Chapter 12b

TBE in Estonia

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

History and current situation

The first cases of tick-borne encephalitis (TBE) in Estonia were identified in 1949. Today, Estonia is a TBE-endemic country. A TBE-endemic area in Estonia is defined as an area with circulation of the TBEV between ticks and vertebrate hosts as determined by detection of the TBEV or the demonstration of autochthonous infections in humans or animals within the last 20 years.

Euro-Asian genotypes of TBEV – the Western or European (TBEV-EU), Siberian (TBEV-Sib), and Far-Eastern (TBEV-FE) subtypes are co-circulating in Estonia. Vectors of TBEV, the tick species *Ixodes ricinus* and *Ixodes persulcatus*, are distributed throughout the country.

The high-risk season for infection coincides with the period of biological activity of ticks and lasts for 7 months from April to November, peaking in June to August.

Most TBE cases are diagnosed in persons ≥60 years of age and the incidence among the rural population is 1.8 times higher than among the urban population.

Overview of TBE in Estonia

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

Viral subtypes, distribution	Co-circulation of European (TBEV-EU), Far-Eastern (TBEV-FE), and Siberian (TBEV-Sib) subtypes
Reservoir animals	Rodents, ruminants, game
Infected tick species (%)	*I. persulcatus* 3.8%, *I. ricinus* on mainland 0.6%–0.8% and on Saaremaa island 3.0% (data from 2011)
Dairy product transmission	Documented but rare

Table 2: TBE reporting and vaccine prevention in Estonia

<table>
<tr><td>Mandatory TBE reporting</td><td>Reporting: neurologists, infectious disease specialist

Case definition
Clinical criteria: a person with symptoms of the central nervous system (meningitis, meningoencephalitis, encephalomyelitis, encephaloradiculitis)

Laboratory criteria for case confirmation:
At least 1 of the following:
• TBE-specific IgM and IgG antibodies in blood
• TBE-specific IgM antibodies in CSF
• Seroconversion of 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 specimens. Probable case: detection of TBE-specific IgM antibodies in a unique serum sample

Epidemiological criteria
Exposure to a common source (unpasteurized dairy product).
Case classification:
• Possible case: not applicable
• Probable case: a person meeting the clinical criteria and the laboratory criteria for a probable case OR a person meeting the clinical criteria and with an epidemiological link
• Confirmed case: a person meeting the clinical and laboratory criteria for case confirmation</td></tr>
<tr><td>Other TBE surveillance</td><td>Laboratory and epidemiological surveillance</td></tr>
<tr><td>Special clinical features</td><td>Biphasic disease: meningitis, meningoencephalitis, or meningoencephalomyelitis.
Risk groups: people who often spend time outdoors (in nature)</td></tr>
<tr><td>Available vaccines</td><td>TBE vaccination by age groups in Estonia, 2018–2021

<table>
<tr><th></th><th>1–14 years</th><th>15–17 years</th><th>Adults</th><th>Population (Estonia)</th></tr>
<tr><td>2018</td><td></td><td></td><td></td><td>1,319,133</td></tr>
<tr><td>Vaccination</td><td>5,717</td><td>1,123</td><td>10,567</td><td></td></tr>
<tr><td>Revaccination</td><td>4,374</td><td>1,618</td><td>17,997</td><td></td></tr>
<tr><td>2019</td><td></td><td></td><td></td><td>1,324,820</td></tr>
<tr><td>Vaccination</td><td>8,253</td><td>897</td><td>16,817</td><td></td></tr>
<tr><td>Revaccination</td><td>4,181</td><td>1,324</td><td>17,856</td><td></td></tr>
<tr><td>2020</td><td></td><td></td><td></td><td>1,328,889</td></tr>
<tr><td>Vaccination</td><td>8,344</td><td>845</td><td>16,033</td><td></td></tr>
<tr><td>Revaccination</td><td>3,716</td><td>1,295</td><td>14,767</td><td></td></tr>
<tr><td>2021</td><td></td><td></td><td></td><td>1,330,068</td></tr>
<tr><td>Vaccination</td><td>5,409</td><td>630</td><td>11,024</td><td></td></tr>
<tr><td>Revaccination</td><td>2,962</td><td>875</td><td>13,308</td><td></td></tr>
</table>
Vaccines available: ENCEPUR CHILDREN and ENCEPUR ADULTS, FSME-IMMUN and FSME-IMMUN Junior</td></tr>
<tr><td>Vaccination recommendations and reimbursement</td><td>Vaccination recommendations 1998. No reimbursement; self-paid</td></tr>
<tr><td>Vaccine uptake by age group/risk group/general population</td><td>Vaccine uptake by general population (vaccinated and revaccinated): 2018 – 3.1%; 2019 – 3.7%; 2020 – 3.4%; 2021 – 2.6%</td></tr>
<tr><td>Name, address/website of TBE NRC</td><td>Institute for Health Development, Lab for Virology
http://www.tai.ee/en/about-us/national-institute-for-health-development</td></tr>
</table>

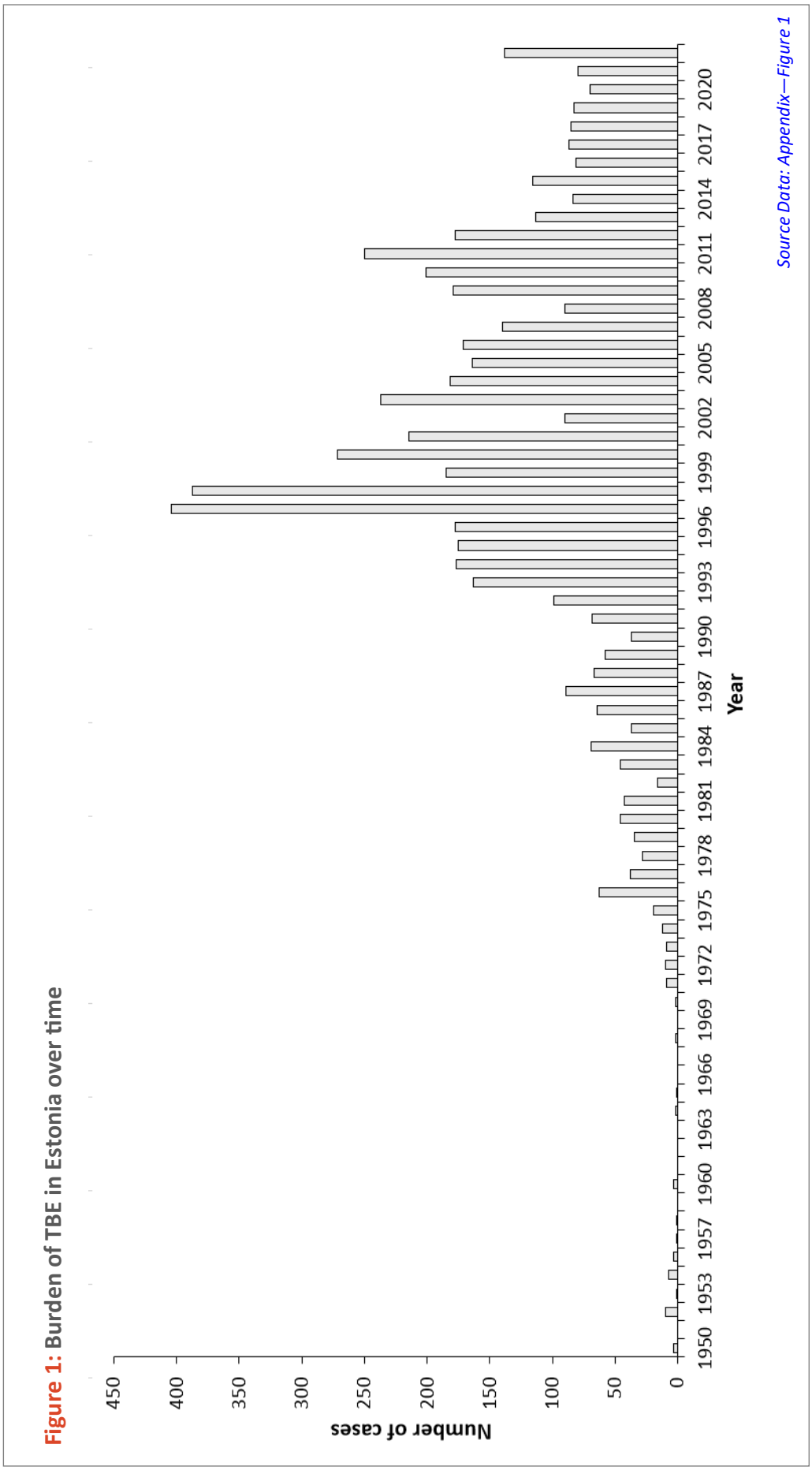
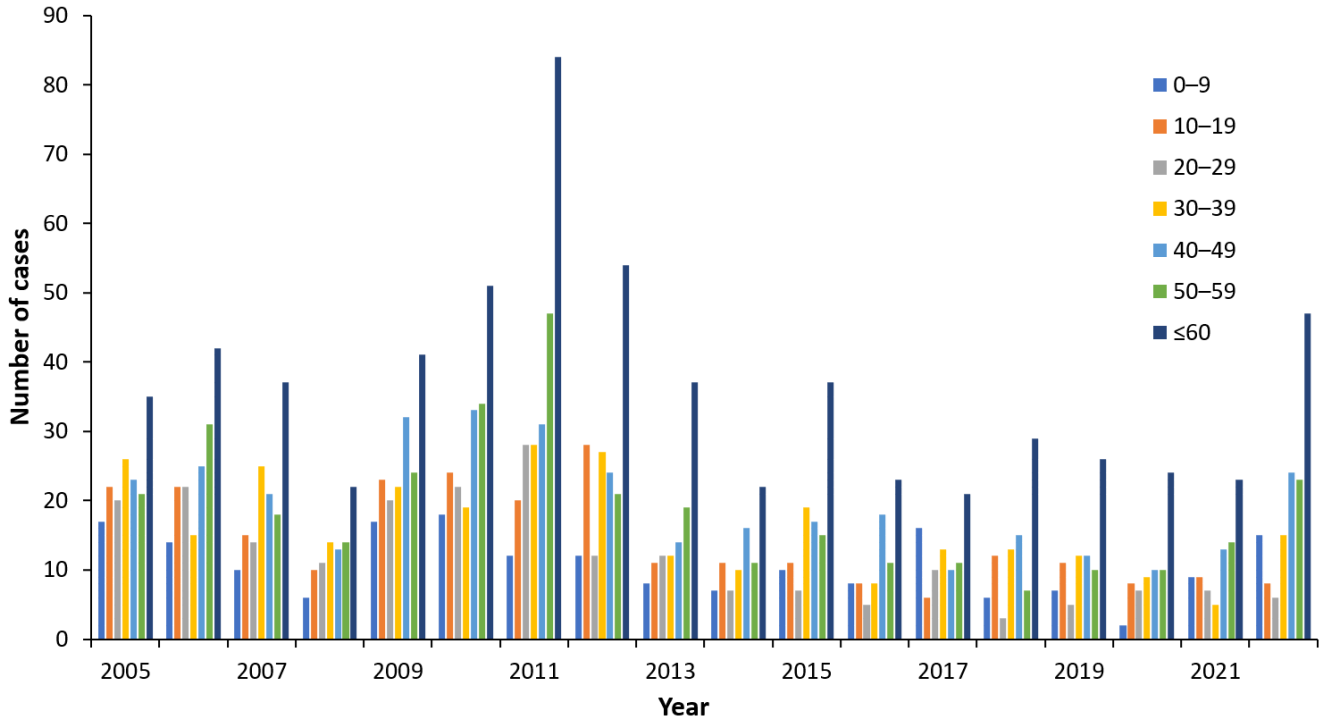


Figure 1: Burden of TBE in Estonia over time

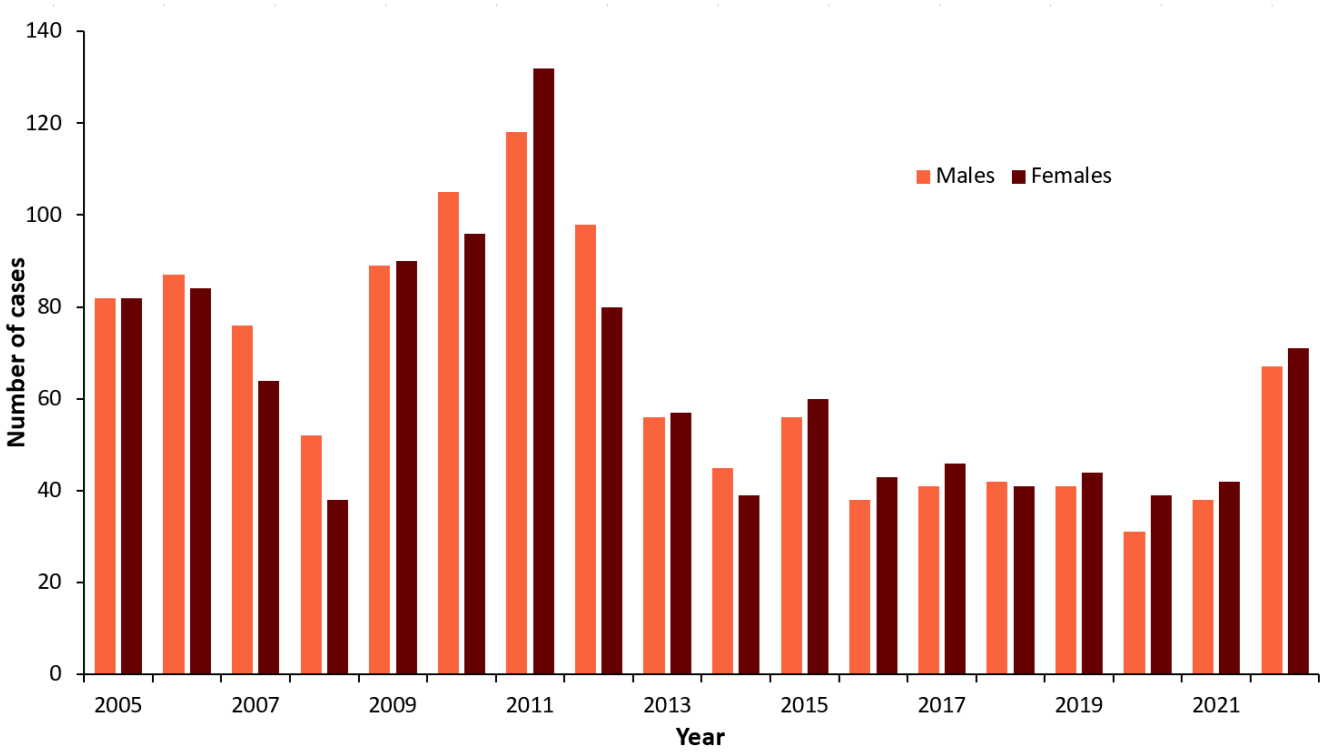
Source Data: Appendix—Figure 1

Figure 2: Age distribution of TBE in Estonia, 2005–2022



Source Data: Appendix—Figure 2

Figure 3: Gender distribution of TBE in Estonia, 2005–2022



Source Data: Appendix—Figure 3

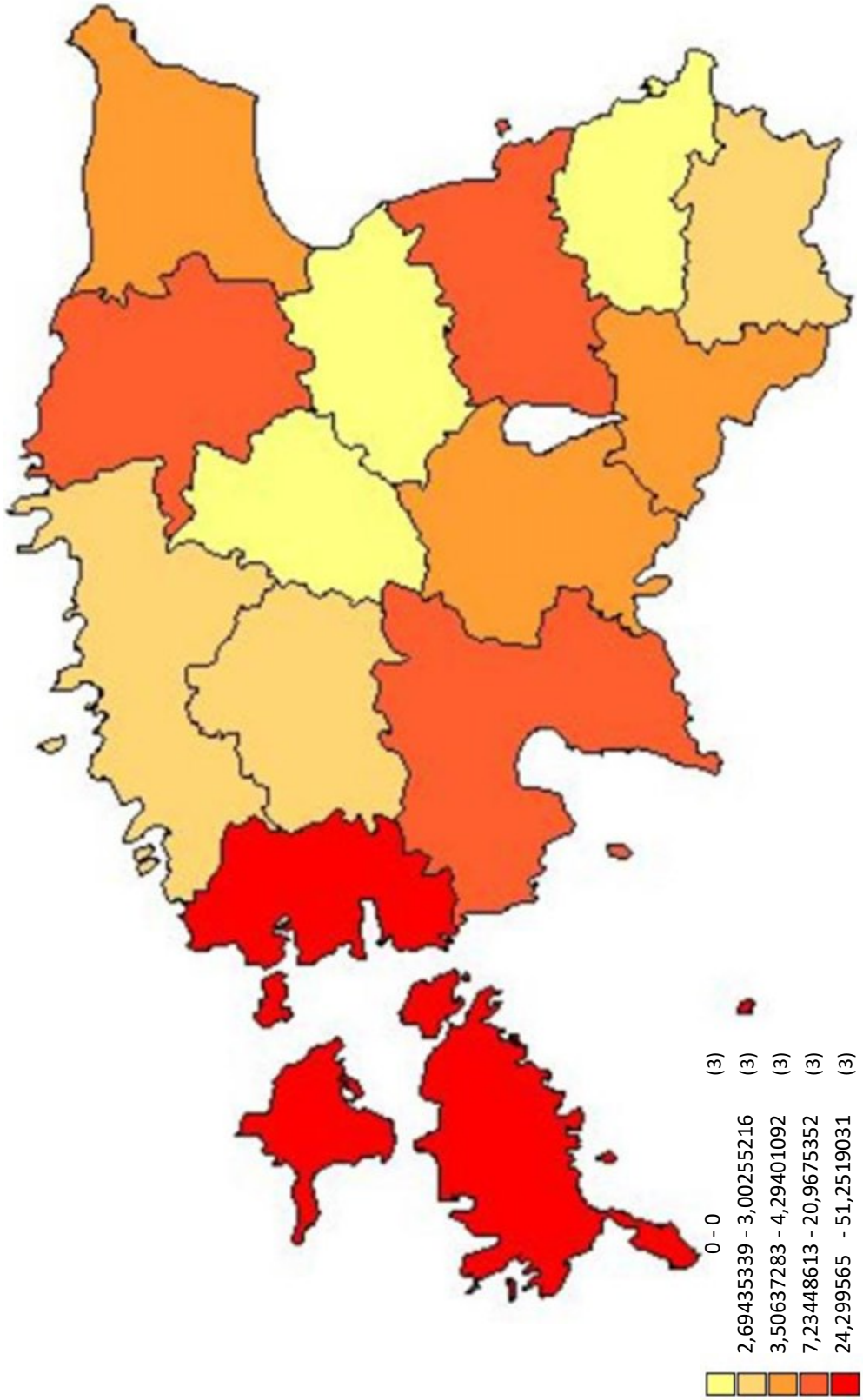


Figure 4: TBEV-isolation and TBE cases, 2018

Source Data: Appendix—Figure 4

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Citation:
Kutsar K. TBE in Estonia. Chapter 12b. In: Dobler G, Erber W, Bröker M, Schmitt HJS, eds. *The TBE Book*. 6th ed. Singapore: Global Health Press;2023. doi:10.33442/26613980_12b10-6

Appendix

Source data: Figure 1

Year	Number of TBE cases	TBE incidence /10^5
1950	3	0.3
1951	0	0
1952	10	0.9
1953	1	0.1
1954	7	0.6
1955	3	0.3
1957	1	0.1
1958	1	0.1
1959	0	0
1960	3	0.2
1961	0	0
1962	0	0
1963	0	0
1964	2	0.2
1965	1	0.1
1966	0	0
1967	0	0
1968	2	0.2
1969	0	0
1970	2	0.2
1971	9	0.7
1972	10	0.7
1973	9	0.7
1974	12	0.8
1975	19	1.3
1976	63	4.4
1977	38	2.6
1978	28	1.9
1979	35	2.4
1980	46	3.1
1981	43	2.9
1982	16	1.1
1983	46	3.0
1984	69	4.5
1985	37	2.4
1986	64	4.1

Year	Number of TBE cases	TBE incidence /10^5
1987	89	5.7
1988	67	4.3
1989	58	3.7
1990	37	2.3
1991	68	4.4
1992	99	6.5
1993	163	10.8
1994	177	11.8
1995	175	11.8
1996	178	12.1
1997	404	27.8
1998	387	27.0
1999	185	12.8
2000	272	19.8
2001	215	15.8
2002	90	6.6
2003	237	17.5
2004	182	13.5
2005	164	12.2
2006	171	12.7
2007	140	10.4
2008	90	6.7
2009	179	13.3
2010	201	15.0
2011	250	18.7
2012	178	13.3
2013	113	8.4
2014	84	6.5
2015	116	8.8
2016	81	6.2
2017	87	6.6
2018	85	6.5
2019	83	6.3
2020	70	5.3
2021	80	6.0
2022	138	10.4

Source data: Figure 2

Year	Vanusrühmad (aastates) / Age groups (years)						
	0-9	10-19	20-29	30-39	40-49	50-59	60≤
2005	17	22	20	26	23	21	35
2006	14	22	22	15	25	31	42
2007	10	15	14	25	21	18	37
2008	6	10	11	14	13	14	22
2009	17	23	20	22	32	24	41
2010	18	24	22	19	33	34	51
2011	12	20	28	28	31	47	84
2012	12	28	12	27	24	21	54
2013	8	11	12	12	14	19	37
2014	7	11	7	10	16	11	22
2015	10	11	7	19	17	15	37
2016	8	8	5	8	18	11	23
2017	16	6	10	13	10	11	21
2018	6	12	3	13	15	7	29
2019	7	11	5	12	12	10	26
2020	2	8	7	9	10	10	24
2021	9	9	7	5	13	14	23
2022	15	8	6	15	24	23	47

Source data: Figure 3

Year	Males	Females
2005	82	82
2006	87	84
2007	76	64
2008	52	38
2009	89	90
2010	105	96
2011	118	132
2012	98	80
2013	56	57

Year	Males	Females
2014	45	39
2015	56	60
2016	38	43
2017	41	46
2018	42	41
2019	41	44
2020	31	39
2021	38	42
2022	67	71

Source data: Figure 4

District	2005		2006		2007		2008		2009	
	No. of cases	Incidence /10^5	No. of cases	Incidence /10^5	No. of cases	Incidence /10^5	No. of cases	Incidence /10^5	No. of cases	Incidence /10^5
Tallinn (capital)	56	14.1	21	5.3	24	6.1	14	3.5	23	5.8
Lääne-Virumaa	2	3.0	9	13.5	2	2.9			4	5.9
Harjumaa	27	21.6	4	3.2	10	8.0	6	4.8	9	7.1
Hiiumaa	2	19.4	1	9.3	2	19.6	5	47.6	2	19.8
Ida-Virumaa	11	10.5	23	22.1	9	8.7	1	1.0	7	6.9
Järvamaa			2	5.2	1	2.7	2	5.5		
Jõgevamaa			7	18.7	2	5.4			6	16.3
Läänemaa	3	10.7	2	7.2	2	6.9	5	18.0	1	3.6
Narva	9	12.8	10	14.3	5	7.2	3	4.3	19	27.5
Pärnumaa	15	16.7	23	25.7	21	23.5	19	21.3	30	33.9
Põlvamaa	6	18.8	1	3.2	1	3.2	5	16.0	2	6.4
Raplamaa			2	5.4			1	2.7	1	2.7
Saaremaa	14	39.6	10	28.4	29	82.7	14	40.0	22	63.1
Tartumaa	17	11.4	31	20.8	20	13.4	10	6.7	35	23.4
Valgamaa	1	2.9	7	20.1			3	8.7	5	14.6
Viljandimaa	1	1.8	1	1.8	7	12.4	1	1.8	9	16.1
Võrumaa			17	44.0	5	13.0	1	2.6	4	10.5
Total	**164**	**12.2**	**171**	**12.7**	**140**	**10.4**	**90**	**6.7**	**179**	**13.3**

District	2010		2011		2012		2013		2014	
	No. of cases	Incidence /10^5	No. of cases	Incidence /10^5	No. of cases	Incidence /10^5	No. of cases	Incidence /10^5	No. of cases	Incidence /10^5
Tallinn (capital)	23	5.8	25	6.3	26	6.5	20	4.9	16	3.9
Harjumaa	13	10.3	24	18.9	12	9.3	16	9.9	10	6.2
Hiiumaa	4	39.6	8	79.7	2	20.0	3	34.7	4	46.6
Ida-Virumaa	8	7.9	6	6.0	6	6.1	0	0.0	3	3.4
Järvamaa	2	5.5	2	5.5	2	5.6	0	0.0		
Jõgevamaa	9	24.5	2	5.5	5	13.7	3	9.5	1	3.2
Läänemaa	2	7.3	15	54.8	3	11.0	2	8.1	2	8.2
Lääne-	4	6.0	4	6.0	3	4.5	4	6.6	3	5.0
Narva	16	23.3	11	16.1	11	16.2	2	3.2	1	1.6
Pärnumaa	39	44.1	45	50.9	35	39.7	27	30.6	10	12.3
Põlvamaa	9	29.0	9	29.1	5	16.3	2	7.2	1	3.6
Raplamaa	2	5.5	6	16.4	5	13.7	0	0.0	7	20.2
Saaremaa	15	43.2	51	147.2	21	60.8	9	28.3	14	44.1
Tartumaa	27	18.0	17	11.3	24	15.9	16	10.5	7	4.6
Valgamaa	7	20.5	8	23.5	2	5.9	3	9.8	1	3.3
Viljandimaa	10	18.0	9	16.2	5	9.1	1	2.1	4	8.4
Võrumaa	11	29.0	8	21.2	11	29.4	5	14.8		
Total	**201**	**15.0**	**250**	**18.6**	**178**	**13.3**	**113**	**8.4**	**83**	**6.3**

District	2015		2016		2017		2018	
	No. of cases	Incidence /10^5	No. of cases	Incidence /10^5	No. of cases	Incidence /10^5	No. of cases	Incidence /10^5
Tallinn (capital)	23	5.6	20	4.7	27	6.4	12	2.8
Harjumaa	19	11.8	10	6.5	10	6.5	4	2.6
Hiiumaa	6	69.9	1	10.7	2	21.4	3	32.1
Ida-Virumaa	1	1.1	3	3.5	2	2.3	3	3.8
Järvamaa	1	3.3			1	3.3		
Jõgevamaa	3	9.6			1	3.2		
Läänemaa	4	16.4	1	4.1	2	8.1	5	24.1
Lääne-Virumaa	7	11.7			1	1.7	5	8.3
Narva	5	8.1	2	3.3	3	4.9	2	3.2
Pärnumaa	15	18.1	14	16.9	11	13.3	18	20.9
Põlvamaa	1	3.6	2	7.1	1	3.5		
Raplamaa			1	2.9			1	3.0
Saaremaa	7	22.0	10	29.9	19	56.7	17	51.0
Tartumaa	16	10.5	12	8.3	6	4.1	11	7.4
Valgamaa					1	3.3	1	3.4
Viljandimaa	3	6.3	2	4.2			2	4.2
Võrumaa	5	15.0	3	8.8			1	2.7
Total	**116**	**8.8**	**81**	**6.2**	**87**	**6.6**	**85**	**6.5**

District	2019		2020		2021		2022	
	No. of cases	Incidence /10^5	No. of cases	Incidence /10^5	No. of cases	Incidence /10^5	No. of cases	Incidence /10^5
Tallinn (capital)	16	3.7	6	1.4	10	2.3	33	7.5
Harjumaa	11	6.9	5	3.1	8	4.8	15	2.4
Hiiumaa	9	95.9	0	0.0	0	0.0	3	35.3
Ida-Virumaa			0	0.0	1	1.3		
Järvamaa	1	3.3	0	0.0	1	3.3		
Jõgevamaa	1	3.4	0	0.0	0	0.0	3	10.8
Läänemaa	1	4.8	2	9.7	4	19.6	1	4.9
Lääne-Virumaa	3	5.0	4	6.7	3	5.1	6	10.2
Narva	2	3.3						
Pärnumaa	12	14.0	12	14.0	12	13.9	27	31.5
Põlvamaa	3	11.9	6	23.7	3	12.2	7	29.2
Raplamaa	2	6.0	2	6.0	3	9.0	3	8.9
Saaremaa	8	24.1	12	36.1	9	27.2	12	38.3
Tartumaa	4	2.6	11	7.3	19	12.4	12	7.6
Valgamaa	1	3.5	3	10.5	1	3.5	1	3.6
Viljandimaa	5	10.7	5	10.7	2	4.3	7	15.4
Võrumaa	4	11.1	1	2.8	4	11.3	5	14.6
Total	**83**	**6.3**	**70**	**5.3**	**80**	**6.0**	**138**	**10.4**

References

1. Republic of Estonia Health Board. [website] https://www.terviseamet.ee/en. *Immunoprophylaxis of communicable diseases 2017-2019*. Accessed February 21, 2020

2. Katargina O, Russakova S, Geller J et al. Detection and characterization of tick-borne encephalitis virus in Baltic countries and Eastern Poland. *PLoS One*. 2013:8(5):e61374