

SURVEILLANCE OF INFECTIOUS DISEASES IN ANIMALS AND HUMANS IN SWEDEN 2019

Chapter excerpt -
Tick-borne encephalitis



Editor: Karl Ståhl

Department of Disease Control and Epidemiology, National Veterinary Institute (SVA), SE-751 89 Uppsala, Sweden.

Authors: Charlotte Axén, Mia Brytting, Ioana Bujila, Erika Chenais, Rikard Dryselius, Helena Eriksson, Pernille Etterlin, Eva Forsgren, Malin Grant, Gittan Gröndahl, Gunilla Hallgren, Anette Hansen, Gete Hestvik, Marika Hjertqvist, Mia Holmberg, Cecilia Hultén, Helena Höök, Cecilia Jernberg, Jerker Jonsson, Ulrika König, Elina Lahti, Emelie Larsdotter, Mats Lindblad, Anna Lundén, Emma Löf, Hans-Olof Nilsson, Oskar Nilsson, Maria Nöremark, Anna Ohlson, Ylva Persson, Karin Persson-Waller, Thomas Rosendal, Karl Ståhl, Robert Söderlund, Kaisa Sörén, Magnus Thelander, Karin Troell, Anders Wallensten, Per Wallgren, Stefan Widgren, Ulrika Windahl, Beth Young, Nabil Yousef, Siamak Zohari, Erik Ågren, Estelle Ågren, Elina Åsbjer

Cover Photo: Anders Lindström

Copyright of map data: ©EuroGeographics for the administrative boundaries

Reporting guidelines: Reporting guidelines were introduced in 2018 for those those chapters related to purely animal pathogens. The guidelines build on experiences from several EU projects, and have been validated by a team of international experts in animal health surveillance. The aim is to develop these guidelines further in collaboration within the global surveillance community and they have therefore been made available in the form of a wiki on the collaborative platform GitHub (<https://github.com/SVA-SE/AHSURED/wiki>). Feel free to contribute!

Layout: The production of this report continues to be accomplished using a primarily open-source toolset. The method allows the source text, produced by authors, to be edited independently of the template for the layout which can be modified and reused for future reports. Specifically, the chapter texts, tables and captions are authored in Microsoft Word and then converted using pandoc and R to the LaTeX typesetting language. Most figures and maps are produced using the R software for statistical computing. Development for 2019 has further improved the importing of content from Word to LaTeX. The method can now import text, tables and figure captions from Word, as well as the newly designed 'IN FOCUS' sections of some chapters. The tool is available as an R-package at GitHub (<https://github.com/SVA-SE/mill/>). This year the report was also built with a continuous integration pipeline on Microsoft's Azure DevOps platform, allowing every committed change to the content to be built and tested automatically. The report generation R-package and process was designed by Thomas Rosendal and Stefan Widgren. In 2019, figures and the final typesetting were done by Wiktor Gustafsson and Thomas Rosendal with contributions from the report authors.

Print: TMG Tabergs AB.

Text, tables, figures and maps may be cited and reprinted only with reference to this report.

Suggestion citation: Surveillance of infectious diseases in animals and humans in Sweden 2019, National Veterinary Institute (SVA), Uppsala, Sweden. SVA:s rapportserie 64 1654-7098.

This report may be subject to updates and corrections. The latest version is always available for download at www.sva.se.

Tick-borne encephalitis

BACKGROUND

Tick-borne encephalitis virus (TBEV) belongs to the genus flavivirus in the family *Flaviviridae*. TBEV is endemic in an area ranging from northern China and Japan, through far-eastern Russia to Europe. The virus may cause a neurological infection which may lead to long-term sequelae in the affected patients. The virus is spread by ticks (*Ixodes ricinus* and *I. persulcatus*), which become infected when they suck blood from infected rodents. Wild rodents are the natural reservoir for TBEV. The virus also circulates in the tick population through transovarial transmission without involvement of vertebrate hosts. Large mammals, predominantly ungulates, are important for the maintenance of large tick populations. Humans typically become infected via ticks, although unpasteurised cow, goat and sheep milk and milk products have also been reported as sources. Vaccination of persons living, visiting or working in endemic areas is recommended.

Three sub-types of TBEV are described: the “Western”, “Siberian” and “Far eastern” subtypes. In Sweden, only the “Western” subtype has been identified.

The first case of TBE infection in Sweden was reported in 1954. During the following three decades, 10–40 annual cases were reported. From the mid-1980s a clearly increasing trend has been observed. In recent years about 150–400 cases have been reported annually. A majority of the cases acquire their infections in Sweden. Most have been infected on the east coast of Sweden and in the Stockholm archipelago but in recent decades cases have been observed regularly on the west coast of the country and the infection occurs from the region of Skåne in the south to the regions of Gävleborg and Dalarna in the north. The age distribution

is wide but most of the cases are between 30 and 70 years. There is a slight over-representation of men. A majority of the patients are diagnosed in July to October.

DISEASE

Animals

In general, animals develop a subclinical infection. However, confirmed clinical cases have been reported in dogs and horses. Seroconversion has been demonstrated in grazing domestic animals such as goats, cattle and sheep as well as in wild ungulates. Ruminants may excrete the virus in milk. Wild rodents are considered the natural reservoir for TBEV but are not reported to contract the disease. Serological testing of wild animals, such as moose and deer, has been suggested as an indicator of the circulation of the virus.

Humans

In humans, a biphasic course of the disease is common. The first, viraemic phase lasts for about four days. After an interval of about a week, a meningoencephalitic phase appears in about one third of the patients. The symptoms may include fever, headache, nausea, cognitive dysfunctions or spinal paresis. The mortality is low, about 0.5%. The incubation period of TBE is usually between 7 and 14 days.

LEGISLATION

Animals

TBE is not a notifiable disease in animals in Sweden.

Humans

TBE in humans is notifiable as a viral meningoencephalitis since 2004, according to the Communicable Disease Act (SFS 2004:168 with the amendments of SFS 2013:634).

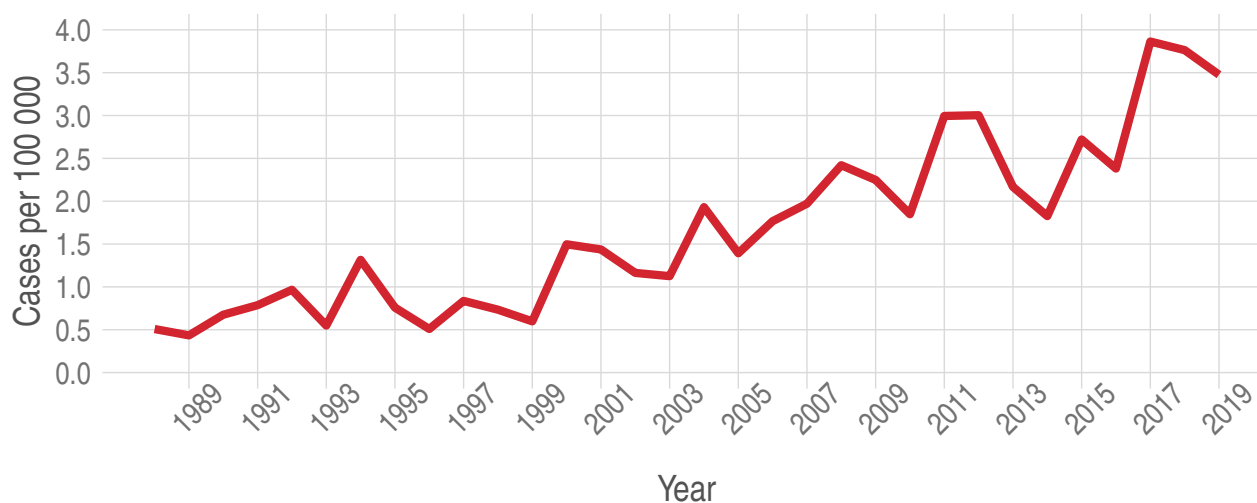


Figure 27: Incidence (per 100 000 inhabitants) of notified cases of TBE in humans 1988–2019.

SURVEILLANCE

Animals

The surveillance in animals is passive. In 2019, a survey was performed on occurrence of antibodies against TBE virus in bulk milk samples from cattle, goat, and sheep farms in Sweden.

Humans

TBE is notifiable based on identification of the disease by a treating physician or by laboratory diagnosis. Both are obligated to report identified cases to the regional and national level to enable further analyses and adequate intervention measures.

RESULTS

Animals

In a survey performed in 2019, using an ELISA test, antibodies to TBEV were found in 4 (3.7%) of the 108 tested bulk milk samples.

Humans

In 2019, 359 cases of TBE were reported. This is a small decrease since the year before, but the number of cases nevertheless remained at a relatively high level (Figure 27).

More men (65%) than women were reported with TBE. The incidence was highest among people in the age group 40–79 years, but there were cases reported from 1 to 90 years of age. Normally, there are few young children reported with TBE and this was the case also in 2019 with only two cases among children below the age of 5.

All but six cases had acquired their infections in Sweden. The other countries of infection were Finland, Germany, Lithuania and Norway. The first TBE case became ill as early as in late January and the last in November. The peak occurred in July and August, when most people fell ill. There was a lower incidence during the autumn months of 2019 than during the previous two years with a record number of cases.

As before, the majority of cases were infected in a geographic area that runs like a belt across Sweden, from the regions of Stockholm, Södermanland, Uppsala and Östergötland in the east to Västra Götaland and Värmland in the west (Figure 28). In addition, TBE is widely distributed in several parts of the rest of southern and central Sweden. Cases were reported from the region of Skåne in the south to Gävleborg and Dalarna in the north. TBE is gradually spreading westwards and in 2019 many cases were reported from, for example, the regions of Värmland, Västmanland and Västra Götaland. However, more people than usual were also infected in the regions of Gävleborg and Östergötland.

DISCUSSION

The TBE incidence has shown a significantly rising trend during the last three decades, but similarly to 2017 and 2018 there were still considerably more cases reported in 2019 than expected.

Although most human cases acquire the TBE infection via tick bites the infection can be food-borne. Outbreaks and

Number of cases

- No cases
- 1–3
- 4–7
- 8–14

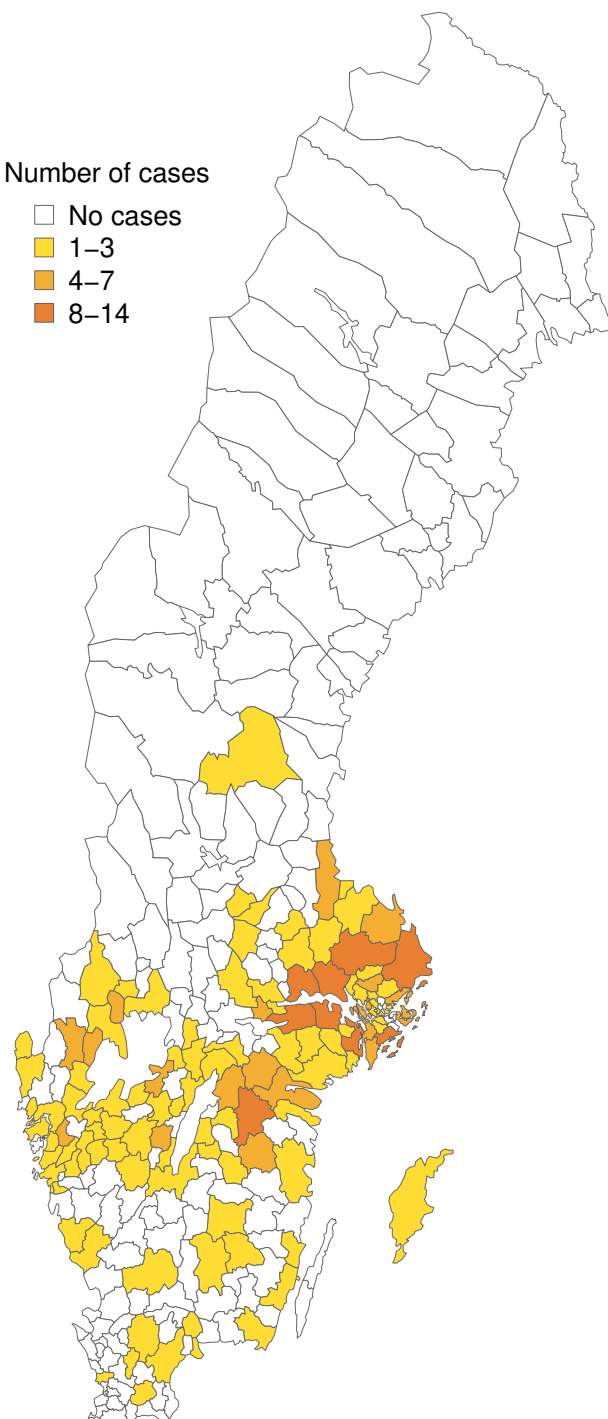


Figure 28: The municipalities of infection of the TBE cases during 2019. ©EuroGeographics for the administrative boundaries.

clusters of cases of TBE caused by consumption of unpasteurised milk or milk products have been described in Baltic, Balkanise and central European countries. The survey performed in Sweden in 2019 showed that the virus circulates in the Swedish population of dairy cattle.

The long-term increase in TBE incidence is probably due to several interacting factors. The most important cause is presumably the very dense population of ticks, a consequence of a large roe deer population from the 1980s up until the recent snowy winters. This situation in combination with a high population of small host animals such as bank voles, and optimal weather for both virus spread and humans spending time outdoors, could explain the large number of cases reported.