TBE in Poland

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E-CDC risk status: endemic (data as of end 2022)

History and current situation

Clinical symptoms of tick-borne encephalitis (TBE) were first described in Poland in 1948 by Demiaszkiewicz. All patients had been living in the Białowieża region (in northeastern Poland). Similar infections were described to those that had been diagnosed in the same region before World War II as complicated cases of typhoid fever or influenza.[1]

Twenty-eight cases of TBE were identified in 1952 among patients hospitalized in Nysa Kłodzka (in southwestern Poland). In 1954, 35 cases were identified in the Olsztyn region in northern Poland. More cases were recognized in the following years across different regions of Poland: northern (Gdańsk, Szczecin), central (Łódź), and southern (Kraków). This was the catalyst for scientific research studies by Przesmycki's team in selected regions of the country in the years 1953 through 1957.[2] In these studies, tick-borne encephalitis viruses (TBEV) were isolated from human specimens as well as from animal samples (small mammals) and vectors (ticks). Isolated viruses were determined to be TBEV, European sub-type.[2–4]

Seroprevalence studies were conducted in the late 1960s and early 1970s. Serum samples collected from ~17,000 blood donors and 20,000 forest workers living in different parts of Poland were examined. Distribution of positive serological results varied depending on the place of residence, ranging from 0.5% to 6.5% among blood donors and 7% to 27% among forest workers. These sero-prevalence data also indicated high numbers of asymptomatic or non-severe infections among the tested populations.[2,5–9]

A distribution map of TBE cases and confirmed presence of TBEV in Poland was developed, based on results from seroprevalence studies, virus isolation and clinical data. Some regions were determined to be endemic for TBEV. These included provinces in the north-eastern part of Poland (Białystok, Olsztyn, Suwalki) and southwestern Poland (Opole).[3,4,6–12]

In total, 576 TBE cases were reported during the 23 years of surveillance (1970–1992); the annual number of reported TBE infections varied from 4 (1991) to 60 (1970), and the incidence ranged from 0.01/100,000 inhabitants to 0.2/100,000 inhabitants, respectively. In the 1980s, the number of reported TBE cases decreased to 14–19 cases annually because of abandonment of diagnostics tests.[2,13]

In 1993, when new commercial tests became available in Poland, the number of reported TBE cases increased more than 30-fold in comparison to 1992 (249 vs. 8 cases). In 1993, the incidence of TBE (0.65/100,000) was the highest observed since surveillance began in 1970. This trend continued into the 21st century and more than 300 TBE cases were reported in the years 2003 (339 cases), 2006 (317 cases), and 2009 (351 cases). The highest incidence (0.92/100,000) was reported in 2009. The annual number of reported TBE cases decreased to 149 in 2015.[13]

In total, 3,662 cases of TBE were reported in Poland between 2000 and 2015. The incidence varied from 0.33 to 0.92/100,000. A 3–4-year cycle was identified based on the reported numbers of TBE cases, with peaks observed in 2003, 2006, and 2009. TBE cases were identified in all regions of Poland except one: there was no diagnosed or reported TBE case in the Lubuskie Province, which is located at the Western border region along the banks of the Odra River. In contrast, more than 70% of the reported cases each year were diagnosed in two provinces in the northeastern part of Poland: Podlaskie (Białystok) with >45% reported TBE cases and an incidence >6/100,000, and Warmińsko-Mazurskie (Olsztyn) with 25% cases and an incidence >1.5/100,000. Also, outbreaks of TBE were observed in those same regions during spring-summer time.[13]

In contrast to Central European countries (Germany, Czech Republic, Austria, Switzerland) the reported Polish TBE case numbers in 2018 did not significantly increase in summer time. Also the total number of 197 TBE cases is ~30% lower than in previous years (279 cases in 2017, 283 cases in 2016) (Fig. 3). However, a similar phenomenon with an increased number of reported TBE cases during the summer time was observed in 2016; but, the total number of TBE cases in that year was comparable to the numbers reported in 2017 although higher than the number of TBE cases reported in 2015 (149 cases).[20] The total number of reported TBE cases in 2019 was 265; however, during the first 6 weeks of the year, the number of reported cases was higher in 2019 (14 cases) than in 2018 and 2020 (10 cases each year).

The age of TBE patients ranged from 3 to 80 years, but the majority of patients were >20 years old.[13] Almost 20% of all reported TBE cases were associated with work or visits in the area where TBEV-infected ticks were found. Moreover, food-borne transmission was documented in 1975 and

1995. The source of infection was fresh, non-pasteurized milk of cows (1975) or goats (1995) contaminated with TBEV.[14,15]

The mortality rate observed for the reported TBE cases in Poland ranged from 0.5% to 2.8% and was similar to that observed in other European countries where European subtype of TBEV (TBEV-EU) variants have been confirmed.[5,13]

Prevention of TBE is based on decreasing the probability of infection by limiting exposure to infected ticks (wearing appropriate clothing, use of insect repellents, etc.), by vaccination, and by appropriate preparation of milk (pasteurization, boiling). Since 1952 the commercial sale of milk in Poland is only allowed after thermal preparation. However, fresh milk is still available in local markets.[14,15]

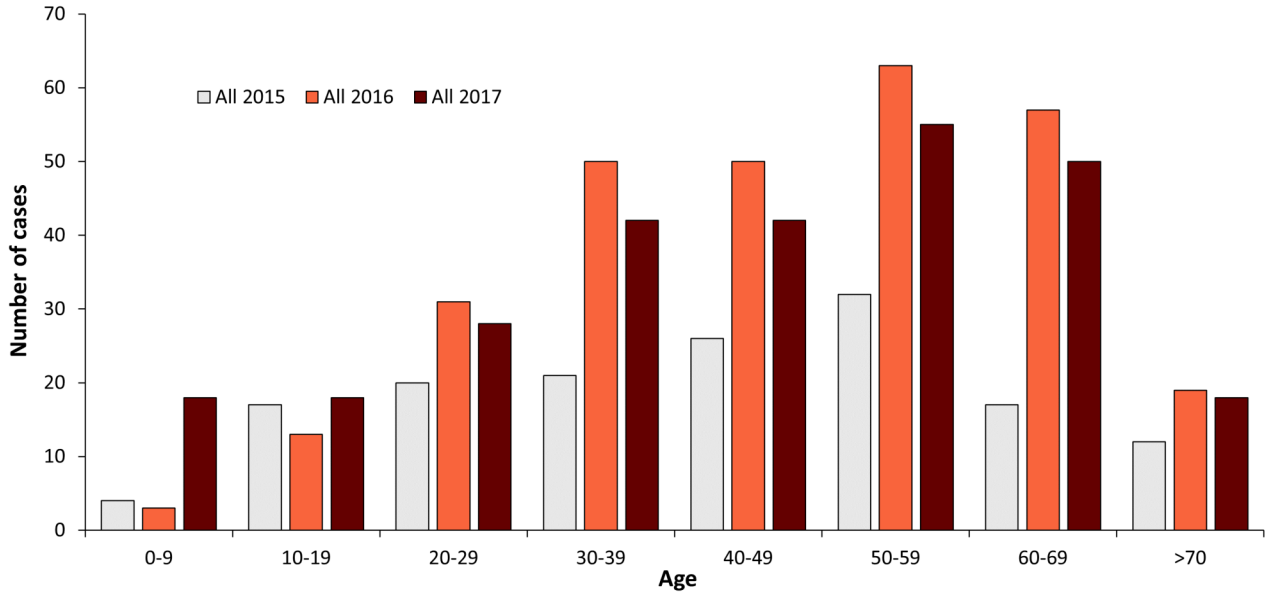
In Poland vaccination against TBEV started in the 1970s. At the beginning of this campaign, vaccination was done using the Russian (local brand name: "Vaccinum Encephalitis Ixodice"), which consisted of a formalin-inactivated TBEV-Siberian type. Since 1993 this vaccine was replaced by the two EMA-licensed vaccines with a TBEV-EU subtype as the seed virus for production (FSME-Immun (Pfizer) and Encepur (Bavarian Nordic)).[2,16–17] Both vaccines are available for use in children and adults. Vaccination against TBEV is recommended in Poland, especially for forest workers, foragers of forest undergrowth, and tourists. The costs of vaccination are not reimbursed, except through campaigns paid for by employers or local communities (medical service, forest workers etc.). In Poland, 27,849 persons were vaccinated in 2015, among them 11,516 below the age of 19 years.[18] The rather low rate of vaccination against TBE among people in Poland has no effect on the number of reported TBE cases and epidemiological characteristics of TBEV infection.

Overview of TBE in Poland

Table 1: Virus, vector, transmission of TBE in Poland

Viral subtypes, distribution	European subtype (also called Western European or Central European subtype)
Reservoir animals	Rodents, Tick[2,7]
Infected tick species (%)	*I. ricinus*, depending on region and used technique, range of "Minimum Infection Rate" from 0.00 to 1.96[3,4,7,10-12] *Dermacentor reticulatus*, depending on region and used technique, range of "Minimum Infection Rate" similar to *I. ricinus*[21-22]
Dairy product transmission	Rare (1975; 1995)[14,15]

Figure 2: Age distribution of TBE cases in Poland, 2015–2017

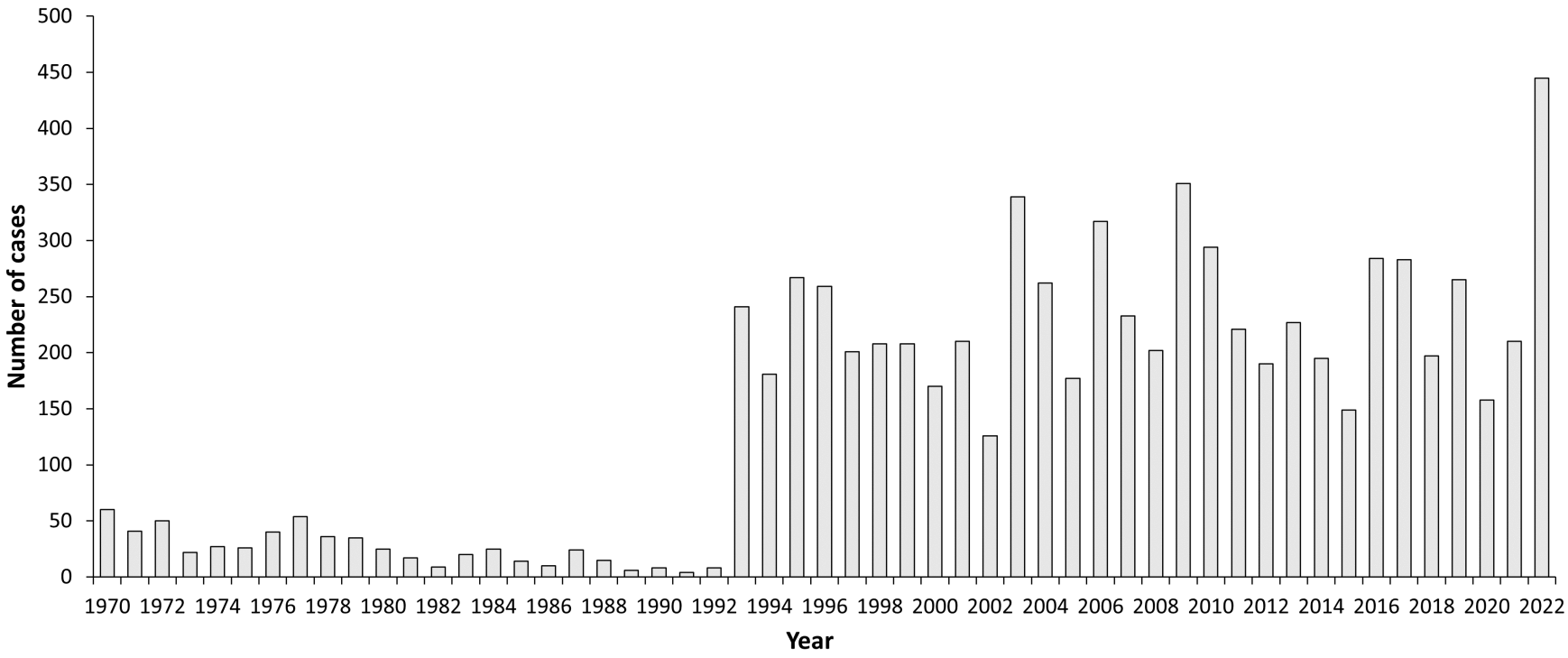


Source Data: Appendix Figure 2

Table 2: TBE reporting and vaccine prevention in Poland	
Mandatory TBE reporting	ONLY cases of neuroinfection Case definition—per ECDC (2.44)[19] **Clinical criteria**: any person with symptoms of inflammation of the central nervous system (CNS): e.g., meningitis, meningoencephalitis, encephalomyelitis, encephaloradiculitis **Laboratory criteria**: laboratory criteria for case confirmation At least 1 of the following 5 criteria: • TBE-specific IgM AND IgG antibodies in blood • TBE-specific IgM antibodies in cerebrospinal fluid (CSF) • Seroconversion or 4-fold increase of TBE-specific antibodies in paired serum samples • Detection of TBE viral nucleic acid in a clinical specimen • Isolation of TBEV from clinical specimen Laboratory criteria for a probable case: • Detection of TBE-specific IgM-antibodies in a unique serum sample • Serological results should be interpreted according to the vaccination status and previous exposure to other flaviviral infections. Confirmed cases in such situations should be validated by serum neutralization assay or other equivalent assays **Epidemiological criteria**: exposure to a common source (unpasteurized dairy products) **Case classification** • **Probable case**: any person meeting the clinical and laboratory criteria for a probable case; any person meeting the clinical criteria and with an epidemiological link • **Confirmed case**: any person meeting the clinical and laboratory criteria for case confirmation
Other TBE surveillance	Obligatory reporting by diagnostic laboratory of any positive results from serological (IgM) examination to local health service in the patient's place of residence
Special clinical features	Contact with ticks; consumption of non-pasteurized dairy products[14,15] Mortality 0.5%–2.8%[13]
Available vaccines	Since 1993: • **FSME-Immun** (manufacturer: Pfizer) in 2 formulations (adults and children <16 years of age) • **Encepur** (manufacturer: Bavarian Nordic) in 2 formulations (for adults and children 1–11 years of age).
Vaccination recommendations and reimbursement	Recommendation for additional supplementary immunization – 1970s. No reimbursement*
Vaccine uptake by age group/ risk group/general population	In 2015, 27,849 persons; among them 11,516 who are <20 years of age[18]
Name, address/website of TBE National Reference Center/	Lack of reference laboratory or center – since 2004 (due to more stable/constant disease situation)

**In Poland, vaccination against TBE is recommended (but not financed from the budget of the Ministry of Health) for persons in areas with severe occurrence of the disease, in particular:*
forest workers, foragers (e.g., persons who harvest mushrooms, berries, etc – commercially or recreationally), stationed military, guards brigade and border, farmers, young people in practice (outdoor play and recreation), tourists and visitors to camps and colonies.

Figure 1: Burden of TBE in Poland [2,13,16,18]



Source Data: Appendix Figure 1

Notes:

[a]1970: Start of registration of TBE in Poland; 1970–1984 recommended vaccination with Russian anti-TBEV Siberian type (not reimbursed)

[b]1975: Establishment of National Arbovirus Laboratory, National Institute of Public Health – National Institute of Hygiene (NIPH-NIH) and production of hemagglutination inhibition (HI) antigen for surveillance service to the end of 1984

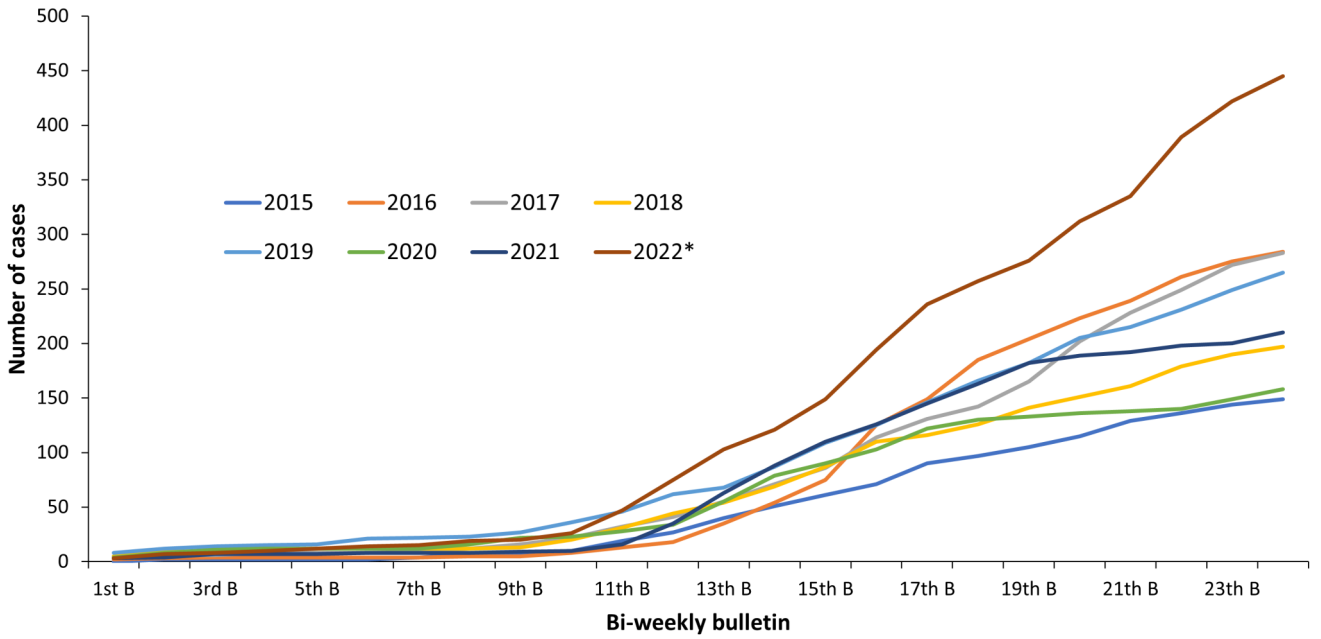
[c]Diagnostics based on ELISA method in hospital and Sanitary Service laboratories with confirmation in Reference Laboratory NIH; 1993–2003 recommended vaccination against TBEV-EU (not reimbursed)

[d]Lack of reference laboratory because of expiry of the mandate and law regulation – from that time there is no necessity to confirm positive serological results for TBEV

[e]Data for 2022 is not verified

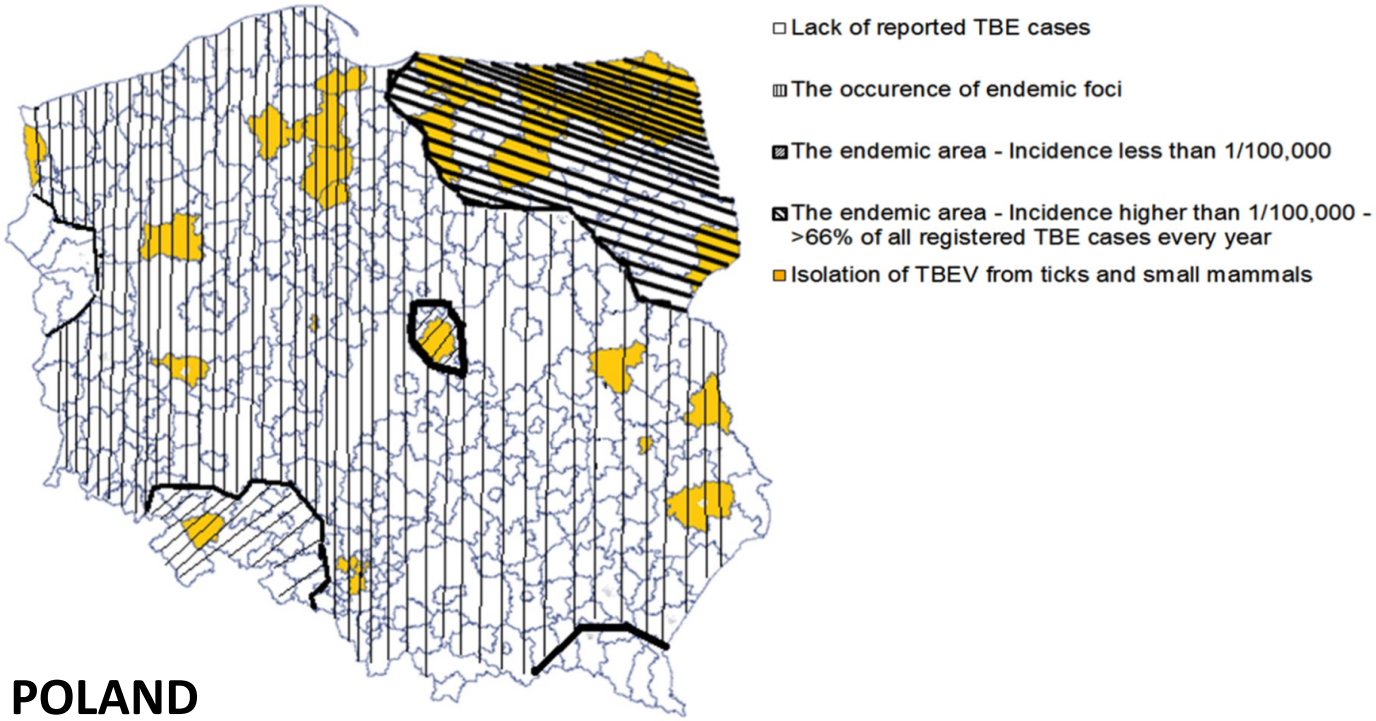
[#]From 1970 to 1985 confirmation based on HI test; since 1993, IgM ELISA for confirmation (and local synthesis of TBEV-specific IgG in CSF)

Figure 3: The cumulative number of reported TBE cases in Poland by bi-weekly period (B)



*Data is not verified

Figure 4: TBEV-isolation and TBE cases in Poland[3–4,6–7,9–12]



Appendix

Source data: Figure 1

Year	Number of TBE cases	TBE incidence /10^5
1970[a]	60	0.15
1971	41	0.10
1972	50	0.125
1973	22	0.05
1974	27	0.07
1975[b]	26	0.07
1976	40	0.10
1977	54	0.14
1978	36	0.10
1979	35	0.09
1980	25	0.06
1981	17	0.04
1982	9	0.007
1983	20	0.045
1984	25	0.05
1985[#]	14	0.03
1986	10	0.02
1987	24	0.06
1988	15	0.03
1989	6	0.04
1990	8	0.006
1991	4	0.003
1992	8	0.006
1993[c]	241	0.63
1994	181	0.47
1995	267	0.70
1996	259	0.69
1997	201	0.53
1998	208	0.54
1999	208	0.54
2000	170	0.44
2001	210	0.54
2002	126	0.33
2003[d]	339	0.89
2004	262	0.69
2005	177	0.46
2006	317	0.83
2007	233	0.61
2008	202	0.53
2009	351	0.92
2010	294	0.77
2011	221	0.57
2012	190	0.49
2013	227	0.59
2014	195	0.51
2015	149	0.39
2016	284	0.74
2017	283	0.74
2018	197	0.51
2019	265	0.69
2020	158	0.42
2021	210	0.56
2022[e]	445	1.18

Notes:

[a] 1970: Start of registration of TBE in Poland; 1970–1984 recommended vaccination with Russian anti-TBEV Siberian type (not reimbursed)

[b] 1975: Establishment of National Arbovirus Laboratory, National Institute of Public Health – National Institute of Hygiene (NIPH-NIH) and production of hemagglutination inhibition (HI) antigen for surveillance service to the end of 1984

[c] Diagnostics based on ELISA method in hospital and Sanitary Service laboratories with confirmation in Reference Laboratory NIH; 1993–2003 recommended vaccination against TBEV-EU (not reimbursed)

[d] Lack of reference laboratory because of expiry of the mandate and law regulation – from that time there is no necessity to confirm positive serological results for TBEV

[e] Data for 2022 is not verified

[#] From 1970 to 1985 confirmation based on HI test; since 1993, IgM ELISA for confirmation (and local synthesis of TBEV-specific IgG in CSF)

Source data: Figure 2

Age group (years)	Males	Females	All 2015	All 2016	All 2017
0-9	-	-	4	3	18
10-19	-	-	17	13	18
20-29	-	-	20	31	28
30-39	-	-	21	50	42
40-49	-	-	26	50	42
50-59	-	-	32	63	55
60-69	-	-	17	57	50
>70	-	-	12	19	18

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