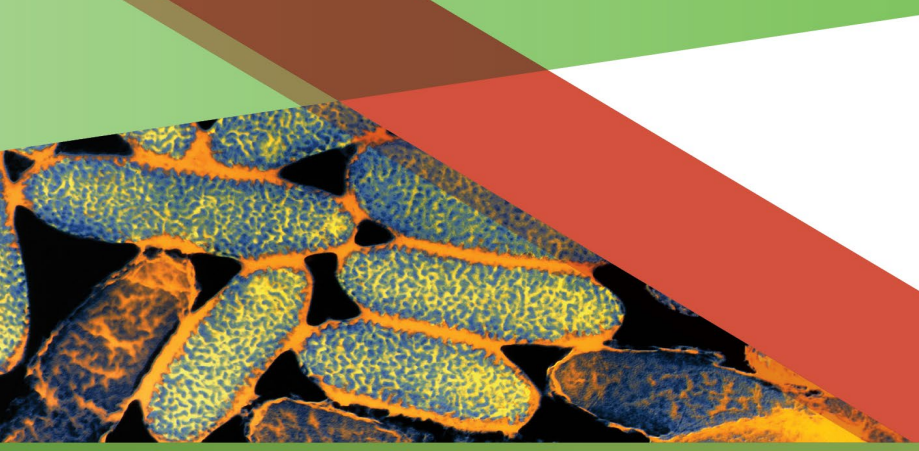


SURVEILLANCE REPORT

Legionnaires' disease

Annual Epidemiological Report for 2019

Key facts

- Legionnaires' disease remains an uncommon and mainly sporadic respiratory infection with an overall notification rate in 2019 for the EU/EEA of 2.2 cases per 100 000 population.
- There is heterogeneity in notification rates between EU/EEA countries, with the highest rate reported by Slovenia (9.4 cases per 100 000 population).
- The annual notification rate increased in recent years, from 1.4 in 2015 to 2.2 cases per 100 000 population in 2019.
- There was a marginal decrease of less than 1% in the number of reported cases in 2019, compared with 2018.
- Four countries (France, Germany, Italy, and Spain) accounted for 71% of all notified cases in 2019.
- Males aged 65 years and above were most affected (8.4 cases per 100 000 population).
- Only 10% of cases were culture-confirmed (10%) probably meaning that disease caused by *Legionella* species other than *Legionella pneumophila* is under-estimated.

Methods

This report is based on data for 2019 retrieved from The European Surveillance System (TESSy) on 12 January 2021. TESSy is a system for the collection, analysis and dissemination of data on communicable diseases.

The methods used to produce this report are published online by ECDC [1] together with an overview of the national surveillance systems [2]. A subset of the data used for this report is available through ECDC's online *Surveillance atlas of infectious diseases* [3].

The surveillance data were collected through three different schemes:

- annual retrospective data collection of Legionnaires' disease (LD) cases reported in EU Member States, Iceland and Norway;
- annual retrospective data collection of outbreak events detected and reported in EU Member States, Iceland and Norway. The following thresholds for reporting outbreaks are used:
  - ≥ five cases, if these cases were not exposed in same building, there is no evidence of exposure to the same aerosol-producing installation/device, or microbiological evidence of linked cases;
  - ≥ three cases, if these cases were exposed in the same building, or if there is evidence of exposure to the same aerosol-producing installation/device, or if there is microbiological evidence of linked cases;
- near-real-time reporting of travel-associated cases of Legionnaires' disease (TALD) through the European Legionnaires' disease surveillance network (ELDSNet) [4], including reports from countries outside the EU/EEA. This scheme aims primarily to identify clusters of cases that may otherwise not be detected at national level, in order to quickly investigate them and take control measures at the implicated tourist accommodation sites to prevent further infections.

Legionnaires' disease cases should be reported to these surveillance schemes in accordance with the 2018 EU/EEA case definition for confirmed cases or probable cases, which includes at least one positive laboratory test.

Suggested citation: European Centre for Disease Prevention and Control. Legionnaires' disease. In: ECDC. Annual epidemiological report for 2019. Stockholm: ECDC; 2021.

Stockholm, May 2021

Annual case surveillance

Epidemiology

In 2019, 28 countries reported 11 298 cases (Table 1), of which 10 636 (94%) were classified as confirmed. The number of notifications per 100 000 population remained stable at 2.2, being the highest notification rate ever observed for the EU/EEA. In the last five years, the notification rates have nearly doubled in the EU/EEA, from 1.4 in 2015 to 2.2 per 100 000 population. Four countries, France, Germany, Italy and Spain, accounted for 71% of all notified cases, although their combined populations only represent approximately 50% of the EU/EEA population.

Table 1. Distribution of Legionnaires' disease cases and rates per 100 000 population by country and year, EU/EEA, 2015–2019

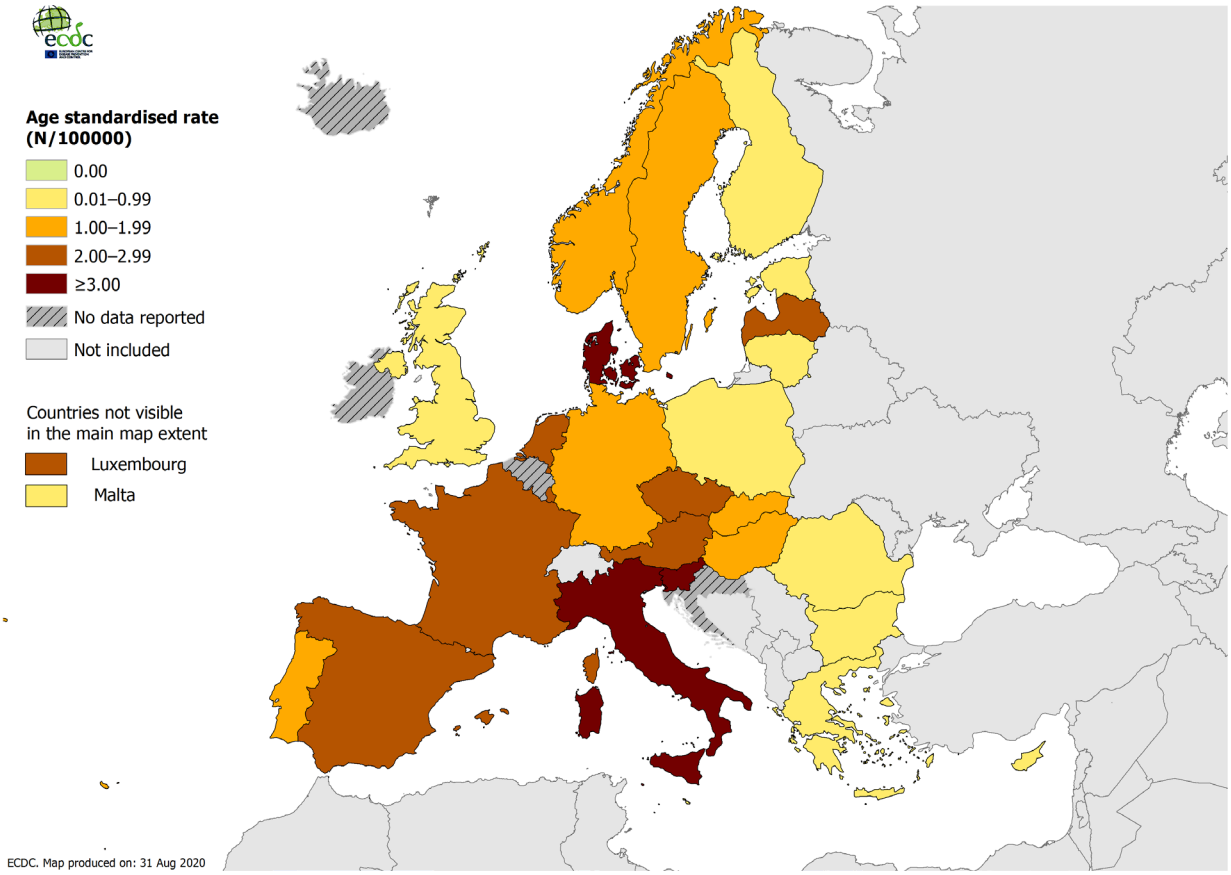
Country	2015		2016		2017		2018		2019		
	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate	ASR
Austria	160	1.9	161	1.9	219	2.5	237	2.7	255	2.9	2.6
Belgium	118	1.1	157	1.4	235	2.1	270	2.4	224	2.0	1.8
Bulgaria	1	0.0	0	0.0	2	0.0	11	0.2	5	0.1	0.1
Croatia	48	1.1	31	0.7	33	0.8	43	1.0	-	-	-
Cyprus	2	0.2	3	0.4	1	0.1	5	0.6	4	0.5	0.5
Czechia	120	1.1	147	1.4	217	2.1	231	2.2	277	2.6	2.3
Denmark	185	3.3	170	3.0	278	4.8	264	4.6	270	4.7	4.2
Estonia	6	0.5	14	1.1	16	1.2	18	1.4	12	0.9	0.8
Finland	17	0.3	15	0.3	27	0.5	24	0.4	44	0.8	0.7
France	1389	2.1	1218	1.8	1630	2.4	2133	3.2	1816	2.7	2.5
Germany	842	1.0	974	1.2	1278	1.5	1446	1.7	1545	1.9	1.6
Greece	29	0.3	31	0.3	43	0.4	65	0.6	45	0.4	0.4
Hungary	58	0.6	66	0.7	62	0.6	74	0.8	113	1.2	1.1
Iceland	1	0.3	3	0.9	3	0.9	5	1.4	-	-	-
Ireland	11	0.2	10	0.2	25	0.5	25	0.5	21	0.4	0.5
Italy	1572	2.6	1733	2.9	2037	3.4	3018	5.0	3143	5.2	4.2
Latvia	22	1.1	24	1.2	31	1.6	37	1.9	42	2.2	2.1
Liechtenstein	.	.	.	.	.	.	.	.	.	.	.
Lithuania	7	0.2	11	0.4	14	0.5	21	0.7	17	0.6	0.6
Luxembourg	5	0.9	3	0.5	9	1.5	10	1.7	14	2.3	2.3
Malta	6	1.4	8	1.8	11	2.4	13	2.7	5	1.0	0.8
Netherlands	419	2.5	454	2.7	561	3.3	584	3.4	566	3.3	3.0
Norway	60	1.2	43	0.8	52	1.0	69	1.3	65	1.2	1.2
Poland	23	0.1	24	0.1	38	0.1	70	0.2	74	0.2	0.2
Portugal	145	1.4	197	1.9	232	2.3	211	2.1	201	2.0	1.7
Romania	3	0.0	2	0.0	19	0.1	62	0.3	19	0.1	0.1
Slovakia	14	0.3	14	0.3	14	0.3	54	1.0	85	1.6	1.6
Slovenia	106	5.1	93	4.5	117	5.7	160	7.7	195	9.4	8.3
Spain	1024	2.2	951	2.0	1363	2.9	1513	3.2	1542	3.3	2.9
Sweden	142	1.5	145	1.5	189	1.9	198	2.0	182	1.8	1.6
United Kingdom	412	0.6	383	0.6	504	0.8	532	0.8	517	0.8	0.7
EU-EEA	**6947**	**1.4**	**7085**	**1.4**	**9260**	**1.8**	**11403**	**2.2**	**11298**	**2.2**	**1.9**

Source: Country reports.
ASR: age-standardised rate.
.: no data reported.
-: no rate calculated.

Of 8 458 cases with known outcome, 630 (7%) were reported to have been fatal.

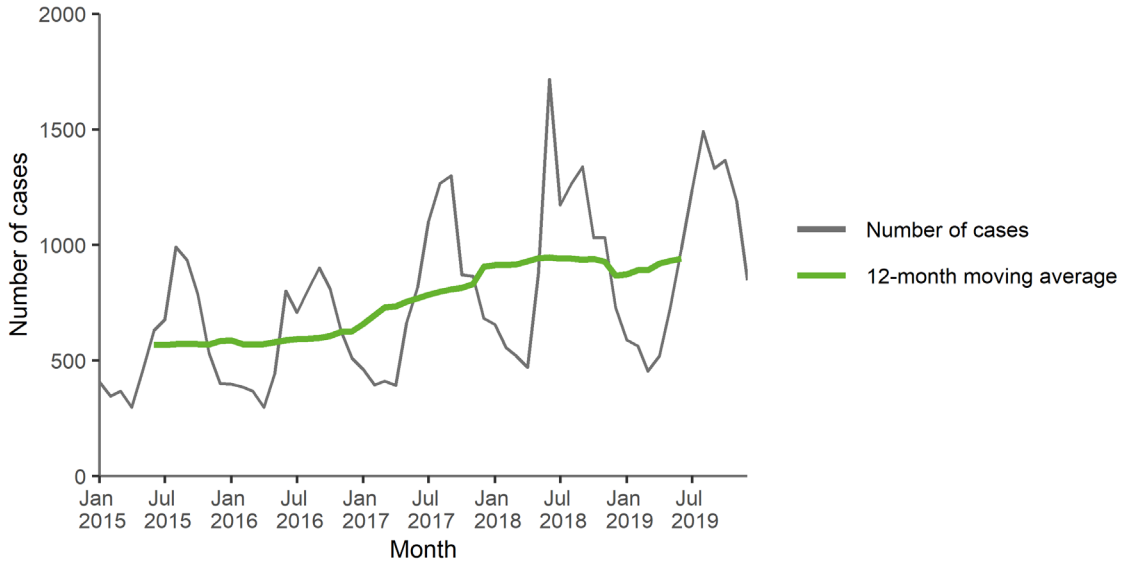
Notification rates ranged from less than 1.0 cases per 100 000 population in 10 countries (Bulgaria, Cyprus, Estonia, Finland, Greece, Ireland, Lithuania, Poland, Romania and the United Kingdom) to 3.0 cases per 100 000 population or more in six countries (Denmark, France, Italy, the Netherlands, Slovenia and Spain); see Table 1 and Figure 1.

Figure 1. Distribution of Legionnaires' disease cases per 100 000 population by country, EU/EEA, 2019



During the period 2015–2019, the number of reported cases increased by 65% from 6 947 to 11 298 showing an increasing trend in recent years (Table 1; Figure 2).

Figure 2. Distribution of Legionnaires' disease cases by month, EU/EEA, 2015–2019

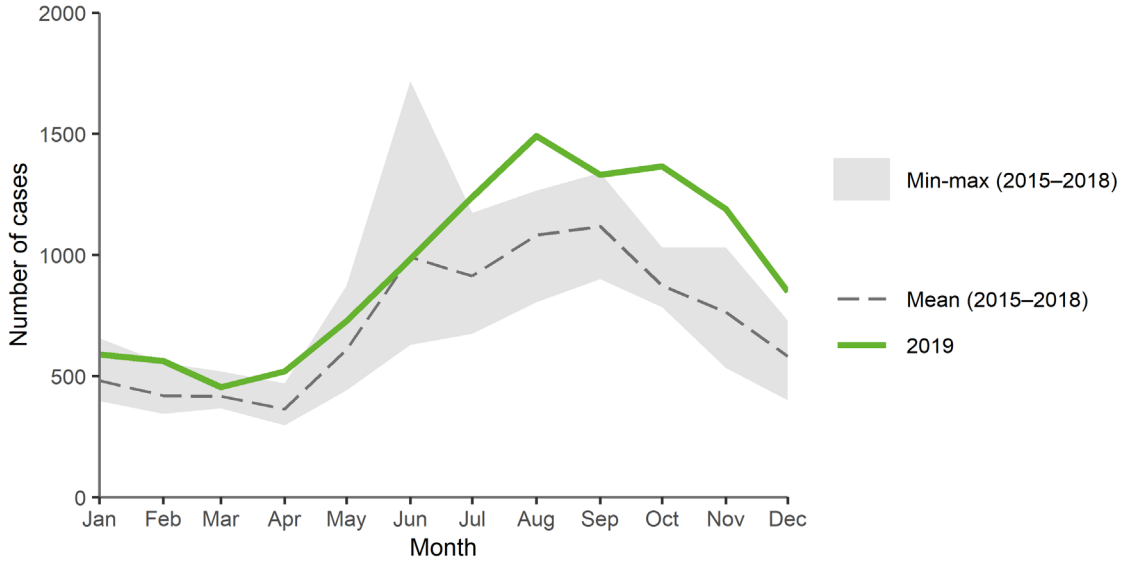


Source: Country reports from Austria, Belgium, Bulgaria, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, the United Kingdom.

The distribution of cases by month of reporting shows that the majority (57%) occurred between June and October, similar to previous years (Figure 3). An increase in cases compared to the maximum in previous years (2015–2018) was observed for every month during the period July to December. The peak of 1 743 cases in June

2018 was the highest monthly number recorded to date under EU/EEA surveillance and was not reached again in 2019. No community outbreaks were reported by any EU/EEA country that could explain the shifted seasonal curve to the later summer and autumn period.

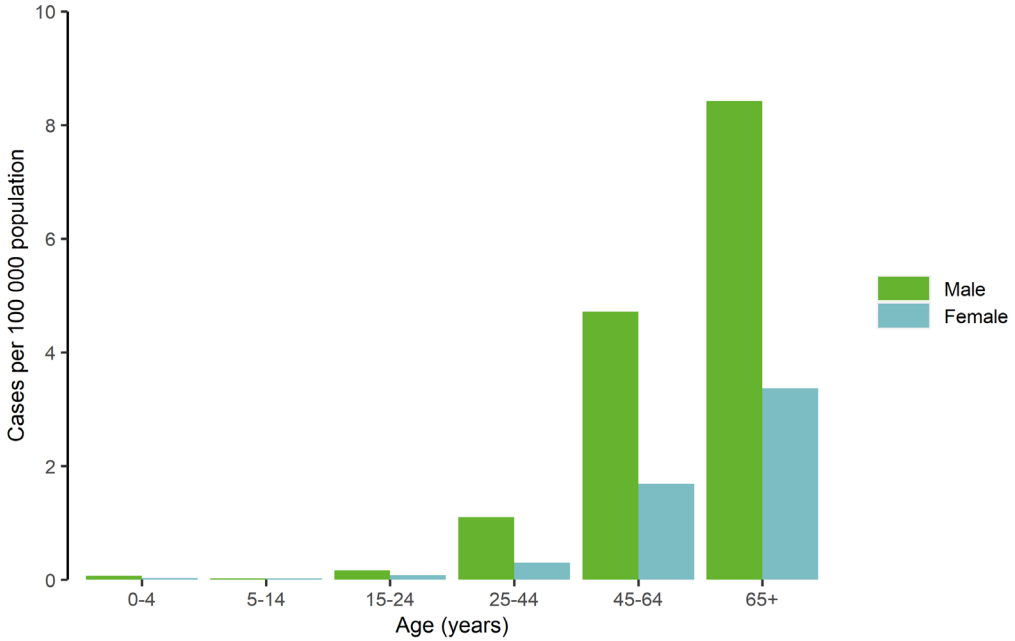
Figure 3. Distribution of Legionnaires' disease cases by month, EU/EEA, 2019 and 2015–2018



Source: Country reports from Austria, Belgium, Bulgaria, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, the United Kingdom

In 2019, people aged 45 years and older accounted for 10 236 of 11 279 cases with known age (91%). The notification rate increased with age, from ≤0.1 cases per 100 000 population in those under 25 years of age to 5.6 cases per 100 000 population in those aged 65 years and above (8.4 cases per 100 000 population in males and 3.4 in females, Figure 4). The overall male-to-female ratio remained unchanged compared to 2018 at 2.3:1.

Figure 4. Distribution of Legionnaires' disease cases per 100 000 population, by age and gender, EU/EEA, 2019



The vast majority of cases in 2019 (90%) were reported using the laboratory method of urine antigen tests (UAT). This was similar to the range of 88–90% cases with UAT testing reported since 2012. In comparison, few cases were reported with a culture test (1 148 cases; 10%) and use of polymerase chain reaction (PCR) method tests was reported for 1 024 cases (9%).

This continues the low-level use of culture as a reported method observed during the same period. Among culture-confirmed cases (1 148) a total of 35 *Legionella* non-pneumophila species were reported: *L. anisa* (1), *L. bozemanii* (2), *L. dumoffi* (1), *L. jordanis* (1), *L. longbeachae* (15), *L. micdadei* (2) and *Legionella* other species (13). As illustrated in Table 2, although *Legionella pneumophila* isolates of all serogroups are detected and reported annually among culture-confirmed cases, over 80% are reported as serogroup 1.

Table 2. Serogroups reported for culture-confirmed cases of *L. pneumophila*, EU/EEA, 2018–2019

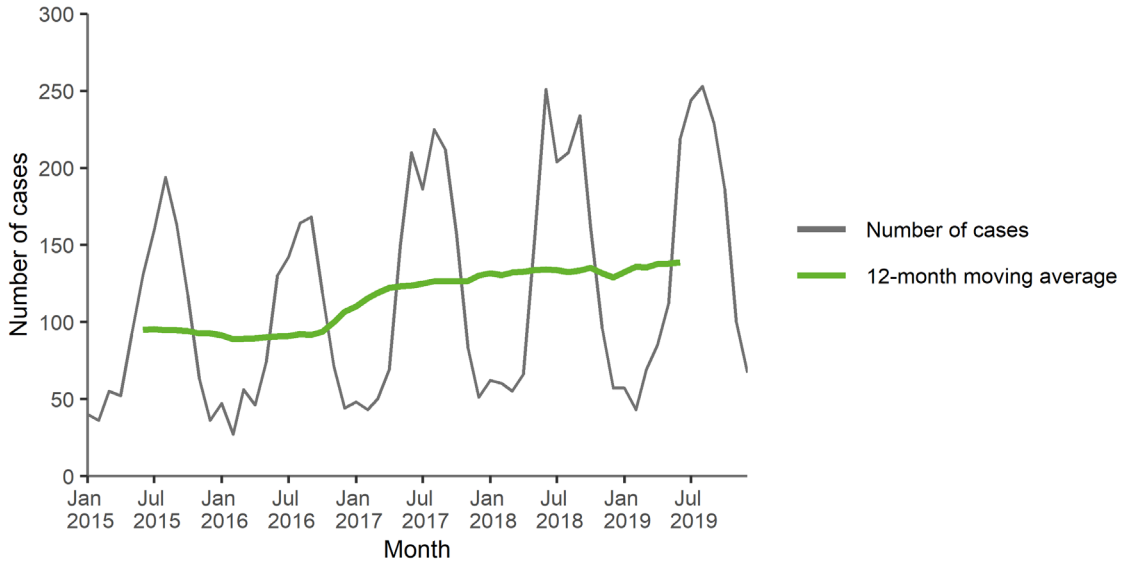
Serogroup (SG)	2018		2019	
	Number	%	Number	%
1	909	85	923	83
2	3	<1	9	<1
3	32	3	35	3
4	7	<1	2	<1
5	7	<1	8	<1
6	16	1	17	2
7	0	-	5	<1
8	3	<1	6	<1
9	0	<1	1	<1
10	2	<1	9	<1
11	0	-	0	-
12	2	<1	0	-
13	2	<1	1	<1
14	1	<1	1	<1
15	0	<1	3	<1
L. pneumophila non serogroup 1	7	<1	7	<1
L. pneumophila serogroup mixed	11	1	3	<1
L. pneumophila serogroup unknown	71	7	76	7
TOTAL	**1 073**		**1 106**	

Travel-associated Legionnaires' disease (TALD)

TALD case reports

ELDSNet received reports of 1 657 cases of TALD with date of onset in 2019, 2% more cases than in 2018, and the highest annual number of TALD cases ever reported to the network (Figure 5).

Figure 5. Distribution of travel-associated cases of Legionnaires' disease by month, EU/EEA, 2015–2019

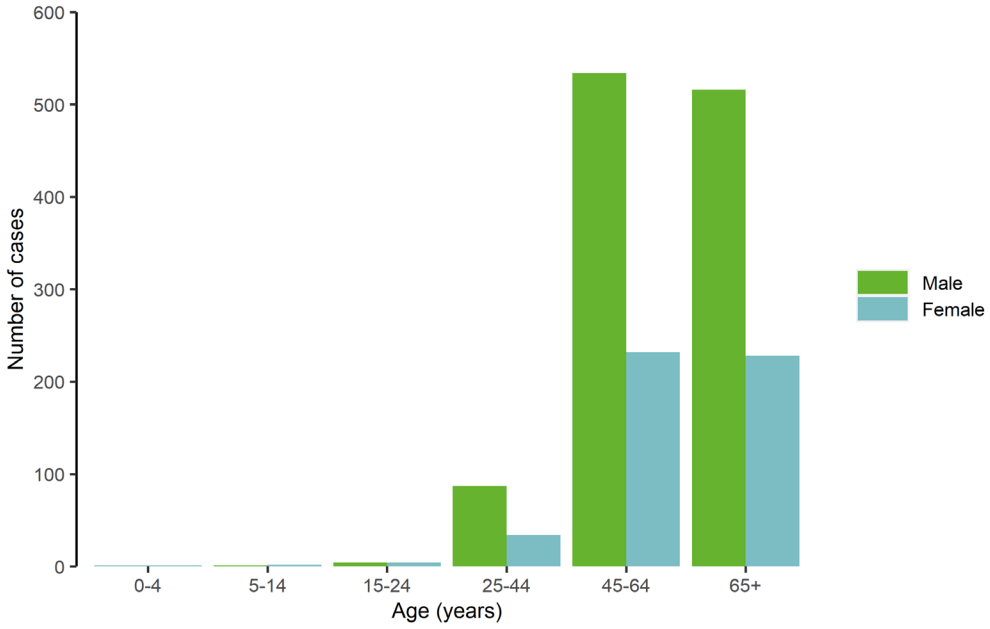


Source: Country reports from Austria, Belgium, Bulgaria, Croatia, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovenia, Spain, Sweden, the United Kingdom.

Cases were reported from 28 countries: 26 EU/EEA Member States and two non-EU/EEA countries: Switzerland (32 cases) and the USA (19 cases). Three quarters (76.7 %) of all TALD cases were reported by only five countries: Italy, Germany, France, the United Kingdom, and the Netherlands.

Similar to previous years, and the overall distribution for Legionnaires' disease, over two thirds (69%) of reported TALD cases were male. Cases had a median age of 63 years (IQR 55-71, range 7-99); 83% of cases occurred in people 50 years and older (Figure 6).

Figure 6. Distribution of travel-associated cases of Legionnaires' disease by age and gender, 2019

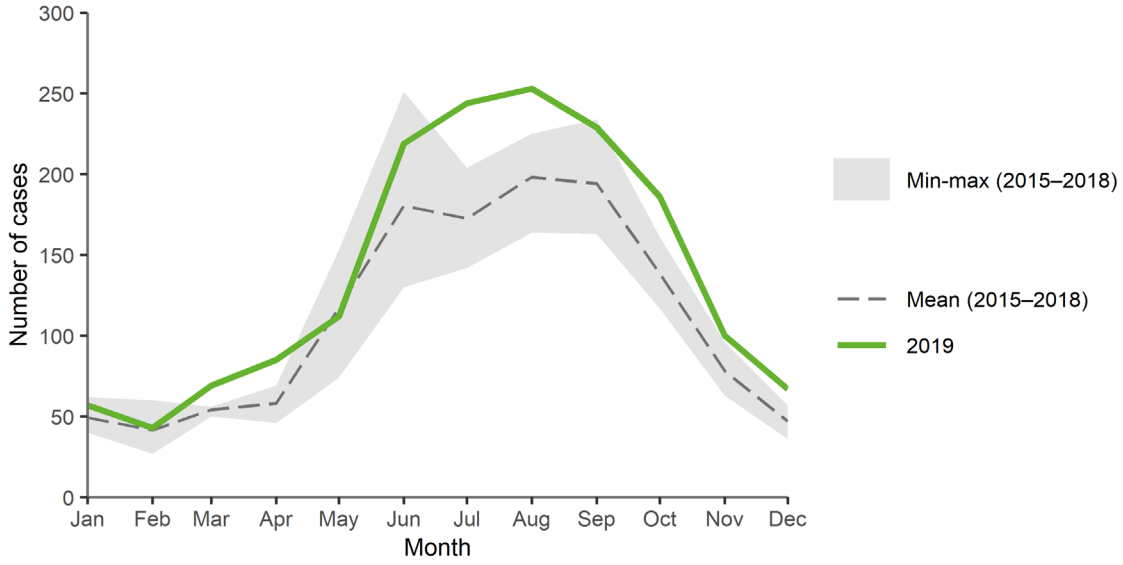


The reported TALD cases were resident in 35 countries. The majority of cases resided in those countries that reported the most cases, but 78 (4.7%) of cases were non-EU/EEA residents, from Switzerland (34), the USA (25), Australia (eight), Canada (four), China (three), Brazil (two), Mexico (one) and New Zealand (one).

The median time from date of onset to reporting to ELDSNet was 18 days, ranging from a minimum of 10–12 days (Latvia, France, Ireland and Norway) to a maximum of 50–53 days (Poland, Hungary and Portugal).

In 2019, two thirds of TALD cases fell ill between June and October, which is in line with the known seasonality for Legionnaires' disease (Figure 7).

Figure 7. Distribution of travel-associated cases of Legionnaires' disease by month, EU/EEA, 2019 and 2015–2018



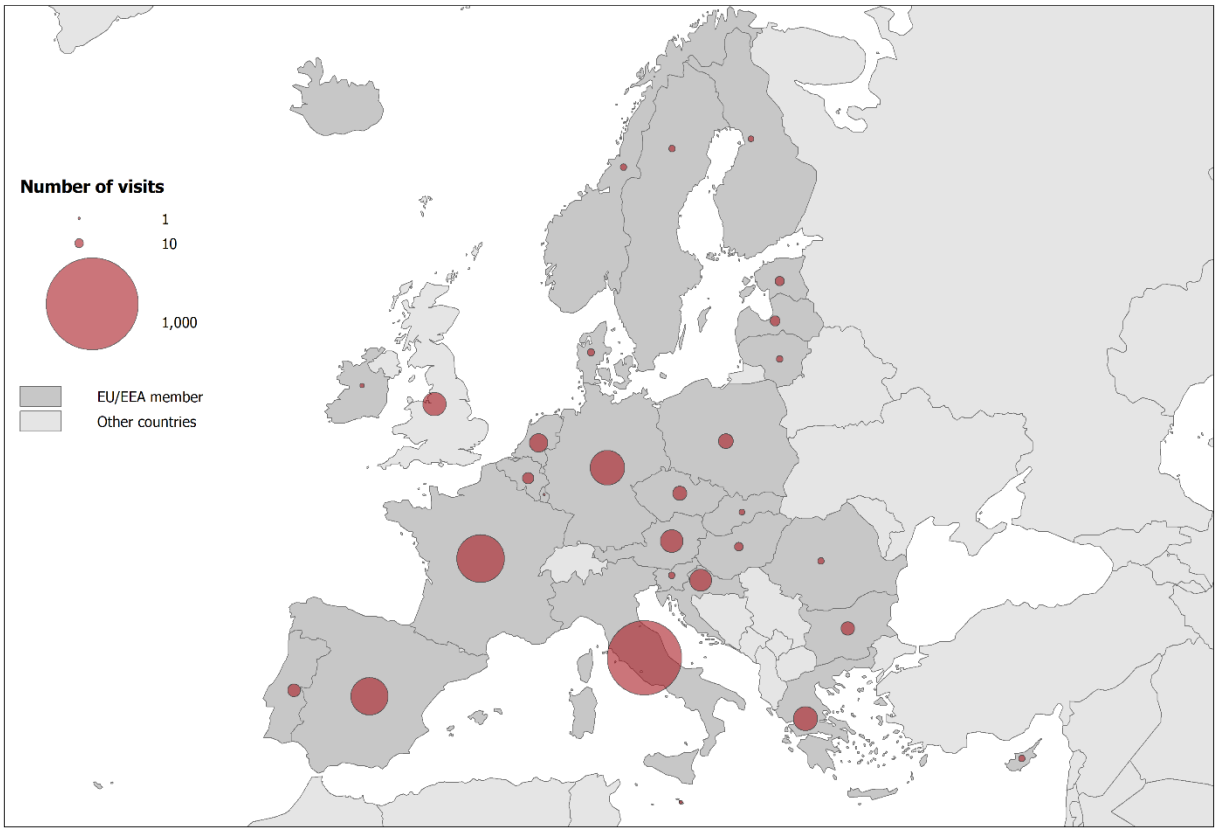
Source: Country reports from Austria, Belgium, Bulgaria, Croatia, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovenia, Spain, Sweden, the United Kingdom.

Outcome was provided for 1 036 (62.6%) TALD cases, with 26 (1.6%) known to have deceased by the time of reporting to ELDSNet. Deceased cases were between 43 and 91 years old, and 17 were male. A total of 1 553 TALD cases (94%) were classified as confirmed and 104 (6%) were probable cases. Of 1 801 laboratory tests, 85% were UATs, 12% were molecular tests (polymerase chain reaction, PCR) and 3% were cultures, while less than one percent were serological tests. Monoclonal subtyping results were reported for 14 cases with *L. pneumophila* serogroup 1: Philadelphia (five cases), Allentown/France (two cases), Benidorm (two cases), Knoxville (two cases), Bellingham (one case), Oxfolda (one case), and OLDA (one case). The sequence type was reported to ELDSNet for only 22 TALD cases from three countries: United Kingdom (15), Denmark (4), and Sweden (3). Three of the reported sequence types were ST42, three were ST62, two were ST1, two were ST37, and the others were a variety of single sequence types.

TALD case travel destinations

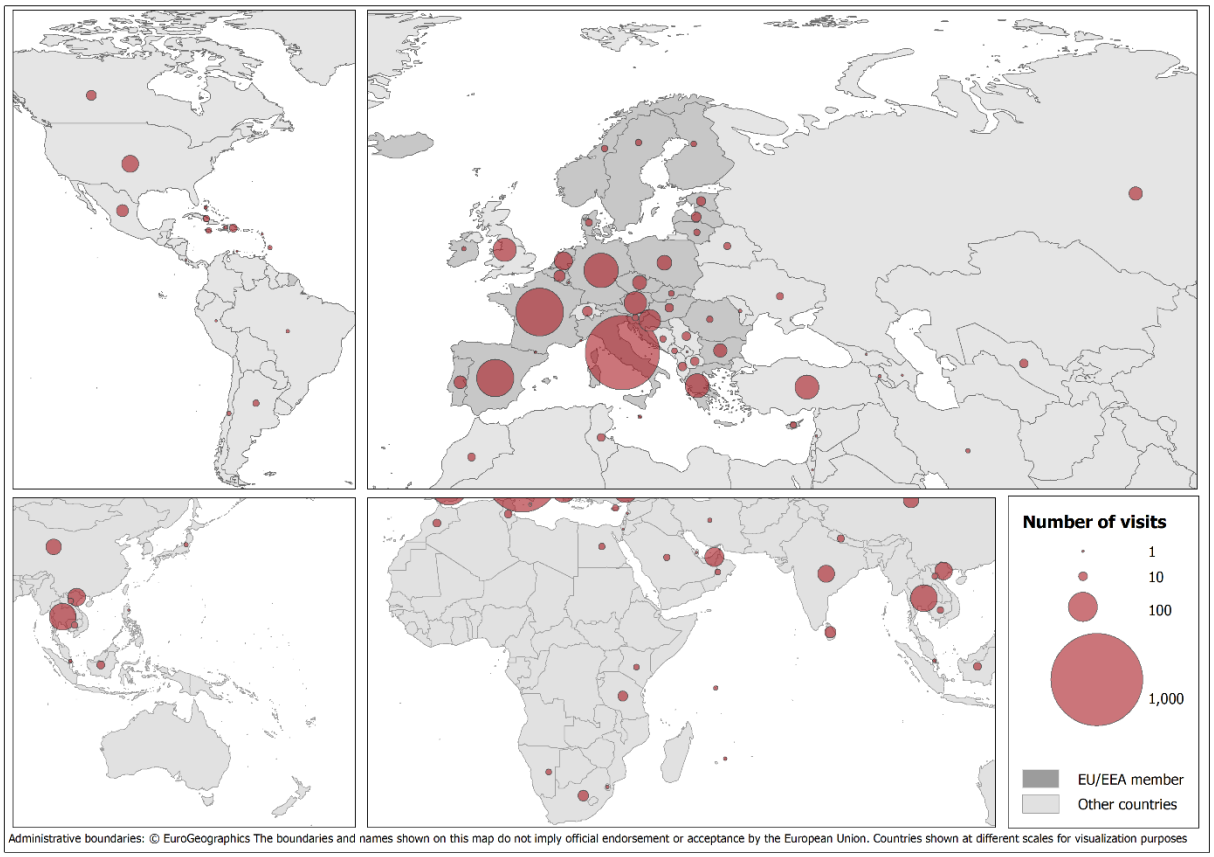
The 1 657 TALD cases had made a total of 2 410 international journeys. Of these, 1 723 (72%) were within the EU/EEA, 638 (26%) were outside the EU/EEA (Figure 8 and Figure 9), and 41 (2%) journeys were on ships. The three destination countries with most TALD associated travel visits were Italy (n=653, 28%), France (n=270, 11%), and Spain (n=164, 7%). Seventy-nine percent of the overnight stays were in hotels, 7% were in apartments, 6% on camping sites, 2% on ships, and 6% were reported as other types of accommodation.

Figure 8. Distribution of accommodation site visits made by travel-associated Legionnaires' disease cases, by destination country, EU/EEA and neighbouring countries, 2019



Administrative boundaries: © EuroGeographics The boundaries and names shown on this map do not imply official endorsement or acceptance by the European Union.

Figure 9. Distribution of accommodation site visits made by travel-associated Legionnaires' disease cases, by destination country, worldwide, 2019



Administrative boundaries: © EuroGeographics The boundaries and names shown on this map do not imply official endorsement or acceptance by the European Union. Countries shown at different scales for visualization purposes

In 2019, ELDSNet detected 176 new TALD clusters. A TALD cluster is an event involving two cases having visited the same accommodation site within a two-year period [4].The clusters were associated with accommodations in 30 countries worldwide (14 within the EU/EEA and 16 outside the EU/EEA), and two clusters were associated with vessels. Of the 176 new clusters from 2019, 125 (71%) comprised of only two cases. ELDSNet shared 60 summary reports of type 1 (non-EU/EEA clusters) with tour operators and 36 of type 2 (rapidly evolving clusters - i.e. three or more cases associated within three months).

For all 176 clusters, a preliminary site assessment report within two weeks of notification, followed by a final assessment report within six weeks of notification, were received by ECDC in accordance with the surveillance scheme operating procedures [4]. In 2019, the names of eight accommodation sites were published on ECDC's website, because assessment reports stated that recommendations from the competent authorities were not implemented in a satisfactory manner.

Outbreaks

In 2019, through the annual outbreak reporting surveillance scheme, five countries (France, Germany, Italy, Netherlands, and United Kingdom) reported a total of 29 community- or hospital-acquired outbreaks, ranging from three to nine per reporting country. The number of cases per reported outbreak ranged from two to 28 confirmed cases. Eight outbreaks were reported in association with hospitals and three in geriatric residences. Sixteen EU/EEA countries reported no outbreaks of Legionnaires' disease under 2019.

Discussion

In 2019, both the number and notification rate of Legionnaires' disease in the EU/EEA remained at the highest level observed, continuing an increase ongoing since 2013, although not an increase on the previous year. The main characteristics of Legionnaires' disease cases reported in 2019 were very similar to 2018, with most cases being sporadic and community-acquired and the disease mostly affecting males aged 65 years and above. A number of countries continue to have very low notification rates of below 0.5 cases per 100 000 population, which probably represents underestimation of the incidence in these countries. As only 10% of cases are reported with a culture-confirmed diagnosis there is probably an underestimation of the burden of disease caused by *Legionella* species other than by *Legionella pneumophila* across the EU/EEA.

Outbreaks of Legionnaires' disease of varying size and origin continue to be identified and investigated by public health authorities in the EU/EEA. However, the high number of cases reported annually is not caused by large outbreaks.

The cause for the continuing high levels of notified cases observed in 2019, as in 2018, remains unknown. Factors that could influence this include changes in national testing policy and surveillance systems; an ageing EU/EEA population and increasing travel trends; the design and infrastructure maintenance in building water systems, and changes in climate and weather patterns across Europe and worldwide that can impact both the ecology of *Legionella* in the environment and causes of exposure to water aerosols containing the bacteria.

Public health implications

Legionnaires' disease remains an important cause of potentially preventable morbidity and mortality in Europe and the burden appears to be increasing.

The overall EU/EEA notification rates has seen sharp rises in the last few years. However, variation in rates across EU/EEA countries remain, probably reflecting under-diagnosis of this disease in many Member States. A priority continues to be assisting those countries with very low notification rates in improving both the diagnosis and reporting of Legionnaires' disease to public health authorities.

Outbreaks of Legionnaires' disease of varying size and origin continue to be identified and investigated by public health authorities in EU/EEA countries. Due to the relatively high mortality associated with disease and considerable challenges for the rapid identification and control of environmental sources, it remains important to be vigilant through surveillance for the detection of clusters and outbreak events.

As detection of TALD clusters through the ELDSNet surveillance scheme leads to investigations and preventive action at accommodation sites by participating countries, the continuing detection of clusters primarily through this multi-country joint surveillance scheme shows its value for public health.

To support the strengthening of surveillance and outbreak investigation capacity in European countries, in 2019 ECDC started an annual EQA scheme on clinical and environmental samples of *Legionella* spp. The first report on the findings of the EQA scheme in participating laboratories from EU/EEA countries for the November 2019 distribution was published in 2020 [6].

Regular checks for the presence of *Legionella* bacteria and appropriate control measures applied to engineered water systems [5] may prevent cases of Legionnaires' disease at tourist accommodation sites and in hospitals, long-term healthcare facilities or other settings where sizeable higher-risk populations can be exposed.

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