

TBE in Latvia

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

History and current situation

Aggregated data on TBE cases in Latvia are available from 1955,¹ but serological testing for TBE began in the 1970s.² Since TBE became notifiable in Latvia, epidemiological changes of disease incidence have been dramatic. Between 1990–2000 Latvia had the highest rates of TBE incidence in the world, ranging from 8 to 53 cases per 100,000 population.² Although the incidence decreased significantly in the past 10 years to about half – from 14.58/100,000 in 2010 to 7.86/100,000 in 2018 – Latvia still ranks very high among all countries in Europe with an annual incidence of 12.67/100,000 in 2022. The distribution of TBE cases in Latvia varies between different regions with the highest incidence usually registered near the northwestern coast.

The Centre for Disease Prevention and Control (CDPC) of Latvia is the governmental institution that provides TBE surveillance in Latvia. Based on national legislation, there is countrywide mandatory but passive case-based reporting, guided by case definition of the European Centre for Disease Prevention and Control (ECDC) since 2012. Adoption of the standardized European case definition for TBE ensures a more specific capture of TBE cases as well as the impact by vaccination.

The main vectors of the TBE virus in Latvia are ticks of the family Ixodidae, mainly *Ixodes ricinus* and *Ixodes persulcatus* in the eastern part of the country.³ All three main TBEV subtypes are carried by ticks in Latvia – the European, Siberian and Far-Eastern subtype.^{4,5,6}

Epidemiological investigations suggests that in Latvia, ticks carry a higher TBEV load than in other at-risk countries, and moreover, up to 20%–40% of ticks are infected in highly endemic areas.⁷ Latvia also has one the highest reported rates of TBEV transmission via unpasteurized dairy products, mainly goat milk,² which accounts for 0.5%–3.5% of all cases (2011–2019).

The largest recent study of the epidemiology of TBE in Latvia documents on a population basis with active case search in hospitals that mostly persons in the age group 18–59 years are affected, mostly males. This is in line with the general risk factors for TBE, i.e., active lifestyle with increased outdoor activities, travelling, and other factors that increase the risk of tick-human contact.⁸ Children (0–17 years) in Latvia make up only 5.6% of all TBE cases.

The most common clinical manifestation of TBE was meningitis, with the highest number of cases in the age group 18–59 years. For children, meningitis was also the most frequent cause of hospitalization.⁹ Compared to other age groups, more severe TBE clinical forms (meningo-encephalitis, etc.) were mainly reported among the age group >60 years.

Vaccination remains the most effective protective measure against TBE.^{10,11,12} In Latvia, there is only a partial National Immunization Program, which has provided vaccine free of charge for children living in highly endemic areas since 2006 and orphans/children without parental care in the whole country since 2010. Vaccination is mandatory for employees with a high risk of occupational exposure, such as forest workers, military personnel, and lab workers and it is paid by the employer. For other residents of Latvia and travelers, vaccination is strongly recommended but not reimbursed; however, most private insurance companies cover TBE vaccine expenses.^{13,14} Because of the National Immunization Program for children, TBE vaccine uptake in children reached up to 77% in highly endemic areas and 22% nationwide, reducing the proportion of TBE cases among children from 12.5% in 2001 to 3.6% in 2010¹⁵ and 2016. Vaccine uptake in the whole population was 39% in 2009¹⁵ and it increased to 52.5% in 2015.¹⁶

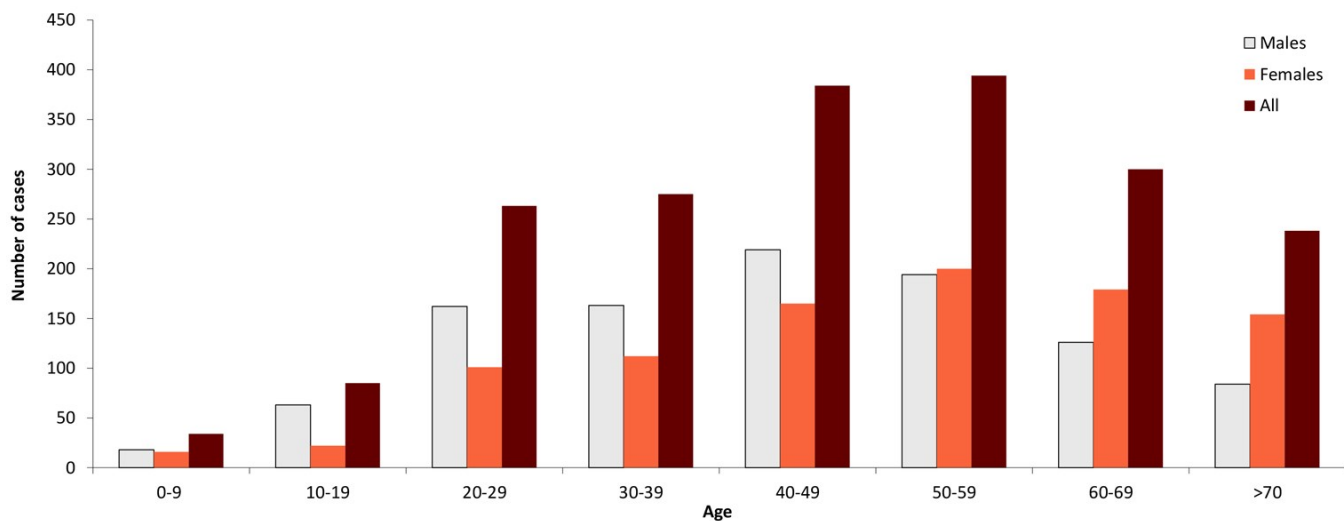
Currently used vaccines in Latvia are *FSME-Immun*[®] (*TicoVac*, used since 1995) and *Encepur*[®] (since 2001 for adults and 2002 for children). *FSME-Immun*[®] is the most commonly used TBE vaccine in Latvia, with an up to 86% market share in those who had received at least one dose where the brand administered was captured.¹⁷ In the future, uptake data need to be carefully monitored in order to explain epidemiological findings.

Overview of TBE in Latvia

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

Viral subtypes, distribution	In Latvia, all 3 main TBEV sub-types circulate: European, Siberian, and Far Eastern In Latvia 1-96 is a close relative to the Vasilchenko strain (Siberian sub-type), and RK1424 is related to the Sofjin strain (Far Eastern sub-type). ^{4,5,6}
Reservoir animals	Among the small rodents identified in the most long-term <i>I. ricinus</i> monitoring site (Riga region) in 1997–2001 were <i>Clethrionomys glareolus</i> (85%), followed by <i>Sorex araneus</i> , <i>Apodemus flavicollis</i> , and <i>Apodemus agrarius</i> . ¹⁹
Infected tick species (%)³	<i>Ixodes ricinus</i> ticks are spread in the western and central part of Latvia, and in small numbers also in the eastern part of the country. <i>Ixodes persulcatus</i> dominates only in the eastern part of the country, comprising 58%–99% of all collected ticks. Earlier data reveals that TBEV annual prevalence from 1993 to 2002 in the field-collected adults for <i>I. ricinus</i> adults varied between 1.7% and 26.6% and for <i>I. persulcatus</i> – between 0% and 37.3%. The infection level in ticks removed from humans was much higher and from 1998 to 2002 reached about 30%. ^{3,6,7}
Dairy product transmission	Rare

Figure 2: Age and gender distribution of TBE in Latvia (2007–2016, n=1973)⁸

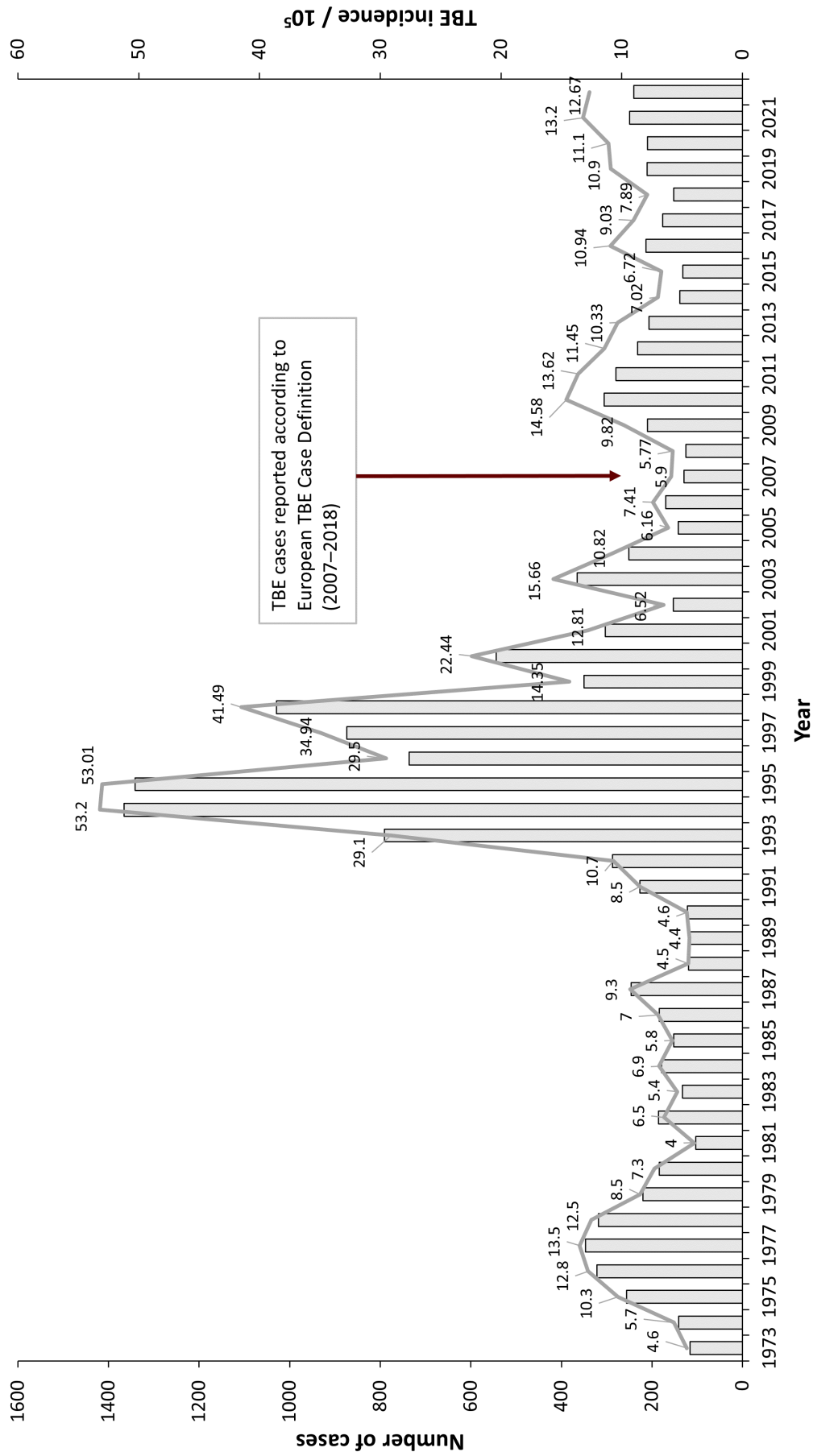


Source Data: Appendix Figure 2

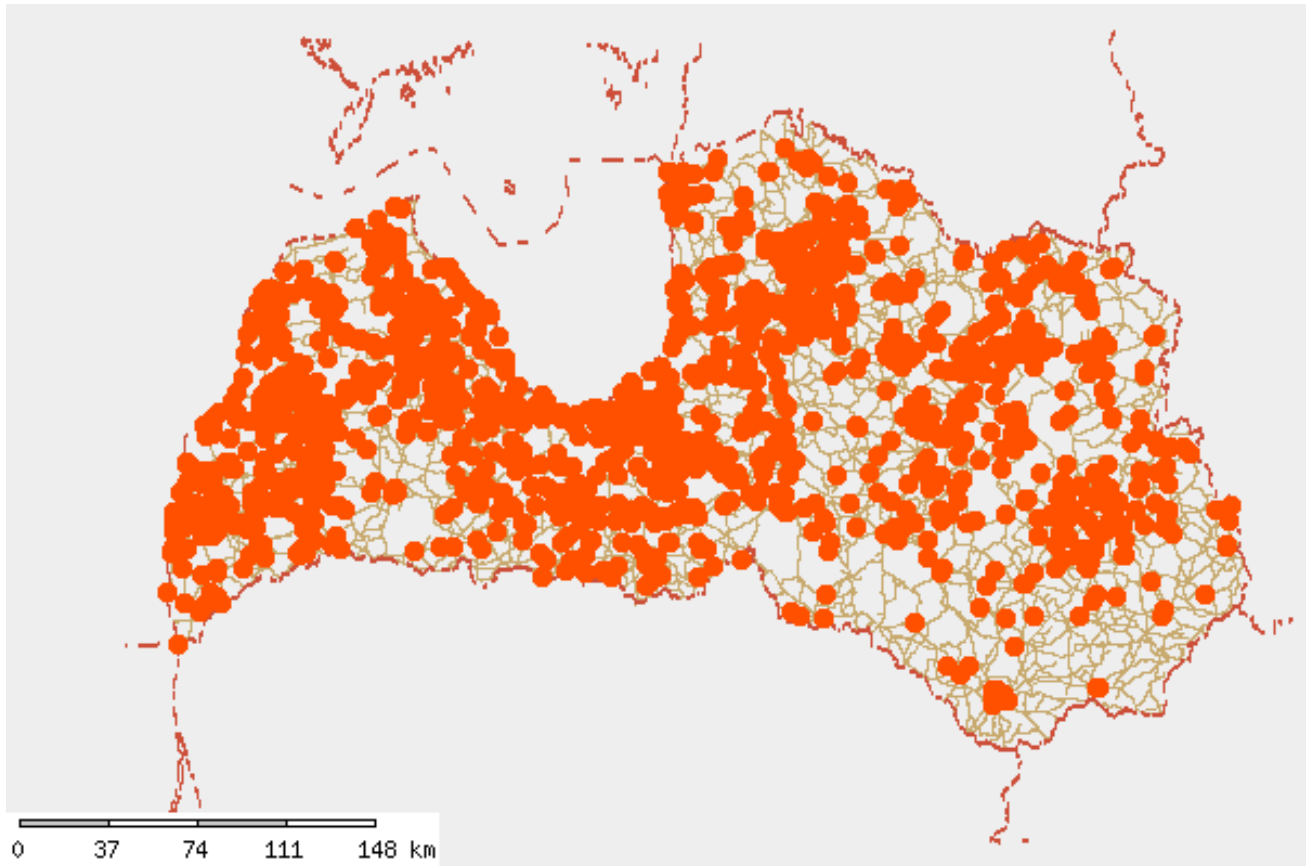
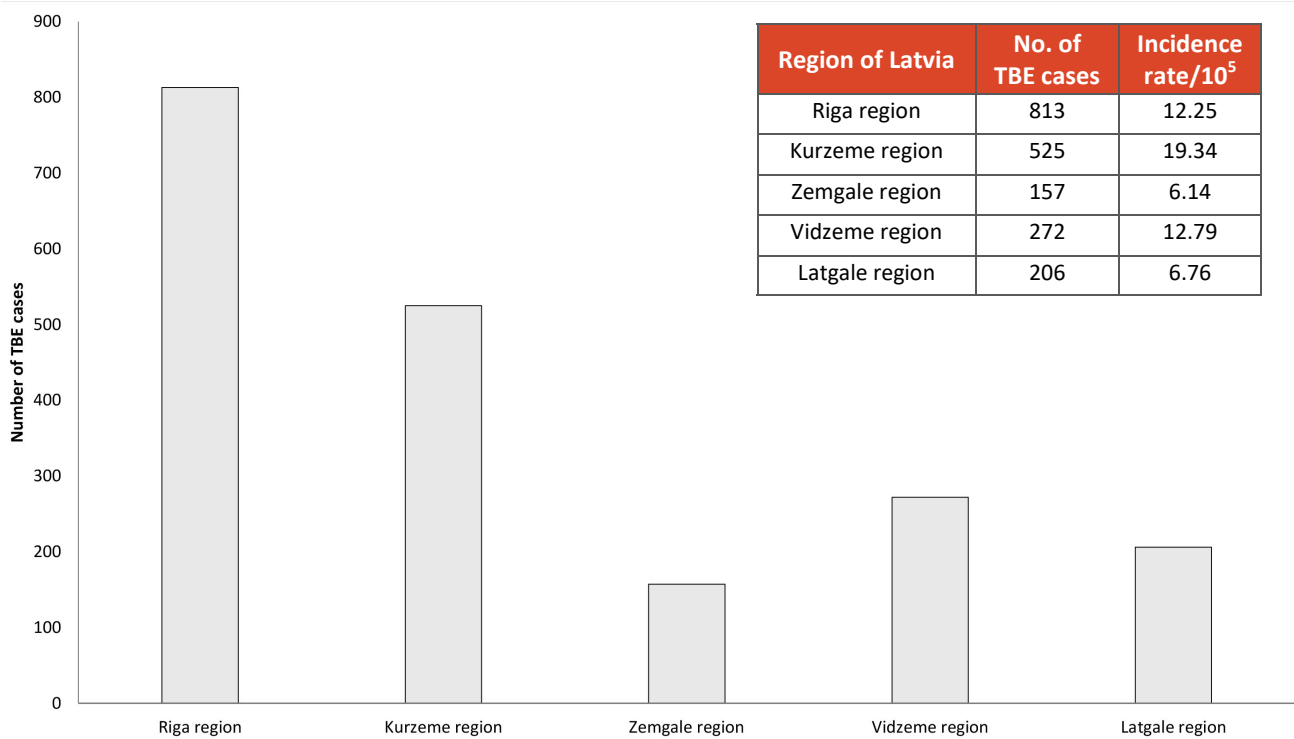
Table 2: TBE reporting and vaccine prevention in Latvia

Mandatory TBE reporting ^{3,20}	<p>Mandatory notification since 1955.</p> <p>Based on national legislation, there is countrywide mandatory case-based passive reporting and the European Centre for Disease Prevention and Control (ECDC) case definition for TBE was adapted in Cabinet Regulations in 2012. Aggregated data on TBE cases are available from 1955 and case-based data in electronic format are available from 2007.</p> <p>Prior to 2012, the case definition of TBE in Latvia included (1) hospitalization because of central nervous system disease and (2) confirmation of infection with TBE virus by laboratory diagnosis, usually by the demonstration of specific IgM antibodies by ELISA.</p>
Other TBE surveillance	None
Special clinical features	<p>Study done in Children's Clinical university hospital reveals that Biphasic fever course was presented in 50% (n=41) of children treated in the hospital between 2000–2015.⁹</p> <p>Annual mortality varies from 0% to 1.3% (1973–2009) and is not related to the overall incidence of TBE. Follow-up for 1–13 years of a cohort of 100 patients revealed long-term sequelae in over 50%, more commonly in those suffering focal forms of acute TBE.³</p>
Available vaccines ^{21,22}	<p>TicoVac (0.25 and 0.5 ml) since 1995 (FSME-Immun)</p> <ul style="list-style-type: none"> • Encepur adults since 2001 <ul style="list-style-type: none"> - Delivery interruption – 12/2012 till 03/2014, therefore sold fewer doses • Encepur Children since 2002 <ul style="list-style-type: none"> - Delivery interruption – 04/2013 till 09/2014, therefore sold fewer doses
Vaccination recommendations and reimbursement ^{16,23}	<p>There is only a partial National Immunization Program in place which recommends vaccination for children and adolescents living in endemic areas since 2007 and has provided vaccine free of charge for children living in highly endemic areas since 2006 and orphans/children without parental care in the whole country since 2010. Vaccination is mandatory for high risk groups and/or those with high occupational exposure such as forest workers, military personnel, and lab workers and is paid by the employer. Vaccination is also recommended, but not reimbursed for adults.</p> <p>Also most insurance companies covers TBE vaccination costs.</p> <p>(https://likumi.lv/doc.php?id=11215 Cabinet Regulations Nr.330. Vaccination regulations)</p>
Vaccine uptake by age group/risk group/general population ^{17,23}	<p>The vaccination uptake overall was 53% in 2015.*</p> <p>In Latvia, approximately 22% of children had been vaccinated by the end of 2010, most (77%) of whom were living in highly endemic areas, the cost of which was reimbursed by the state. The vaccination rate for the national population was 39% in 2009 and 41% in 2010.</p>
Name, address/website of TBE NRC	<p>Center of Disease Prevention and Control of Latvia www.spkc.gov.lv Dunties iela 22, k-5, Rīga, Latvija, LV 1005</p> <p><i>Diagnostics:</i> Latvian Centre of Infectious Diseases (Latvijas Infektoloģijas centrs) of the Riga East University Hospital: https://www.aslimnica.lv/en/saturs/latvian-centre-infectious-diseases 3 Linezera Street, Riga, LV-1006</p>

Figure 1: Burden of TBE in Latvia over time⁸



*Although European Case Definition for TBE was officially adapted in Latvia in 2012, surveillance study⁸ has reported TBE cases according to Case Definition for 2007–2011 as well.

Figure 3: TBEV-isolation and TBE cases in Latvia (2007–2016, n=1973)⁸**Figure 4: Burden of TBE (“CNS disease”) by 5 regions of Latvia (2007–2016, n=1973)⁸**

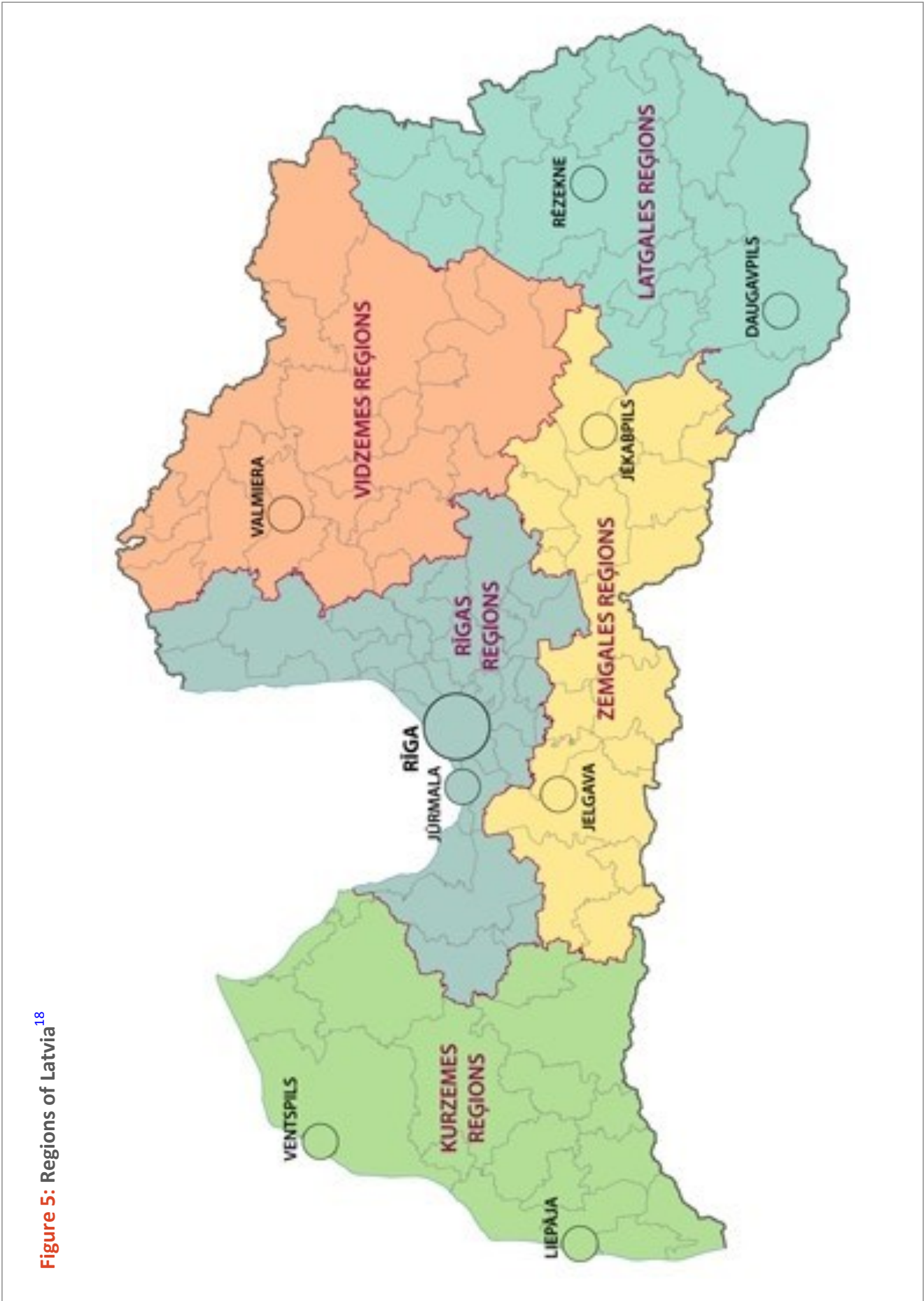


Figure 5: Regions of Latvia¹⁸

Appendix

Source data: Figure 1

Year	Number of TBE cases (including “no CNS disease” forms)	TBE incidence /10 ⁵
1973	116	4.6
1974	141	5.7
1975	256	10.3
1976	322	12.8
1977	347	13.5
1978	318	12.5
1979	220	8.5
1980	184	7.3
1981	103	4
1982	186	6.5
1983	133	5.4
1984	179	6.9
1985	152	5.8
1986	184	7
1987	246	9.3
1988	119	4.5
1989	117	4.4
1990	122	4.6
1991	227	8.5
1992	287	10.7
1993	791	29.1
1994	1366	53.2
1995	1341	53.01
1996	736	29.5
1997	874	34.94

Year	Number of TBE cases (including “no CNS disease” forms)	TBE incidence /10 ⁵
1998	1029	41.49
1999	350	14.35
2000	544	22.44
2001	303	12.81
2002	153	6.52
2003	365	15.66
2004	251	10.82
2005	142	6.16
2006	170	7.41
2007	129	5.90
2008	125	5.77
2009	210	9.82
2010	306	14.58
2011	280	13.62
2012	232	11.45
2013	207	10.33
2014	139	7.02
2015	132	6.72
2016	213	10.94
2017	176	9.03
2018	152	7.89
2019	211	10.9
2020	210	11.1
2021	249	13.2
2022	240	12.67

*Although European Case Definition for TBE was officially adapted in Latvia in 2012, surveillance study⁸ has reported TBE cases according to Case Definition for 2007–2011 as well.

Source data: Figure 2**

Age group (years)	Males	Females	All
0–9	18	16	34
10–19	63	22	85
20–29	162	101	263
30–39	163	112	275
40–49	219	165	384
50–59	194	200	394
60–69	126	179	300
>70	84	154	238

**Number of TBE cases (“CNS disease”) by age and gender.

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