

Legionnaires' disease

Annual Epidemiological Report for 2018

Key facts

- Legionnaires' disease remains an uncommon and mainly sporadic respiratory infection with an overall notification rate of 2.2 per 100 000 for the EU/EEA in 2018.
- There is heterogeneity in notification rates between EU/EEA countries, with the highest rate reported by Slovenia (7.7 per 100 000).
- The annual notification rate increased continuously over the period 2014–2018, from 1.3 per 100 000 in 2014 to 2.2 in 2018.
- There was a 23% increase in the number of cases in 2018 compared with 2017.
- Four countries (France, Germany, Italy and Spain) accounted for 71% of all notified cases in 2018.
- Males aged 65 years and above were most affected (8.5 per 100 000).

Methods

This report is based on data for 2018 retrieved from The European Surveillance System (TESSy) on 12 June 2019. 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 two different schemes:

- annual retrospective data collection of Legionnaires' disease (LD) cases in EU Member States, Iceland and Norway; and
- 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 at identifying clusters of cases that may otherwise not be detected at the national level, in order to quickly investigate them and take control measures at the implicated tourist accommodation sites to prevent further infections.

For both surveillance schemes, countries were asked to report Legionnaires' disease cases in accordance with the 2018 EU/EEA case definition for confirmed or probable cases (i.e. at least one positive laboratory test).

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Epidemiology

In 2018, 30 countries reported 11 343 cases, of which 10 672 (94%) were classified as confirmed (Table 1). The number of notifications per 100 000 population increased to 2.2, which was the highest notification rate ever observed for the EU/EEA. This was an increase of 23% in the number of reported cases in the EU/EEA compared with 2017, and an additional increase of 0.4 per 100 000 population on the previous year. Over the most recent five year period the notification rates have nearly doubled in the EU/EEA, from 1.3 in 2014 to 2.2 per 100 000 population.

Of 8 974 cases with known outcome, 696 (8%) were reported to have been fatal. Four countries - France, Germany, Italy and Spain - accounted for 71% of all notified cases, although their combined populations only represented 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, 2014–2018

Country	2014		2015		2016		2017		2018			
	Reported cases	Rate	Reported cases	Rate	Reported cases	Rate	Reported cases	Rate	Reported cases	Rate	ASR	Confirmed cases
Austria	133	1.6	160	1.9	161	1.9	219	2.5	237	2.7	2.5	230
Belgium	101	0.9	118	1.1	157	1.4	235	2.1	270	2.4	2.2	216
Bulgaria	1	0.0	1	0.0	0	0.0	2	0.0	11	0.2	0.1	11
Croatia	26	0.6	48	1.1	31	0.7	33	0.8	43	1.0	0.9	43
Cyprus	6	0.7	2	0.2	3	0.4	1	0.1	5	0.6	0.6	5
Czech Republic	110	1.0	120	1.1	147	1.4	217	2.1	231	2.2	2.0	224
Denmark	158	2.8	185	3.3	170	3.0	278	4.8	264	4.6	4.2	170
Estonia	8	0.6	6	0.5	14	1.1	16	1.2	18	1.4	1.2	7
Finland	10	0.2	17	0.3	15	0.3	27	0.5	24	0.4	0.4	20
France	1348	2.0	1389	2.1	1218	1.8	1630	2.4	2133	3.2	3.0	2091
Germany	836	1.0	842	1.0	973	1.2	1277	1.5	1442	1.7	1.5	1300
Greece	27	0.2	29	0.3	31	0.3	43	0.4	65	0.6	0.5	64
Hungary	32	0.3	58	0.6	66	0.7	62	0.6	74	0.8	0.7	60
Iceland	4	1.2	1	0.3	3	0.9	3	0.9	5	1.5	1.7	2
Ireland	8	0.2	11	0.2	10	0.2	25	0.5	25	0.5	0.6	25
Italy	1510	2.5	1572	2.6	1733	2.9	2037	3.4	2962	4.9	4.0	2874
Latvia	38	1.9	22	1.1	24	1.2	31	1.6	37	1.9	1.8	36
Liechtenstein	.	.	.	.	.	.	.	.	.	.	.	.
Lithuania	8	0.3	7	0.2	11	0.4	14	0.5	21	0.7	0.7	17
Luxembourg	5	0.9	5	0.9	3	0.5	9	1.5	10	1.7	1.7	10
Malta	9	2.1	6	1.4	8	1.8	11	2.4	13	2.8	2.6	13
Netherlands	348	2.1	419	2.5	454	2.7	561	3.3	584	3.4	3.1	536
Norway	51	1.0	60	1.2	43	0.8	52	1.0	69	1.3	1.3	59
Poland	12	0.0	23	0.1	24	0.1	38	0.1	70	0.2	0.2	62
Portugal	588	5.6	145	1.4	197	1.9	232	2.3	211	2.0	1.8	210
Romania	1	0.0	3	0.0	2	0.0	19	0.1	62	0.3	0.3	55
Slovakia	14	0.3	14	0.3	14	0.3	14	0.3	54	1.0	1.0	54
Slovenia	59	2.9	106	5.1	93	4.5	117	5.7	160	7.7	7.0	160
Spain	925	2.0	1024	2.2	951	2.0	1363	2.9	1513	3.3	2.9	1492
Sweden	136	1.4	142	1.5	145	1.5	189	1.9	198	2.0	1.8	96
United Kingdom	370	0.6	412	0.6	383	0.6	504	0.8	532	0.8	0.8	530
EU/EEA	6882	1.3	6947	1.4	7084	1.4	9259	1.8	11343	2.2	1.9	10672

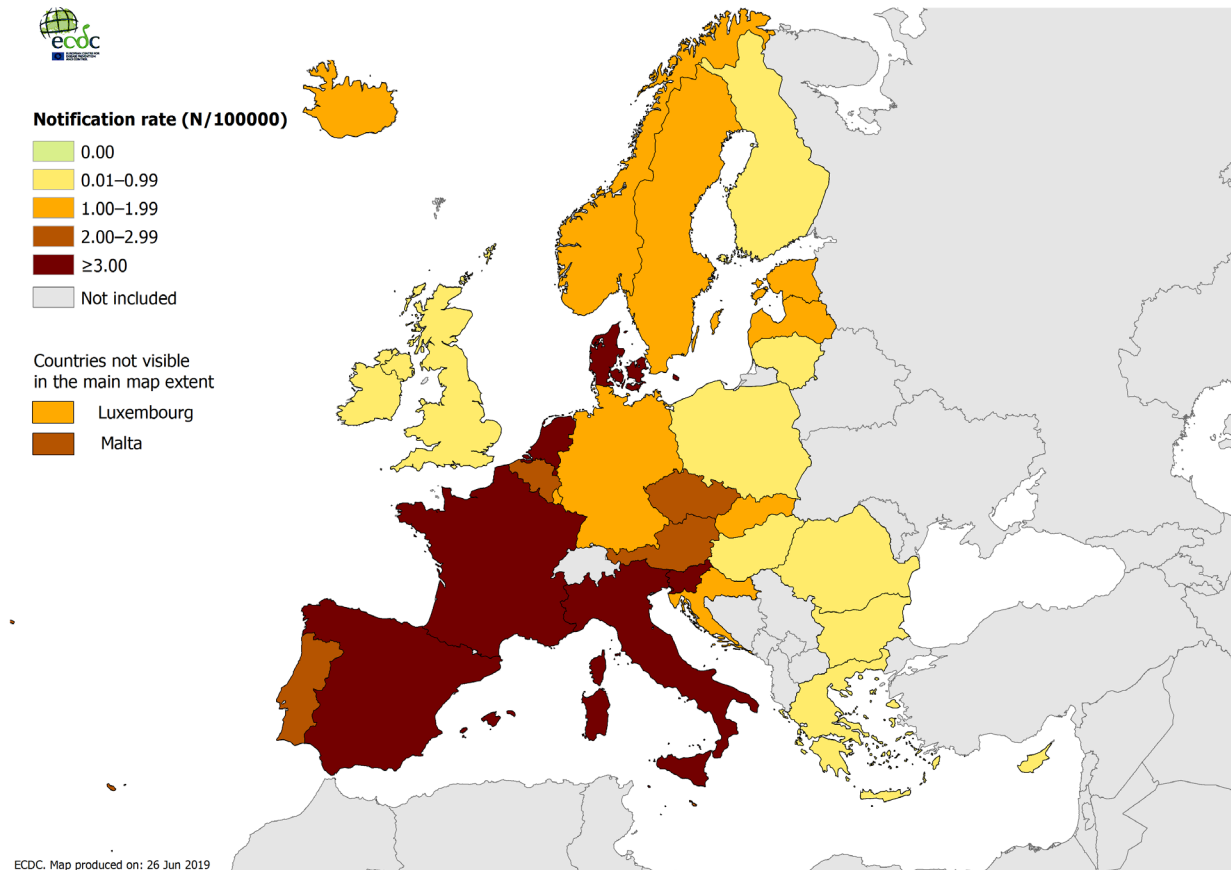
ASR: age-standardised rate

∴: no data reported

-: no rate calculated.

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

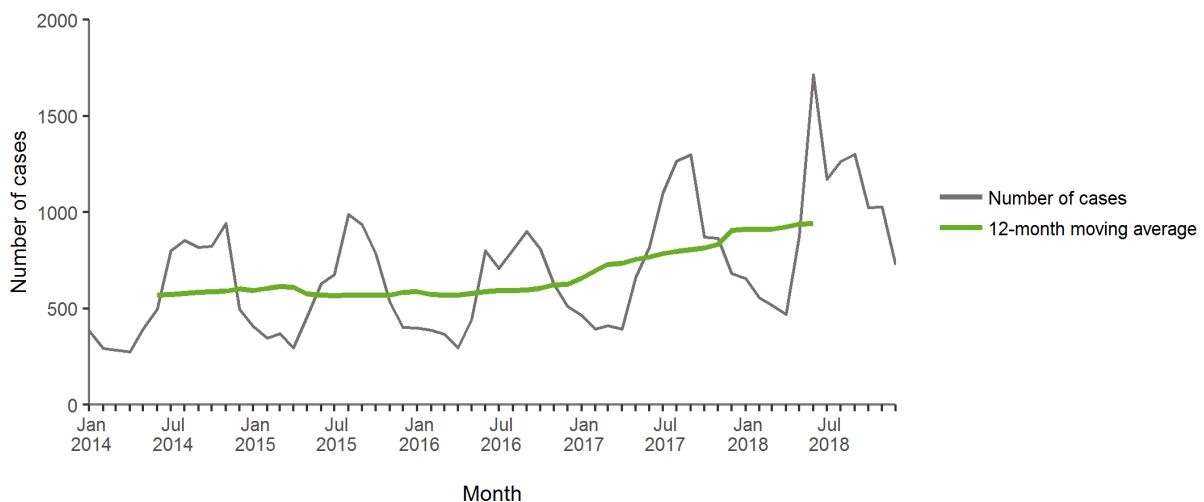
Figure 1. Distribution of Legionnaires' disease cases per 100 000 population by country, EU/EEA, 2018



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

The number of reported cases increased by 65% over the 2014–2018 period from 6 882 to 11 343, showing an increasing trend in recent years (Table 1; Figure 2).

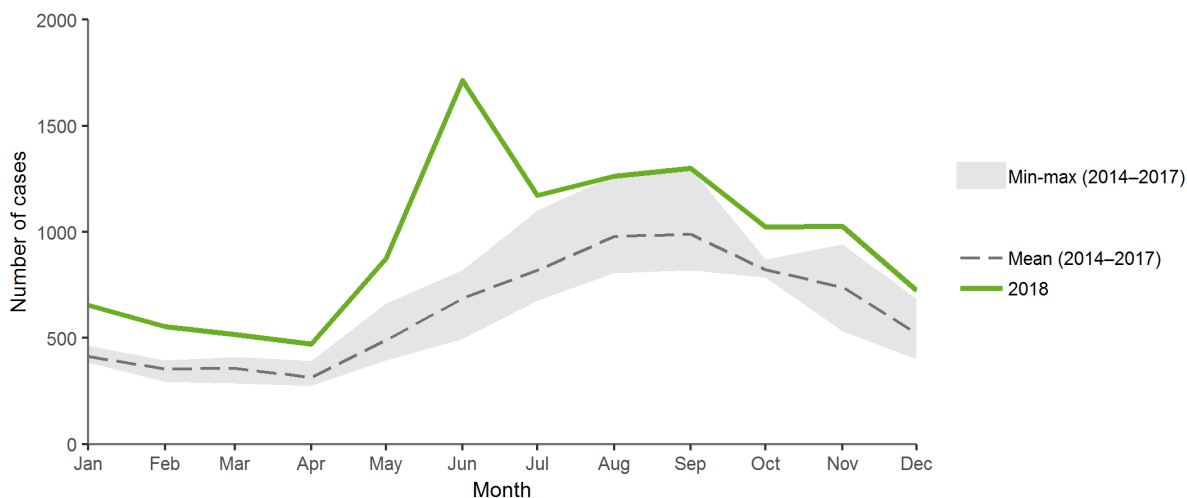
Figure 2. Distribution of Legionnaires' disease cases by month, EU/EEA, 2014–2018



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

The distribution of cases by month of reporting shows that the majority (57%) of cases occurred between June and October, similar to previous years (Figure 3). For every month there was an increase in cases compared to the maximum in previous years (2014–2017). The peak of 1 743 cases in June 2018 was the highest monthly number recorded to date under EU/EEA surveillance. No large outbreaks were reported by any EU/EEA country that could explain or contribute to this notable seasonal increase, seen particularly early in the season.

Figure 3. Distribution of Legionnaires' disease cases by month, EU/EEA, 2018 and 2014–2017

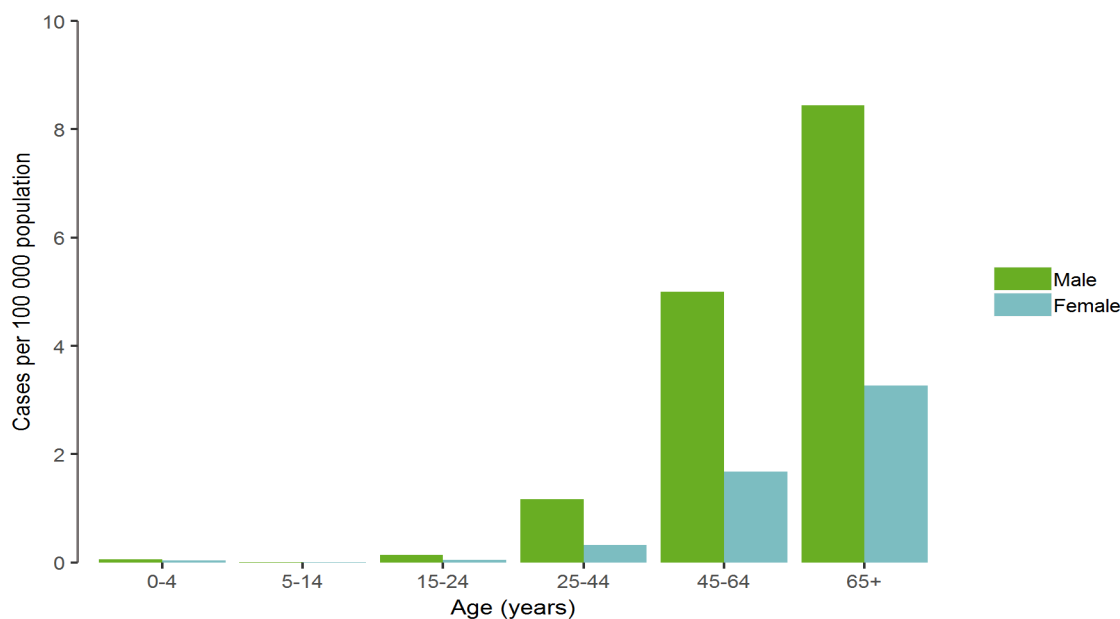


Source: Country reports Austria, Belgium, Bulgaria, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and the United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

As in previous years, most cases were community-acquired (72%), while 20% were travel-associated, 6% were associated with healthcare facilities and 2% were associated with other settings.

In 2018, people aged 45 years and older accounted for 10 315 of 11 428 cases with known age (90%). The notification rate increased with age, from ≤0.1 per 100 000 population in those under 25 years to 5.5 in persons aged 65 years and above (8.5 per 100 000 population in males and 3.3 in females, Figure 4). The overall male-to-female ratio remained unchanged compared to 2017 and was 2.4:1.

Figure 4. Distribution of Legionnaires' disease cases per 100 000 population by age and gender, EU/EEA, 2018



Urine antigen tests (UAT) were used for laboratory diagnosis in 91% of all cases, increasing from 88% in 2014. In comparison only 10% of cases were culture-confirmed, a decline from 12% in 2014.

L. pneumophila serogroup 1 remains the most commonly identified pathogen, accounting for 909 of 1 073 culture-confirmed cases (85%).

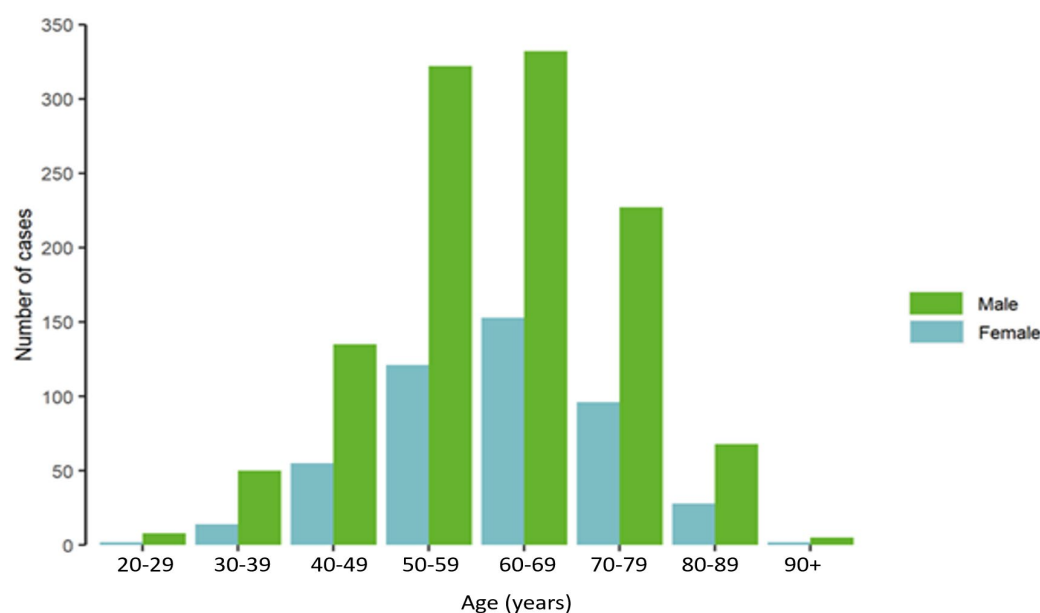
Travel-associated Legionnaires' disease (TALD)

TALD case reports

ELDSNet received reports of 1 618 cases of TALD with date of onset in 2018, 9% more cases than in 2017, and the highest annual number of TALD cases ever reported to the network. Cases were reported from 25 countries: 22 EU/EEA Member States and three non-EU/EEA countries: Switzerland (43 cases), USA (15 cases), and Thailand (one case). Three quarters (74.1 %) of all TALD cases were reported by only five countries: Italy, France, United Kingdom, Germany, and the Netherlands. The median time from date of onset to reporting to ELDSNet was 19 days, ranging from 10 days (Czech Republic and Ireland) to 141 days (Portugal).

In 2018, two thirds of TALD cases fell ill between June and October, which is in line with the known seasonality of Legionnaires' disease. Similar to previous years, and the overall distribution for Legionnaires' disease, over two thirds (71%) of reported TALD cases were male. Cases had a median age of 62.5 (IQR 54-71, range 21-99); 84% of cases occurred in people 50 years and older (Figure 5).

Figure 5. Distribution of travel-associated cases of Legionnaires' disease by age and gender, 2018



Outcome was provided for 989 (61%) TALD cases, with 25 (2.5%) known to have deceased by the time of reporting to ELDSNet. Deceased cases were between 47 and 99 years old, and 19 were male. A total of 1 092 TALD cases (96%) were classified as confirmed and 49 (4%) were probable cases. Of 1 215 laboratory tests used, 89% were UATs, 8% were molecular tests (polymerase chain reaction, PCR) and 4% were cultures. The sequence type was reported to ELDSNet for only 16 TALD cases from three countries: United Kingdom (10), Denmark (3), and Germany (3).

TALD case travel destinations

The 1 618 TALD cases had made a total of 2 420 international journeys. Of these, 1 846 (76%) were within the EU/EEA, 537 (22%) were outside the EU/EEA (Figure 6 and Figure 7), and 37 journeys were on ships. The three destination countries with most TALD-associated travel visits were Italy (n=656, 28%), France (n=366, 15%), and Spain (n=166, 7%). Seventy eight percent of the overnight stays were in hotels, 7% were on camping sites, 6% in apartments, 2% were on ships, and 7% were reported as other types of accommodation.

Figure 6. Distribution of accommodation site visits made by travel-associated Legionnaires' disease cases, by destination country, EU/EEA and neighbouring countries, 2018

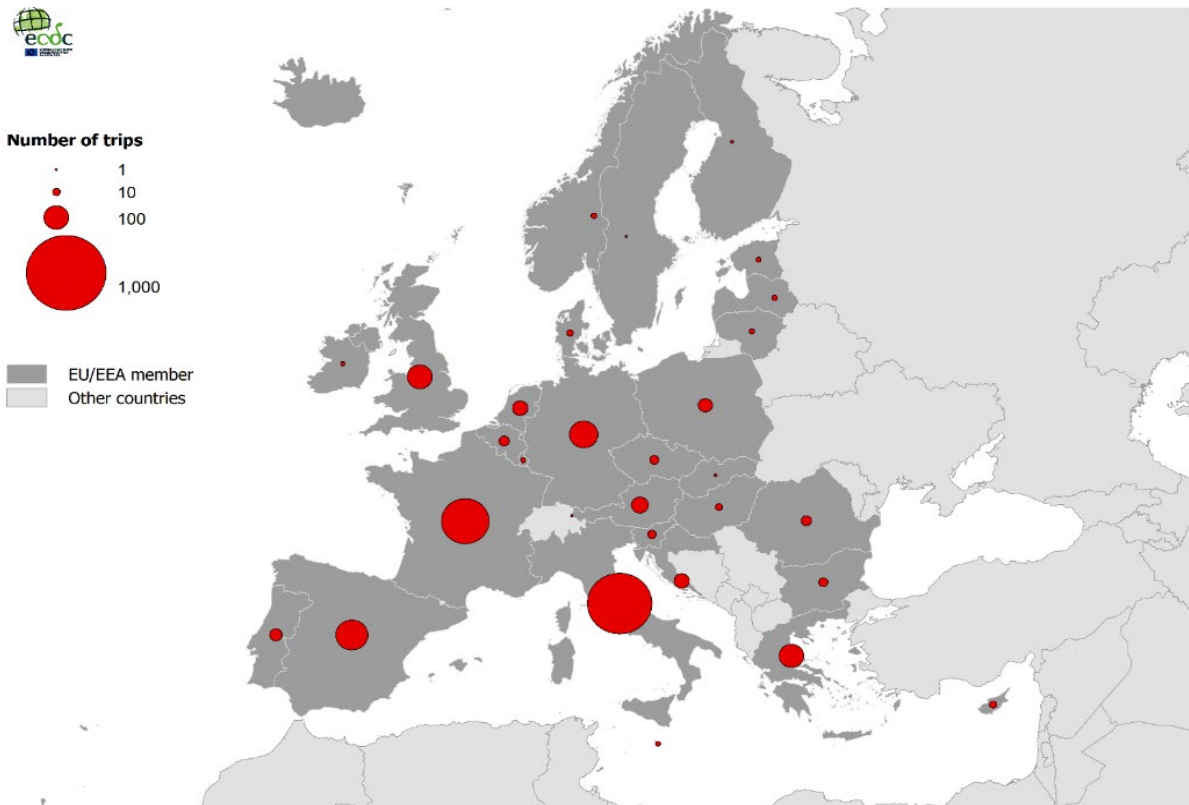
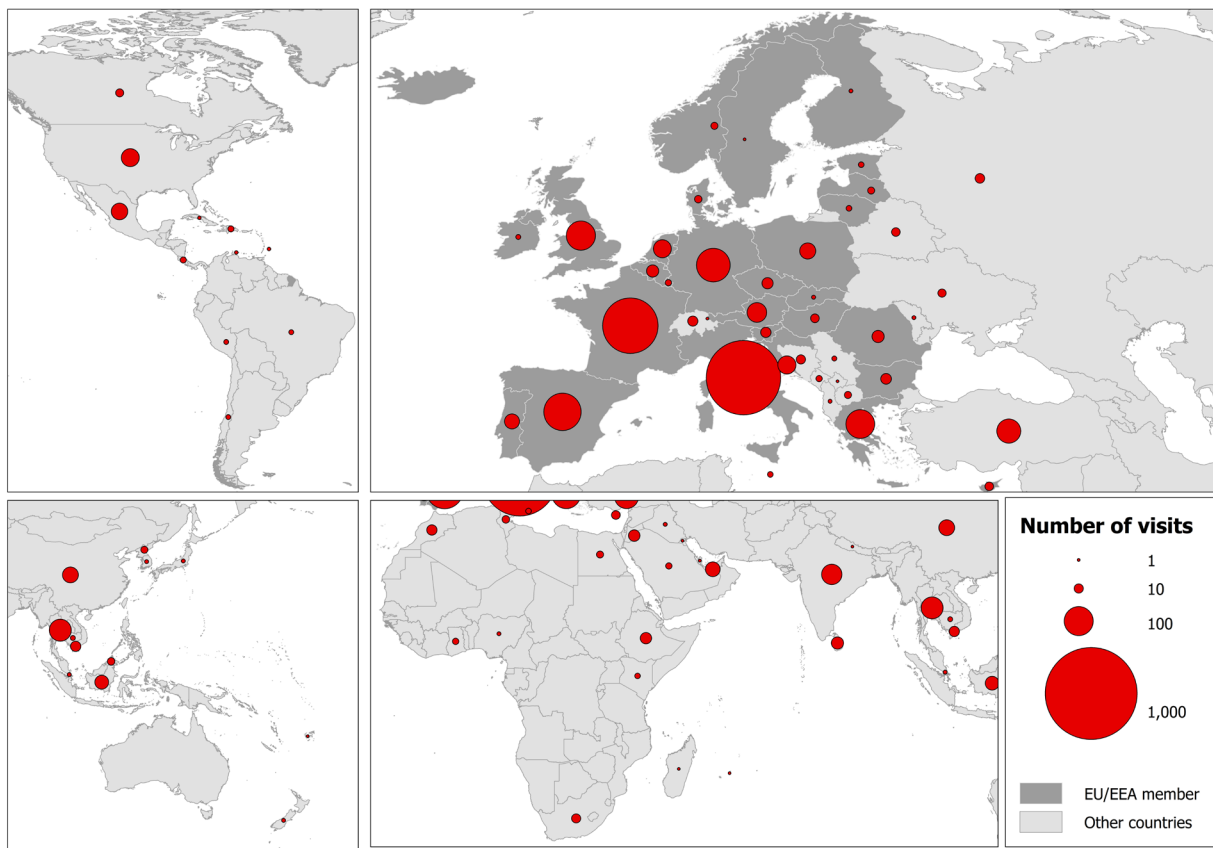


Figure 7. Distribution of accommodation site visits made by travel-associated Legionnaires' disease cases, by destination country, worldwide, 2018



Countries shown at different scales for visualization purposes

In 2018, ELDSNet detected 177 new TALD clusters. A TALD cluster is categorised as two cases having visited the same accommodation site within a two-year period [4]. The clusters were associated with accommodation in 37 countries worldwide, and five clusters were associated with vessels. Of the 177 new clusters from 2018, 118 (67%) comprised of only two cases at the time of reporting through ELDSNet by 31 December 2019. ELDSNet shared 65 summary reports of type 1 (non-EU/EEA clusters) with tour operators and 34 of type 2 (rapidly evolving clusters - i.e. three or more cases associated within three months).

For all 177 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. In 2018, the names of 14 accommodation sites were published on ECDC's website (Italy 10, France 2, Czech Republic 1, Slovakia 1) because assessment reports stated that recommendations from the competent authorities had not been implemented satisfactorily.

Outbreaks

In 2018, through the annual outbreak reporting surveillance scheme, ten countries (Belgium, Croatia, France, Germany, Italy, Luxembourg, Portugal, Spain, Sweden and United Kingdom) reported a total of 32 community- or hospital-acquired outbreaks, ranging from one to eleven per reporting country. The number of cases per reported outbreak ranged from three to 53 confirmed cases. Six outbreaks were reported in association with hospitals and two in geriatric residences. Eighteen EU/EEA countries reported no outbreaks of Legionnaires' disease under 2018.

Discussion

In 2018, both the number and notification rate of Legionnaires' disease in the EU/EEA were the highest ever observed, continuing a rise observed since 2013, while also representing a further significant increase on the previous year. There were no large outbreaks that contributed to the high number of reported cases. The main characteristics of Legionnaires' disease cases reported in 2018 were similar to those reported in previous years, 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, which probably represents an underestimation of the incidence in these countries.

The cause of the continuing increase in notified cases observed in 2018, as in 2017, remains unknown. However contributing factors probably include surveillance systems; an ageing EU/EEA population and increasing travel trends; design and maintenance in building infrastructures and 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 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 there is no indication of decreasing burden.

There have been sharp increases in the overall EU/EEA notification rates in recent years, but variation in incidence across EU/EEA countries remains, probably reflecting under-diagnosis of this disease in many Member States. A priority continues to be the provision of assistance to those countries with very low notification rates to improve both the diagnosis and reporting of Legionnaires' disease to public health authorities.

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

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 populations at higher risk may be exposed.

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