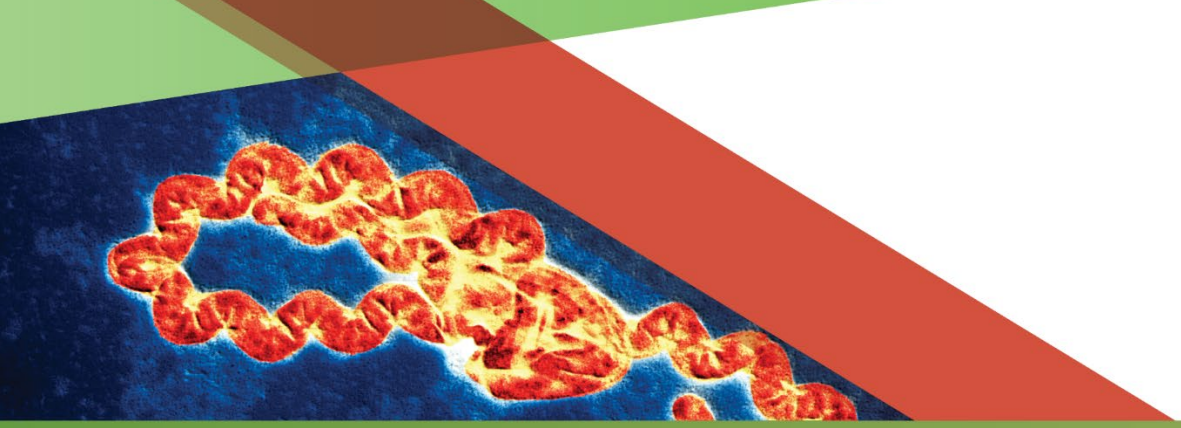

SURVEILLANCE REPORT

Leptospirosis

Annual Epidemiological Report for 2022

Key facts

- In 2022, 765 confirmed cases of leptospirosis were reported in the EU/EEA.
- The notification rate of confirmed cases in the EU/EEA was 0.18 cases per 100 000 population.
- The highest number of cases (596) and confirmed cases (245) was reported in France (0.36 cases per 100 000 population).
- A higher notification rate was reported in the EU/EEA in 2022 than during the first year of the COVID-19 pandemic (2020) when the number of cases declined.
- The highest rates of confirmed cases were reported in 45–64-year-old males and 15–24-year-old females (0.37 and 0.17 cases per 100 000 population, respectively). Cases were three times more common in males for all age groups.

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. The most frequent maintenance hosts are small rodents such as rats and mice, which can transfer the infection to livestock, dogs and humans. However, livestock and domestic animals, such as dairy cattle, pigs, sheep, and dogs, are also known to be maintenance hosts [1]. Although infected animals may be symptomatic, infected carrier animals can potentially remain symptom-free while shedding leptospires for an entire lifetime.

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

Humans are most probably infected through indirect contact with leptospires shed in the environment (e.g. freshwater ponds, rivers) during occupational activities (e.g. farmers, soldiers, miners, or sewer workers) or recreation (e.g. water sports, gardening). 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. 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 can potentially be fatal.

Methods

This report is based on data for 2022 retrieved from The European Surveillance System (TESSy) on 5 February 2024. 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' [2].

An overview of the national surveillance systems of leptospirosis is available online [3].

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Stockholm, June 2024

A subset of the data used for this report is available through ECDC's online 'Surveillance Atlas of Infectious Diseases' [4].

In 2022, 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 except for Spain. For 2020 and 2021, Spain has not received data from all regions and the case numbers for these years are therefore lower than could be expected. 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 (unspecified) system.

Fifteen countries used the latest EU case definition (2018), four used the previous case definition from 2012, five used the one from 2008, and three did not specify which case definition they used. France used the World Health Organization (WHO) case definition in which the presence of *Leptospira* immunoglobulins type M (IgM) in one serum sample would only meet the criteria for a probable case, which was then reported to TESSy with an unknown case classification. All countries reported case-based data, except for Belgium and Bulgaria, which reported aggregated data.

In addition to TESSy reporting, information from event-based surveillance for leptospirosis clusters or outbreaks with a potential EU dimension was collected through EpiPulse - the European surveillance portal for infectious diseases (europa.eu).

Epidemiology

For 2022, 28 EU/EEA countries reported data on leptospirosis. Among these, 22 countries reported 765 confirmed cases. Six countries reported zero cases (Table 1). France reported the highest number of confirmed cases (245; 41%), with a notification rate of 0.36 confirmed cases per 100 000 population. France also reported high number of cases with unknown case classification (351; 59%). Other countries with a high number of confirmed cases were Germany (153), the Netherlands (87), Portugal (65), Spain (50) and Romania (45). Together with France, these countries represented 78% of the reported confirmed cases. However, they only represent 54% of the total EU/EEA population.

The overall EU/EEA notification rate for 2022 was 0.18 confirmed cases per 100 000 population. This rate fluctuated between 0.14 and 0.23 cases per 100 000 population in the period from 2018 to 2022, 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 Portugal) had a notification rate above 0.50 confirmed cases per 100 000 population.

In 2022, the proportion of travel-associated cases of leptospirosis was 19% among 496 confirmed cases with information on travel. This was an increase compared to 2020–2021 (8%) but still lower than the pre-pandemic years (2018 to 2019) when 26% of the cases (excluding the UK) were acquired outside the reporting country.

It should be noted that cases from the following EU Outermost regions[1] are included in the total number of cases reported as domestically acquired in the relevant EU Member State: the Autonomous Region of the Azores and the Autonomous Region of Madeira (both included in count for Portugal), and the Canary Islands (included in count for Spain). Portugal reported the place of infection at sub-national level, allowing the analysis of data for Azores and Madeira separately: among the domestically acquired cases, 33 (62%) were infected in mainland Portugal, 13 (25%) were infected in the Azores and seven (13%) were infected in Madeira. No information on importation and place of infection was provided for the remaining 11 cases reported (17%). This was the second lowest number of reported cases registered between 2016 and 2022 in the Azores but the highest in Madeira (in absolute numbers and percentage terms for the total number of confirmed cases in Portugal). In the past five years, the highest number of cases in Azores was reported in 2017 (78 cases), which corresponded to 67% of the cases reported by Portugal (n=117). Cases from the French outermost regions were not included in the French national data and were not reported to TESSy.

Overall, 85% of the 322 confirmed cases of leptospirosis in the EU/EEA with a known hospitalisation status, had a history of hospitalisation. Of these, two patients died. One other case – out of 437 confirmed cases for which no information on hospitalisation status was available – was additionally registered as deceased. This resulted in a case fatality rate of 0.7% among 462 cases with reported outcome.

[1] Outermost regions (ORs) | Fact Sheets on the European Union | European Parliament (europa.eu)

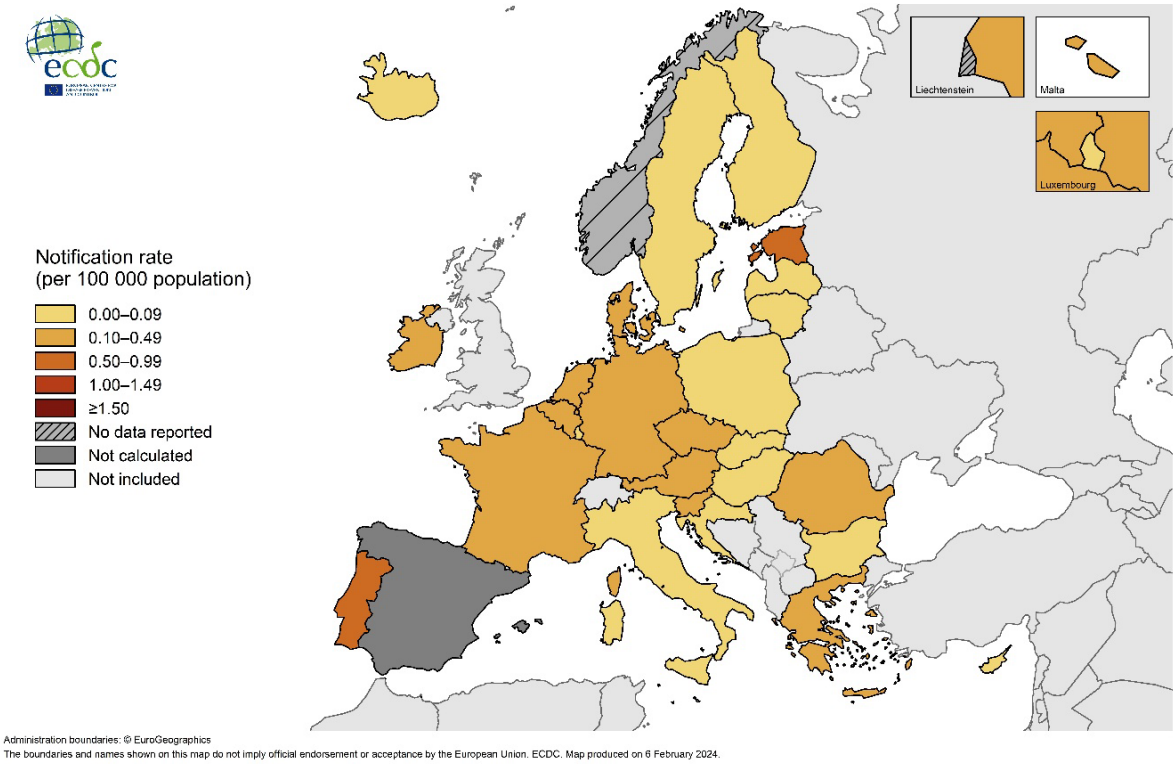
Table 1. Confirmed leptospirosis cases and rates per 100 000 population by country and year, EU/EEA, 2018–2022

Country	2018		2019		2020		2021		2022	
	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate
Austria	24	0.27	24	0.27	11	0.12	15	0.17	10	0.11
Belgium	20	0.18	18	0.16	11	0.10	33	0.29	13	0.11
Bulgaria	15	0.21	7	0.10	1	0.01	6	0.09	4	0.06
Croatia	7	0.17	22	0.54	4	0.10	0	0.00	1	0.03
Cyprus	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Czechia	10	0.09	24	0.23	27	0.25	30	0.28	19	0.18
Denmark	19	0.33	13	0.22	14	0.24	14	0.24	8	0.14
Estonia	6	0.45	5	0.38	10	0.75	8	0.60	9	0.68
Finland	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
France	129	0.19	201	0.30	129	0.19	308	0.46	245	0.36
Germany	117	0.14	160	0.19	120	0.14	164	0.20	153	0.18
Greece	18	0.17	27	0.25	17	0.16	21	0.20	14	0.13
Hungary	19	0.19	14	0.14	3	0.03	2	0.02	3	0.03
Iceland	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Ireland	19	0.39	17	0.35	25	0.50	16	0.32	13	0.26
Italy	41	0.07	34	0.06	18	0.03	26	0.04	8	0.01
Latvia	4	0.21	4	0.21	3	0.16	1	0.05	0	0.00
Liechtenstein	NDR	NRC	NDR	NRC	NDR	NRC	NDR	NRC	NDR	NRC
Lithuania	3	0.11	0	0.00	0	0.00	1	0.04	0	0.00
Luxembourg	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Malta	2	0.42	4	0.81	0	0.00	6	1.16	2	0.38
Netherlands	45	0.26	111	0.64	60	0.34	54	0.31	87	0.49
Norway	NDR	NRC	NDR	NRC	NDR	NRC	NDR	NRC	NDR	NRC
Poland	7	0.02	4	0.01	1	0.00	2	0.01	6	0.02
Portugal	69	0.67	82	0.80	70	0.68	43	0.42	65	0.63
Romania	51	0.26	66	0.34	10	0.05	29	0.15	45	0.24
Slovakia	3	0.06	5	0.09	3	0.05	3	0.05	1	0.02
Slovenia	18	0.87	59	2.84	12	0.57	10	0.47	7	0.33
Spain	65	NRC	49	NRC	20	NRC	45	NRC	50	NRC
Sweden	3	0.03	7	0.07	0	0.00	0	0.00	2	0.02
EU/EEA (30 countries)	**714**	**0.16**	**957**	**0.23**	**569**	**0.14**	**837**	**0.20**	**765**	**0.18**
United Kingdom	88	0.13	92	0.14	NDR	NRC	NA	NA	NA	NA
EU/EEA (31 countries)	**802**	**0.16**	**1 049**	**0.21**	**569**	**0.14**	**NA**	**NA**	**NA**	**NA**

Source: Country reports.

NDR: No data reported.
NRC: No rate calculated.
NA: Not applicable.
From 2020 onwards no data were reported by the United Kingdom, due to its withdrawal from the EU on 31 January 2020.

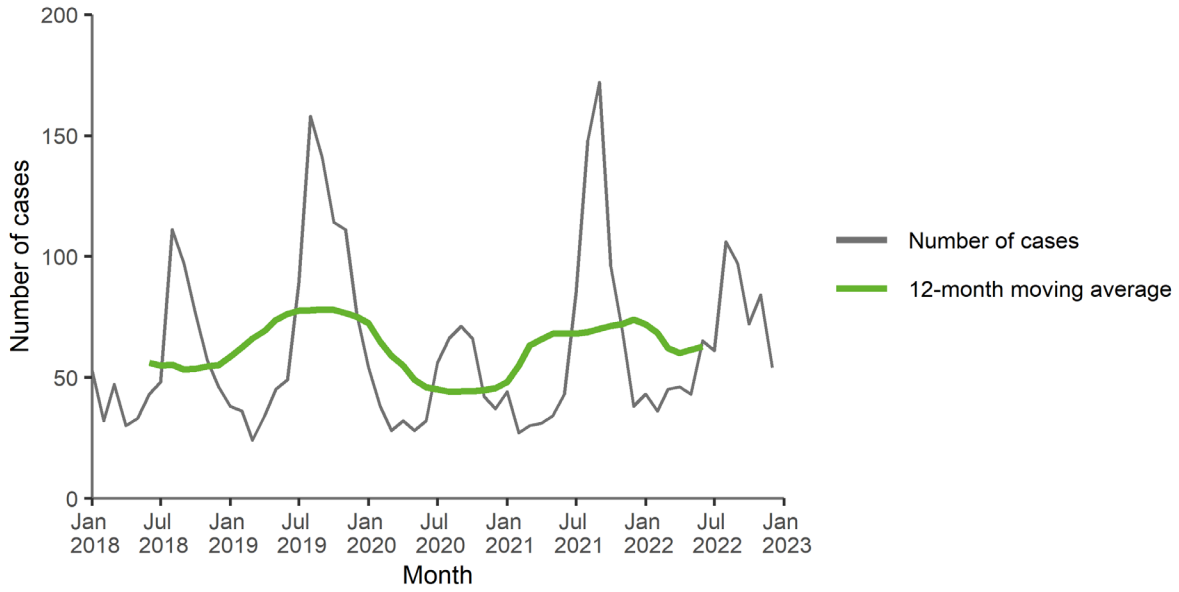
Figure 1. Number of confirmed cases of leptospirosis per 100 000 population by country, EU/EEA, 2022



Source: Country reports

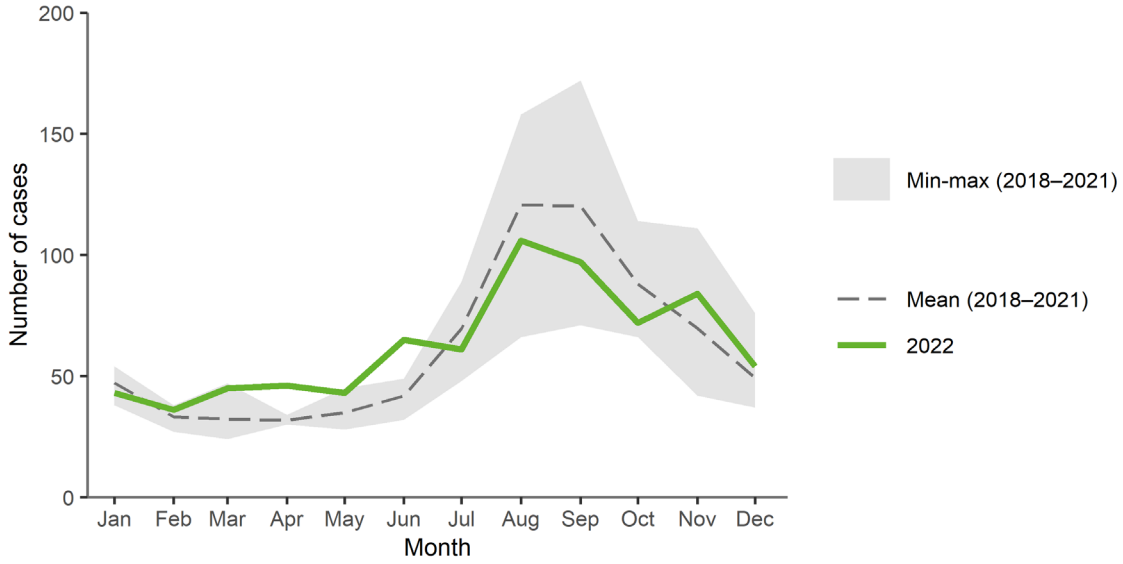
For 2022, the distribution of cases by month of reporting shows that most cases occurred between July and November, similar to previous years (Figure 2). In total, 544 confirmed cases (71%) were recorded during that time period. The cases peaked in August (Figure 3).

Figure 2. Confirmed leptospirosis cases by month, EU/EEA, 2018–2022



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.

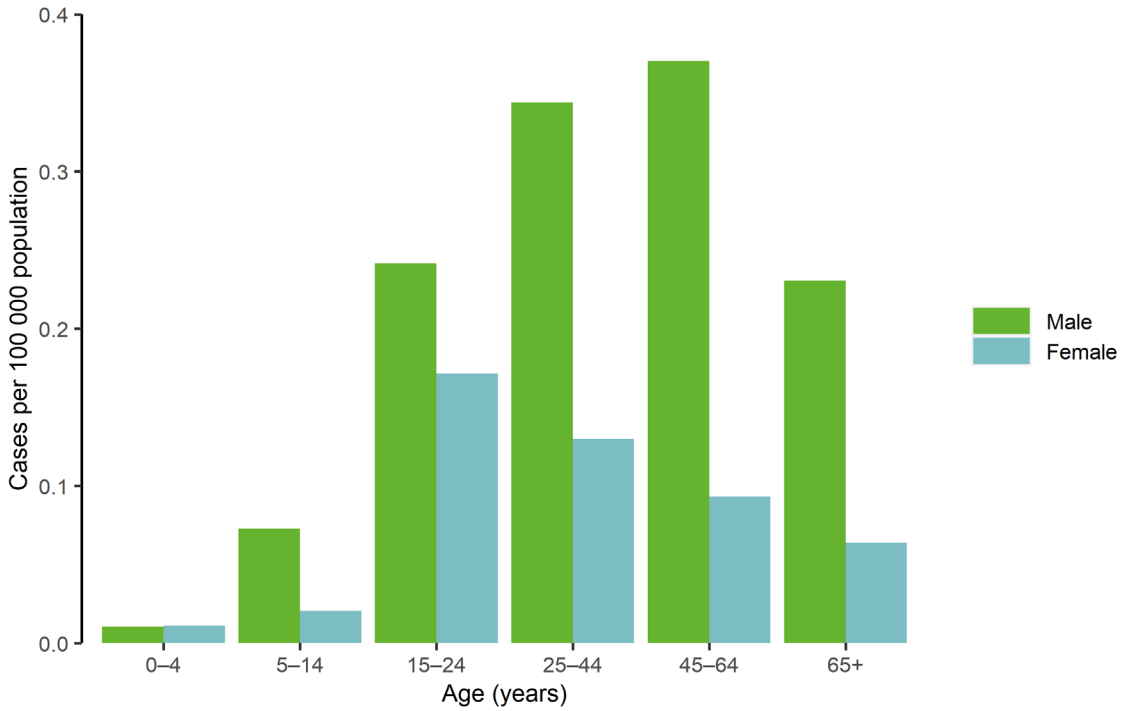
Figure 3. Confirmed leptospirosis cases by month, EU/EEA, 2022 and 2018–2021



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.

For 2022, people aged 25–64 years accounted for 519 (69%) of the 751 confirmed cases with known age. Cases were mainly males, and the male-to-female ratio was 3:1. For males, the notification rate increased with age, peaking at 0.37 cases per 100 000 population in 45–64-year-old males, and then decreasing in 65-year-old males (Figure 4). For females, the highest notification rate was 0.17 cases per 100 000 population in the 15–24-years age group.

Figure 4. Confirmed leptospirosis cases per 100 000 population, by age and gender, EU/EEA, 2022



Source: Country reports from Austria, Bulgaria, Croatia, Cyprus, Czechia, 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

No national or multi-country leptospirosis outbreaks were reported in EpiPulse in 2022.

Discussion

Leptospirosis remains a relatively uncommon disease with low rates in EU/EEA countries. Most cases occur between July and November, probably driven by a combination of environmental factors (e.g. rainfall and high temperatures) and human behaviour (e.g. outdoor activities) [5]. After a decrease of cases in 2020, most probably due to the COVID-19 pandemic, the notification rate increased again in 2021−2022. This may be associated with the changes in population behaviour after the pandemic (e.g. increase in travel and seeking medical help for milder symptoms). The reduction of cases in 2020 did not substantially change the overall increasing EU/EEA trend observed in 2010−2021, which was mainly driven by France and Germany [6].

As in previous years, France reported the highest number of confirmed and total number of leptospirosis cases in the EU/EEA in 2022. Cases have been steadily increasing over the last decade [4]. Several possible reasons for the rise in cases include growth of the *Leptospira* reservoir due to increasing numbers of rats and other mammals, including dogs, and the favourable effects of climate warming and increased rainfall on bacterial proliferation [7]. Further possible reasons might be increased opportunities for contamination during recreational or professional activities, such as freshwater sports where several outbreaks have been reported. Furthermore, introduction of more sensitive diagnostic tools such as PCR and serological methods may have increased the detection of cases [8]. In Germany, the annual notification rate has consistently increased from 0.08 to 0.2 cases per 100 000 population since 2007 when EU/EEA-level surveillance for leptospirosis began [4]. In a recent 20-year retrospective study in the Northern Germany, spending leisure time in the forest and contact with water and soil were the major factors connected to leptospirosis infections [9].

In recent years, domestic cases registered in the Azores have had a significant impact on the total number of cases and the high notification rate reported by Portugal. The Azores 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.[2] In 2022, a slight increase in confirmed cases was registered in the Azores compared with 2021, however cases had steadily decreased during the previous five years [4]. In 2022, an increase was seen in Madeira which also has a subtropical climate. Together, these two outermost regions accounted for almost 40% of all domestic leptospirosis cases reported in Portugal.

In 2022, 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 [5].

Early acute leptospirosis infection is very non-specific and symptoms includes fever, myalgia, and headache. Although many patients experience few or no symptoms, severe disease with organ failure and bleeding requiring intensive care unit admission has been reported in 6–59% of cases [1]. Symptoms are dependent on certain known and unknown factors, such as immune status, and it is thought that the causative serovar might play a role. 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. This fact, 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.

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 behaviour [10].

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 [10]. The latter can be achieved by rodent and herd control measures such as 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. A further effective approach for reducing human leptospirosis is to increase awareness of the disease and the risks of infection for clinicians, the population (especially for risk groups), and public health decision-makers [10].

At the individual-patient level, early diagnosis and adequate treatment of cases of leptospirosis have been shown to decrease both morbidity and mortality [10]. This also underlines the importance of awareness among clinicians of a possible leptospirosis infection.

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

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