

Leptospirosis

Annual Epidemiological Report for 2021

Key facts

- In 2021, 1 246 cases of leptospirosis were reported in the EU/EEA, of which 837 were confirmed cases.
- The notification rate of confirmed cases in the EU/EEA was 0.20 cases per 100 000 population.
- The highest number of confirmed cases (308) was reported in France (0.46 cases per 100 000 population).
- After a substantial decline in notification rates from 2019 to 2020, cases again increased in 2021. This may be associated with changes in population behaviours and surveillance activities during the COVID-19 pandemic.
- The highest rates of confirmed cases were detected in 45–64-year-old males and 15–24-year-old females (0.44 and 0.14 cases per 100 000 population, respectively).

Introduction

Leptospirosis is a zoonotic disease caused by spirochaetes bacteria of the genus *Leptospira*, which live in the kidneys of their natural hosts. Animals can be both maintenance hosts (persistent carriers) and accidental hosts depending on the *Leptospira* serovars involved [1]. The most important maintenance hosts are small rodents like rats (for e.g. serovars of the serogroups Icterohaemorrhagiae and Ballum) and mice (for e.g. serogroup Ballum) which could transfer the infection to livestock, dogs, and humans. However, livestock and domestic animals are also known to be maintenance hosts for specific serovars, such as dairy cattle (for e.g. serovars hardjo, pomona and grippityphosa), pigs (for e.g. serovars pomona, tarassovi and bratislava), sheep (for e.g. serovars hardjo and pomona), and dogs (for e.g. serovar canicola) [1]. Although infected animals could be symptomatic, infected carrier animals could potentially remain symptom-free while shedding leptospires for an entire lifetime [2].

A warm and humid environment promotes the survival of leptospires in the environment. Therefore, wet tropical and subtropical regions are known to show a high prevalence of cases of human leptospirosis [3]. In addition, outbreaks have been associated with floods and hurricanes after heavy rainfall [4].

Humans are most likely infected through indirect contact with leptospires shed in the environment (e.g. freshwater ponds, rivers) during occupational (e.g. farmers, soldiers, miners, or sewer workers) or recreational (e.g. water sport, gardening) activities [1,3]. Leptospires can enter the human body through abrasions or skin cuts, via the conjunctiva, through inhalation or ingestion of contaminated aerosols or water, or (rarely) following an animal bite [5].

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The clinical presentation of human leptospirosis ranges from mild flu-like illness to severe disease affecting the kidneys, liver, brain, heart and/or lungs, which potentially leads to death [1,2]. Symptoms are dependent on certain unknown and known factors, of which immune status and causal serovar might be of importance [3]. Early acute disease is very non-specific including fever, myalgia, and headache. This makes it hard to distinguish from other diseases such as influenza, hepatitis, viral haemorrhagic fevers, or enteric disease, resulting in mis- or under-diagnosis. The latter, together with the sub-clinical nature of the disease in animals and technically-demanding laboratory tests to diagnose the disease, has led to a lack of awareness of leptospirosis [3].

Methods

This report is based on data for 2021 retrieved from The European Surveillance System (TESSy) on 9 October 2022. TESSy is a system for the collection, analysis, and dissemination of data on communicable diseases.

For a detailed description of the methods used to produce this report, please refer to the 'Methods' chapter of the online 'Introduction to the Annual Epidemiological Report' [6].

An overview of the national surveillance systems of leptospirosis is available online [7].

A subset of the data used for this report is available through ECDC's online 'Surveillance Atlas of Infectious Diseases' [8].

In 2021, leptospirosis data were reported by 28 EU/EEA countries. In Norway and Liechtenstein, leptospirosis is neither notifiable nor under surveillance. All the reporting countries had comprehensive surveillance systems. The notification of leptospirosis is mandatory in all the reporting countries except for France, where reporting is voluntary, and Belgium, where notification is based on another (not specified) system. No data were reported for 2020 to 2021 by the United Kingdom (UK) due to its withdrawal from the EU on 31 January 2020.

Fourteen countries used the latest EU case definition (2018), four used the previous case definition from 2012, six used the one from 2008, and four did not specify which case definition they used. All countries reported case-based data, except for Belgium and Bulgaria, which reported aggregated data.

Epidemiology

For 2021, 28 EU/EEA countries reported 1 246 cases of leptospirosis, of which 837 (67%) were classified as 'confirmed' (Table 1). The remaining 409 cases (33%) were reported as 'probable'. Six countries reported zero cases. France reported the highest number of total (706) and confirmed (308) cases, with a notification rate of 0.46 confirmed cases per 100 000 population. Other countries with a high number of reported cases were, Germany (n=165), the Netherlands (n=54), Spain (n=46), and Portugal (n=44). Together with France, these countries represented 82% of the reported cases. However, they only represent 50% of the total EU/EEA population.

The overall EU/EEA notification rate was 0.20 confirmed cases per 100 000 population. This rate fluctuated between 0.14 and 0.21 cases per 100 000 population in the period from 2017 to 2021, with the highest rate in 2019 and the lowest in 2020. There was no discernible geographical pattern in the distribution of confirmed cases of leptospirosis (Figure 1). Two countries (Estonia and Malta) had a notification rate above 0.50 confirmed cases per 100 000 population. The age-standardised notification rates did not differ substantially from the crude rates (Table 1).

In 2021, the proportion of travel-associated cases of leptospirosis was 7.3% among 531 confirmed cases with known information. This was a decrease compared to the pre-pandemic years from 2017 to 2019, when 23.5% of the cases (excluding the UK) were acquired outside the reporting country.

It must be noted that cases from the following EU/EEA outermost regions (ORs) are included in the total number of cases reported in the associated EU Member State: the Autonomous Region of the Azores (RAA; included for Portugal), the Autonomous Region of Madeira (RAM; included for Portugal), and the Canary Islands (included for Spain). Only for Portugal, cases are identified at the sub-national level allowing the analysis of data for the RAA and RAM separately. Of those two regions, only the cases registered in the RAA had a large impact on the total number of cases for Portugal. In 2021, Portugal reported 43 confirmed cases of which 11 (26%) were reported in the RAA. This is the lowest number of cases registered between 2017 and 2021 in this region (in absolute numbers and percentagewise of the total number of confirmed cases in Portugal). In the past five years, the highest number of cases in the RAA was reported in 2017 with 78 cases, which corresponded to 67% of the cases reported by Portugal (n=117). Cases from the French ORs were not included in the French national data.

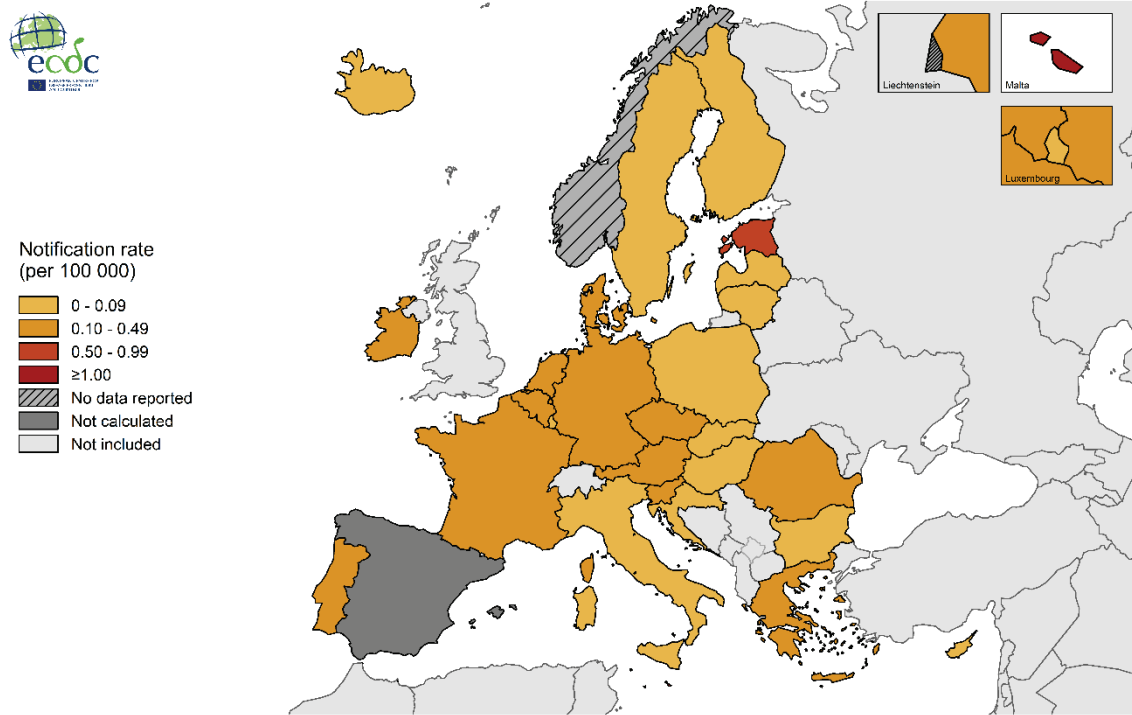
Overall, 90% of the 277 confirmed cases of leptospirosis in the EU/EEA with a known hospitalisation status, had a history of hospitalisation. Of these, five patients died due to the disease. Three other cases – out of 560 confirmed cases for which no information about their hospitalisation status was available – were additionally registered as deceased. This resulted in a case fatality rate of 1.8% among 439 cases with reported outcome.

Table 1. Number of confirmed cases of leptospirosis and rates per 100 000 population by country and year, EU/EEA, 2017–2021

Country	2017		2018		2019		2020		2021		
	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate	ASR
Austria	68	0.78	24	0.27	24	0.27	11	0.12	15	0.17	0.16
Belgium	17	0.15	20	0.18	18	0.16	11	0.10	33	0.29	0.29
Bulgaria	5	0.07	15	0.21	7	0.10	1	0.01	6	0.09	0.08
Croatia	24	0.58	7	0.17	22	0.54	4	0.10	0	0.00	0.00
Cyprus	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0.00
Czechia	21	0.20	10	0.09	24	0.23	27	0.25	30	0.28	0.29
Denmark	22	0.38	19	0.33	13	0.22	14	0.24	14	0.24	0.25
Estonia	5	0.38	6	0.45	5	0.38	10	0.75	8	0.60	0.64
Finland	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0.00
France	134	0.20	129	0.19	201	0.30	129	0.19	308	0.46	0.45
Germany	129	0.16	117	0.14	160	0.19	120	0.14	164	0.20	0.20
Greece	24	0.22	18	0.17	27	0.25	17	0.16	21	0.20	0.19
Hungary	14	0.14	19	0.19	14	0.14	3	0.03	2	0.02	0.02
Iceland	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0.00
Ireland	19	0.40	19	0.39	17	0.35	25	0.50	16	0.32	0.34
Italy	32	0.05	41	0.07	34	0.06	18	0.03	26	0.04	0.04
Latvia	8	0.41	4	0.21	4	0.21	3	0.16	1	0.05	0.05
Liechtenstein	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
Lithuania	16	0.56	3	0.11	0	0.00	0	0.00	1	0.04	0.04
Luxembourg	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0.00
Malta	2	0.43	2	0.42	4	0.81	0	0.00	6	1.16	1.13
Netherlands	77	0.45	45	0.26	111	0.64	60	0.34	54	0.31	0.30
Norway	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
Poland	2	0.01	7	0.02	4	0.01	1	0.00	2	0.01	0.01
Portugal	117	1.13	69	0.67	82	0.80	70	0.68	43	0.42	0.37
Romania	44	0.22	51	0.26	66	0.34	10	0.05	29	0.15	0.14
Slovakia	7	0.13	3	0.06	5	0.09	3	0.05	3	0.05	0.06
Slovenia	24	1.16	18	0.87	59	2.84	12	0.57	10	0.47	0.46
Spain	19	NRC	65	NRC	49	NRC	20	NRC	45	NRC	NRC
Sweden	4	0.04	3	0.03	7	0.07	0	0.00	0	0.00	0.00
United Kingdom	98	0.15	88	0.13	92	0.14	NDR	NDR	NDR	NDR	NDR
EU/EEA	932	0.20	802	0.16	1 049	0.21	569	0.14	837	0.20	0.20

Source: Country reports
ASR: Age-standardised rate
NDR: No data reported
NRC: No rate calculated

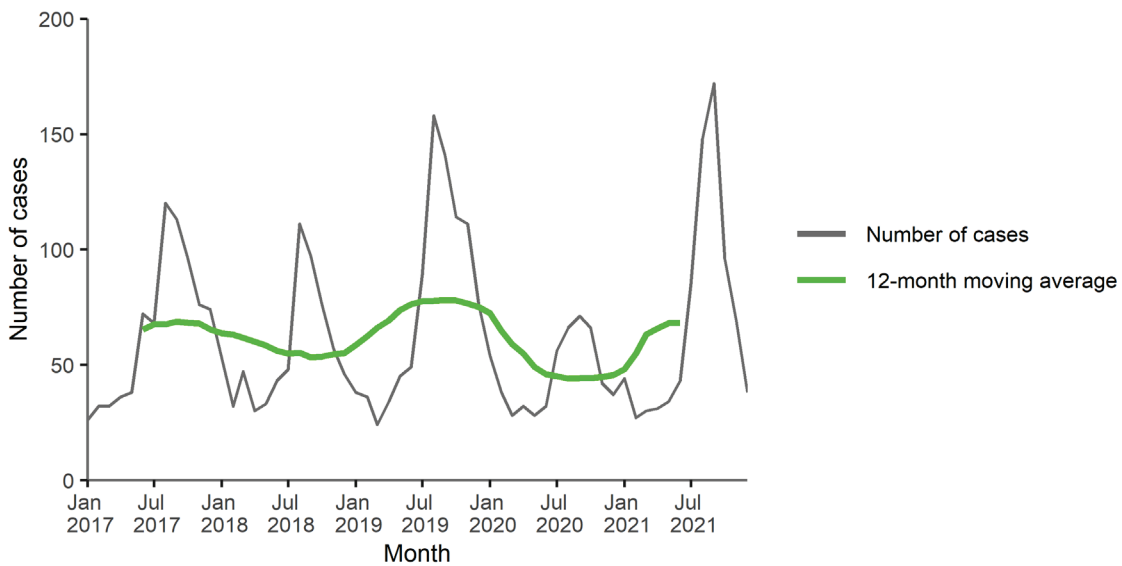
Figure 1. Number of confirmed cases of leptospirosis per 100 000 population by country, EU/EEA, 2021



Source: Country reports

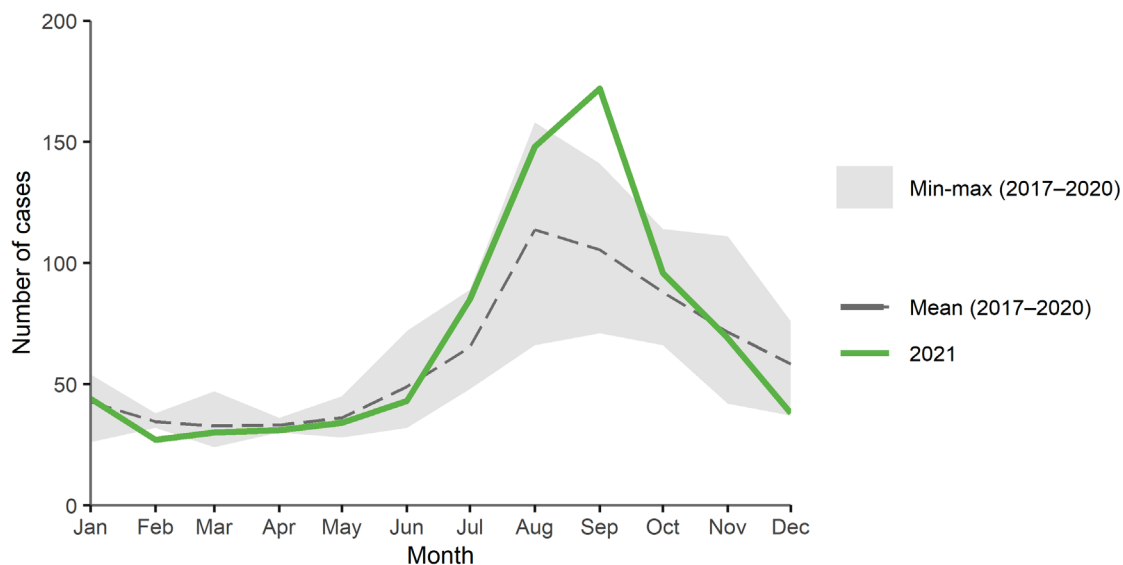
For 2021, the distribution of cases by month of reporting shows that most cases occurred between July and October, similar to previous years (Figure 2). However, the peak was much more pronounced compared to 2020, and was the highest in the last five years. In total, 510 confirmed cases (61%) were recorded between July and October 2021. The cases peaked in September (Figure 3).

Figure 2. Number of confirmed cases of leptospirosis by month, EU/EEA, 2017–2021



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

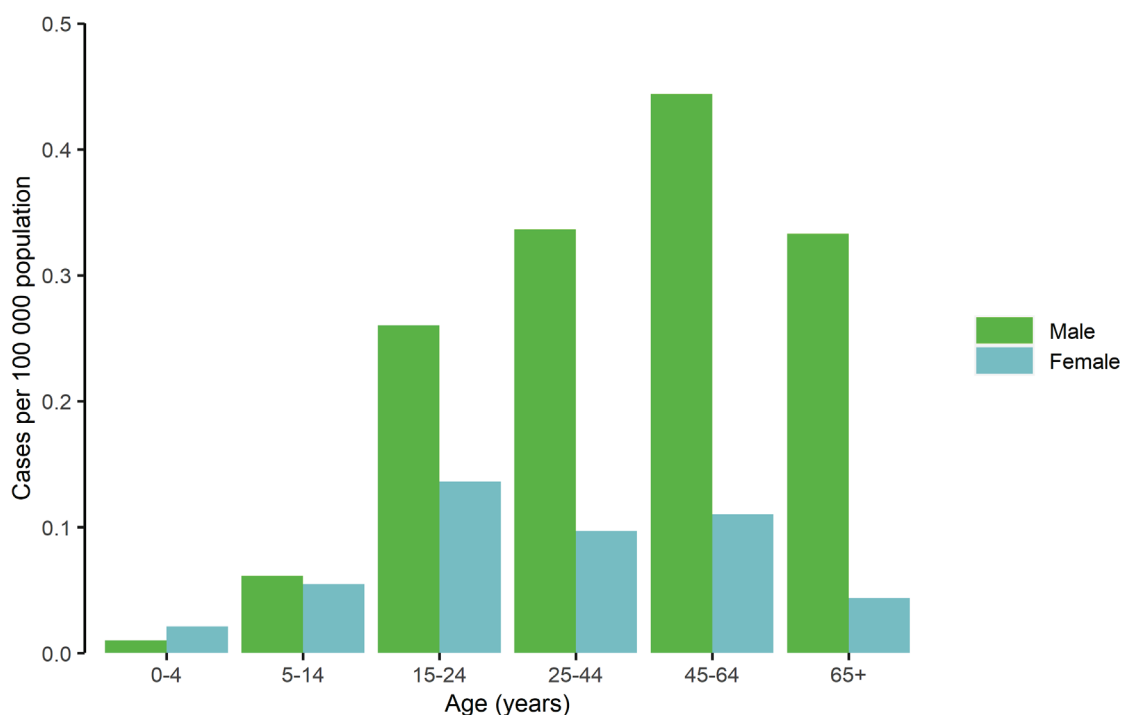
Figure 3. Number of confirmed cases of leptospirosis by month, EU/EEA, 2021 and 2017–2020



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

For 2021, people aged 25–64 years accounted for 565 (68%) out of the 837 confirmed cases with known age. Cases were mainly males, and the male-to-female ratio was 3.6:1. For males, the notification rate increased with age, peaking at 0.44 cases per 100 000 population in 45–64-year-old males, and then decreased in 65-year-old males (Figure 4). For females, the highest notification rate was 0.14 cases per 100 000 population in the age group of 15–24-year-old females.

Figure 4. Number of confirmed cases of leptospirosis per 100 000 population, by age and gender, EU/EEA, 2021



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

Outbreaks and other threats

In the summer of 2021, ECDC made a transition from the Epidemic Intelligence Information System for Food- and Waterborne Diseases and Zoonoses (EPIS-FWD) to the new European surveillance portal for infectious diseases (EpiPulse) system for the reporting of outbreaks/unusual events of food- or waterborne diseases. No national or multi-country leptospirosis outbreaks were reported through EpiPulse in 2021.

Discussion

Leptospirosis remains a relatively uncommon disease with low rates in EU/EEA countries. Most cases occur between July and October, a seasonality probably driven by a combination of environmental factors (e.g. rainfall and high temperatures) and human behaviours (e.g. outdoor activities) [9]. After a decrease of cases from 2019 to 2020, the notification rate went up again in 2021.

In the past years, domestic cases registered in the RAA (the Azores), largely impacted the total number of cases for Portugal. The RAA is considered an endemic area for leptospirosis. It has a subtropical climate and harbours a high density of rats, both favourable for the transmission of leptospirosis.¹ However, in 2021, fewer confirmed cases were registered at the RAA compared with the previous years. This might be resulting from, but not exclusively, the burden on regional resources because of the COVID-19 pandemic, including a lack of time for administrative notification.¹

In 2021, and as in previous years, most confirmed cases were males. This population may be more likely to engage in occupations or activities associated with an increased risk of leptospirosis, such as occupational work with exposure to rodents (e.g. sewer or field worker) or livestock, or water-based recreational activities [9].

The decline of cases of leptospirosis in 2020, followed by an increase in the number of cases in 2021, may be associated with the changes in population behaviours during the COVID-19 pandemic (e.g. less travel and more limited or impaired surveillance activities during the first year of the pandemic). An analysis of surveillance data from the United States (US) found a 40% decrease in reported cases among food- and waterborne diseases between 2019 and 2020 [10].

Public health implications

Prevention of leptospirosis needs to take into account its complex and dynamic epidemiology, including environmental aspects (e.g. climate), the presence of carriers (e.g. rodents), and human behaviours [3].

Prevention of human leptospirosis starts by avoiding the penetration of the leptospires into the accidental host (i.e. by wearing protective clothes and improving food and water storage) and by reducing the sources of infection [3]. The latter can be achieved by rodent control and herd control measures like treatment and/or vaccination of carrier animals. However, both the measures can be very intensive and might also require an integrated One Health approach to identify potential leptospirosis sources. In addition, increasing awareness about the disease and the risks of infection for clinicians, the population (especially for risk groups), and public health decision-makers is considered an effective approach to reduce human leptospirosis [3].

At the individual-patient level, early diagnosis and adequate treatment of cases of leptospirosis have been shown to decrease both morbidity and mortality [3]. This also underlines the importance of awareness among clinicians of a possible leptospirosis infection.

¹ João Vieira Martins, MD, Direção-Geral da Saúde (DGS), Lisbon, Portugal (personal communication by email, June 2023).

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