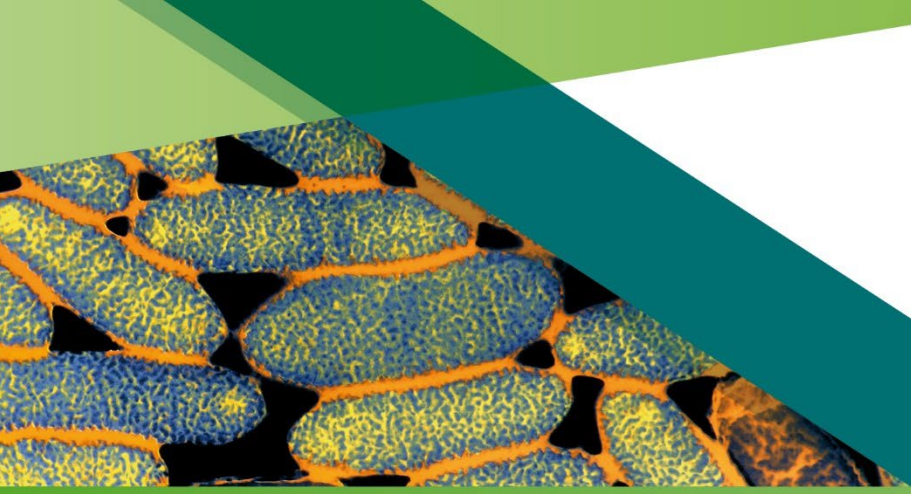


SURVEILLANCE AND MONITORING

Legionnaires' disease

Annual Epidemiological Report for 2022

Key facts

- In 2022, the notification rate of Legionnaires' disease steadily increased to 2.6 per 100 000 population from the two previous years (2.4 in 2021 and 1.9 in 2020).
- Notification rates remained heterogenous across the European Union/European Economic Area (EU/EEA), varying from less than 0.5 per 100 000 population to the highest rate of 6.1 cases per 100 000 population reported by Slovenia. Four countries (France, Germany, Italy, and Spain) accounted for 73% of all notified cases.
- Most cases occurred between June and October, with a later peak in September and higher than average cases seen in December.
- The median age of cases increased from 64 years in 2018 to 67 years in 2022. Males aged 65 years and above were most affected (7.1 cases per 100 000 population vs 2.8 in females).
- The number of reported cases to the travel-associated surveillance scheme were 48% more in 2022 compared with 2021.
- Five countries reported a total of 33 community- or hospital-acquired outbreaks with a total of 205 cases.

Introduction

Legionnaires' disease is a multi-system disease that causes pneumonia due to an infection with *Legionella* bacteria, most commonly of the species *Legionella pneumophila*. The bacteria are found in the natural environment, soil and water. They can become a health risk when they become aerosolised into inhalable fine mists, usually through engineered water systems. Cooling towers, evaporative condensers, humidifiers, decorative fountains, hot tubs, and showers are examples of water systems with identified *Legionella* risks. Conditions that are favourable for *Legionella* growth are water temperatures in the range of 25–42 °C, stagnant water with sediment build-up, and low biocide levels. The aerosolisation of the bacteria-contaminated water may cause sporadic cases or outbreaks.

Methods

This report is based on data for 2022 retrieved from The European Surveillance System (TESSy) on 14 October 2024 for travel-associated Legionnaires' disease (TALD) and 20 December 2024 for the annual data and outbreak reporting scheme. TESSy is a surveillance 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].

Suggested citation: European Centre for Disease Prevention and Control. Legionnaires' disease. In: ECDC. Annual Epidemiological Report for 2022. Stockholm: ECDC; 2026.

Stockholm, January 2026

The surveillance data were collected through three different schemes:

- annual retrospective data collection of all Legionnaires' disease (LD) cases reported in EU countries, as well as in Iceland, Liechtenstein and Norway; time periods in results presented are based on reported date for statistics.
- annual retrospective data collection of outbreak events detected and reported in EU countries, as well as in Iceland, Liechtenstein and Norway. The following thresholds for reporting outbreaks are used:
  - i) ≥ five cases, if these are not exposed in same building, nor evidence of exposure to same aerosol-producing installation/device, nor microbiological evidence of linked cases;
  - ii) ≥ three cases, if these are exposed in the same building, or if evidence for exposure to same aerosol-producing installation/device, or if microbiological evidence of linked cases;
- near-real-time reporting of Legionnaires' disease cases with a travel stay at commercial accommodation sites (TALD) [4]. This scheme aims primarily at identifying clusters of cases associated to accommodation sites such as hotels or camping sites, that may otherwise not be detected at the national level, to facilitate timely investigation and preventive control measures. Time periods in results presented are based on reported case illness onset.

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

Epidemiology

In 2022, 30 countries reported 11 447 cases (Table 1), of which 10 555 (92%) were classified as confirmed. The number of notifications per 100 000 population has steadily increased to 2.6 from the two previous years (2.4 in 2021 and 1.9 in 2020). Four countries – Italy, Spain, France, and Germany – continued to account for most notified cases (73%), although their combined populations only represented approximately 50% of the EU/EEA population.

Table 1. Legionnaires' disease cases and rates per 100 000 population by country and year, EU/EEA, 2018–2022

Country	2019		2020		2021		2022		
	Number	Rate	Number	Rate	Number	Rate	Number	Rate	ASR
Austria	255	2.9	249	2.8	278	3.1	305	3.4	3.0
Belgium	224	2.0	143	1.2	274	2.4	268	2.3	2.1
Bulgaria	5	0.1	7	0.1	1	<0.1	3	0.0	<1
Croatia	NDR	NRC	NDR	NRC	NDR	NRC	NDR	NRC	NRC
Cyprus	4	0.5	3	0.3	4	0.4	3	0.3	0.3
Czechia	277	2.6	231	2.2	219	2.1	296	2.8	2.4
Denmark	269	4.6	278	4.8	281	4.8	287	4.9	4.2
Estonia	12	0.9	18	1.4	10	0.8	14	1.1	1.0
Finland	44	0.8	24	0.4	34	0.6	43	0.8	0.7
France	1 816	2.7	1 328	2.0	2 039	3.0	1 863	2.7	2.5
Germany	1 554	1.9	1 270	1.5	1 530	1.8	1 456	1.7	1.5
Greece	45	0.4	29	0.3	25	0.2	48	0.5	0.4
Hungary	113	1.2	101	1.0	85	0.9	86	0.9	0.8
Iceland	4	1.1	4	1.1	10	2.7	2	0.5	0.6
Ireland	21	0.4	12	0.2	4	0.1	23	0.5	0.5
Italy	3 205	5.4	2 120	3.6	2 726	4.6	3 106	5.3	4.0
Latvia	42	2.2	27	1.4	61	3.2	66	3.5	3.2
Liechtenstein	NDR	NRC	NDR	NRC	2	5.1	1	2.5	2.1
Lithuania	17	0.6	12	0.4	4	0.1	21	0.7	0.7
Luxembourg	14	2.3	10	1.6	17	2.7	12	1.9	1.9
Malta	5	1.0	16	3.1	8	1.6	9	1.7	1.6
Netherlands	566	3.3	461	2.6	658	3.8	623	3.5	3.1
Norway	65	1.2	39	0.7	43	0.8	70	1.3	1.2
Poland	74	0.2	46	0.1	46	0.1	109	0.3	0.3
Portugal	201	2.0	307	3.0	254	2.5	245	2.4	2.0
Romania	19	0.1	8	<0.1	8	<0.1	32	0.2	0.2
Slovakia	85	1.6	98	1.8	148	2.7	131	2.4	2.3
Slovenia	196	9.4	120	5.7	88	4.2	143	6.8	6.0
Spain	1 542	3.3	1 336	2.8	1 703	3.6	1 966	4.1	3.5
Sweden	182	1.8	135	1.3	168	1.6	216	2.1	1.9
EU/EEA (30 countries)	**10 856**	**2.4**	**8 432**	**1.9**	**10 728**	**2.4**	**11 447**	**2.6**	**2.2**
United Kingdom	517	0.8	NDR	NRC	NA	NA	NA	NA	NA
EU/EEA (31 countries)	**11 373**	**2.2**	**8 432**	**1.9**	**NA**	**NA**	**NA**	**NA**	**NA**

Source: Country reports. ASR: Age-standardised rate. NDR: No data reported. NRC: No rate calculated. NA: Not applicable. No data for 2020 and 2021 were reported by the United Kingdom, due to its withdrawal from the EU on 31 January 2020.

Of 8 537 cases with known outcome, 801 (9.5%) were reported to have a fatal outcome.

Notification rates ranged from less than 1.0 cases per 100 000 population in 10 countries (Bulgaria, Cyprus, Finland, Greece, Hungary, Iceland, Ireland, Lithuania, Poland, and Romania) to 4.0 cases per 100 000 population or more in three countries (Denmark, Italy, and Slovenia); see Table 1 and Figure 1.

Figure 1. Legionnaires' disease cases per 100 000 population by country, EU/EEA, 2022

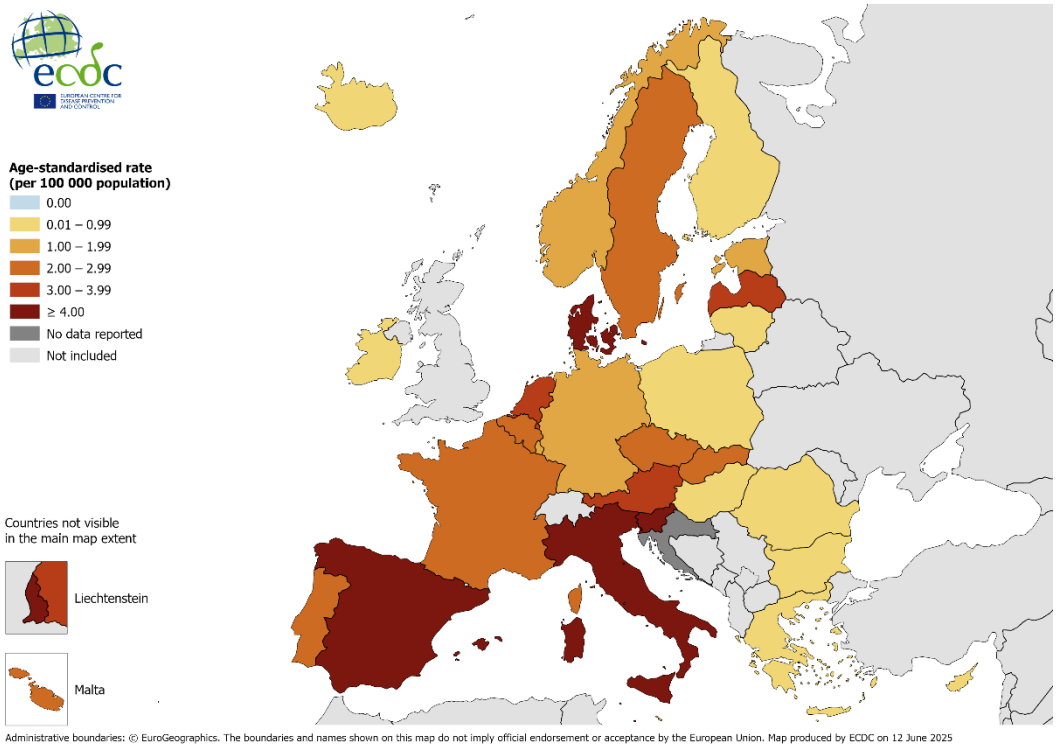
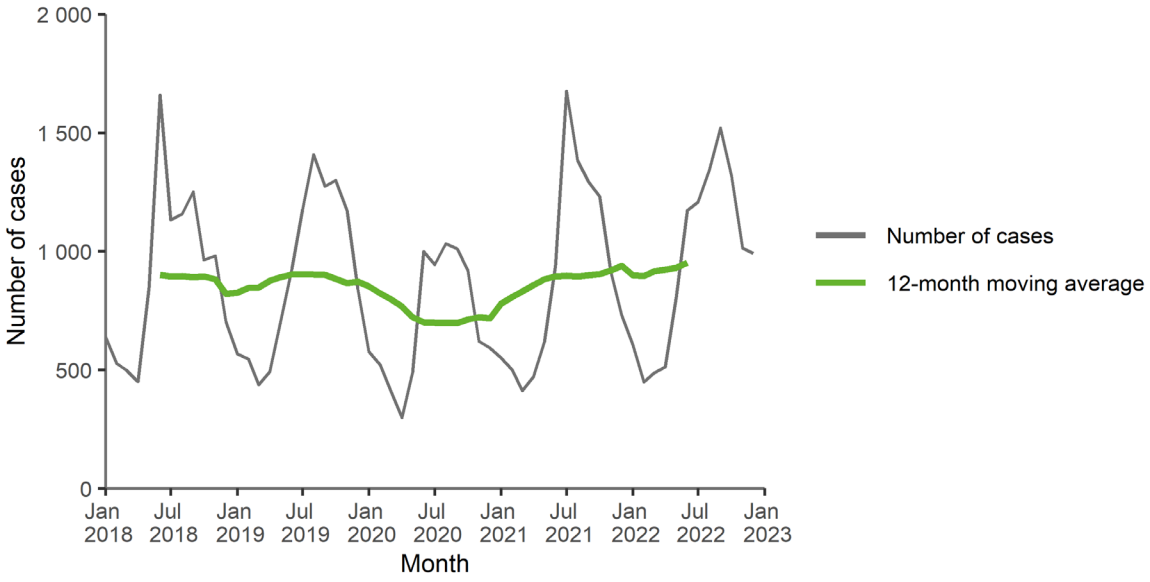


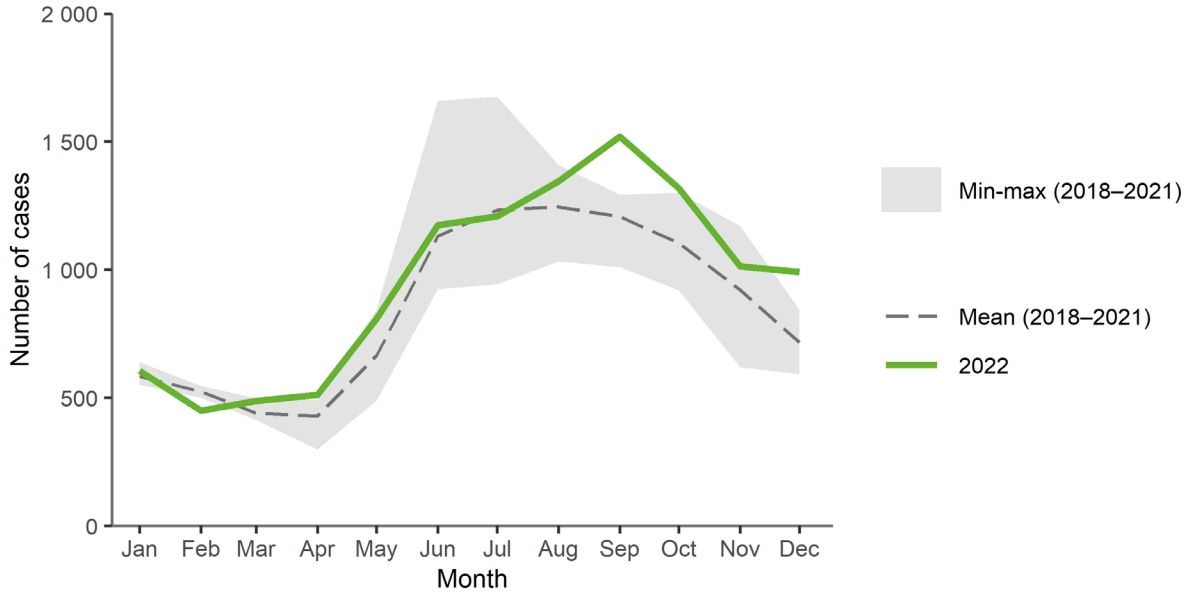
Figure 2. Legionnaires' disease cases by month, EU/EEA, 2018–2022



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

The distribution of cases per month (Figure 2) shows a seasonality trend, with most cases reported during the summer period in the EU/EEA. The majority of cases (6 574, 58%) occurred between June and October, as in previous years (Figure 3). The seasonal distribution in 2022 showed a peak in September (1 521 cases) that was above the minimum and maximum range observed in the previous four years (June 2018 with 1 671 cases and July 2021 with 1 676 cases). In 2022, the count in December (868 cases) was also above the average for the same month over the past five years (Figure 3).

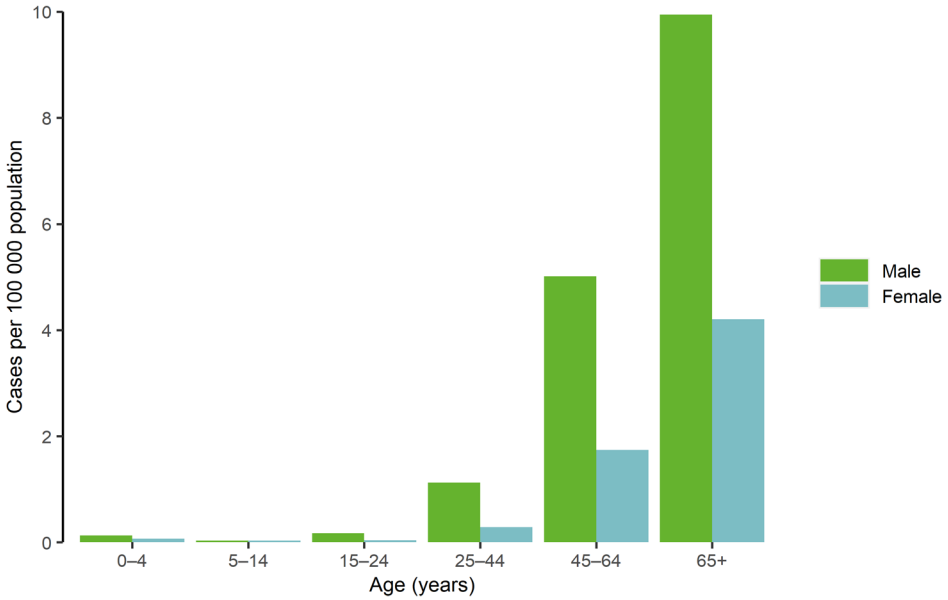
Figure 3. Legionnaires' disease cases by month, EU/EEA, 2022 and 2018–2021



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

In 2022, people aged 45 years and older accounted for 10 536 of 11 437 cases with known age (92%). The median age of cases has increased over the past five years from 64 years in 2018 to 67 years in 2022. The notification rate increased with age, from ≤0.1 cases per 100 000 population in those under 25 years of age to 6.7 cases per 100 000 population in persons aged 65 years and above (9.9 cases per 100 000 population in males and 4.2 in females, Figure 4). The overall male-to-female ratio remained unchanged compared to the previous 5 years and was 2.2:1.

Figure 4. Legionnaires' disease cases per 100 000 population, by age and gender, EU/EEA, 2022



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

More than one test method may be used to establish a Legionnaires' disease diagnosis. Most cases in 2022 (8 939; 81%) were reported as diagnosed with a urine antigen test (UAT). In comparison, few cases were reported having a culture test (1 182 cases; 10%) and polymerase chain reaction (PCR) method tests (405, 3.7%).

Among culture-confirmed cases (1 182) a total of 44 (4%) *Legionella* non-pneumophila species were reported: *L. anisa* (5), *L. bozemanii* (7), *L. dumoffii* (1), *L. longbeachae* (27), *L. micdadei* (4) and *Legionella* other species (11). Of the 1 182 cases, 13 were reported as Legionella species unknown. Table 2 further illustrates that although *Legionella pneumophila* isolates of all serogroups are detected and reported annually among culture-confirmed cases, over 80% are identified as serogroup 1.

Table 2. Distribution of serogroups reported among culture-confirmed cases of *L. pneumophila*, EU/EEA, 2021 and 2022

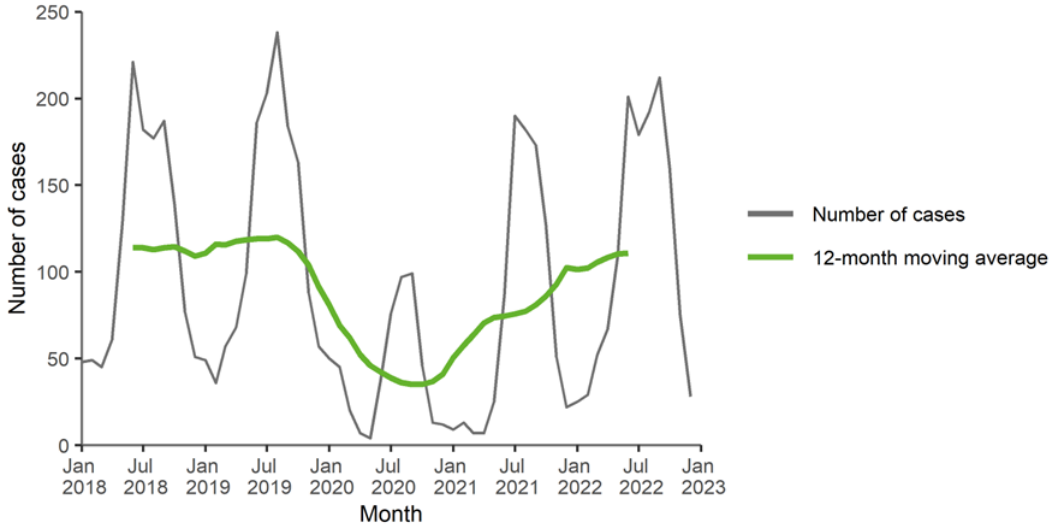
Serogroup (SG)	2021		2022	
	Number of cases	%	Number of cases	%
1	890	82	891	80
2	14	1	12	1
3	46	4	45	4
4	3	<1	6	<1
5	5	<1	4	<1
6	10	1	18	2
7	6	1	14	1
8	2	<1	4	<1
9	1	<1	1	<1
10	5	<1	6	<1
11	0	-	0	-
12	1	<1	0	-
13	1	<1	0	-
14	1	<1	1	<1
15	0	-	1	<1
16	0	-	0	-
Non-specified, *L. pneumophila* non-serogroup 1	6	1	8	<1
L. pneumophila serogroup mixed	3	<1	0	-
L. pneumophila serogroup unknown	93	9	101	9
Total	**1 087**		**1 112**	

Travel-associated Legionnaires' disease (TALD)

TALD case reports

The European Legionnaires' Disease Surveillance Network (ELDSNet) received reports of 1 291 cases of TALD with date of onset in 2022, more than in 2021 (895 cases) (Figure 5) but similar to the number of cases observed in 2019 (1 369 cases). This increase in cases most likely reflects the pattern of increased travel following the lifting of travel restrictions which were implemented in response to the COVID-19 pandemic and a return to pre-pandemic patterns.

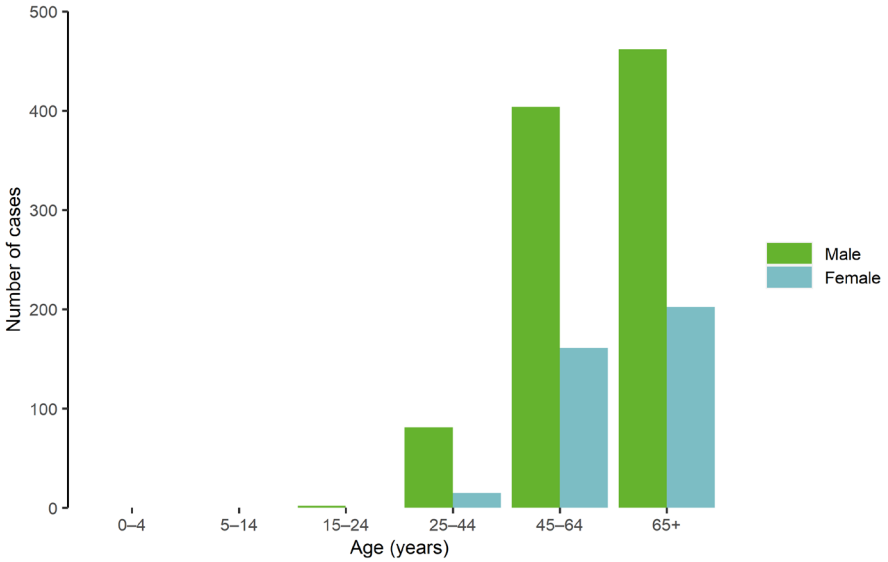
Figure 5. Travel-associated cases of Legionnaires' disease by month, EU/EEA, 2018–2022



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, Slovakia, Slovenia, Spain, and Sweden.

Cases were reported from 27 EU/EEA countries. The majority (73%; n=938) of all TALD cases were reported by four countries: Italy (342; 26%), Germany (239; 19%), France (212; 16%), and the Netherlands (145; 11%).

Figure 6. Travel-associated cases of Legionnaires' disease by age and gender, 2022



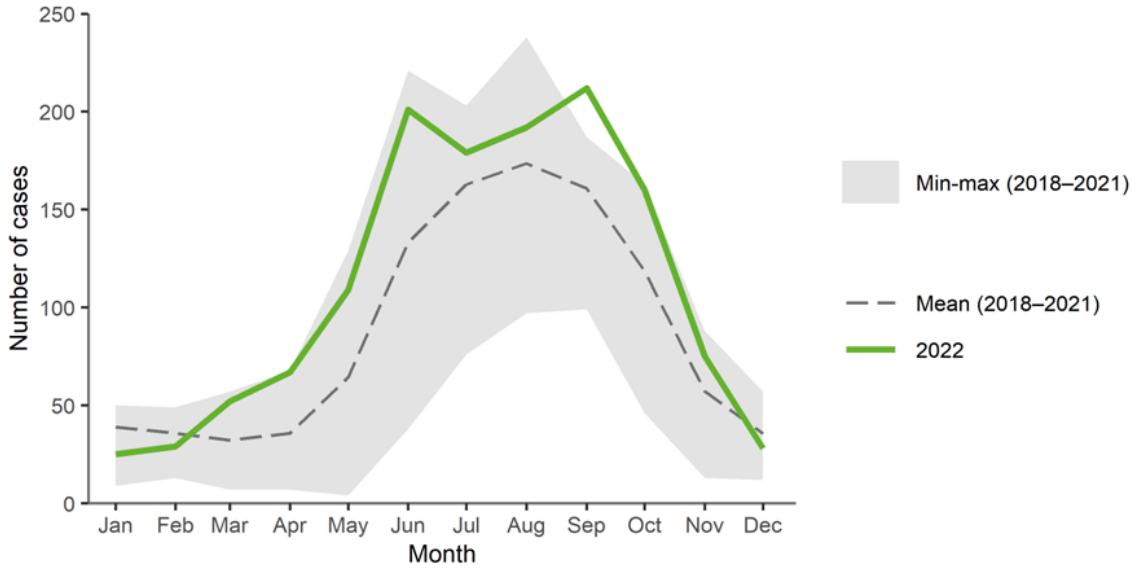
Source: Country reports from Austria, Belgium, Bulgaria, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, and Sweden.

A majority (72%; n=922) of reported TALD cases were male, which is consistent with previous years (68% in 2021, 76% in 2020 and 70% in 2019) and that observed for all reported Legionnaires' disease cases. Cases had a median age of 65 years (IQR 18, range 15–97); 93% of cases occurred in people 45 years and older and no reports were made in people under the age of 15 years (Figure 6).

The median reporting time among countries (from date of illness onset to reporting to ELDSNet) was 17 days (IQR: 20 days) similar to 2021 (18 days (IQR: 23).

In 2022, more than three quarters (n=1 027; 80%) of TALD cases fell ill between May and October, which is consistent with the known seasonality of Legionnaires' disease in Europe with the European summer. There were double peaks during the year with a first peak in June and a second peak in September (Figure 7).

Figure 7. Travel-associated cases of Legionnaires' disease by month, EU/EEA, 2022 and 2018–2021



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, Slovakia, Slovenia, Spain, and Sweden.

The disease outcome was provided for 495 (38%) TALD cases, with seven (1.4%) known to have deceased by the time of reporting to ELDSNet. A total of 1 206 TALD cases (93%) were classified as confirmed; 85 (7%) were probable cases. More than one test method may be used to establish a Legionnaires' disease diagnosis. Of the 1 360 tests reported for the 1 206 confirmed TALD cases, 88% of tests were UAT, 14% were PCR tests, 10% were culture, and less than one percent were serological tests.

Among cases with reported information on pathogen type (n=1 239), the majority were identified as *Legionella pneumophila* serogroup 1 (n=1 117; 90%), followed by *L. pneumophila* serogroup unknown (n=111; 9%). Few cases were infected with other *Legionella pneumophila* serogroups including serogroup 10 (two cases), serogroup 3 (one case), serogroup 5 (one case), serogroup 6 (one case), serogroup 8 (one case), and non-serogroup 1 *Legionella pneumophila* (three cases).

TALD case travel destinations

The 1 206 TALD cases had made a total of 1 799 accommodation visits. Of these, 1 494 (83%) were within the EU/EEA, 283 (16%) were outside the EU/EEA, and 22 (1.2%) were on ships. The three destination countries with most TALD-associated travel visits were Italy (n=668, 37%), France (n=240, 13%), and Spain (n=148, 8%). By accommodation type, 81 percent of the overnight stays were in hotels, 7% were in campsites, 7% were in commercial rentals, 1% on ships, 2% through online short rentals and 1% were reported as other types of accommodation.

In 2022, ELDSNet detected 149 new TALD clusters. A TALD cluster is the event of two cases having visited the same accommodation site within a two-year period [4]. The clusters were associated with accommodations in 20 countries worldwide (12 within the EU/EEA and 8 outside the EU/EEA).

Outbreaks

In 2022, through the annual outbreak reporting surveillance scheme, five EU/EEA countries (Belgium, France, the Netherlands, Portugal, and Spain) reported at least one outbreak, and 18 countries did not detect any outbreak (Austria, Denmark, Finland, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Norway, Romania, Slovakia, and Sweden). Seven countries did not report data. The five countries reporting outbreaks identified a total of 33 community- or hospital-acquired outbreaks, ranging from one to 22 outbreaks per reporting country. In total, 205 outbreak-related confirmed cases were reported, and the number of cases per reported outbreak ranged from three to 22 confirmed cases.

Three outbreaks were reported associated with a swimming pool or spa and two were reported in association with a wastewater treatment plant. In addition, a dental clinic, a geriatric residence, and a hospital were reported as outbreak sites. A source was reported found in 15% of the reported outbreaks (5/33).

Discussion

The notification rate of Legionnaires' disease in 2022 (2.6 per 100 000 population) was one of the highest rates reported in the last decade. Rates increased from 2017 onwards [5] but only decreased slightly during the COVID-19 pandemic compared to other respiratory infectious diseases.

The cause for the higher notification rates observed in Europe in recent years remains unknown. Factors affecting this include changes in national testing policy and surveillance systems, an ageing EU/EEA population, the design and infrastructure maintenance in building water systems, and changes in climate and weather patterns across Europe and worldwide. All these factors can have an impact on both the ecology of *Legionella* in the environment and causes of exposure to water aerosols containing the bacteria.

Many of the characteristics of Legionnaires' disease cases reported in 2022 were consistent with previous years, with most cases being sporadic and from sources in the built environment (community-acquired). Moreover, the disease still mostly affects males aged 65 years and above. As in previous years, four countries accounted for most Legionnaires' disease cases in EU/EEA (Italy, Germany, France, and Spain). The median age of cases has increased gradually over the past 10 years, from 62 to 67 years in 2022. Slight seasonal differences were observed in 2022, with peaks in the months of September and December that were marginally above the average for the same months over the past five years. TALD cases were consistent with the patterns for LD, with a majority of TALD cases being male, and the median age 65 years.

Several countries continue to have very low notification rates, below 0.5 cases per 100 000 population, which probably represents an underestimation of the incidence in these countries. It is also likely that in several countries there is an underestimation of the burden of disease caused by *Legionella* species other than by *Legionella pneumophila,* as only 10% of cases are reported with a culture-confirmed diagnosis. Among the many serogroups, the majority are reported as serogroup 1, which may possibly be because urinary antigen testing is the most reported pathogen detection method for *Legionella* and predominantly detects serogroup 1.

Five EU/EEA countries reported Legionnaires' disease outbreaks in 2022, which was proportionally fewer than in previous years as approximately one third of countries reported at least one outbreak between 2016 and 2021. A source was found in only 15% of outbreaks which demonstrates the challenges both in identifying and controlling potential sources of *Legionella* bacteria in outbreak situations.

Public health implications

EU/EEA notification rates for Legionnaires' disease were already rising in the years prior to the pandemic, and this continued in 2022, reaching 2.6 cases per 100 000 population. This shows that Legionnaires' disease remains an important cause of morbidity and mortality in Europe. Although notification rates are increasing there remains uncertainty as to the true incidence of Legionnaires' disease in the EU/EEA.

Notification rates across the EU/EEA continue to be heterogeneous. The same four countries continue to report most cases, while over half of the EU/EEA countries report comparatively low notification rates. It is difficult to assess whether this reflects differences in population risk, disease prevention and control, or under-diagnosis of the disease. It therefore remains a priority to assist all EU/EEA countries in improving both the diagnosis and reporting of Legionnaires' disease to public health authorities. This also requires continued awareness raising among healthcare practitioners to consider Legionnaires' disease in differential diagnosis among pneumonia cases.

The year 2022 saw a later seasonal peak in September and a higher number of cases in December compared to preceding years (2018–2021). Further monitoring is therefore required to understand changes to the seasonal patterns of the disease and its associated risk factors, such as environmental and meteorological effects in the EU/EEA region.

Outbreaks of Legionnaires' disease of varying size and source continue to be identified and investigated by public health authorities in the EU/EEA countries. This and the relatively high mortality (around 10%) indicate that Legionnaires' disease remains a public health challenge across the region. Continued vigilance – including surveillance for the detection of clusters and outbreaks – is required to reduce the disease burden. There are considerable challenges for the rapid identification and control of environmental sources. Therefore, regular checks for the presence of Legionella bacteria and appropriate control measures applied to engineered water systems [6] are important for reducing the risk for Legionnaires' disease at tourist accommodation sites and in hospitals, long-term healthcare facilities or other settings where populations at higher risk may be exposed.

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