

Tick-borne encephalitis

Annual Epidemiological Report for 2018

Key facts

- In 2018, 3 212 cases of tick-borne encephalitis (TBE) were reported in EU/EEA countries, 3 092 (96.3%) of which were confirmed.
- The notification rate in 2018 was 0.6 cases per 100 000 population and it has remained at this level for three years, without showing any significant change in trend over the past five years.
- TBE is predominant in males (ratio 1.5 M:1 F) and among those aged 45–64 years.
- TBE presents a seasonal pattern. In 2018, 95% of confirmed cases occurred during the period May–November, while 59% occurred during the period June–August.

Methods

This report is based on data for 2018 retrieved from The European Surveillance System (TESSy) on 6 September 2019. 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 [1].

An overview of the national surveillance systems is available online [2].

A subset of the data used for this report is available through ECDC's online *Surveillance atlas of infectious diseases* [3].

Twenty-six EU/EEA countries reported data on TBE in 2018 with Denmark reporting cases to TESSy for the first time. Eighteen countries used the EU case definition (2008, 2012 or 2018), two countries (Germany and Italy) reported using another case definition and six countries did not specify which case definition was used (Belgium, Denmark, Croatia, Finland, Luxembourg and Poland).

Twenty reporting countries have a comprehensive surveillance system. Reporting is compulsory in 18 countries, voluntary in six (Belgium, Denmark, France, Luxembourg, the Netherlands and the United Kingdom) and 'not specified' in two countries (Croatia and Poland). Surveillance systems are mostly passive, except in the Czech Republic, Slovakia and the United Kingdom, where active surveillance is in place. The disease surveillance method is not specified for three countries [2]. Data reporting is case-based, except in Belgium which reports in aggregate form.

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Epidemiology

In 2018, 3 212 TBE cases were reported to TESSy from the EU/EEA countries, 3 092 (96.3%) of which were confirmed (0.6 cases per 100 000 population, Table 1). Of 2 539 cases with known outcome, 16 died (case fatality: 0.6%). Four countries reported no cases.

The notification rate was the highest in Lithuania (13.6 cases per 100 000 population), followed by Slovenia (7.4) and the Czech Republic (6.7; Table 1, Figure 1). The highest number of confirmed cases in 2018 were reported by the Czech Republic (n=712), Germany (n=583) and Lithuania (n=384; Table 1).

The overall EU/EEA notification rate in 2018 remained at 0.6 per 100 000, similar to the last three years, with no major changes reported in surveillance systems [4]. Compared to 2017 data, the notification rate for Slovakia doubled and that for Germany increased by 22.4%, while Lithuania's notification rate decreased by 23.2%. Looking at the trends over the last five years, the notification rates have fluctuated annually and only Slovenia and Germany have seen a steady increase.

Table 1. Distribution of confirmed tick-borne encephalitis cases and rates per 100 000 population by country, EU/EEA, 2014–2018

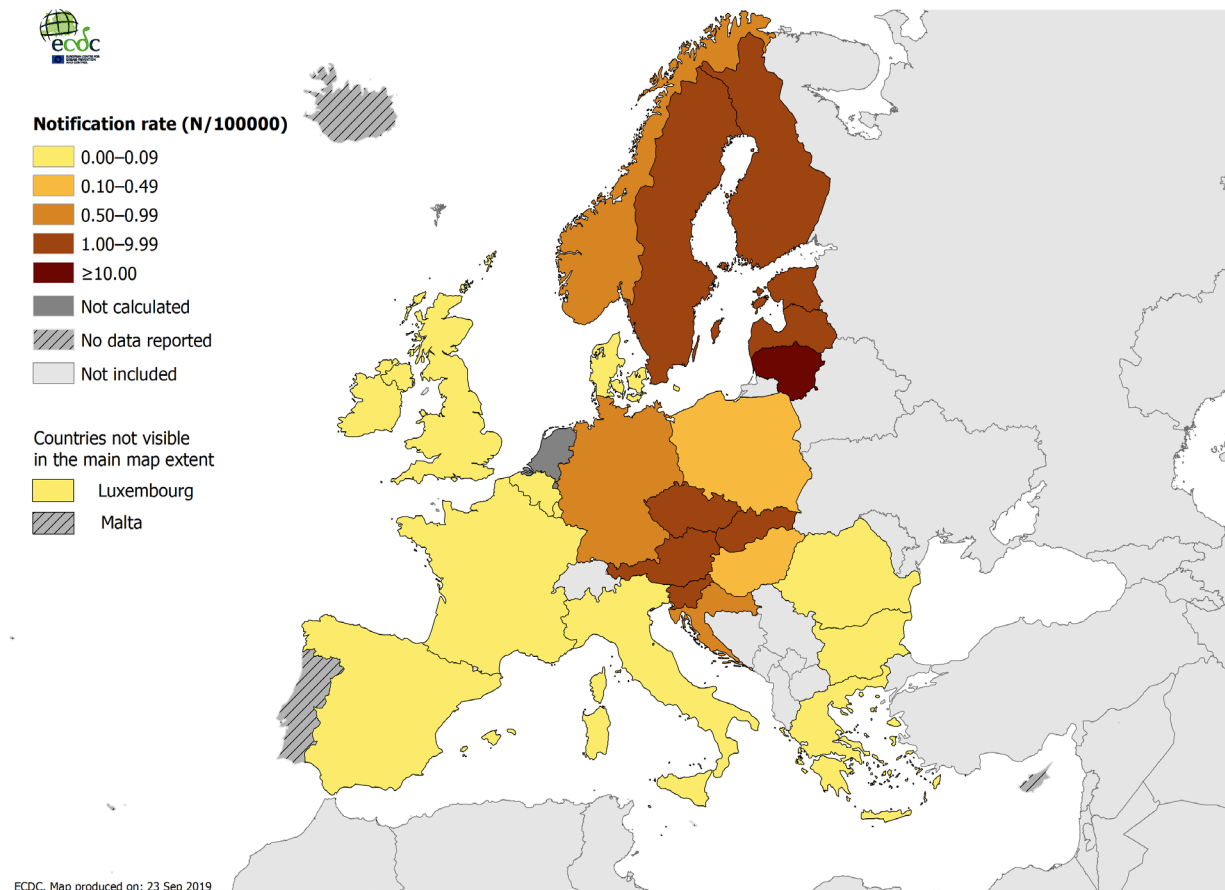
| Country | 2014 | | 2015 | | 2016 | | 2017 | | 2018 | | | |
|----------------|-------------|------------|-------------|------------|-------------|------------|-------------|------------|----------------|------------|------------|-----------------|
| | Number | Rate | Number | Rate | Number | Rate | Number | Rate | Reported cases | Rate | ASR | Confirmed cases |
| Austria | 81 | 1.0 | 79 | 0.9 | 96 | 1.1 | 123 | 1.4 | 170 | 1.9 | 1.9 | 170 |
| Belgium | 0 | 0.0 | 1 | 0.0 | 1 | 0.0 | 3 | 0.0 | 3 | 0.0 | 0.0 | 3 |
| Bulgaria | 0 | 0.0 | 2 | 0.0 | 0 | 0.0 | 1 | 0.0 | 0 | 0.0 | 0.0 | 0 |
| Croatia | 23 | 0.5 | 26 | 0.6 | 6 | 0.1 | 10 | 0.2 | 24 | 0.5 | 0.5 | 22 |
| Cyprus | . | . | . | . | . | . | . | . | . | . | . | . |
| Czech Republic | 410 | 3.9 | 349 | 3.3 | 565 | 5.4 | 677 | 6.4 | 713 | 6.7 | 6.7 | 712 |
| Denmark | - | - | - | - | - | - | - | - | 4 | 0.1 | 0.1 | 4 |
| Estonia | 82 | 6.2 | 115 | 8.7 | 80 | 6.1 | 84 | 6.4 | 85 | 6.4 | 6.4 | 85 |
| Finland | 47 | 0.9 | 68 | 1.2 | 61 | 1.1 | 82 | 1.5 | 79 | 1.4 | 1.4 | 79 |
| France | 9 | 0.0 | 10 | 0.0 | 15 | 0.0 | 2 | 0.0 | 25 | 0.0 | 0.0 | 25 |
| Germany | 264 | 0.3 | 218 | 0.3 | 347 | 0.4 | 486 | 0.6 | 583 | 0.7 | 0.7 | 583 |
| Greece | 1 | 0.0 | 1 | 0.0 | 0 | 0.0 | 0 | 0.0 | 2 | 0.0 | 0.0 | 2 |
| Hungary | 26 | 0.3 | 22 | 0.2 | 14 | 0.1 | 14 | 0.1 | 32 | 0.3 | 0.3 | 30 |
| Iceland | . | . | . | . | . | . | . | . | . | . | . | . |
| Ireland | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0.0 | 0 |
| Italy | 0 | 0.0 | 5 | 0.0 | 48 | 0.1 | 24 | 0.0 | 39 | 0.1 | 0.1 | 39 |
| Latvia | 149 | 7.4 | 141 | 7.1 | 91 | 4.6 | 178 | 9.1 | 139 | 5.2 | 4.9 | 100 |
| Liechtenstein | . | . | . | . | . | . | . | . | . | . | . | . |
| Lithuania | 353 | 12.0 | 336 | 11.5 | 633 | 21.9 | 474 | 16.6 | 384 | 13.7 | 13.1 | 384 |
| Luxembourg | 0 | 0.0 | 1 | 0.2 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0.0 | 0 |
| Malta | . | . | . | . | . | . | . | . | . | . | . | . |
| Netherlands | - | - | - | - | 4 | - | 3 | - | 6 | - | - | 6 |
| Norway | 13 | 0.3 | 9 | 0.2 | 12 | 0.2 | 16 | 0.3 | 26 | 0.5 | 0.5 | 26 |
| Poland | 131 | 0.3 | 115 | 0.3 | 211 | 0.6 | 196 | 0.5 | 197 | 0.4 | 0.4 | 148 |
| Portugal | . | . | . | . | . | . | . | . | . | . | . | . |
| Romania | 1 | 0.0 | 0 | 0.0 | 0 | 0.0 | 1 | 0.0 | 4 | 0.0 | 0.0 | 4 |
| Slovakia | 115 | 2.1 | 80 | 1.5 | 169 | 3.1 | 75 | 1.4 | 156 | 2.9 | 2.9 | 156 |
| Slovenia | 100 | 4.9 | 62 | 3.0 | 83 | 4.0 | 102 | 4.9 | 153 | 7.4 | 7.0 | 153 |
| Spain | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0.0 | 0 |
| Sweden | 178 | 1.8 | 268 | 2.7 | 238 | 2.4 | 365 | 3.7 | 385 | 3.5 | 3.6 | 359 |
| United Kingdom | 2 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 3 | 0.0 | 0.0 | 2 |
| EU/EEA | 1985 | 0.4 | 1908 | 0.4 | 2674 | 0.6 | 2916 | 0.6 | 3212 | 0.6 | 0.6 | 3092 |

.: no data reported

-.: no rate calculated.

ASR: age-standardised rate.

Figure 1. Distribution of confirmed tick-borne encephalitis case notification rate per 100 000 population by country, EU/EEA, 2018

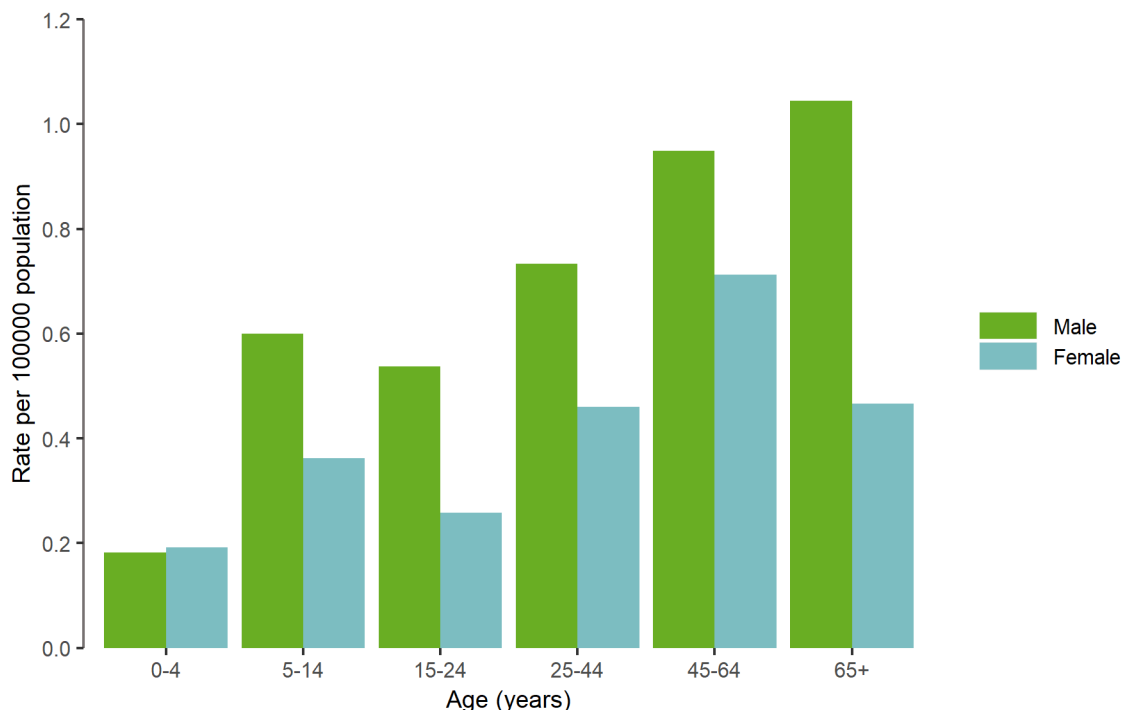


Source: Country reports from Austria, Belgium, Bulgaria, Croatia, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, the Netherlands, Norway, Poland, Romania, Slovakia, Slovenia, Spain, Sweden and the United Kingdom

Age and gender distribution

In 2018, the largest proportion of cases were reported in the age group 45–64 years (n=1 120, 36%). The notification rate increased with age, with the lowest rate observed among children aged 0–4 years (0.2 per 100 000 population) and the highest rate among those aged 45–64 years (0.8 cases per 100 000 population). Cases were more frequently reported among men (n=1 874, 60.6%) and the male-to-female ratio was 1.5:1. Notification rates were higher among men in all age groups (Figure 2).

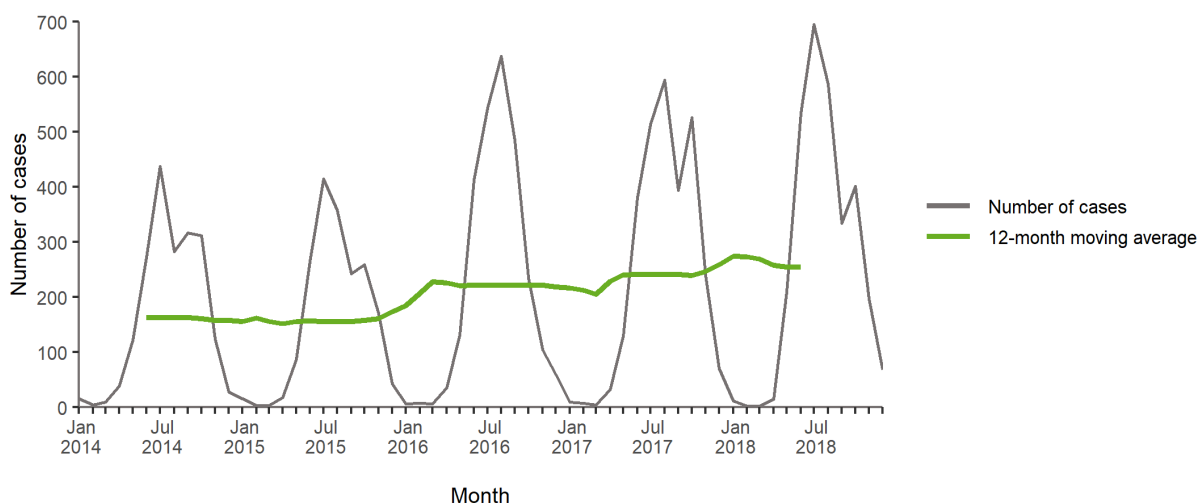
Figure 2. Distribution of confirmed tick-borne encephalitis cases per 100 000 population by age and gender, EU/EEA, 2018



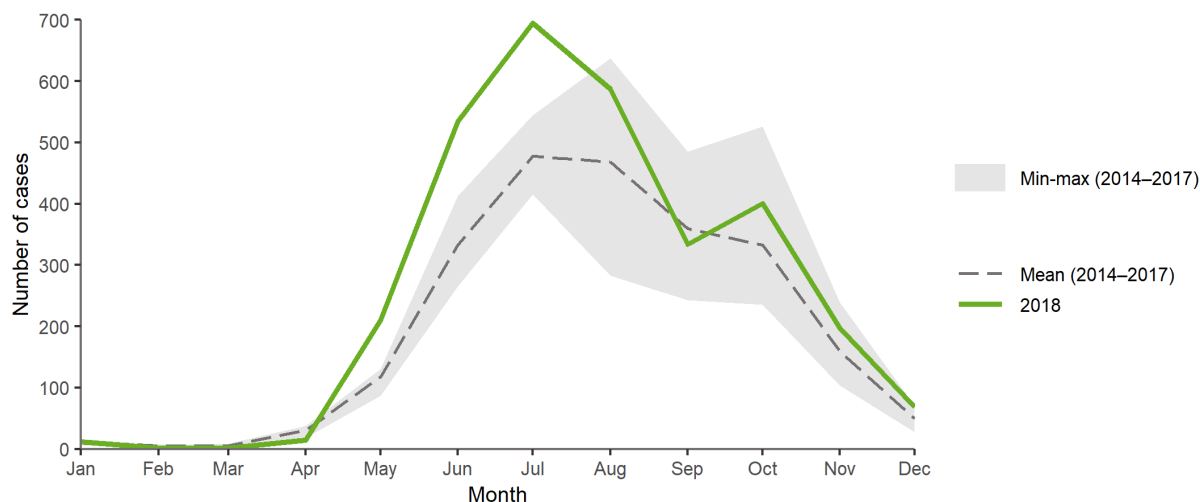
Seasonality

TBE cases generally display a seasonal peak in the months of July and August. In 2018, the reported cases showed the expected pronounced seasonality, with 95% of confirmed cases reported from May to November. As in 2017, the notification of cases presented a bimodal distribution, with a first pronounced peak from June until August (n=1 821, 59% of reported cases with known notification date) and a later smaller one in October, for the second year in a row. (Figures 3,4).

Figure 3. Distribution of confirmed tick-borne encephalitis cases by month, EU/EEA, 2014–2018



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

Figure 4. Distribution of confirmed tick-borne encephalitis cases by month, EU/EEA, 2018 and 2014–2017

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

Imported cases

Data on importation status were available for 2 907 confirmed cases, 2.2% (n=65) of which were travel-associated. Imported cases were reported by nine countries, with Germany reporting the highest number (25). Among imported cases where the place of infection was reported, cases were reported to have been infected in 13 different central and northern EU Member States with known circulation of the TBE virus. Ten of the imported cases were infected outside the EU/EEA (in Bosnia and Herzegovina, Belarus, India, Serbia and Switzerland).

Immunisation

Of the 881 (28.5%) confirmed cases for which information about immunisation status was available, 856 cases (97%) were reported as not vaccinated and 25 (2.8 %) had a history of receiving between one and four doses of TBE vaccine. Of the latter, 16 reported having received ≥ 3 vaccine doses, but the last reported dose was on average seven years before onset of symptoms in 2018 (median: 4 years).

Discussion

TBE is a flavivirus (TBEV) infection of the central nervous system transmitted by infected ticks (genus *Ixodes*) or in rare instances through consumption of unpasteurised dairy products [5]. TBE is endemic in several central, northern and eastern European countries, with the highest incidence historically found in the Baltic countries. The majority of the infections caused by the circulating virus subtype, TBEV-Eu, are asymptomatic (up to 75%), while the symptomatic ones present typically with a biphasic illness. [6]

TBE became notifiable in the EU in 2012 and the current case definition was adopted in 2018 [7]. The number of reporting countries, including those reporting no cases, has increased gradually to 26 in 2018, when Denmark reported cases for the first time. The EU notification rate for TBE has fluctuated between 0.4 and 0.6 cases per 100 000 population during the period 2014–2018. In 2018, the highest incidence rates were reported in Lithuania, Slovenia and the Czech Republic, as in previous years.

Notification rates are higher among males and adults aged 45–64 years, possibly due to more frequent exposure to tick bites while undertaking outdoor activities as a result of their occupation or during leisure time. [6] The majority of cases continue to be diagnosed during the warmer months, with no evidence of a major shift in seasonal pattern [8,9].

In 2018, one of the TBE cases imported into an EU country had travelled to India during the incubation period. Although TBE virus is probably present in India, especially in the northern parts of the subcontinent, there is a possibility that this might be a cross reaction with another flavivirus circulating in the particular area (e.g. West Nile virus, Japanese encephalitis virus or Kyasanur Forest virus). A recent evaluation of the available serological methods for the diagnosis of TBE highlighted the need for confirmatory neutralisation antibody testing, and clinical correlation with careful history-taking for accurate diagnosis of TBE in Europe. [10]

Public health conclusions

TBE is an important zoonotic infection for many countries in central, northern and eastern Europe. Residents in and travellers to regions where TBE is endemic in the EU/EEA countries should be aware of the risk of exposure to ticks, protect themselves against tick bites and consider immunisation for TBE for the most effective protection, in line with relevant national recommendations. This is particularly relevant if engaging in extensive outdoor activities. Data on immunisation history against TBE is relatively scarce and is only reported in connection with <30% of confirmed cases. However among those cases <3% actually became sick, which indicates the protective effect offered by vaccination.

References

1. European Centre for Disease Prevention and Control (ECDC). Introduction to the Annual Epidemiological Report 2019 [cited 6 November 2019]. Available from: <https://www.ecdc.europa.eu/en/annual-epidemiological-reports/methods>
2. European Centre for Disease Prevention and Control (ECDC). Surveillance systems overview Stockholm ECDC; 2019 [cited 6 November 2019]. Available from: <https://www.ecdc.europa.eu/en/publications-data/surveillance-systems-overview-2018>
3. European Centre for Disease Prevention and Control (ECDC). Surveillance atlas of infectious diseases Stockholm2018. Available from: <http://atlas.ecdc.europa.eu/public/index.aspx?Dataset=27&HealthTopic=56>
4. Beauté J, Spiteri G, Warns-Petit E, Zeller H. Tick-borne encephalitis in Europe, 2012 to 2016. Eurosurveillance. 2018;23(45).
5. Taba P, Schmutzhard E, Forsberg P, Lutsar I, Ljøstad U, Mygland Å, et al. EAN consensus review on prevention, diagnosis and management of tick-borne encephalitis. European Journal of Neurology. 2017;24(10):1214-e61.
6. Lindquist L, Vapalahti O. Tick-borne encephalitis. Lancet. 2008 May 31;371(9627):1861-71.
7. European Centre for Disease Prevention and Control (ECDC). EU case definitions: European Commission; 2018 [cited 2019 24/07/2019]. Available from: <https://ecdc.europa.eu/en/surveillance-and-disease-data/eu-case-definitions>
8. European Centre for Disease Prevention and Control. Epidemiological situation of tick-borne encephalitis in the European Union and European Free Trade Association countries Stockholm: ECDC; 2012. Available from: <https://ecdc.europa.eu/sites/portal/files/media/en/publications/Publications/TBE-in-EU-EFTA.pdf>
9. European Centre for Disease Prevention and Control. Tick-borne encephalitis (TBE): factsheet for health professionals Stockholm: ECDC; 2010 [cited 2017 7 September 2017]. Available from: <https://ecdc.europa.eu/en/tick-borne-encephalitis/facts/factsheet>
10. Reusken C, Boonstra M, Rugebregt S, Scherbeijn S, Chandler F, Avsic - Zupanc T, et al. An evaluation of serological methods to diagnose tick-borne encephalitis from serum and cerebrospinal fluid. J of Clinical Virology 2019;120:78 - 83.