

SURVEILLANCE REPORT

Tick-borne encephalitis

Annual Epidemiological Report for 2022

Key facts

- For 2022, 20 European Union/European Economic Area (EU/EEA) countries reported 3 650 cases of tick-borne encephalitis (TBE), 3 516 (96.3%) of which were confirmed.
- The EU/EEA notification rate for 2022 was 0.81 per 100 000 population, which is a 14% increase compared to the results from 2021.
- Cases were more frequently reported among men (male-to-female ratio: 1.5:1) and most cases were reported in the age group 45–64 years.
- TBE presented a seasonal pattern. For 2022, 90% of confirmed cases in EU/EEA occurred between June and November, with July having the highest number of reported cases (n=800).

Introduction

Tick-borne encephalitis (TBE) is an infection of the central nervous system caused by tick-borne encephalitis virus (TBEV) (genus *flavivirus*), which is transmitted by infected ticks (genus *Ixodes*), and occasionally by the consumption of unpasteurised dairy products from infected ruminants [1,2]. Among the several viral subtypes of TBEV, the European subtype (TBEV-Eu) is predominantly found in Europe [2].

A major proportion of those infected with TBEV remain asymptomatic. Among those who develop symptoms, the disease can present in a varied range of severity, from mild non-specific fever like symptoms to severe neurological symptoms. The clinical manifestation usually follows a biphasic course, with symptoms such as fever, fatigue, headache, myalgia, and nausea during the first phase followed by neurological symptoms such as meningitis and encephalitis in the second phase. Long-term neurological sequelae have also been observed.

In the absence of specific antiviral treatment against TBEV, symptomatic and supportive treatment remains the mainstay. A vaccine to prevent TBE is available and is a very effective means of prevention [3].

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Methods

This report is based on data for 2022 retrieved from The European Surveillance System (TESSy) on 18 January 2024. TESSy is a system for the collection, analysis and dissemination of data on communicable diseases.

For a detailed description of methods used to produce this report, refer to the 'Introduction to the Annual Epidemiological Report' chapter [4].

An overview of the national surveillance systems is available online [5].

A subset of the data used for this report is available through ECDC's online 'Surveillance atlas of infectious diseases' [6].

Twenty-two countries used the EU case definition, two countries (Germany and Italy) reported using a case definition other than the EU case definition, and four countries (Croatia, Denmark, France, and Malta) did not specify which case definition was used. Twenty-four reporting countries reported having a comprehensive surveillance system. Reporting was compulsory in 24 countries, voluntary in three (Belgium, Denmark, and the Netherlands) and was not specified for one country (Croatia). Belgium and Bulgaria reported aggregated data, while all other countries reported case-based data.

Epidemiology

For 2022, 28 countries reported data on TBE. Among these, 20 EU/EEA countries reported 3 650 TBE cases, of which 3 516 (96.3%) were confirmed (Table 1). Eight countries reported zero cases (Bulgaria, Iceland, Ireland, Liechtenstein, Luxembourg, Malta, Romania, and Spain). The highest number of confirmed cases for 2022 were reported by Czechia (n=709), Germany (n=554), and Sweden (n=465) (Table 1).

The EU/EEA notification rate for 2022 was 0.81 per 100 000 population. The notification rate was highest in Lithuania (13.4 cases per 100 000 population), followed by Estonia (10.5) (Table 1, Figure 1). The notification rates show a gradual rise from 2018 to 2020 followed by a drop in the notification rate in 2021 and a slight rise again in 2022. Notification rates were consistently high (over five per 100 00 population) during the last five years in three countries: Lithuania, Estonia, and Czechia. Significant variation in the notification rates between countries as compared to 2021 was observed, with both notable increases and decreases.

Data on importation status were available for 3 274 confirmed cases, of which 2.3% (n=76) were travel-associated and 97.7% (n=3 198) were locally acquired. Imported cases were reported by 13 countries, with Germany reporting the highest number (n=27).

Of the 1 620 confirmed cases for which information about vaccination status was available, 1 522 (94.0%) were reported as not vaccinated against TBE. Of the 98 vaccinated cases, 29 had only received one dose, 21 had received two doses, 29 had received at least three doses, and 19 had received an unknown number of doses.

Table 1. Number of confirmed tick-borne encephalitis 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 | ASR |
| Austria | 171 | 1.9 | 106 | 1.2 | 250 | 2.8 | 135 | 1.5 | 206 | 2.3 | 2.2 |
| Belgium | 3 | 0.0 | 4 | 0.0 | 7 | 0.1 | 2 | 0.0 | 2 | 0.0 | 0.0 |
| Bulgaria | 0 | 0.0 | 1 | 0.0 | 2 | 0.0 | 1 | 0.0 | 0 | 0.0 | 0.0 |
| Croatia | 22 | 0.5 | 13 | 0.3 | 14 | 0.3 | 4 | 0.1 | 23 | 0.6 | 0.6 |
| Cyprus | NDR | NRC | NDR | NRC | NDR | NRC | NDR | NRC | NDR | NRC | NRC |
| Czechia | 714 | 6.7 | 771 | 7.2 | 850 | 7.9 | 593 | 5.7 | 709 | 6.7 | 6.7 |
| Denmark | 4 | 0.1 | 5 | 0.1 | 5 | 0.1 | 7 | 0.1 | 5 | 0.1 | 0.1 |
| Estonia | 85 | 6.4 | 82 | 6.2 | 70 | 5.3 | 82 | 6.2 | 140 | 10.5 | 10.1 |
| Finland | 79 | 1.4 | 69 | 1.3 | 91 | 1.6 | 160 | 2.9 | 124 | 2.2 | 2.1 |
| France | 25 | 0.0 | 4 | 0.0 | 46 | 0.1 | 28 | 0.0 | 37 | 0.1 | 0.1 |
| Germany | 582 | 0.7 | 444 | 0.5 | 716 | 0.9 | 421 | 0.5 | 554 | 0.7 | 0.6 |
| Greece | 2 | 0.0 | 0 | 0.0 | 0 | 0.0 | 4 | 0.0 | 1 | 0.0 | 0.0 |
| Hungary | 30 | 0.3 | 17 | 0.2 | 18 | 0.2 | 6 | 0.1 | 29 | 0.3 | 0.3 |
| Iceland | NDR | NRC | NDR | NRC | NDR | NRC | NDR | NRC | 0 | 0.0 | 0.0 |
| Ireland | 0 | 0.0 | 1 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0.0 |
| Italy | 39 | 0.1 | 37 | 0.1 | 55 | 0.1 | 18 | 0.0 | 104 | 0.2 | 0.2 |
| Latvia | 100 | 5.2 | 175 | 9.1 | 149 | 7.8 | 222 | 11.7 | NDR | NRC | NRC |
| Liechtenstein | NDR | NRC | NDR | NRC | NDR | NRC | 0 | 0.0 | 0 | 0.0 | 0.0 |
| Lithuania | 384 | 13.7 | 711 | 25.4 | 679 | 24.3 | 365 | 13.1 | 377 | 13.4 | 12.9 |
| Luxembourg | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0.0 |
| Malta | NDR | NRC | NDR | NRC | NDR | NRC | NDR | NRC | 0 | 0.0 | 0.0 |
| Netherlands | 6 | NRC | 3 | NRC | 5 | NRC | 3 | NRC | 5 | NRC | NRC |
| Norway | 26 | 0.5 | 35 | 0.7 | 41 | 0.8 | 71 | 1.3 | 84 | 1.5 | 1.5 |
| Poland | 148 | 0.4 | 197 | 0.5 | 114 | 0.3 | 181 | 0.5 | 367 | 1.0 | 1.0 |
| Portugal | NDR | NRC | NDR | NRC | 0 | 0.0 | 0 | 0.0 | 1 | 0.0 | 0.0 |
| Romania | 4 | 0.0 | 0 | 0.0 | 0 | 0.0 | 1 | 0.0 | 0 | 0.0 | 0.0 |
| Slovakia | 154 | 2.8 | 162 | 3.0 | 185 | 3.4 | 72 | 1.3 | 158 | 2.9 | 2.9 |
| Slovenia | 153 | 7.4 | 111 | 5.3 | 187 | 8.9 | 62 | 2.9 | 125 | 5.9 | 5.6 |
| Spain | 0 | 0.0 | 1 | 0.0 | 0 | 0.0 | 1 | 0.0 | 0 | 0.0 | 0.0 |
| Sweden | 359 | 3.5 | 355 | 3.5 | 267 | 2.6 | 533 | 5.1 | 465 | 4.4 | 4.4 |
| EU/EEA (30 countries) | 3 090 | 0.7 | 3 304 | 0.8 | 3 751 | 0.9 | 2 972 | 0.7 | 3 516 | 0.8 | 0.8 |
| United Kingdom | 2 | 0.0 | 2 | 0.0 | NDR | NRC | NA | NA | NA | NA | NA |
| EU/EEA (31 countries) | 3 092 | 0.6 | 3 306 | 0.7 | 3 751 | 0.9 | 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. Rates were not calculated for the Netherlands because no information was provided on the level of coverage of the national surveillance system.

In 2022, a seasonal pattern was observed, with 90% of confirmed cases reported from June to November. The highest number of confirmed cases (n=800) was found in July, representing 23% of the confirmed cases (Figure 3). This pattern is consistent with previous years (Figure 2).

Figure 1. Confirmed tick-borne encephalitis cases per 100 000 population by country, EU/EEA, 2022

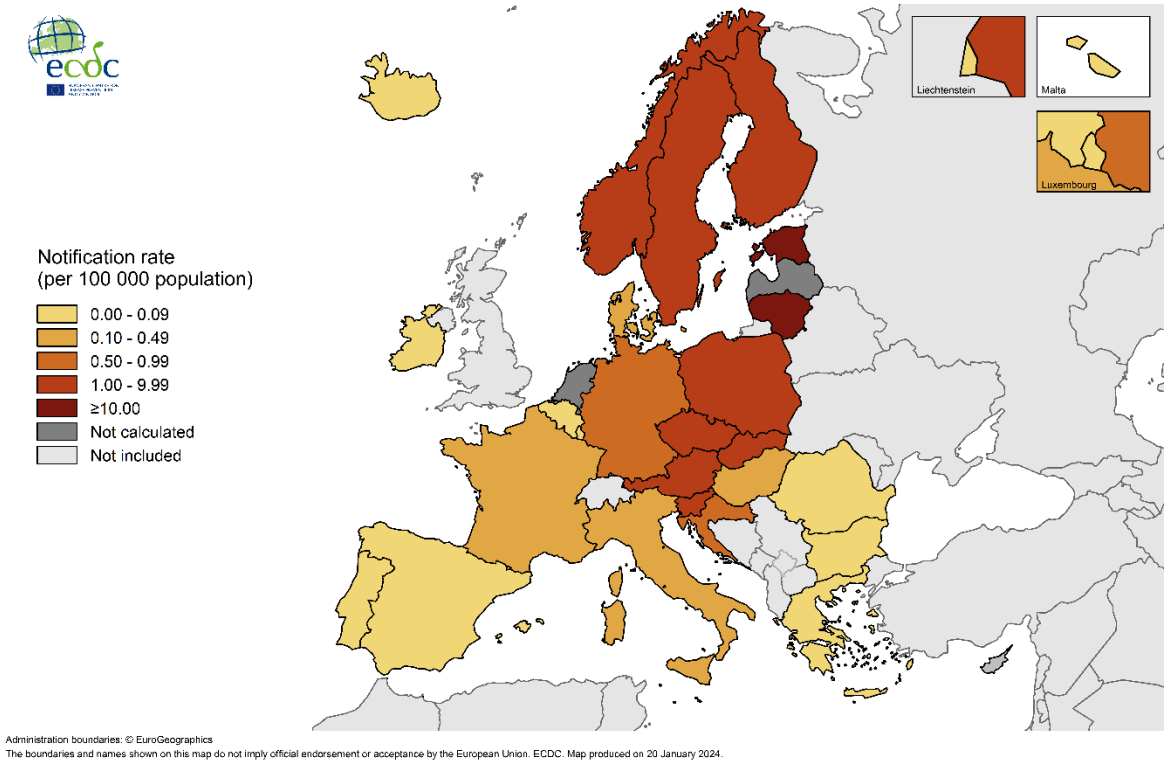
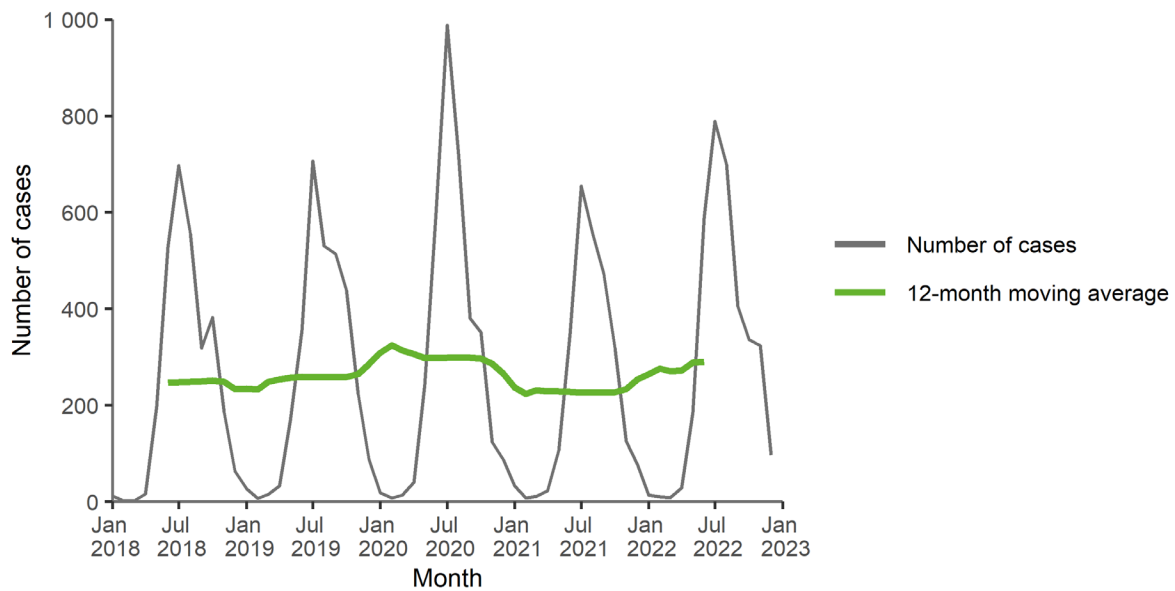
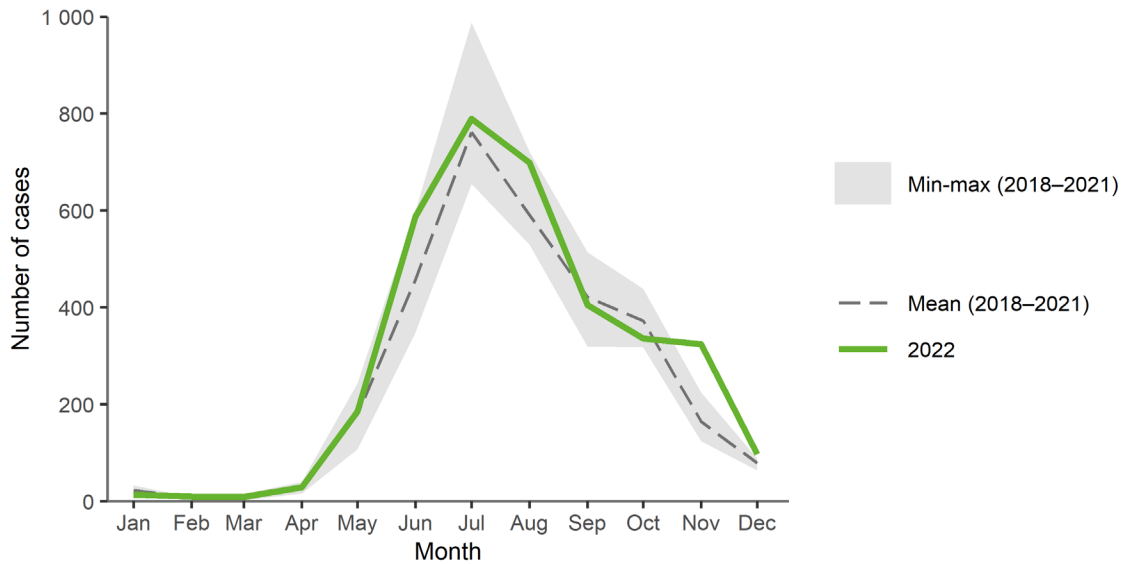


Figure 2. Number of confirmed tick-borne encephalitis cases by month, EU/EEA, 2018–2022



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

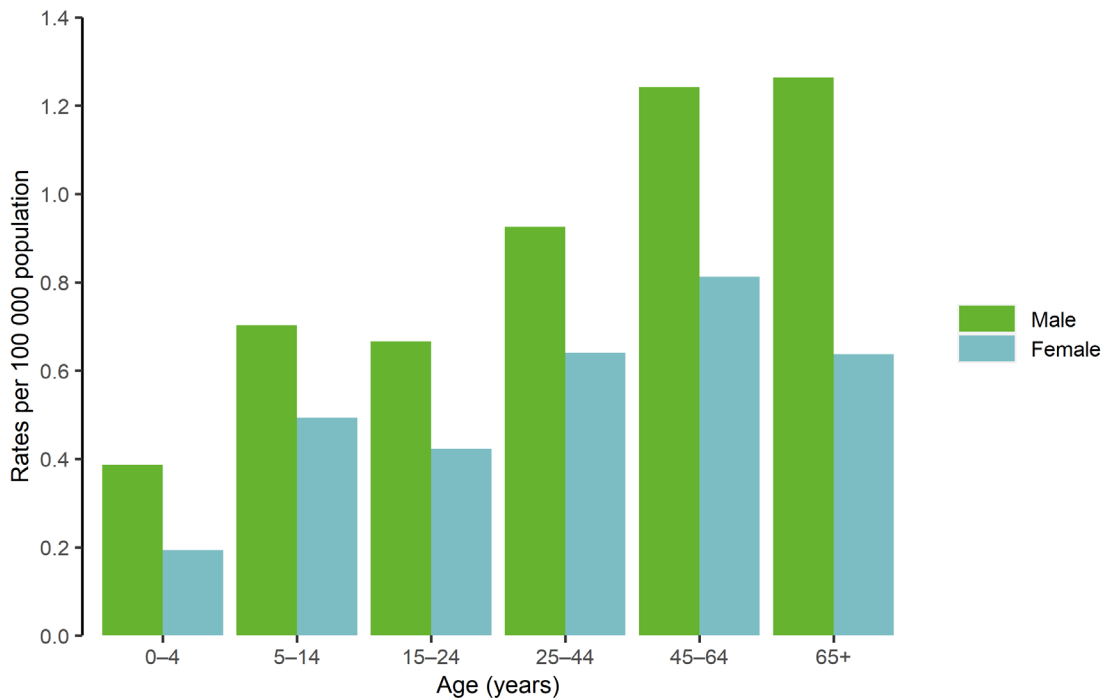
Figure 3. Number of confirmed tick-borne encephalitis cases by month, EU/EEA, 2022 and 2018–2021



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

For 2022, the largest proportion of cases and notification rate was reported in people aged 45–64 years (n=1 245, rate=1.0). The male-to-female ratio was 1.5:1, and the notification rates were higher among men in all age groups (Figure 4).

Figure 4. Rates of confirmed tick-borne encephalitis per 100 000 population, by age and gender, EU/EEA, 2022



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

Discussion

The reporting year 2022 marked an increase in the number of cases compared with the preceding year. Similar to the previous four years, the highest notification rate was reported by Lithuania. Latvia, which has consistently reported a high rate of cases (ranging between 5.2 and 11.7 per 100 000 population from 2018 to 2021, with an average of 8.5 per 100 000 population), did not provide data in 2022, which may have contributed to a decrease in the overall notification rate of EU/EEA.

The incidence of TBE is influenced by several factors, including the abundance of ticks and human population behaviours [7]. The abundance of ticks is driven by the prevailing environmental conditions such as weather and climate conditions and the availability of host reservoirs [8]. Increased outdoor recreational activities and low levels of vaccination can lead to an increased incidence of TBE [7]. The overall coverage of and compliance with TBE vaccination has been found to be low in Europe and in most countries where TBE is considered to be endemic, with significant variability among countries [9].

As in previous years, notification rates were higher among males and among adults aged 45–64 years, possibly due to more frequent exposure to tick bites during outdoor activities associated with occupation or leisure [10]. In addition, recent studies conducted in Scandinavian countries have shown that women have a higher risk perception than men, are more prone to use protective measures, and have more knowledge about tick-borne disease [11-13]. Most TBE cases were diagnosed during the warmer months, which is expected for a tick-borne disease.

The reasons behind fluctuations in case numbers are multifactorial. Demographic and environmental factors have been shown to partially explain yearly variation [14]. However, predictions for Austria based on these factors alone underestimated the high case numbers for 2020 [15]. Other factors, such as human behaviour, particularly related to outdoor recreational activities, can influence TBE transmission but are more difficult to account for and to predict [10,14].

The COVID-19 pandemic might have influenced the epidemiology of TBE in different ways. Changes in case finding, diagnosis, and reporting of TBE cases due to altered care-seeking behaviour and an overburdened work force might have accentuated the underestimation of the true incidence [16-18]. Different non-pharmaceutical interventions and restrictions, on the other hand, could have potentially resulted in increased outdoor activities in endemic areas [16,17].

Public health implications

As a vector-borne disease prevalent in many parts of Europe and as one of the leading causes of central nervous system infections that can lead to long-term neurological sequelae, TBE contributes considerably to the disease burden in Europe. Preventive strategies include vaccination and the avoidance of tick bites. Vaccination is considered to be the most effective means of preventing TBE [19]. Use of personal protective measures to avoid tick bites while engaging in outdoor activities and removal of ticks from the body can reduce the risk of tick-borne infections [20]. As dairy products from TBEV-infected cattle can also transmit the virus, avoiding consumption of unpasteurised dairy products in risk areas is also considered a precaution to avoid infection.

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