

TBE in Switzerland and Liechtenstein

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E-CDC risk status: endemic (data as of end 2023)

History and current situation

Tickborne Encephalitis (TBE) was first reported in Switzerland in 1969.¹ From the 1970s through the 1990s the causative agent, the tickborne encephalitis virus (TBEV), was found to be endemic in geographically localized areas within the northeastern part of the country.²⁻⁴ A formal case definition and surveillance activities were introduced in 1984 and TBE was made a mandatory notifiable disease in 1988.⁵ Currently, all suspected TBE cases are reported to the Swiss Federal Office of Public Health (FOPH) using a two-tiered system. First, all laboratory tests indicative of acute TBEV infection are reported to the FOPH. Then, attending physicians are requested to complete a notification form providing specific clinical information, which is forwarded to the cantonal physician for review and then returned to the FOPH (Table 1). Both laboratory and completed clinical reporting forms are registered and maintained by the FOPH5. The TBE case definition used in Switzerland is based on a combination of clinical and laboratory criteria and is similar to, but differs slightly from, that used by the ECDC in that “possible” cases, in addition to “probable” and “confirmed” cases, are included (Table 1).⁶⁻⁹

The majority of TBE cases in Switzerland are reported between April and October¹⁰ (Figure 1). Cases are more commonly reported in men, compared to women, and individuals aged 50-69 are most affected, though a bimodal trend with a smaller peak in cases among children aged 5-9 is also observed (Figure 2).¹⁰ Recent work has demonstrated that approximately 5% of unvaccinated individuals throughout the country are seropositive, suggesting that exposures far outnumber clinically confirmed cases of disease.¹¹ Among clinical TBE cases, approximately 75% recalled a tick bite within the 4 weeks prior to disease onset.^{6,8} Approximately 75% result in hospitalization. Meningitis is observed in 19-49% of cases,^{6,12,13} meningoencephalitis in 43-59% of cases,^{6,12,13} and meningoencephalomyelitis and/or radiculitis in 5-7%.^{6,12,13} Just under 1% of cases are fatal (Table 1).^{6,8,13}

Over the last two decades, both the geographic range and total incidence of TBE cases have increased dramatically throughout Switzerland.^{10,14,15} From an initial localization to the northeastern part of the country, TBE cases have increasingly been reported further west- and southward. This has been paralleled by increases in the range of TBEV-infected ticks¹⁶⁻²³ and small and large mammal populations with positive anti-TBEV serology (Table 1).²⁴⁻²⁸ Currently,

TBEV has been identified in ticks from most regions of Switzerland and in Liechtenstein, and, accordingly, human cases are now found in most areas of the country.²⁹ In 2020, the nationwide average disease incidence exceeded the WHO’s definition of “highly endemic”, with greater than 5.0 cases/100,000 individuals reported.¹⁰

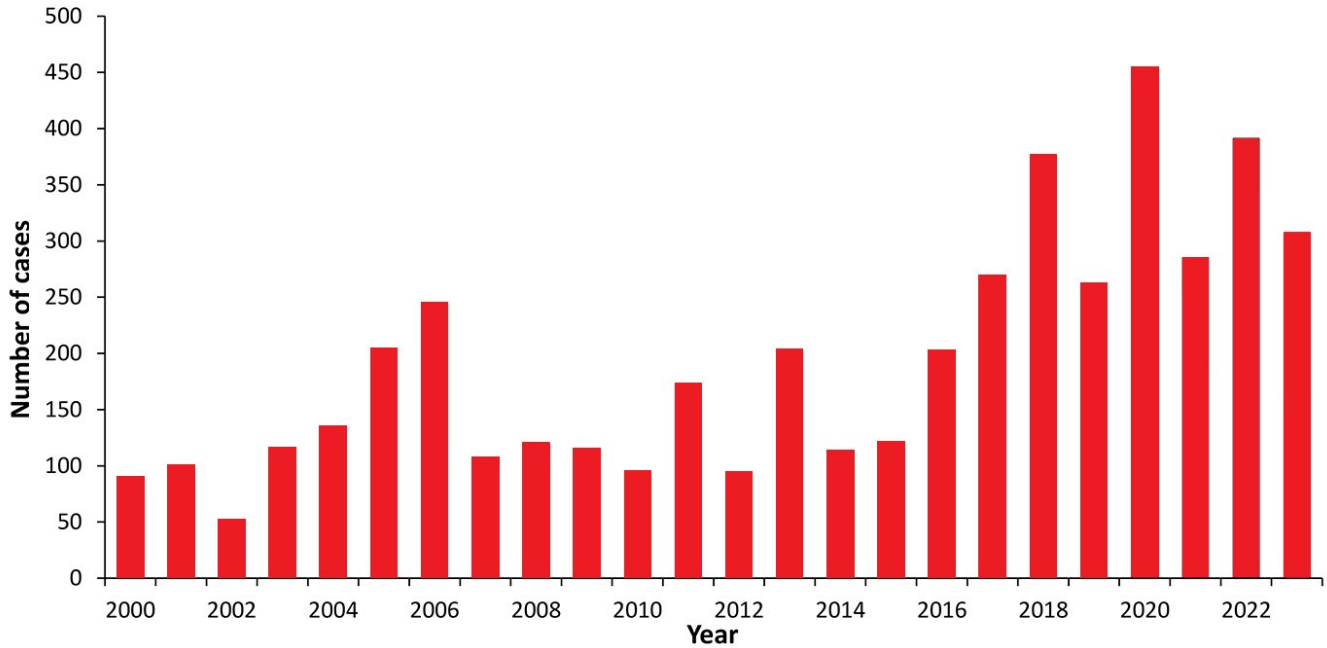
Official recommendations for vaccination against TBE have been in place in Switzerland and Liechtenstein since 2006; initially for all individuals aged 6 and older living or spending significant time in 71 “high risk” areas throughout both countries (Table 1).³⁰ These risk areas, based on reported cases and viral surveillance in the environment, were updated and expanded annually to reflect the changing epidemiology of the disease.^{29,31} The resulting risk area map (Figure 3b) was used until 2018 to define TBE vaccination recommendations throughout the country.^{29,31} However, in 2019, in view of the continuing increases in incidence and geographic range of disease, health authorities in Switzerland and Liechtenstein expanded the risk area and simplified the vaccination recommendation to cover the entirety of both countries – with the exceptions of the Swiss cantons of Geneva and Ticino (Figure 3a – 3c).^{14,29} In 2024 the recommendation was further revised to include the canton of Geneva (from summer 2024) as well as to recommend vaccination beginning at 3 years of age.³²

Vaccination is reimbursed by compulsory health insurance for individuals to which the recommendation applies; namely those 3 years of age and older living or spending significant time in risk area.^{14,32} In children 1–2 years of age, vaccination is considered and reimbursed on a case-by-case basis.^{14,32} Considerations are also made for those with “high risk” occupations, though the cost of vaccination is to be reimbursed by the employer (Table 1).^{14,32} Nationwide, between 2020 and 2022, just 2% of 2-year-olds were vaccinated, increasing to 50% coverage among 8- and 16-year-olds. Among adults, from the most recent data in 2018, 42% had received at least one TBE vaccine dose while 33% had completed at least the three dose primary series (Table 1).³³ Following completion of primary immunization, Switzerland has a unique recommendation for administration of booster vaccine doses every 10 years,^{30,34} unlike most other European countries and in contrast to the label. However, recent epidemiologic studies in the country have demonstrated that vaccine effectiveness (VE) remains high in both children³⁵ and adults³⁶ over this interval, with sustained protection for at least 10 years after the last vaccine dose was received.

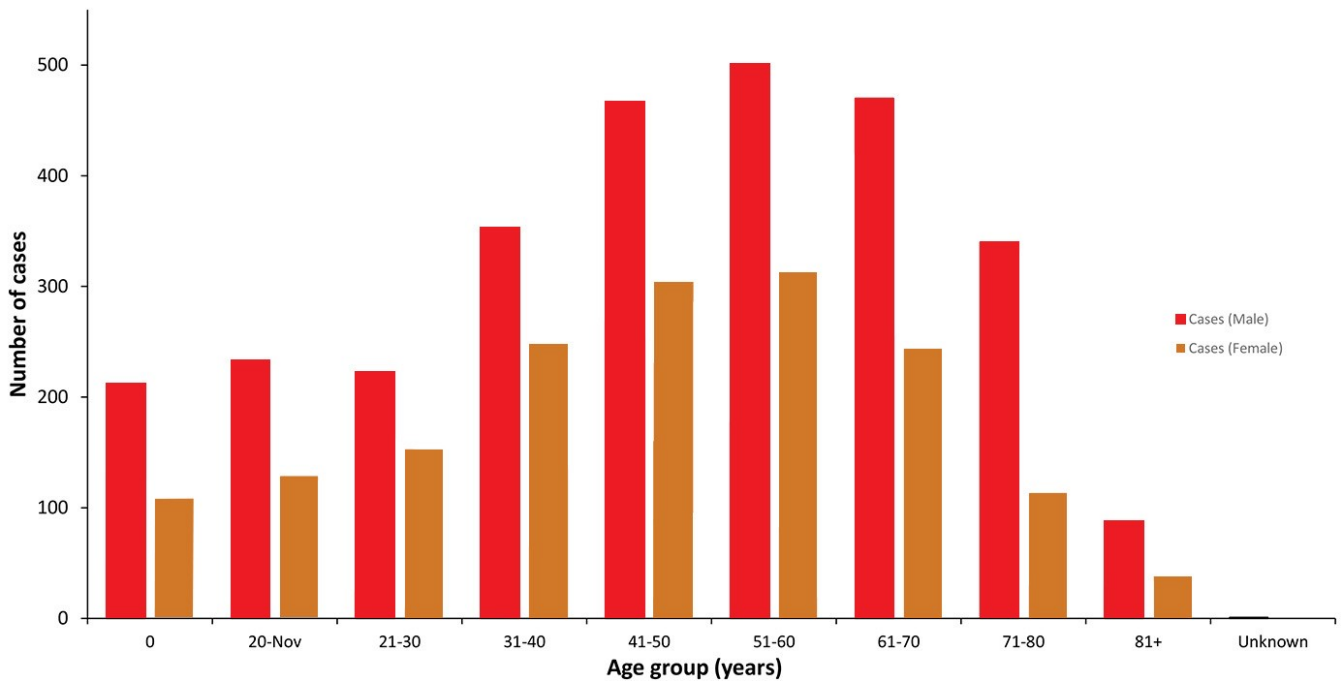
Overview of TBE in Switzerland

Table 1: TBE in Switzerland	
Virus subtypes isolated	Only the European subtype has been described ^{17,20,22,23}
Reservoir animals	Small mammals, generally rodents (<i>Apodemus flavicollis</i> , <i>A. sylvaticus</i> , <i>Myodes glareolus</i>), are the primary reservoir hosts for TBEV observed in Switzerland. ²⁴ TBEV-infected ticks have also been found on migrating birds ²¹
Percentage infected ticks	Only <i>Ixodes ricinus</i> ticks described; Prevalence in ticks is focal and ranges widely, generally less than 1% of questing ticks but as high as 14.3% ^{16-23,25,26,37}
Dairy product transmission	Not documented, risk estimated to be low ³⁸
Case definition used by authorities	Possible Case: positive IgM serology with influenza-like illness (ILI) or non-specific neurological signs & symptoms, OR , positive IgM + positive IgG serology without specific clinical symptoms Probable Case: positive IgM serology with meningitis, meningoencephalitis, encephalomyelitis or radiculitis, OR , positive IgM + positive IgG serology with influenza-like illness (ILI) or non-specific neurological signs & symptoms Confirmed Case: positive IgM + positive IgG serology with meningitis, meningoencephalitis, encephalomyelitis or radiculitis, OR , TBE-RNA detection by PCR with meningitis, meningoencephalitis, encephalomyelitis or radiculitis
Completeness of case detection and reporting	Case reporting assumed to be complete or near complete due to two-tiered system ⁵⁻⁸ , though no specific studies have evaluated this
Type of reporting	A mandatory notifiable disease since 1988 with reporting to the Swiss FOPH following a two-tiered system ⁵⁻⁸ : -First, all laboratory tests positive for evidence of acute TBE are reported -Afterwards, attending physicians are requested to complete a specific notification form providing specific clinical information
Other TBE surveillance	Not routine Studies assessing TBEV in ticks ^{16-23,25,26,37} Studies assessing seropositive blood donors ¹¹
Special clinical features	In children: ³⁵ <ul style="list-style-type: none"> • No neurologic involvement reported in 13% of cases • Meningeal irritation, meningitis observed in 35% of cases • Meningoencephalitis in 49% of cases • Encephalitis, encephalomyelitis, radiculitis, paresis reported in 3% of cases In adults: <ul style="list-style-type: none"> • Hospitalization observed in 71-75% of reported cases^{6,8,13} • Meningitis in 19-49% of cases^{6,12,13} • Meningoencephalitis in 43-59% of cases^{6,12,13} • Meningoencephalomyelitis/Radiculitis in 5-7% of cases^{6,12,13} • Slightly under 1% of cases are fatal^{6,8,13}

<p>Licensed vaccines</p>	<p>Encepur N® (Bavarian Nordic) Adult Formulation³⁹</p> <p>Encepur N® Kinder (Bavarian Nordic) Pediatric Formulation³⁹</p> <p>FSME-Immun® (Pfizer) Adult Formulation⁴⁰</p> <p>FSME-Immune® Junior (Pfizer) Pediatric Formulation⁴¹</p>
<p>Vaccination recommendations</p>	<p>Localized recommendations based primarily on area of residence since 2006³⁰; in 2019 and 2024 the recommendation was expanded to cover all of Switzerland and Liechtenstein with the exceptions of Geneva and Ticino^{14,29,32}</p> <p>Vaccination is reimbursed by compulsory health insurance for individuals covered by the recommendation:</p> <ul style="list-style-type: none"> • Individuals 3 years of age and older living or spending significant time in risk areas^{14,32,33} • In children 1–2 years of age vaccination is considered and reimbursed on a case-by-case basis^{14,32,33} • For individuals with “high risk” occupations, costs of vaccination are covered by the employer^{14,32,33}
<p>Vaccine uptake</p>	<p>In children^{34,43} - Average national vaccination uptake (3+ doses) 2019-2022:</p> <ul style="list-style-type: none"> • 2 years old: 2.3% (1.8-2.9) • 8 years old: 48.7% (46.9-50.6) • 16 years old: 50.1% (48.3-52.0) <p>In adults³⁵ - Average national vaccination uptake (3+ doses) 2018:</p> <p>-18-39 years old: 34.7% (31.5–38.0%)</p> <p>-40-59 years old: 31.3% (29.0–33.8%)</p> <p>-60-79 years old: 32.4% (30.1–34.8%)</p>
<p>National Reference center for TBE</p>	<p>Nationales Referenzzentrum für durch Zecken übertragene Krankheiten (NRZK; National Reference Centre for Tick-borne Diseases)</p> <p>Website: www.swissticks.ch</p> <p>The reference center consists of two partners:</p> <p>Institut für Mikrobiologie des Centre Hospitalier Universitaire Vaudois (CHUV)</p> <p>Rue du Bugnon 48 1011 Lausanne Tél. +41 21 314 46 48 / +41 21 314 40 56 (secrétariat) Tél. +41 21 314 49 79 (Prof. G. Greub) Mail: gilbert.greub@chuv.ch</p> <p>ADMED Microbiologie</p> <p>Boucle de Cydalise 16+2300 La Chaux-de-Fonds Tél. +41 32 967 21 01 Mail: admed.microbiologie@ne.ch</p>

Figure 1: Number of reported TBE cases in Switzerland, 2000-2023

Source Data: Appendix—Figure 1

Figure 2: Age and gender distribution of TBE cases in Switzerland 2000–2023

Source Data: Appendix—Figure 2

Figure 3a: TBE cases - Reported exposure sites, 2012-2023.

Latest update available at: <https://s.geo.admin.ch/727304e0f5>

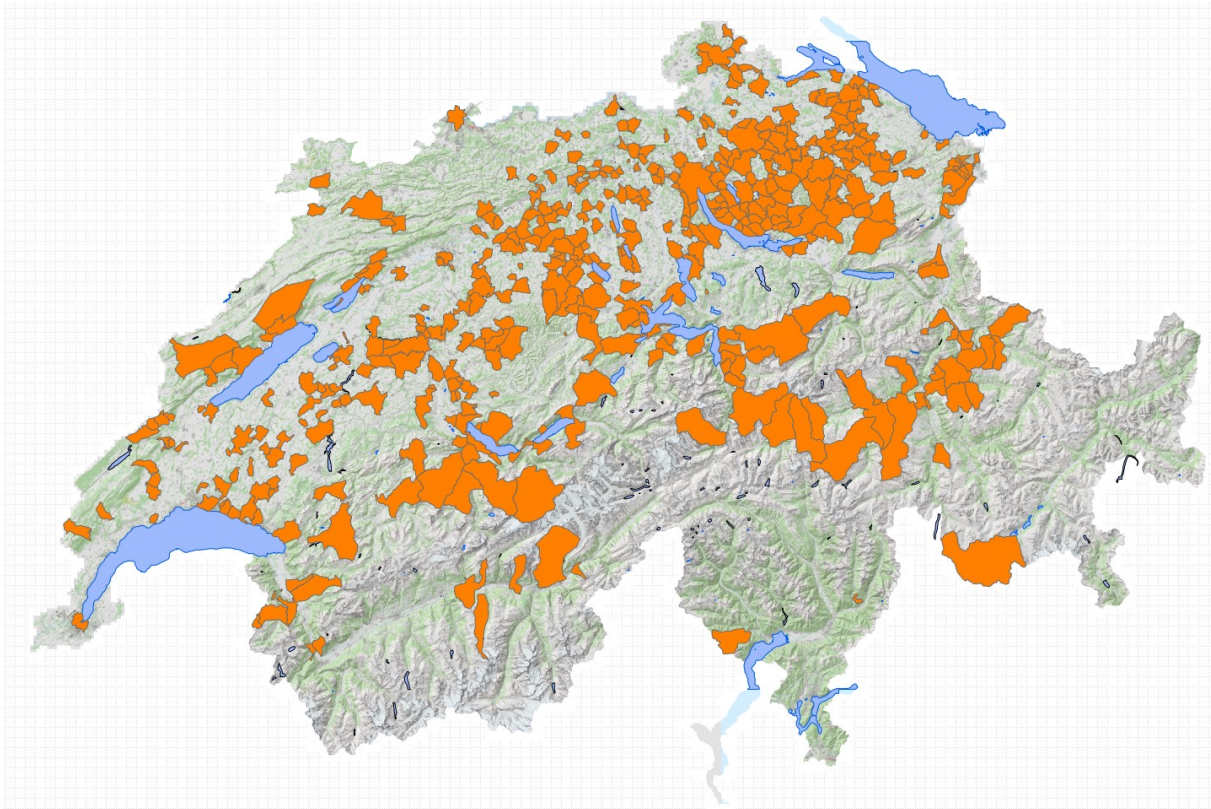


Figure 3b: Risk areas in Switzerland where TBE vaccination was recommended until the end of 2018

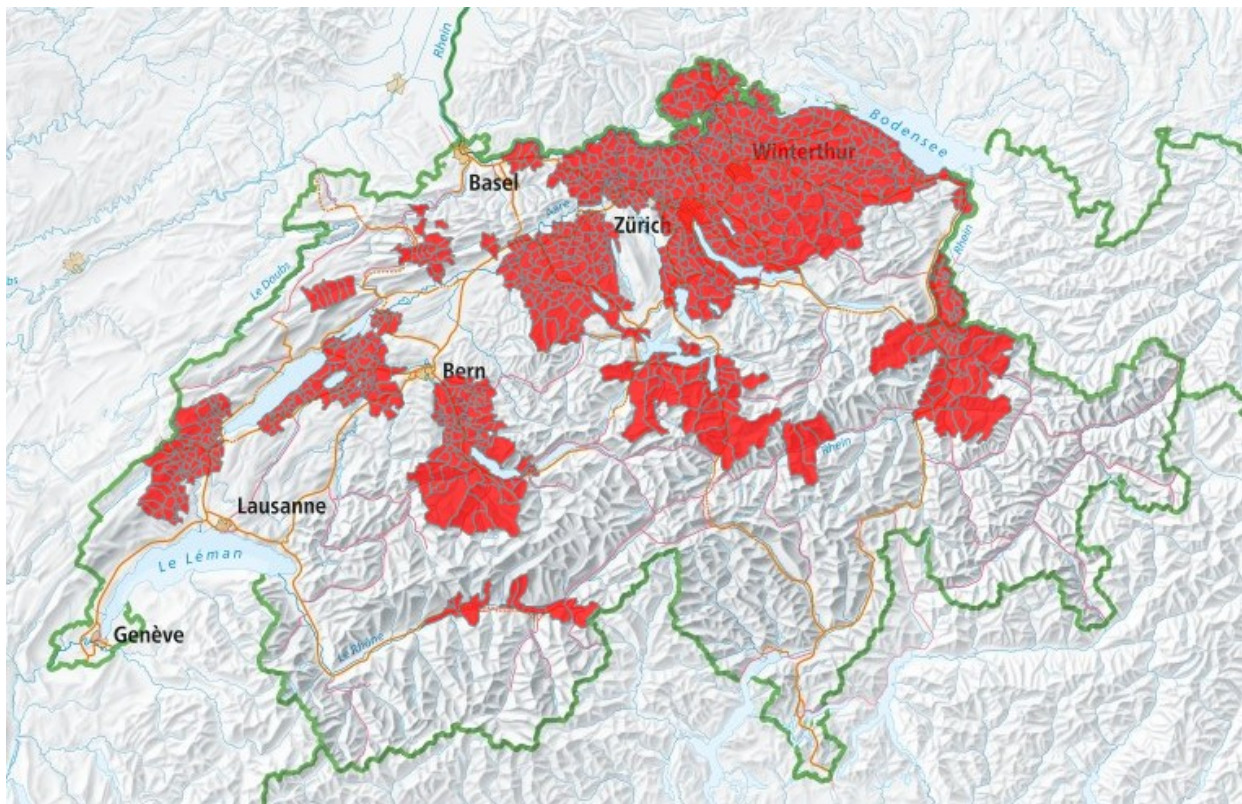
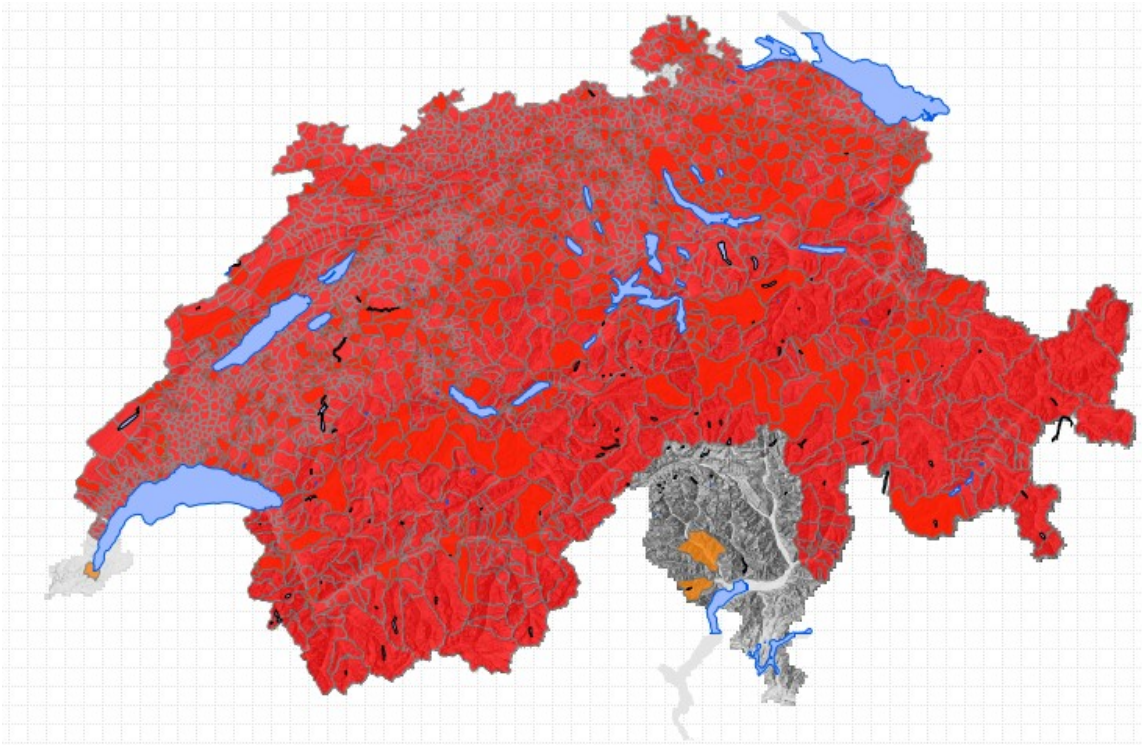


Figure 3c: Extended risk areas where TBE vaccination was recommended, 2019-2023. Risk areas were further extended for all individuals (residents and visitors aged 3+ years) with the exception of canton Ticino, from April 2024. Official update of map not yet available by April 30, 2024 but can be found afterward with latest update at: <https://s.geo.admin.ch/727304e0f5>



Acknowledgments

Unpublished data were kindly provided by Annora Mack and Ekkehardt Altpeter, Federal Office of Public Health FOPH, Division of Communicable Diseases, Bern, Switzerland.

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Citation:

Zens K. TBE in Switzerland and Liechtenstein. Chapter 13 In: Dobler G, Erber W, Bröker M, Chitimia-Dobler L, Schmitt HJ, eds. *The TBE Book*. 7th ed. Singapore: Global Health Press; 2024. doi:10.33442/26613980_13-33-7

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Appendix

Source data: Figure 1

Year	Number of cases	Incidence/10 ⁵
2000	90	1.24
2001	100	1.37
2002	52	0.70
2003	116	1.56
2004	135	1.81
2005	204	2.72
2006	245	3.24
2007	107	1.40
2008	120	1.55
2009	115	1.44
2010	95	1.20
2011	173	2.17
2012	94	1.16
2013	203	2.48
2014	113	1.37
2015	121	1.42
2016	202	2.39
2017	269	3.16
2018	376	4.38
2019	262	3.03
2020	454	5.11
2021	285	3.25
2022	388	4.38
2023	307	3.47

Source data: Figure 2

Age group (years)	Cases (Male)	Cases (Female)	Unknown
0-10	212	108	0
11-20	233	128	2
21-30	222	153	0
31-40	353	248	0
41-50	466	304	2
51-60	501	313	1
61-70	470	244	1
71-80	340	113	0
81+	88	38	0
Unknown	1	0	0

Data Include all possible, probable, and confirmed cases according to Swiss TBE case definitions

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