	Maryland	2.55	Oklahoma	1.23
Arkansas	1.24	Massachusetts	2.38	Oregon	1.17
California	1.16	Michigan	2.53	Pennsylvania	2.97
Colorado	1.36	Minnesota	0.93	Rhode Island	1.99
Connecticut	1.59	Mississippi	1.27	South Carolina	1.21
Delaware	2.54	Missouri	2.43	South Dakota	1.17
D.C.	1.93	Montana	0.77	Tennessee	1.80
Florida	1.51	Nebraska	0.95	Texas	1.06
Georgia	1.18	Nevada	0.86	Utah	1.03
Hawaii	0.42	New Hampshire	2.40	Vermont	2.88
Idaho	0.79	New Jersey	2.39	Virginia	1.66
Illinois	2.45	New Mexico	0.82	Washington	0.78
Indiana	2.67	New York	3.85	West Virginia	1.90
Iowa	1.15	New York City	5.11	Wisconsin	2.06
Kansas	1.06	North Carolina	1.76	Wyoming	0.68
Kentucky	1.97				

[a] Crude incidence of cases per 100,000 population (number of confirmed Legionnaires' disease cases reported that year divided by postcensal resident jurisdiction population estimate for that year times 100,000 population).
[b] Cases of disease due to *Legionella* are reported to NNDSS as legionellosis, which includes Legionnaires' disease, Pontiac fever, and disease due to *Legionella* infection at extrapulmonary sites, but are referred to as Legionnaires' disease in this figure (because almost all legionellosis cases reported in the United States are due to Legionnaires' disease).
[c] Jurisdiction of the patient's "usual residence" at the time of disease onset.
[d] National Notifiable Diseases Surveillance System (NNDSS).
[e] Based on year case was reported to CDC.
[f] Shading represents quintiles of incidence rates.

Table 1. Number of reported confirmed cases of Legionnaires' disease[a] by jurisdiction of residence[b] and year[c]—NNDSS,[d] United States, 2014 and 2015.

Jurisdiction	2014 (Total= 5,166) N	2014 %	2015 (Total= 6,079) N	2015 %	Percent Change %
Alabama	63	1.2	59	1.0	-6.3
Alaska	2	0.0	0	0.0	-100.0
Arizona	59	1.1	93	1.5	57.6
Arkansas	38	0.7	37	0.6	-2.6
California	351	6.8	453	7.5	29.1
Colorado	65	1.3	74	1.2	13.8
Connecticut	60	1.2	57	0.9	-5.0
Delaware	20	0.4	24	0.4	20.0
D.C.	13	0.3	13	0.2	0.0
Florida	280	5.4	306	5.0	9.3
Georgia	93	1.8	121	2.0	30.1
Hawaii	7	0.1	6	0.1	-14.3
Idaho	17	0.3	13	0.2	-23.5
Illinois	249	4.8	315	5.2	26.5
Indiana	129	2.5	177	2.9	37.2
Iowa	33	0.6	36	0.6	9.1
Kansas	19	0.4	31	0.5	63.2
Kentucky	95	1.8	87	1.4	-8.4
Louisiana	64	1.2	42	0.7	-34.4
Maine	19	0.4	16	0.3	-15.8
Maryland	144	2.8	153	2.5	6.3
Massachusetts	144	2.8	162	2.7	12.5
Michigan	229	4.4	251	4.1	9.6
Minnesota	59	1.1	51	0.8	-13.6
Mississippi	33	0.6	38	0.6	15.2
Missouri	106	2.1	148	2.4	39.6
Montana	4	0.1	8	0.1	100.0
Nebraska	23	0.5	18	0.3	-21.7
Nevada	25	0.5	25	0.4	0.0
New Hampshire	12	0.2	32	0.5	166.7
New Jersey	199	3.9	214	3.5	7.5
New Mexico	8	0.2	17	0.3	112.5
New York City	228	4.4	437	7.2	91.7
New York State	422	8.2	433	7.1	2.6
North Carolina	187	3.6	177	2.9	-5.3

Jurisdiction	2014 (Total= 5,166) N	%	2015 (Total= 6,079) N	%	Percent Change %
North Dakota	4	0.1	5	0.1	25.0
Ohio	406	7.9	572	9.4	40.9
Oklahoma	36	0.7	48	0.8	33.3
Oregon	33	0.6	47	0.8	42.4
Pennsylvania	324	6.3	380	6.3	17.3
Rhode Island	28	0.5	21	0.3	-25.0
South Carolina	45	0.9	59	1.0	31.1
South Dakota	10	0.2	10	0.2	0.0
Tennessee	161	3.1	119	2.0	-26.1
Texas	256	5.0	292	4.8	14.1
Utah	28	0.5	31	0.5	10.7
Vermont	7	0.1	18	0.3	157.1
Virginia	129	2.5	139	2.3	7.8
Washington	55	1.1	56	0.9	1.8
West Virginia	48	0.9	35	0.6	-27.1
Wisconsin	95	1.8	119	2.0	25.3
Wyoming	2	0.0	4	0.1	100.0
TOTAL	5,166	100	6,079	100	17.7

[a]Cases of disease due to *Legionella* are reported to NNDSS as legionellosis, which includes Legionnaires' disease, Pontiac fever, and disease due to *Legionella* infection at extrapulmonary sites, but are referred to as Legionnaires' disease in this figure (because almost all legionellosis cases reported in the United States are due to Legionnaires' disease).
[b]Jurisdiction of the patient's "usual residence" at the time of disease onset.
[c]Based on year case was reported to CDC.
[d]National Notifiable Diseases Surveillance System (NNDSS).
Accessible version at: https://www.cdc.gov/legionella/health-depts/surv-reporting/2014-15-report-tables/index.html#table1

Table 2. Number, percent, and crude incidence[a] rates of reported confirmed cases of Legionnaires' disease[b] by demographic characteristics and year[c]—NNDSS,[d] United States, 2014 and 2015.

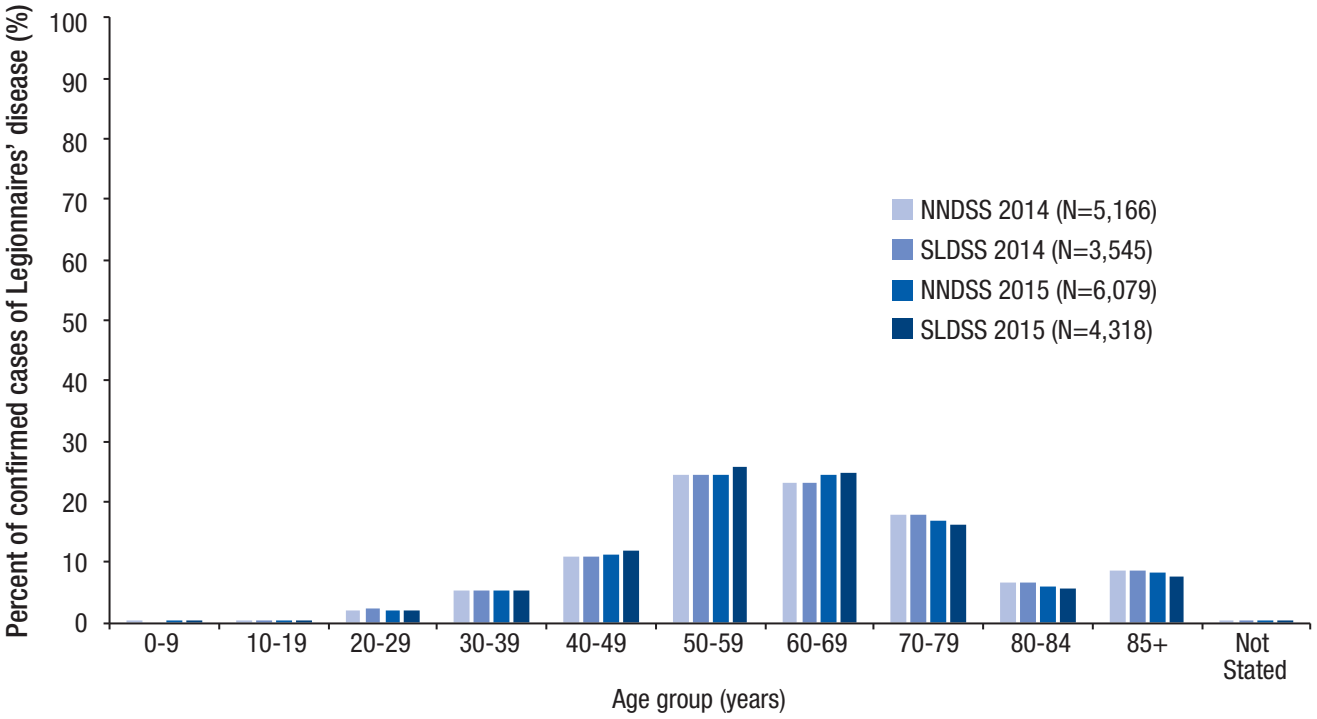
	2014			2015		
Characteristic	N	%	Rate[a]	N	%	Rate[a]
Age						
0–9	1	0.0	0.00	9	0.1	0.02
10–19	10	0.2	0.02	19	0.3	0.05
20–29	111	2.1	0.25	131	2.2	0.29
30–39	277	5.4	0.67	329	5.4	0.78
40–49	563	10.9	1.36	695	11.4	1.69
50–59	1,264	24.5	2.87	1,486	24.4	3.37
60–69	1,204	23.3	3.55	1,482	24.4	4.22
70–79	933	18.1	4.91	1,037	17.1	5.29
80–84	350	6.8	6.08	376	6.2	6.48
85+	451	8.7	7.32	513	8.4	8.16
Not stated	2	0.0	N/A	2	0.0	N/A
Sex						
Female	2,112	40.9	1.30	2,328	38.3	1.43
Male	3,050	59.0	1.94	3,748	61.7	2.37
Not stated	4	0.1	N/A	3	0.0	N/A
Race						
American Indian/Alaska Native	21	0.4	0.46	18	0.3	0.39
Native Asian/Pacific Islander	69	1.3	0.36	86	1.4	0.43
African American/Black	901	17.4	2.03	1,111	18.3	2.48
White	3,155	61.1	1.26	3,761	61.9	1.49
Other[e]	122	2.4	N/A	150	2.5	N/A
Not stated	898	17.4	N/A	953	15.7	N/A
Ethnicity[f]						
Hispanic	280	5.4	N/A	408	6.7	N/A
Non-Hispanic	3,577	69.2	N/A	4,356	71.7	N/A
Not stated	1,309	25.3	N/A	1,315	21.6	N/A
Total	5,166	100	1.62	6,079	100	1.89

[a] Crude incidence of cases per 100,000 population (number of confirmed Legionnaires' disease cases reported that year divided by postcensal population estimate for that year times 100,000 population).
[b] Cases of disease due to *Legionella* are reported to NNDSS as legionellosis, which includes Legionnaires' disease, Pontiac fever, and disease due to *Legionella* infection at extrapulmonary sites, but are referred to as Legionnaires' disease in this figure (because almost all legionellosis cases reported in the United States are due to Legionnaires' disease).
[c] Based on year case was reported to CDC.
[d] National Notifiable Diseases Surveillance System (NNDSS).
[e] Other race includes individuals that did not identify with races listed.
[f] Due to significant proportion of missing ethnicity data reported, incidence rates by ethnicity are not presented.
Accessible version at: https://www.cdc.gov/legionella/health-depts/surv-reporting/2014-15-report-tables/index.html#table2

Section 2: National Notifiable Diseases Surveillance System comparison with Supplemental Legionnaires' Disease Surveillance System

NOTE: For accessible versions of tables in this report, visit https://www.cdc.gov/legionella/health-depts/surv-reporting/2014-15-report-tables/

Figure 4a. Percent of reported confirmed cases of Legionnaires' disease[a] by age group and year[b]—NNDSS[c] and SLDSS,[d] United States, 2014 and 2015.



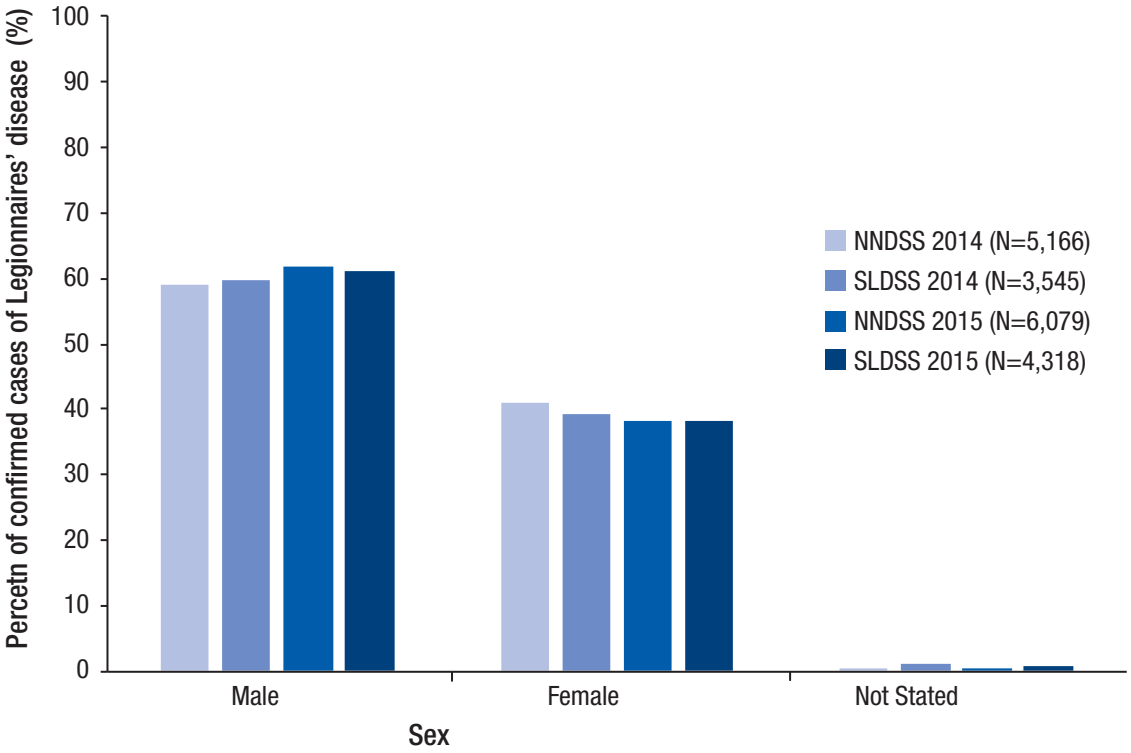
[a] Cases of disease due to *Legionella* are reported to NNDSS as legionellosis, which includes Legionnaires' disease, Pontiac fever, and disease due to *Legionella* infection at extrapulmonary sites, but are referred to as Legionnaires' disease in this figure (because almost all legionellosis cases reported in the United States are due to Legionnaires' disease). SLDSS data are limited to cases of Legionnaires' disease in this figure.

[b] Based on year case was reported to CDC in NNDSS and year of symptom onset in SLDSS. If onset date was not stated in SLDSS, case year for confirmed cases was determined by the following dates (in order of reporting): positive laboratory date (by either urinary antigen testing, culture, or fourfold rise of antibody against *Legionella pneumophila* serogroup 1); date patient was hospitalized during treatment for Legionnaires' disease; or date case was first reported to public health at any level.

[c] National Notifiable Diseases Surveillance System (NNDSS).

[d] Supplemental Legionnaires' Disease Surveillance System (SLDSS).

Figure 4b. Percent of reported confirmed cases of Legionnaires' disease[a] by sex and year[b]—NNDSS[c] and SLDSS,[d] United States, 2014 and 2015.



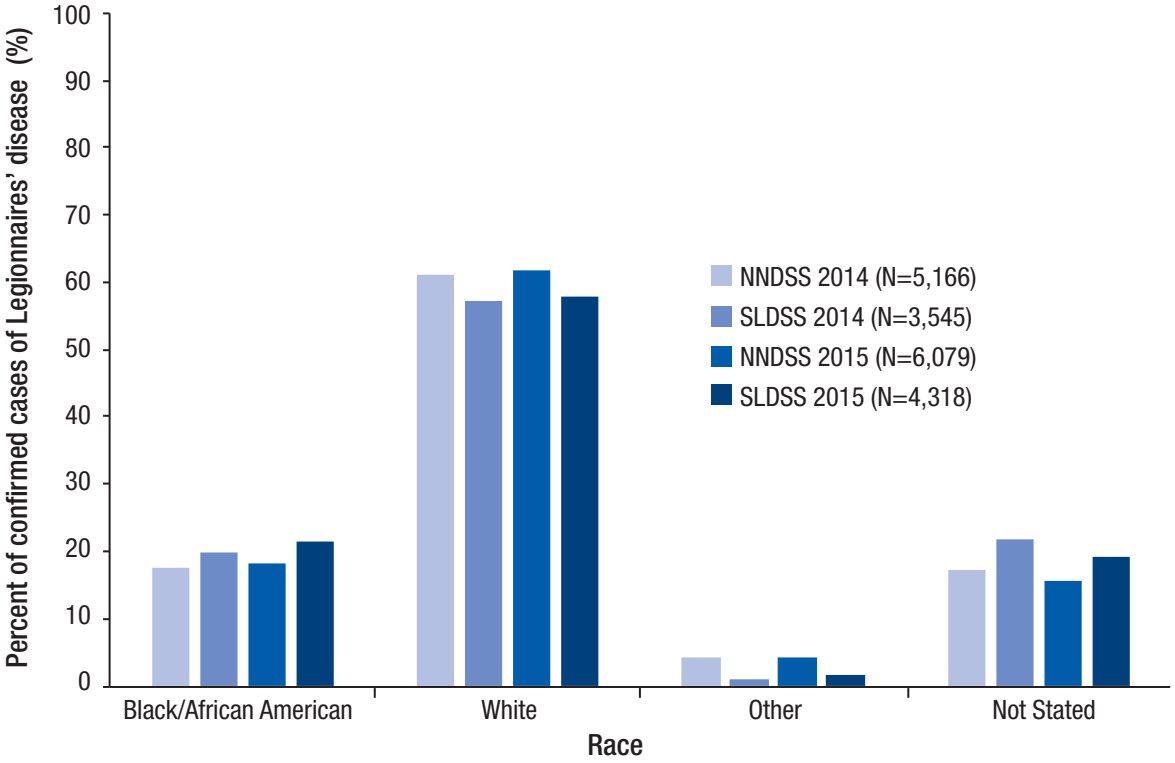
[a] Cases of disease due to *Legionella* are reported to NNDSS as legionellosis, which includes Legionnaires' disease, Pontiac fever, and disease due to *Legionella* infection at extrapulmonary sites, but are referred to as Legionnaires' disease in this figure (because almost all legionellosis cases reported in the United States are due to Legionnaires' disease). SLDSS data are limited to cases of Legionnaires' disease in this figure.

[b] Based on year case was reported to CDC in NNDSS and year of symptom onset in SLDSS. If onset date was not stated in SLDSS, case year for confirmed cases was determined by the following dates (in order of reporting): positive laboratory date (by either urinary antigen testing, culture, or fourfold rise of antibody against *Legionella pneumophila* serogroup 1); date patient was hospitalized during treatment for Legionnaires' disease; or date case was first reported to public health at any level.

[c] National Notifiable Diseases Surveillance System (NNDSS).

[d] Supplemental Legionnaires' Disease Surveillance System (SLDSS).

Figure 4c. Percent of reported confirmed cases of Legionnaires' disease[a] by race[b] and year[c]—NNDSS[d] and SLDSS,[e] United States, 2014 and 2015.



[a] Cases of disease due to *Legionella* are reported to NNDSS as legionellosis, which includes Legionnaires' disease, Pontiac fever, and disease due to *Legionella* infection at extrapulmonary sites, but are referred to as Legionnaires' disease in this figure (because almost all legionellosis cases reported in the United States are due to Legionnaires' disease). SLDSS data are limited to cases of Legionnaires' disease in this figure.

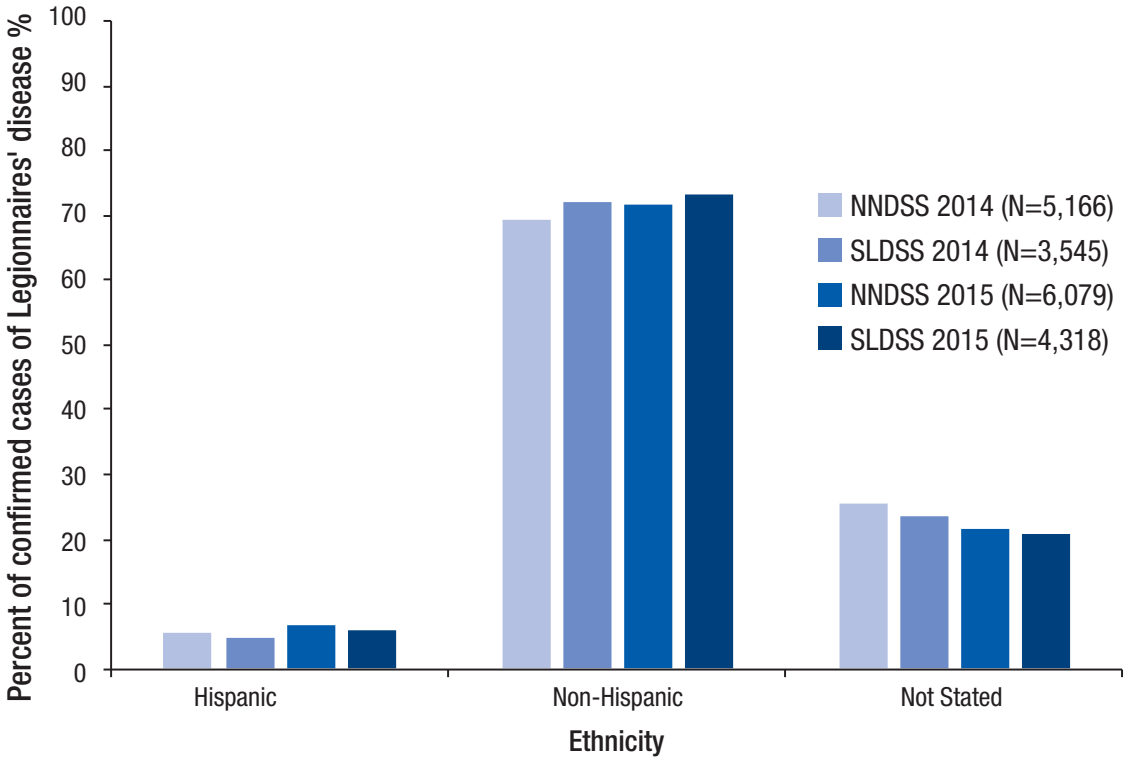
[b] In NNDSS, Other includes American Indian/Alaska Native, Asian/Pacific Islander, and individuals that did not identify with either race in NNDSS. In SLDSS, Other includes American Indian/Alaska Native, Asian, Hawaii/Pacific Islander, and individuals that identified with multiple races.

[c] Based on year reported to CDC in NNDSS and year of symptom onset in SLDSS. If onset date was not stated in SLDSS, case year for confirmed cases was determined by the following dates (in order of reporting): positive laboratory date (by either urinary antigen testing, culture, or fourfold rise of antibody against *Legionella pneumophila* serogroup 1); date patient was hospitalized during treatment for Legionnaires' disease; or date case was first reported to public health at any level.

[d] National Notifiable Diseases Surveillance System (NNDSS).

[e] Supplemental Legionnaires' Disease Surveillance System (SLDSS).

Figure 4d. Percent of reported confirmed cases of Legionnaires' disease[a] by ethnicity and year[b]—NNDSS[c] and SLDSS,[d] United States, 2014 and 2015.



[a] Cases of disease due to *Legionella* are reported to NNDSS as legionellosis, which includes Legionnaires' disease, Pontiac fever, and disease due to *Legionella* infection at extrapulmonary sites, but are referred to as Legionnaires' disease in this figure (because almost all legionellosis cases reported in the United States are due to Legionnaires' disease). SLDSS data are limited to cases of Legionnaires' disease in this figure.

[b] Based on year case was reported to CDC in NNDSS and year of symptom onset in SLDSS. If onset date was not stated in SLDSS, case year for confirmed cases was determined by the following dates (in order of reporting): positive laboratory date (by either urinary antigen testing, culture, or fourfold rise of antibody against *Legionella pneumophila* serogroup 1); date patient was hospitalized during treatment for Legionnaires' disease; or date case was first reported to public health at any level.

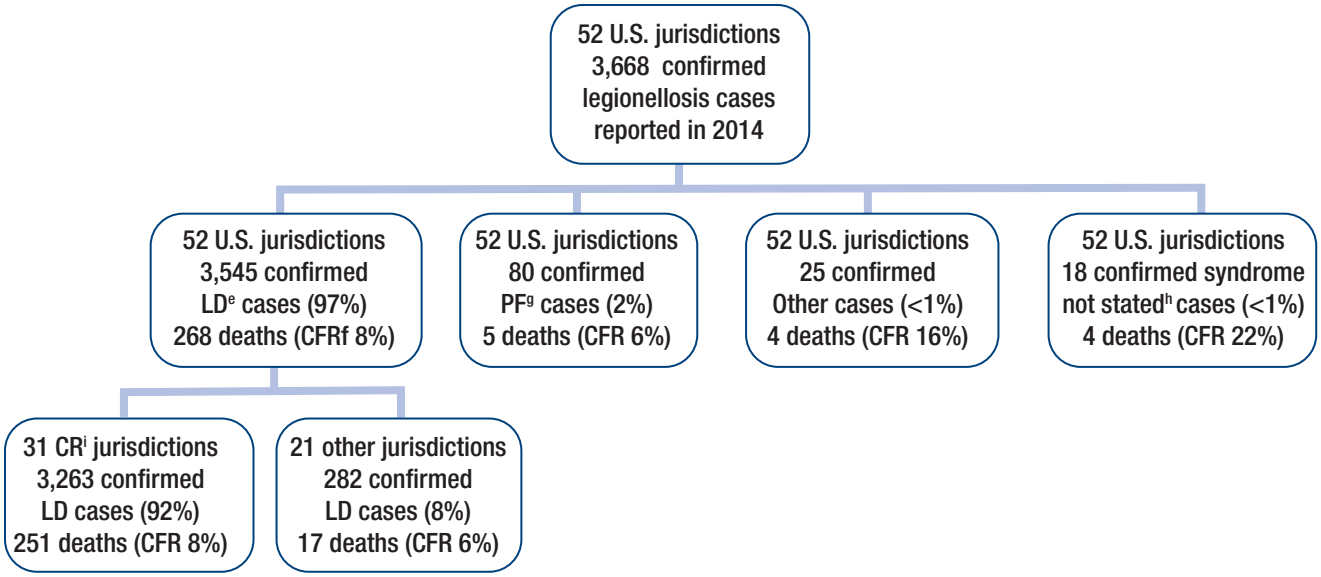
[c] National Notifiable Diseases Surveillance System (NNDSS).

[d] Supplemental Legionnaires' Disease Surveillance System (SLDSS).

Section 3: Supplemental Legionnaires' Disease Surveillance System

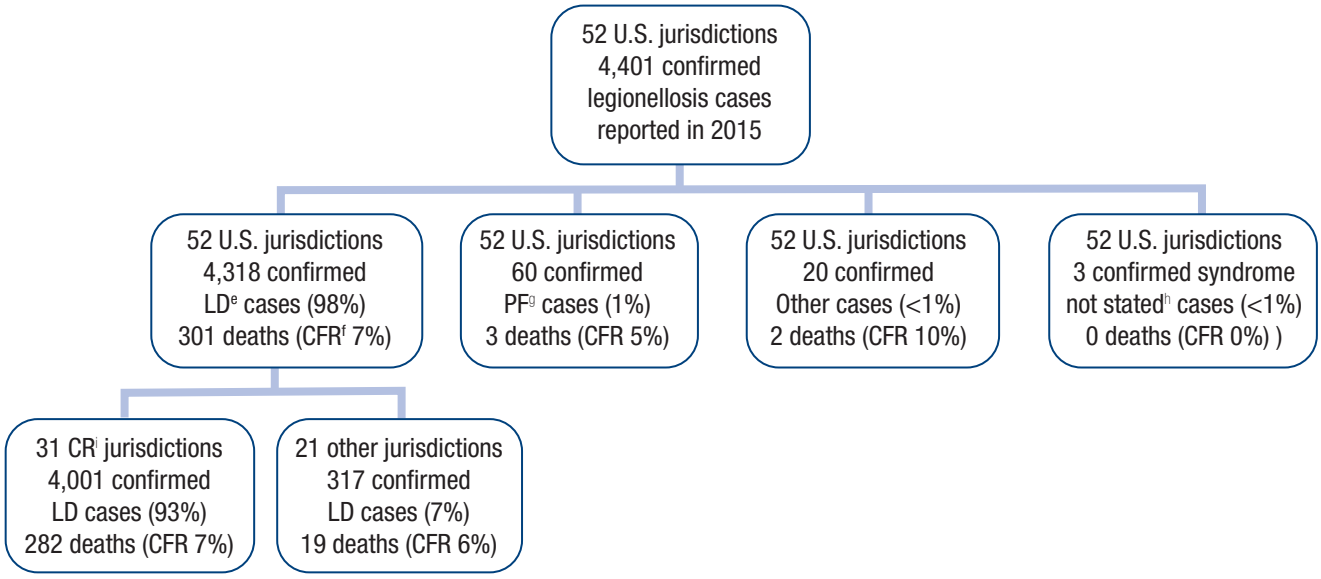
NOTE: For accessible versions of tables in this report, visit https://www.cdc.gov/legionella/health-depts/surv-reporting/2014-15-report-tables/

Figure 5a. Reported confirmed cases of legionellosis[a] by syndrome and completeness of reporting[b]—SLDSS,[c] United States, 2014.[d]



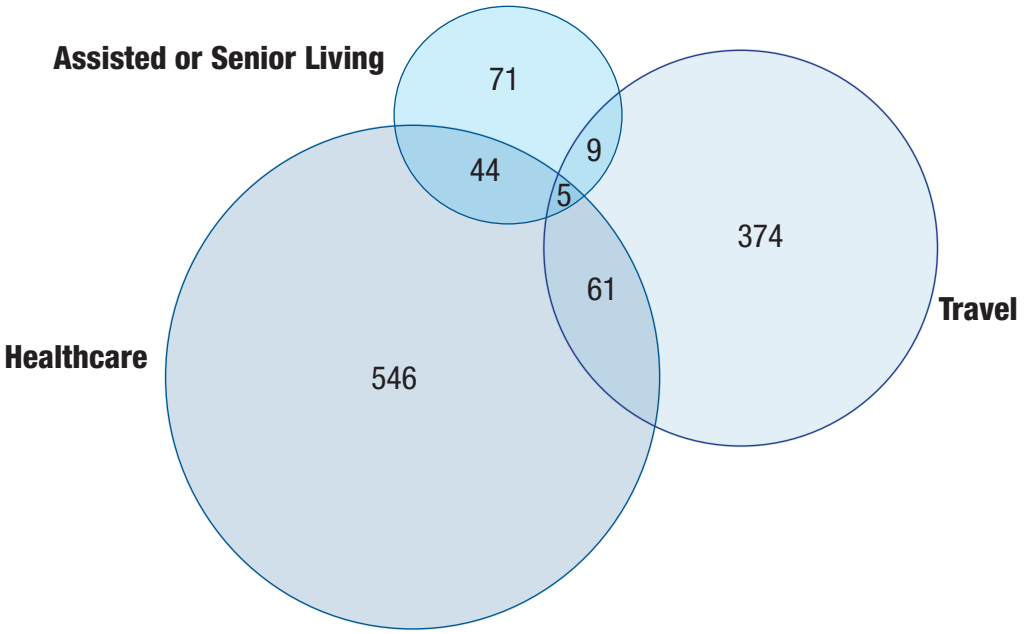
[a] Legionellosis includes Legionnaires' disease, Pontiac fever, and disease due to *Legionella* infection at extrapulmonary sites (e.g., endocarditis or wound infection).
[b] CR: 31 complete reporting jurisdictions reported at least 90% of confirmed NNDSS cases to SLDSS in 2014: Alabama, Alaska, Colorado, Connecticut, Florida, Georgia, Iowa, Kansas, Kentucky, Maine, Maryland, Michigan, Minnesota, Mississippi, Missouri, New Hampshire, New York City, New York State, North Dakota, Ohio, Pennsylvania, Rhode Island, South Carolina, Texas, Utah, Vermont, Virginia, Washington, West Virginia, Wisconsin, and Wyoming.
[c] Supplemental Legionnaires' Disease Surveillance System (SLDSS).
[d] Based on year of symptom onset in SLDSS. If onset date was not stated in SLDSS, case year for confirmed cases was determined by the following dates (in order of reporting): positive laboratory date (by either urinary antigen testing, culture, or fourfold rise of antibody against *Legionella pneumophila* serogroup 1); date patient was hospitalized during treatment for Legionnaires' disease; or date case was first reported to public health at any level.
[e] Legionnaires' disease.
[f] CFR: Case fatality rate calculated as the number of reported confirmed case deaths divided by the number of patients with the same legionellosis syndrome.
[g] Pontiac fever.
[h] While legionellosis consists of Legionnaires' disease, Pontiac fever, or Other (disease due to *Legionella* infection at extrapulmonary sites), syndrome was not specified for some cases.
[i] Complete reporting.

Figure 5b. Reported confirmed cases of legionellosis[a] by syndrome and completeness of reporting[b]—SLDSS,[c] United States, 2015.[d]



[a] Legionellosis includes Legionnaires' disease, Pontiac fever, and disease due to *Legionella* infection at extrapulmonary sites (e.g., endocarditis or wound infection).
[b] CR: 31 complete reporting jurisdictions reported at least 90% of confirmed NNDSS cases to SLDSS in 2015: Alabama, Colorado, Connecticut, Florida, Georgia, Hawaii, Iowa, Kansas, Kentucky, Maine, Maryland, Michigan, Minnesota, Mississippi, Missouri, New Hampshire, New Mexico, New York City, New York State, North Dakota, Ohio, Pennsylvania, Rhode Island, South Carolina, Texas, Vermont, Virginia, Washington, West Virginia, Wisconsin, and Wyoming.
[c] Supplemental Legionnaires' Disease Surveillance System (SLDSS).
[d] Based on year of symptom onset in SLDSS. If onset date was not stated in SLDSS, case year for confirmed cases was determined by the following dates (in order of reporting): positive laboratory date (by either urinary antigen testing, culture, or fourfold rise of antibody against *Legionella pneumophila* serogroup 1); date patient was hospitalized during treatment for Legionnaires' disease; or date case was first reported to public health at any level.
[e] Legionnaires' disease.
[f] CFR: Case fatality rate calculated as the number of reported confirmed case deaths divided by the number of patients with the same legionellosis syndrome.
[g] Pontiac fever.
[h] While legionellosis syndromes consists of Legionnaires' disease, Pontiac fever, or Other (disease due to *Legionella* infection at extrapulmonary sites), syndrome was not specified for some cases.
[i] Complete reporting.

Figure 6a. Number of reported confirmed cases and deaths of Legionnaires' disease by exposure category[a]—SLDSS,[b] complete reporting jurisdictions,[c] 2014.[d]



Exposure category	Cases (Total = 3,263) N	Cases (Total = 3,263) %	Deaths (Total= 251) N	Deaths (Total= 251) CFR[e]
Any healthcare	656	20.1	78	11.9
Definite healthcare	150	4.6	34	22.7
Possible healthcare	506	15.5	44	8.7
Any travel	449	13.8	18	4.0
Any assisted or senior living	129	4.0	13	10.1
None of these	2,153	66.0	150	7.0

[a] Exposure categories are not mutually exclusive. A patient may report multiple exposures in the 10 days before date of symptom onset. Exposure categories:
Healthcare: A patient who visited, worked, or stayed in a healthcare setting in the 10 days before date of symptom onset.
Travel: A patient with a history of spending at least one night away from home (in the state of residence, another state, or another country) in the 10 days before date of symptom onset, not including nights spent in a healthcare facility.
Assisted or senior living: A patient who visited, worked, or stayed in a senior or assisted living facility in the 10 days before date of symptom onset.
None of these: A patient without reported healthcare setting, travel, or senior or assisted living facility exposure in the 10 days before date of symptom onset.

[b] Supplemental Legionnaires' Disease Surveillance System (SLDSS).

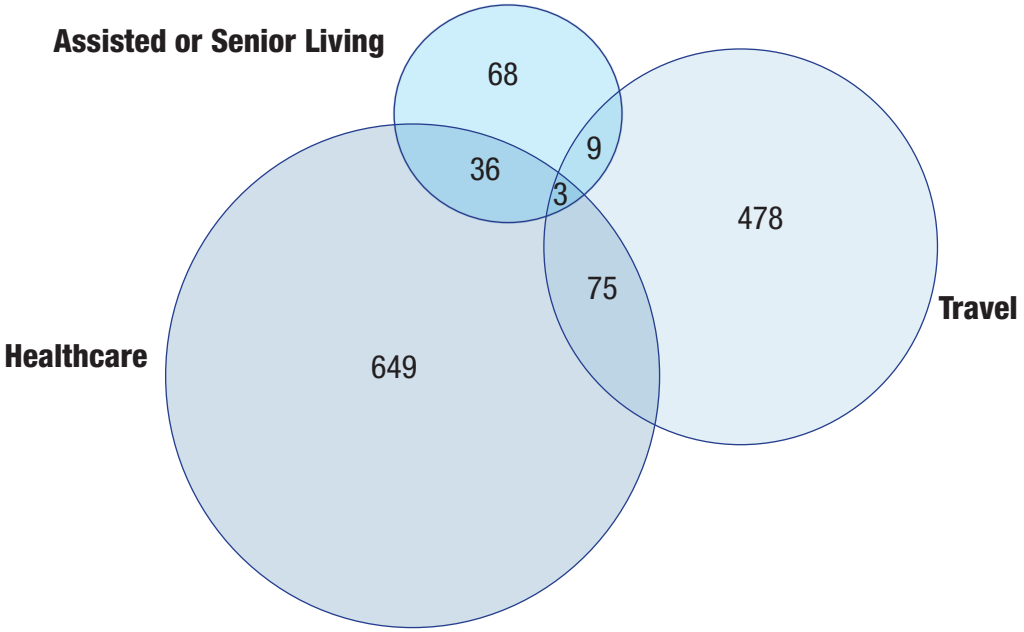
[c] Complete reporting jurisdictions in 2015: 31 complete reporting jurisdictions reported at least 90% of confirmed NNDSS cases to SLDSS: Alabama, Colorado, Connecticut, Florida, Georgia, Hawaii, Iowa, Kansas, Kentucky, Maine, Maryland, Michigan, Minnesota, Mississippi, Missouri, New Hampshire, New Mexico, New York City, New York State, North Dakota, Ohio, Pennsylvania, Rhode Island, South Carolina, Texas, Vermont, Virginia, Washington, West Virginia, Wisconsin, and Wyoming.

[d] Based on year of symptom onset in SLDSS. If onset date was not stated in SLDSS, case year for confirmed cases was determined by the following dates (by either urinary antigen testing, culture, or fourfold rise of antibody against *Legionella pneumophila* serogroup 1); date patient was hospitalized during treatment for Legionnaires' disease; or date case was first reported to public health at any level.

[e] CFR: Case fatality rate calculated as the number of reported confirmed Legionnaires' disease case deaths divided by the number of patients with Legionnaires' disease and the same exposure history.

Accessible version at: https://www.cdc.gov/legionella/health-depts/surv-reporting/2014-15-report-tables/index.html#figure6a

Figure 6b. Number of reported confirmed cases and deaths of Legionnaires' disease by exposure category[a]—SLDSS,[b] complete reporting jurisdictions,[c] 2015.[d]



Exposure category	Cases (Total = 4,001) N	Cases (Total = 4,001) %	Deaths (Total= 282) N	Deaths (Total= 282) CFR[e]
Any healthcare	763	19.1	88	11.5
Definite healthcare	119	3.0	27	22.7
Possible healthcare	644	16.1	61	9.5
Any travel	565	14.1	21	3.7
Any assisted or senior living	116	2.9	11	9.5
None of these	2,683	67.1	173	6.4

[a] Exposure categories are not mutually exclusive. A patient may report multiple exposures in the 10 days before date of symptom onset. Exposure categories:
Healthcare: A patient who visited, worked, or stayed in a healthcare setting in the 10 days before date of symptom onset.
Travel: A patient with a history of spending at least one night away from home (in the state of residence, another state, or another country) in the 10 days before date of symptom onset, not including nights spent in a healthcare facility.
Assisted or senior living: A patient who visited, worked, or stayed in a senior or assisted living facility in the 10 days before date of symptom onset.
None of these: A patient without reported healthcare setting, travel, or senior or assisted living facility exposure in the 10 days before date of symptom onset.
[b] Supplemental Legionnaires' Disease Surveillance System (SLDSS).
[c] Complete reporting jurisdictions in 2015: 31 complete reporting jurisdictions reported at least 90% of confirmed NNDSS cases to SLDSS: Alabama, Colorado, Connecticut, Florida, Georgia, Hawaii, Iowa, Kansas, Kentucky, Maine, Maryland, Michigan, Minnesota, Mississippi, Missouri, New Hampshire, New Mexico, New York City, New York State, North Dakota, Ohio, Pennsylvania, Rhode Island, South Carolina, Texas, Vermont, Virginia, Washington, West Virginia, Wisconsin, and Wyoming.
[d] Based on year of symptom onset in SLDSS. If onset date was not stated in SLDSS, case year for confirmed cases was determined by the following dates (by either urinary antigen testing, culture, or fourfold rise of antibody against *Legionella pneumophila* serogroup 1); date patient was hospitalized during treatment for Legionnaires' disease; or date case was first reported to public health at any level.
[e] CFR: Case fatality rate calculated as the number of reported confirmed Legionnaires' disease case deaths divided by the number of patients with Legionnaires' disease and the same exposure history.
Accessible version at: https://www.cdc.gov/legionella/health-depts/surv-reporting/2014-15-report-tables/index.html#figure6b

Table 3. Number of reported confirmed cases of Legionnaires' disease by exposure category[a] and year[b] —SLDSS,[c] complete reporting jurisdictions,[d] 2014 and 2015.

	2014 (Total = 3,263)		2015 (Total=4,001)	
Exposure Category	N	%	N	%
Healthcare	656	20.1	763	19.1
Healthcare facility type				
Hospital	282	43.0	328	43.0
Long-term care facility	172	26.2	170	22.3
Clinic	128	19.5	184	24.1
Multiple	53	8.1	59	7.7
Other	8	1.2	17	2.2
Not stated	13	2.0	5	0.7
Healthcare exposure type				
Inpatient	293	44.7	287	37.6
Outpatient	204	31.1	289	37.9
Visitor	66	10.1	102	13.4
Employee	49	7.5	53	6.9
Multiple	25	3.8	23	3.0
Not stated	19	2.9	9	1.2
Travel	449	13.8	565	14.1
Any commercial accommodation	291	64.8	371	65.7
Hotel/motel/resort	287	N/A	365	N/A
Cruise ship	10	N/A	15	N/A
Non-commercial accommodation only	130	29.0	170	30.1
Unknown travel accommodation type	28	6.2	24	4.2
Asssisted or Senior Living	129	4.0	116	2.9
Assisted or Senior Living Facility Type				
Assisted living facility	82	63.6	69	59.5
Senior living facility	38	29.5	39	33.6
Not stated	9	7.0	8	6.9
Assisted or Senior Living Exposure Type				
Resident	91	70.5	75	64.7
Visitor	19	14.7	23	19.8
Employee	9	7.0	7	6.0
Not stated	10	7.8	11	9.5
None of these	2,153	66.0	2,683	67.1

[a] Exposure categories (categories are not mutually exclusive):
Healthcare: A patient who visited, worked, or stayed in a healthcare setting in the 10 days before date of symptom onset.
Travel: A patient with a history of spending at least one night away from home (in the state of residence, another state, or another country) in the 10 days before date of symptom onset, not including nights spent in a healthcare facility. Cases may occur in patients with multiple travel locations during the exposure period. If any exposure to a commercial accommodation occurs, the case is categorized as commercial travel. Non-commercial travel represents exposure to non-commercial accommodations only. If a patient has exposure to both non-commercial and unknown accommodations, the case is categorized as unknown travel.

Assisted or senior living: A patient who visited, worked, or stayed in a senior or assisted living facility in the 10 days before date of symptom onset.

None of these: A patient without reported healthcare setting, travel, or senior or assisted living facility exposure in the 10 days before date of symptom onset.

[b] Based on year of symptom onset in SLDSS. If onset date was not stated in SLDSS, case year for confirmed cases was determined by the following dates (in order of reporting): positive laboratory date (by either urinary antigen testing, culture, or fourfold rise of antibody against *Legionella pneumophila* serogroup 1; date patient was hospitalized during treatment for Legionnaires' disease; or date case was first reported to public health at any level.

[c] Supplemental Legionnaires' Disease Surveillance System (SLDSS).

[d] Complete reporting jurisdictions in 2014: 31 complete reporting jurisdictions reported at least 90% of confirmed NNDSS cases to SLDSS: Alabama, Alaska, Colorado, Connecticut, Florida, Georgia, Iowa, Kansas, Kentucky, Maine, Maryland, Michigan, Minnesota, Mississippi, Missouri, New Hampshire, New York City, New York State, North Dakota, Ohio, Pennsylvania, Rhode Island, South Carolina, Texas, Utah, Vermont, Virginia, Washington, West Virginia, Wisconsin, and Wyoming.
Complete reporting jurisdictions in 2015: 31 complete reporting jurisdictions reported at least 90% of confirmed NNDSS cases to SLDSS: Alabama, Colorado, Connecticut, Florida, Georgia, Hawaii, Iowa, Kansas, Kentucky, Maine, Maryland, Michigan, Minnesota, Mississippi, Missouri, New Hampshire, New Mexico, New York City, New York State, North Dakota, Ohio, Pennsylvania, Rhode Island, South Carolina, Texas, Vermont, Virginia, Washington, West Virginia, Wisconsin, and Wyoming.

Accessible version at: https://www.cdc.gov/legionella/health-depts/surv-reporting/2014-15-report-tables/index.html#table3

Table 4a. Number of reported confirmed cases of Legionnaires' disease by demographic characteristics and exposure category[a]—SLDSS,[b] complete reporting jurisdictions,[c] 2014.[d]

	Healthcare (Total = 656)		Travel (Total = 449)		Assisted or senior living (Total =129		None of these (Total =2,153)	
Characteristic	N	%	N	%	N	%	N	%
Median Age (years)	67	N/A	60	N/A	78	N/A	61	N/A
Age								
0–9	0	0.0	0	0.0	0	0.0	0	0.0
10–19	1	0.2	1	0.2	0	0.0	6	0.3
20–29	13	2.0	12	2.7	2	1.6	50	2.3
30–39	26	4.0	23	5.1	3	2.3	125	5.8
40–49	39	5.9	46	10.2	8	6.2	267	12.4
50–59	132	20.1	126	28.1	19	14.7	536	24.9
60–69	159	24.2	118	26.3	18	14.0	479	22.2
70–79	138	21.0	81	18.0	16	12.4	381	17.7
80–84	67	10.2	20	4.5	18	14.0	127	5.9
85+	78	11.9	19	4.2	44	34.1	176	8.2
Not stated	3	0.5	3	0.7	1	0.8	6	0.3
Sex								
Female	288	43.9	173	38.5	67	51.9	818	38.0
Male	360	54.9	272	60.6	59	45.7	1,319	61.3
Not stated	8	1.2	4	0.9	3	2.3	16	0.7
Race								
American Indian/ Alaska Native	5	0.8	1	0.2	1	0.8	8	0.4
Asian	1	0.2	3	0.7	0	0.0	4	0.2
African American/Black	119	18.1	68	15.1	17	13.2	445	20.7
Native Hawaiian/ Other Pacific Islander	0	0.0	0	0.0	0	0.0	1	0.0
White	391	59.6	269	59.9	83	64.3	1,220	56.7
Othere	1	0.2	0	0.0	1	0.8	3	0.1
Not stated	139	21.2	108	24.1	27	20.9	472	21.9
Ethnicity[f]								
Hispanic	21	3.2	18	4.0	0	0.0	111	5.2
Non-Hispanic	461	70.3	331	73.7	92	71.3	1,556	72.3
Not stated	174	26.5	100	22.3	37	28.7	486	22.6

[a] Exposure categories (categories are not mutually exclusive):
Healthcare: A patient who visited, worked, or stayed in a healthcare setting in the 10 days before date of symptom onset.
Travel: A patient with a history of spending at least one night away from home (in the state of residence, another state, or another country) in the 10 days before date of symptom onset, not including nights spent in a healthcare facility.
Assisted or senior living: A patient who visited, worked, or stayed in a senior or assisted living facility in the 10 days before date of symptom onset.
None of these: A patient without reported healthcare setting, travel, or senior or assisted living facility exposure in the 10 days before date of symptom onset.
[b] Supplemental Legionnaires' Disease Surveillance System (SLDSS).
[c] Complete reporting jurisdictions in 2014: 31 complete reporting jurisdictions reported at least 90% of confirmed NNDSS cases to SLDSS: Alabama, Alaska, Colorado, Connecticut, Florida, Georgia, Iowa, Kansas, Kentucky, Maine, Maryland, Michigan, Minnesota, Mississippi, Missouri, New Hampshire, New York City, New York State, North Dakota, Ohio, Pennsylvania, Rhode Island, South Carolina, Texas, Utah, Vermont, Virginia, Washington, West Virginia, Wisconsin, and Wyoming.
[d] Based on year of symptom onset in SLDSS. If onset date was not stated in SLDSS, case year for confirmed cases was determined by the following dates (in order of reporting): positive laboratory date (by either urinary antigen testing, culture, or fourfold rise of antibody against *Legionella pneumophila* serogroup 1); date patient was hospitalized during treatment for Legionnaires' disease; or date case was first reported to public health at any level.
Accessible version at: https://www.cdc.gov/legionella/health-depts/surv-reporting/2014-15-report-tables/index.html#table4a

Table 4b. Number of reported confirmed cases of Legionnaires' disease by demographic characteristics and exposure category[a]—SLDSS,[b] complete reporting jurisdictions,[c] 2015.[d]

	Healthcare (Total = 763)		Travel (Total = 565)		Assisted or senior living (Total = 116)		None of these (Total =2,683)	
Characteristic	N	%	N	%	N	%	N	%
Median Age (years)	65	N/A	60	N/A	77	N/A	60	N/A
Age								
0–9	0	0.0	0	0.0	0	0.0	2	0.1
10–19	1	0.1	1	0.2	0	0.0	9	0.3
20–29	19	2.5	12	2.1	1	0.9	53	2.0
30–39	18	2.4	32	5.7	0	0.0	171	6.4
40–49	55	7.2	79	14.0	1	0.9	350	13.0
50–59	168	22.0	155	27.4	17	14.7	710	26.5
60–69	188	24.6	164	29.0	22	19.0	654	24.4
70–79	158	20.7	90	15.9	25	21.6	400	14.9
80–84	60	7.9	13	2.3	14	12.1	148	5.5
85+	95	12.5	19	3.4	36	31.0	181	6.7
Not stated	1	0.1	0	0.0	0	0.0	5	0.2
Sex								
Female	341	44.7	199	35.2	61	52.6	972	36.2
Male	417	54.7	363	64.2	55	47.4	1,693	63.1
Not stated	5	0.7	3	0.5	0	0.0	18	0.7
Race								
American Indian/ Alaska Native	4	0.5	0	0.0	0	0.0	13	0.5
Asian	6	0.8	5	0.9	0	0.0	17	0.6
African American/Black	128	16.8	103	18.2	19	16.4	620	23.1
Native Hawaiian/ Other Pacific Islander	1	0.1	0	0.0	0	0.0	3	0.1
White	475	62.3	354	62.7	72	62.1	1,503	56.0
Other[e]	1	0.1	1	0.2	0	0.0	2	0.1
Not stated	148	19.4	102	18.1	25	21.6	525	19.6
Ethnicity[f]								
Hispanic	43	5.6	17	3.0	3	2.6	192	7.2
Non-Hispanic	545	71.4	443	78.4	96	82.8	1,937	72.2
Not stated	175	22.9	105	18.6	17	14.7	554	20.6

[a] Exposure categories (categories are not mutually exclusive):
Healthcare: A patient who visited, worked, or stayed in a healthcare setting in the 10 days before date of symptom onset.
Travel: A patient with a history of spending at least one night away from home (in the state of residence, another state, or another country) in the 10 days before date of symptom onset, not including nights spent in a healthcare facility.
Assisted or senior living: A patient who visited, worked, or stayed in a senior or assisted living facility in the 10 days before date of symptom onset.
None of these: A patient without reported healthcare setting, travel, or senior or assisted living facility exposure in the 10 days before date of symptom onset.
[b] Supplemental Legionnaires' Disease Surveillance System (SLDSS).
[c] Complete reporting jurisdictions in 2014: 31 complete reporting jurisdictions reported at least 90% of confirmed NNDSS cases to SLDSS: Alabama, Alaska, Colorado, Connecticut, Florida, Georgia, Iowa, Kansas, Kentucky, Maine, Maryland, Michigan, Minnesota, Mississippi, Missouri, New Hampshire, New York City, New York State, North Dakota, Ohio, Pennsylvania, Rhode Island, South Carolina, Texas, Utah, Vermont, Virginia, Washington, West Virginia, Wisconsin, and Wyoming.
[d] Based on year of symptom onset in SLDSS. If onset date was not stated in SLDSS, case year for confirmed cases was determined by the following dates (in order of reporting): positive laboratory date (by either urinary antigen testing, culture, or fourfold rise of antibody against *Legionella pneumophila* serogroup 1); date patient was hospitalized during treatment for Legionnaires' disease; or date case was first reported to public health at any level.
Accessible version at: https://www.cdc.gov/legionella/health-depts/surv-reporting/2014-15-report-tables/index.html#table4b

Table 5a. Number of reported confirmed cases of healthcare-associated[a] Legionnaires' disease by healthcare facility type and healthcare exposure certainty[b]—SLDSS,[c] complete reporting jurisdictions[d], 2014.[e]

	Healthcare exposure certainty					
	Definite		Possible		Total	
Facility type	N	%	N	%	N	%
Hospital	31	20.7	251	49.6	282	43.0
Long-term care facility	100	66.7	72	14.2	172	26.2
Clinic	0	0.0	128	25.3	128	19.5
Multiple[f]	17	11.3	36	7.1	53	8.1
Other[g]	0	0.0	8	1.6	8	1.2
Not stated	2	1.3	11	2.2	13	2.0
Total	150	100	506	100	656	100

[a] Healthcare–associated Legionnaires' disease includes both definite and possible cases in patients who worked, visited, or stayed in a healthcare setting for any amount of time in the 10 days preceding symptom onset.

[b] Healthcare exposure certainty defined as:

Definite case of healthcare–associated Legionnaires' disease was defined as laboratory-confirmed legionellosis in a patient with exposure to a hospital or long-term–care facility for the entire 10 days preceding symptom onset.

Possible case of healthcare–associated Legionnaires' disease was defined as laboratory-confirmed legionellosis in a patient with exposure to a healthcare facility for a portion of the 10 days preceding symptom onset.

[c] Supplemental Legionnaires' Disease Surveillance System (SLDSS).

[d] Complete reporting jurisdictions in 2014: 31 complete reporting jurisdictions reported at least 90% of confirmed NNDSS cases to SLDSS in 2014: Alabama, Alaska, Colorado, Connecticut, Florida, Georgia, Iowa, Kansas, Kentucky, Maine, Maryland, Michigan, Minnesota, Mississippi, Missouri, New Hampshire, New York City, New York State, North Dakota, Ohio, Pennsylvania, Rhode Island, South Carolina, Texas, Utah, Vermont, Virginia, Washington, West Virginia, Wisconsin, and Wyoming.

[e] Based on year of symptom onset in SLDSS. If onset date was not stated in SLDSS, case year for confirmed cases was determined by the following dates (in order of reporting): positive laboratory date (by either urinary antigen testing, culture, or fourfold rise of antibody against *Legionella pneumophila* serogroup 1); date patient was hospitalized during treatment for Legionnaires' disease; or date case was first reported to public health at any level.

[f] Multiple indicates two or more healthcare facilities.

[g] Other facility includes locations such as outpatient laboratories and pharmacies.

Accessible version at: https://www.cdc.gov/legionella/health-depts/surv-reporting/2014-15-report-tables/index.html#table5a

Table 5b. Number of reported confirmed cases of healthcare-associated[a] Legionnaires' disease by healthcare facility type and healthcare exposure certainty[b]—SLDSS,[c] complete reporting jurisdictions,[d] 2015.[e]

	Healthcare exposure certainty					
	Definite		Possible		Total	
Facility type	N	%	N	%	N	%
Hospital	21	17.6	307	47.7	328	43.0
Long-term care facility	87	73.1	83	12.9	170	22.3
Clinic	0	0.0	184	28.6	184	24.1
Multiple[f]	9	7.6	50	7.8	59	7.7
Other[g]	0	0.0	17	2.6	17	2.2
Not stated	2	1.7	3	0.5	5	0.7
Total	119	100	644	100	763	100

[a] Healthcare–associated Legionnaires' disease includes both definite and possible cases in patients who worked, visited, or stayed in a healthcare setting for any amount of time in the 10 days preceding symptom onset.
[b] Healthcare exposure certainty defined as:
Definite case of healthcare–associated Legionnaires' disease was defined as laboratory-confirmed legionellosis in a patient with exposure to a hospital or long-term–care facility for the entire 10 days preceding symptom onset
Possible case of healthcare–associated Legionnaires' disease was defined as laboratory-confirmed legionellosis in a patient with exposure to a healthcare facility for a portion of the 10 days preceding symptom onset.
[c] Supplemental Legionnaires' Disease Surveillance System (SLDSS).
[d] Complete reporting jurisdictions in 2015: 31 complete reporting jurisdictions reported at least 90% of confirmed NNDSS cases to SLDSS: Alabama, Colorado, Connecticut, Florida, Georgia, Hawaii, Iowa, Kansas, Kentucky, Maine, Maryland, Michigan, Minnesota, Mississippi, Missouri, New Hampshire, New Mexico, New York City, New York State, North Dakota, Ohio, Pennsylvania, Rhode Island, South Carolina, Texas, Vermont, Virginia, Washington, West Virginia, Wisconsin, and Wyoming.
[e] Based on year of symptom onset in SLDSS. If onset date was not stated in SLDSS, case year for confirmed cases was determined by the following dates (in order of reporting): positive laboratory date (by either urinary antigen testing, culture, or fourfold rise of antibody against *Legionella pneumophila* serogroup 1); date patient was hospitalized during treatment for Legionnaires' disease; or date case was first reported to public health at any level.
[f] Multiple indicates two or more healthcare facilities.
[g] Other facility includes locations such as outpatient laboratories and pharmacies.
Accessible version at: https://www.cdc.gov/legionella/health-depts/surv-reporting/2014-15-report-tables/index.html#table5b

Table 6a. Number of reported confirmed cases of Legionnaires' disease by hospitalization,[a] outcome,[b] and exposure category[c]—SLDSS,[d] complete reporting jurisdictions,[e] 2014.[f]

	Healthcare (Total = 656)		Travel (Total = 449)		Assisted or senior living (Total = 129)		None of these (Total =2,153)	
	N	%	N	%	N	%	N	%
Hospitalized								
Yes	622	94.8	422	94.0	126	97.7	2,083	96.7
No	29	4.4	16	3.6	2	1.6	41	1.9
Not stated	5	0.8	11	2.4	1	0.8	29	1.3
Outcome								
Death	78	11.9	18	4.0	13	10.1	150	7.0
Still ill	67	10.2	45	10.0	12	9.3	181	8.4
Survived	441	67.2	335	74.6	88	68.2	1,545	71.8
Not stated	70	10.7	51	11.4	16	12.4	277	12.9

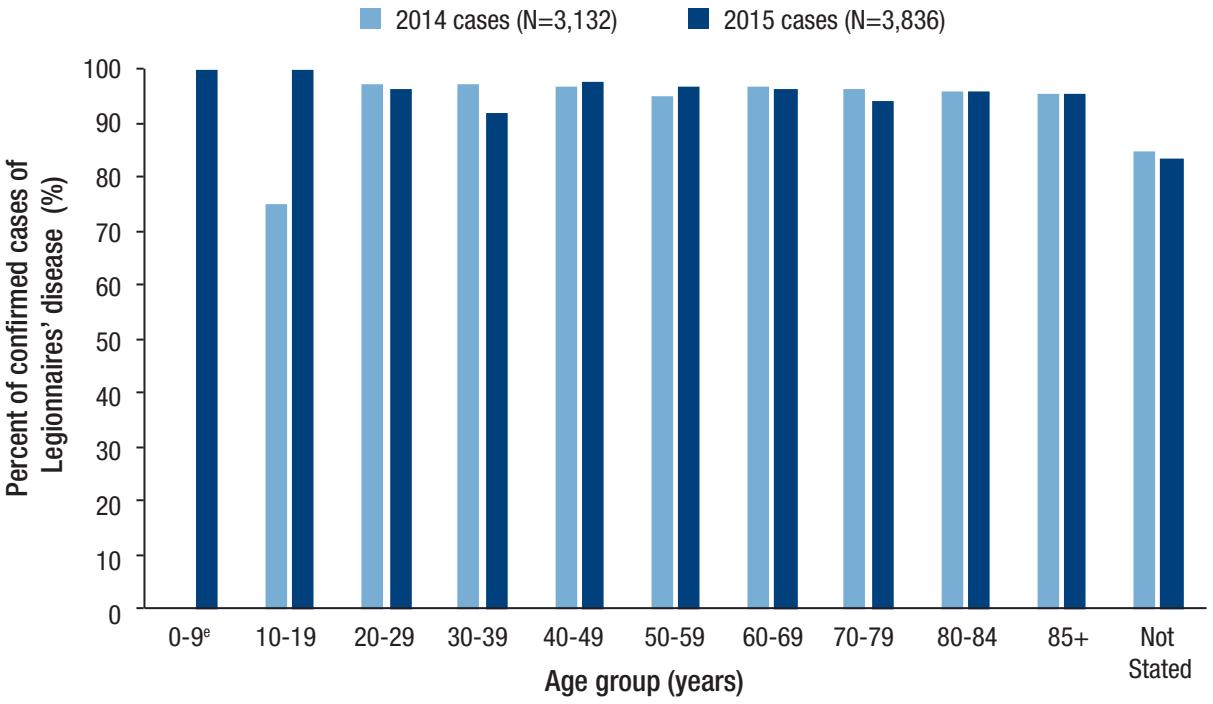
[a] Hospitalization for treatment of Legionnaires' disease.
[b] Outcome at time of case reporting.
[c] Exposure categories (categories are not mutually exclusive):
Healthcare: Legionnaires' disease in a patient who visited, worked, or stayed in a healthcare setting in the 10 days before date of symptom onset.
Travel: Legionnaires' disease in a patient with a history of spending at least one night away from home (in the state of residence, another state, or another country) in the 10 days before date of symptom onset, not including nights spent in a healthcare facility.
Assisted or senior living: Legionnaires' disease in a patient who visited, worked, or stayed in a senior or assisted living facility in the 10 days before date of symptom onset.
None of these: A patient without reported healthcare setting, travel, or senior or assisted living facility exposure in the 10 days before date of symptom onset.
[d] Supplemental Legionnaires' Disease Surveillance System (SLDSS).
[e] Complete reporting jurisdictions in 2014: 31 complete reporting jurisdictions reported at least 90% of confirmed NNDSS cases to SLDSS: Alabama, Alaska, Colorado, Connecticut, Florida, Georgia, Iowa, Kansas, Kentucky, Maine, Maryland, Michigan, Minnesota, Mississippi, Missouri, New Hampshire, New York City, New York State, North Dakota, Ohio, Pennsylvania, Rhode Island, South Carolina, Texas, Utah, Vermont, Virginia, Washington, West Virginia, Wisconsin, and Wyoming.
[f] Based on year of symptom onset in SLDSS. If onset date was not stated in SLDSS, case year for confirmed cases was determined by the following dates (in order of reporting): positive laboratory date (by either urinary antigen testing, culture, or fourfold rise of antibody against *Legionella pneumophila* serogroup 1); date patient was hospitalized during treatment for Legionnaires' disease; or date case was first reported to public health at any level.
Accessible version at: https://www.cdc.gov/legionella/health-depts/surv-reporting/2014-15-report-tables/index.html#table6a

Table 6b. Number of reported confirmed cases of Legionnaires' disease by hospitalization,[a] outcome,[b] and exposure category[c]—SLDSS,[d] complete reporting jurisdictions,[e] 2015.[f]

	Healthcare (Total = 763)		Travel (Total = 565)		Assisted or senior living (Total = 116)		None of these (Total =2,683)	
	N	%	N	%	N	%	N	%
Hospitalized								
Yes	722	94.6	537	95.0	110	94.8	2,585	96.3
No	30	3.9	18	3.2	4	3.4	70	2.6
Not stated	11	1.4	10	1.8	2	1.7	28	1.0
Outcome								
Death	88	11.5	21	3.7	11	9.5	173	6.4
Still ill	106	13.9	67	11.9	16	13.8	347	12.9
Survived	499	65.4	425	75.2	82	70.7	1,868	69.6
Not stated	70	9.2	52	9.2	7	6.0	295	11.0

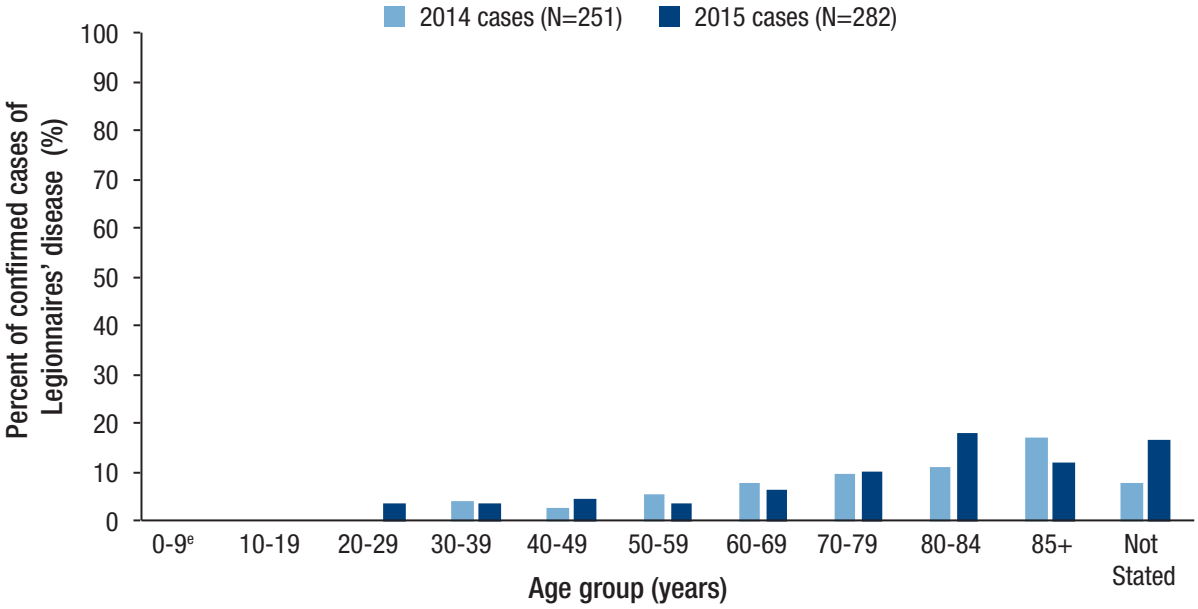
[a] Hospitalization for treatment of Legionnaires' disease.
[b] Outcome at time of case reporting.
[c] Exposure categories (categories are not mutually exclusive):
Healthcare: Legionnaires' disease in a patient who visited, worked, or stayed in a healthcare setting in the 10 days before date of symptom onset.
Travel: Legionnaires' disease in a patient with a history of spending at least one night away from home (in the state of residence, another state, or another country) in the 10 days before date of symptom onset, not including nights spent in a healthcare facility.
Assisted or senior living: Legionnaires' disease in a patient who visited, worked, or stayed in a senior or assisted living facility in the 10 days before date of symptom onset.
None of these: A patient without reported healthcare setting, travel, or senior or assisted living facility exposure in the 10 days before date of symptom onset.
[d] Supplemental Legionnaires' Disease Surveillance System (SLDSS).
[e] Complete reporting jurisdictions for 2015: 31 complete reporting jurisdictions reported at least 90% of confirmed NNDSS cases to SLDSS: Alabama, Colorado, Connecticut, Florida, Georgia, Hawaii, Iowa, Kansas, Kentucky, Maine, Maryland, Michigan, Minnesota, Mississippi, Missouri, New Hampshire, New Mexico, New York City, New York State, North Dakota, Ohio, Pennsylvania, Rhode Island, South Carolina, Texas, Vermont, Virginia, Washington, West Virginia, Wisconsin, and Wyoming.
[f] Based on year of symptom onset in SLDSS. If onset date was not stated in SLDSS, case year for confirmed cases was determined by the following dates (in order of reporting): positive laboratory date (by either urinary antigen testing, culture, or fourfold rise of antibody against *Legionella pneumophila* serogroup 1); date patient was hospitalized during treatment for Legionnaires' disease; or date case was first reported to public health at any level.
Accessible version at: https://www.cdc.gov/legionella/health-depts/surv-reporting/2014-15-report-tables/index.html#table6b

Figure 7. Percent of reported confirmed cases of Legionnaires' disease that were treated in hospital[a] by age group and year[b]—SLDSS,[c] complete reporting jurisdictions,[d] 2014 and 2015.



[a] Hospitalization for treatment of Legionnaires' disease.
[b] Based on year of symptom onset in SLDSS. If onset date was not stated in SLDSS, case year for confirmed cases was determined by the following dates (in order of reporting): positive laboratory date (by either urinary antigen testing, culture, or fourfold rise of antibody against *Legionella pneumophila* serogroup 1); date patient was hospitalized during treatment for Legionnaires' disease; or date case was first reported to public health at any level.
[c] Supplemental Legionnaires' Disease Surveillance System (SLDSS).
[d] Complete reporting jurisdictions for 2014: 31 complete reporting jurisdictions reported at least 90% of confirmed NNDSS cases to SLDSS: Alabama, Alaska, Colorado, Connecticut, Florida, Georgia, Iowa, Kansas, Kentucky, Maine, Maryland, Michigan, Minnesota, Mississippi, Missouri, New Hampshire, New York City, New York State, North Dakota, Ohio, Pennsylvania, Rhode Island, South Carolina, Texas, Utah, Vermont, Virginia, Washington, West Virginia, Wisconsin, and Wyoming.
Complete reporting jurisdictions for 2015: 31 complete reporting jurisdictions reported at least 90% of confirmed NNDSS cases to SLDSS: Alabama, Colorado, Connecticut, Florida, Georgia, Hawaii, Iowa, Kansas, Kentucky, Maine, Maryland, Michigan, Minnesota, Mississippi, Missouri, New Hampshire, New Mexico, New York City, New York State, North Dakota, Ohio, Pennsylvania, Rhode Island, South Carolina, Texas, Vermont, Virginia, Washington, West Virginia, Wisconsin, Wyoming.
[e] In 2014, no confirmed cases of Legionnaires' disease were reported to SLDSS in the 0-9 year age group from the 31 complete reporting jurisdictions.

Figure 8. Percent of reported confirmed cases of Legionnaires' disease resulting in death[a] by age group and year[b]—SLDSS,[c] complete reporting jurisdictions,[d] 2014 and 2015.

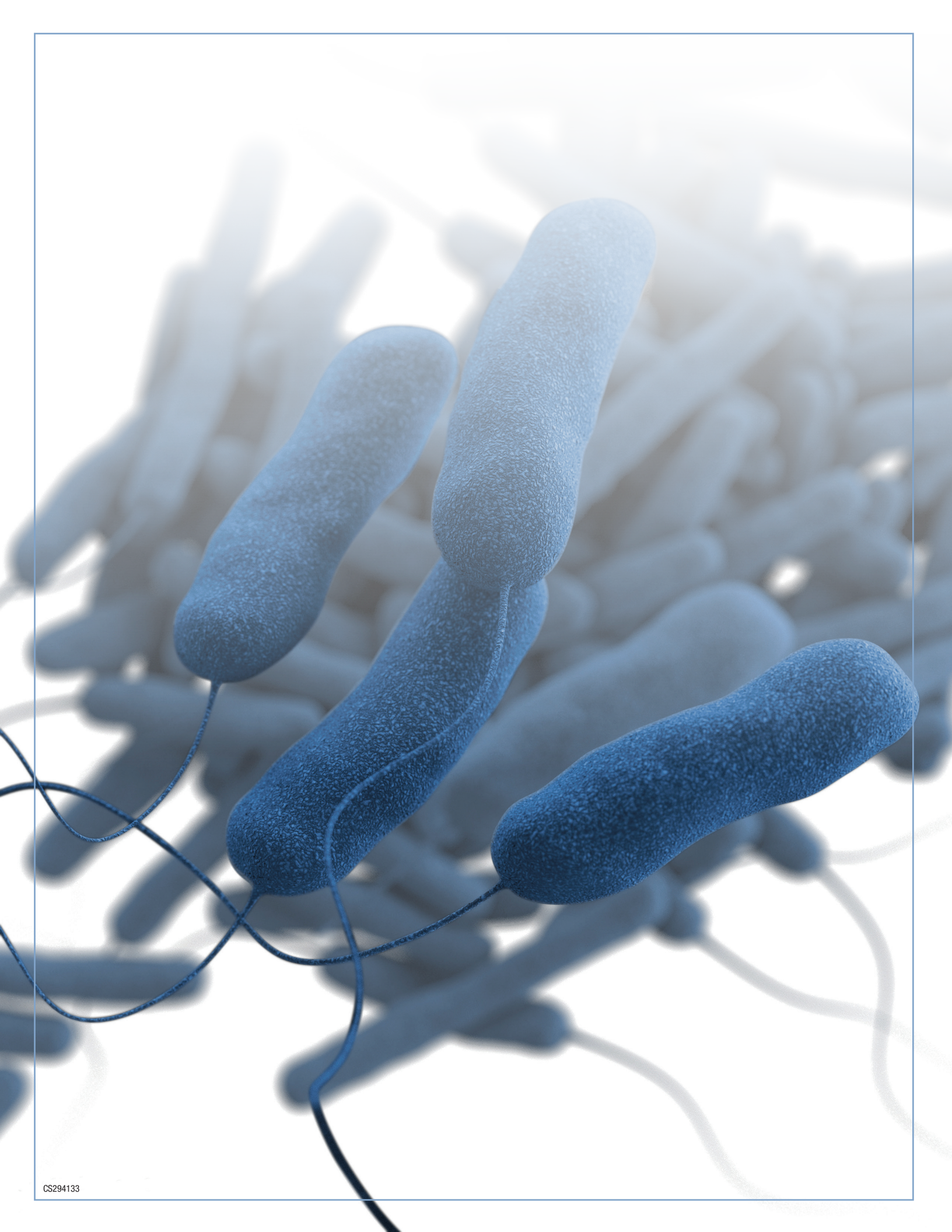


[a] Based on outcome at time of case reporting.
[b] Based on year of symptom onset in SLDSS. If onset date was not stated in SLDSS, case year for confirmed cases was determined by the following dates (in order of reporting): positive laboratory date (by either urinary antigen testing, culture, or fourfold rise of antibody against *Legionella pneumophila* serogroup 1); date patient was hospitalized during treatment for Legionnaires' disease; or date case was first reported to public health at any level.
[c] Supplemental Legionnaires' Disease Surveillance System (SLDSS).
[d] Complete reporting jurisdictions in 2014: 31 complete reporting jurisdictions reported at least 90% of confirmed NNDSS cases to SLDSS in 2014: Alabama, Alaska, Colorado, Connecticut, Florida, Georgia, Iowa, Kansas, Kentucky, Maine, Maryland, Michigan, Minnesota, Mississippi, Missouri, New Hampshire, New York City, New York State, North Dakota, Ohio, Pennsylvania, Rhode Island, South Carolina, Texas, Utah, Vermont, Virginia, Washington, West Virginia, Wisconsin, and Wyoming.
Complete reporting jurisdictions in 2015: 31 complete reporting jurisdictions reported at least 90% of confirmed NNDSS cases to SLDSS in 2015: Alabama, Colorado, Connecticut, Florida, Georgia, Hawaii, Iowa, Kansas, Kentucky, Maine, Maryland, Michigan, Minnesota, Mississippi, Missouri, New Hampshire, New Mexico, New York City, New York State, North Dakota, Ohio, Pennsylvania, Rhode Island, South Carolina, Texas, Vermont, Virginia, Washington, West Virginia, Wisconsin, Wyoming.
[e] In 2014, no confirmed cases of Legionnaires' disease were reported to SLDSS in the 0-9 year age group from the 31 complete reporting jurisdictions.

Table 7. Number of reported confirmed cases of Legionnaires' disease by diagnostic testing method[a] and year[b]—SLDSS,[c] United States, 2014 and 2015.

	2014		2015		Total	
	N	%	N	%	N	%
Diagnosed testing method						
Urinary antigen test	3,454	97.5	4,231	98.1	7,685	97.9
Serology	9	0.3	4	0.1	13	0.2
Culture	127	3.6	180	4.2	307	3.9
Culture Sites						
Respiratory secretion[d]	111	87.4	152	84.4	263	85.7
Blood	2	1.6	3	1.7	5	1.6
Lung biopsy	3	2.4	7	3.9	10	3.3
Pleural fluid	2	1.6	2	1.1	4	1.3
Other	0	0.0	8	4.4	8	2.6
Not stated	9	7.1	8	4.4	17	5.5
Culture Species						
L. pneumophila	74	58.3	112	62.2	186	60.6
Serogroup 1	29	N/A	65	N/A	94	N/A
Serogroup 2	0	N/A	1	N/A	1	N/A
Serogroup 3	1	N/A	0	N/A	1	N/A
Serogroup 4	1	N/A	0	N/A	1	N/A
Serogroup 5	0	N/A	1	N/A	1	N/A
Serogroup 6	4	N/A	0	N/A	4	N/A
Serogroup 12	3	N/A	0	N/A	3	N/A
L. longbeachae	2	1.6	1	0.6	3	1.0
Serogroup 1	1	N/A	0	N/A	1	N/A
L. micdadei	3	2.4	1	0.6	4	1.3
L. parisiensis	0	0.0	2	1.1	2	0.7
Serogroup 1	0	N/A	2	N/A	2	N/A
L. bozemanii	1	0.8	0	0.0	1	0.3
L. feeleii	1	0.8	2	1.1	3	1.0
Other or not stated	46	36.2	62	34.4	108	35.2

[a] More than one type of test might apply. Laboratory criteria for diagnosis include the following for confirmed cases:
Urinary antigen test: detection of *Legionella pneumophila* serogroup 1 antigen in urine using validated reagents.
Culture: isolation of any *Legionella* organism from respiratory secretions, lung tissue, pleural fluid, or other normally sterile site.
Serology: fourfold or greater rise in specific serum antibody titer to *Legionella pneumophila* serogroup 1 using validated reagents detected 3–6 weeks apart.
[b] Based on year of symptom onset in SLDSS. If onset date was not stated in SLDSS, case year for confirmed cases was determined by the following dates (in order of reporting): positive laboratory date (by either urinary antigen testing, culture, or fourfold rise of antibody against *Legionella pneumophila* serogroup 1); date patient was hospitalized during treatment for Legionnaires' disease; or date case was first reported to public health at any level.
[c] Supplemental Legionnaires' Disease Surveillance System (SLDSS).
[d] Respiratory secretions include sputum, bronchial wash, bronchoalveolar lavage.
Accessible version at: https://www.cdc.gov/legionella/health-depts/surv-reporting/2014-15-report-tables/index.html#table7



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