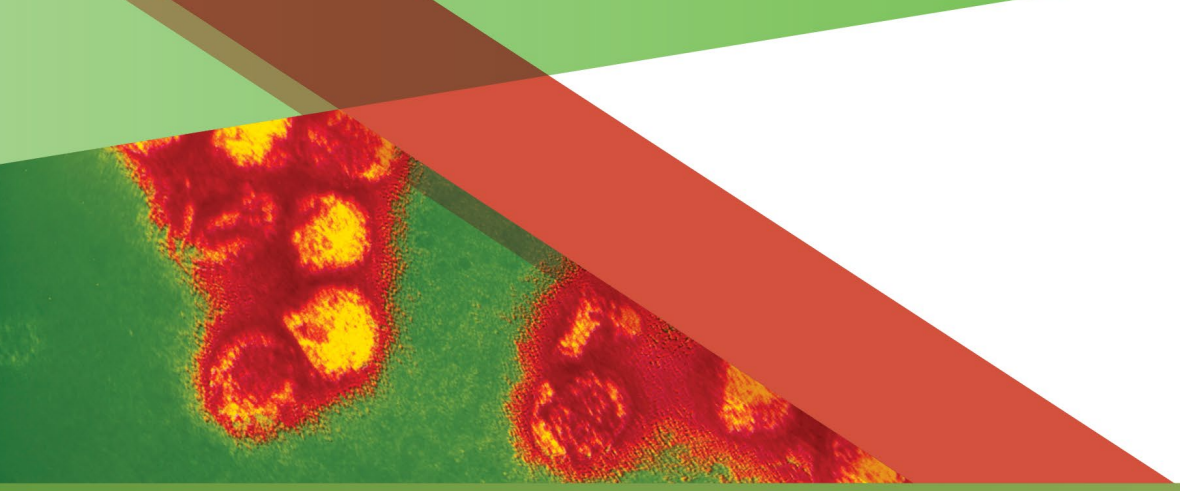

SURVEILLANCE REPORT

Tick-borne encephalitis

Annual Epidemiological Report for 2020

Key facts

- For 2020, 24 EU/EEA countries reported 3 817 cases of tick-borne encephalitis (TBE), 3 734 (97.8%) of which were confirmed.
- The EU/EEA notification rate for 2020 is 0.9 cases per 100 000, which represents a further increase compared with the rate of 0.7 for 2019, and the stable rate of 0.6 from 2016 to 2018.
- Cases were more frequently reported among males (male-to-female ratio: 1.5:1) and in the age group 45–64 years.
- TBE presents a seasonal pattern. For 2020, 95% of confirmed cases occurred from May to November. July was the month with the highest number of reported cases (n = 1 016).

Introduction

TBE is a flavivirus (TBEV) infection of the central nervous system transmitted by infected ticks (genus *Ixodes*) or, in rare instances, by unpasteurised dairy products [1,2]. TBE is endemic in several central, northern, and eastern European countries, with the highest incidence in Baltic and Central European countries [3]. The majority of the infections caused by the circulating virus subtype, TBEV-Eu, are asymptomatic (70–98%), while symptomatic infections typically present with a biphasic illness [2].

Methods

This report is based on data for 2020 retrieved from The European Surveillance System (TESSy) on 25 October 2021. TESSy is a system for the collection, analysis and dissemination of data on communicable diseases.

For a detailed description of the methods used to produce this report, refer to the *Introduction to the Annual Epidemiological Report* chapter [4].

An overview of the national surveillance systems is available online [5].

A subset of the data used for this report is available through ECDC's online *Surveillance atlas of infectious diseases* [6].

For 2020, 24 EU/EEA countries reported data on TBE. No data were reported by Cyprus, Denmark, Iceland, Liechtenstein, Malta or Portugal. As the United Kingdom (UK) withdrew from the EU on 31 January 2020, the country no longer provides data to ECDC. Nineteen countries used various versions of the EU case definition for

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TBE (2008, 2012 or 2018 versions), three countries (Germany, Italy, and Sweden) reported using another case definition and two countries (Croatia and Luxembourg) did not specify which case definition was used.

Nineteen reporting countries have a comprehensive surveillance system. All reporting countries, except for the Netherlands, stated that their reporting systems have national coverage. Reporting is compulsory in 19 countries, voluntary in four (Belgium, France, Luxembourg, and the Netherlands) and 'not specified' in one country (Croatia). Surveillance systems are mostly passive, and all data were case based except for data from Belgium and Bulgaria.

Epidemiology

For 2020, 3 817 TBE cases were reported to TESSy from 24 EU/EEA countries, 3 734 (97.8%) of which were confirmed (Table 1). Of 3 029 cases with known outcome, 16 died from TBE (case fatality: 0.5%). Three countries reported zero cases (Greece, Luxembourg, and Romania).

The notification rate was highest in Lithuania (24.3 cases per 100 000 population), followed by Slovenia (8.9) and Czechia (7.9; Table 1, Figure 1). The highest numbers of confirmed cases were reported by Czechia (n = 849), Germany (n = 705), and Lithuania (n = 679; Table 1).

The EU/EEA notification rate for 2020 was 0.9 cases per 100 000 population, which represents a further increase compared with the rate of 0.7 for 2019, and the stable rate of 0.6 from 2016 to 2018. Compared with the 2019 data, there has been a substantial increase in the notification rates of Slovenia (from 5.3 to 8.9) and Austria (from 1.2 to 2.8).

Data on importation status were available for 3 600 confirmed cases, 0.8% (n = 30) of which were travel associated. Imported cases were reported by nine countries, with Germany reporting the highest number (n = 19). Of the 29 imported cases with specified probable country of infection, 25 were probably infected in the EU/EEA (in Austria, Czechia, Germany, France, Lithuania, Latvia, Poland, and Sweden), three in Switzerland and one in Afghanistan.

Of the 2 393 (64.1%) confirmed cases for which information about immunisation status was available, 2 265 (94.7%) were reported as not vaccinated against TBE. Of the 128 (5.3%) vaccinated cases, 33 had only received one dose, 26 had received two doses, 40 had received at least three doses and 29 had received an unknown number of doses. Thirty-five of those with at least two doses had information on when the last dose was received. The time window between the last dose and infection ranged from 4 days to 21.5 years, with a mean value of 5.8 years.

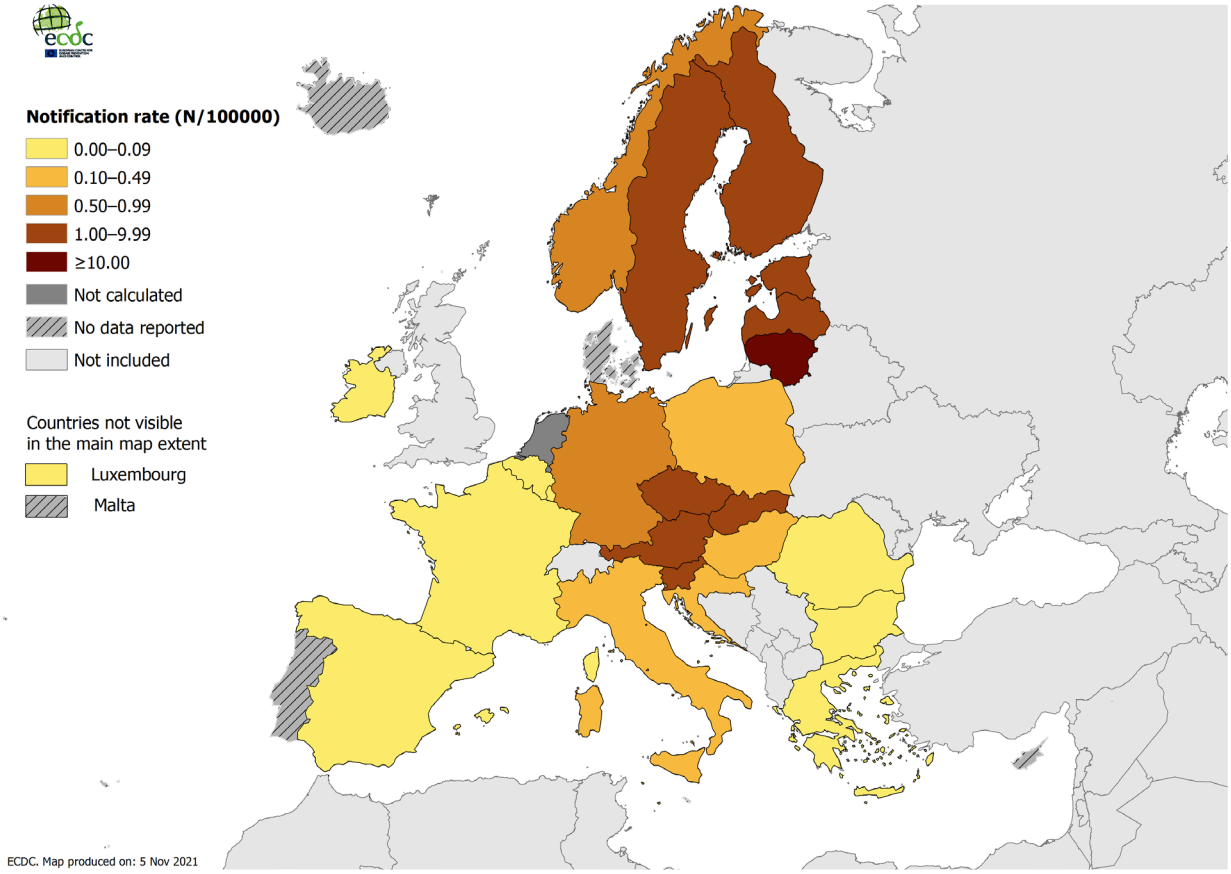
Table 1. Number of confirmed tick-borne encephalitis cases and rates per 100 000 population by country and year, EU/EEA, 2016–2020

Country	2016		2017		2018		2019		2020		
	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate	ASR
Austria	96	1.1	123	1.4	170	1.9	106	1.2	250	2.8	2.8
Belgium	1	0.0	3	0.0	3	0.0	4	0.0	7	0.1	0.1
Bulgaria	0	0.0	1	0.0	0	0.0	1	0.0	2	0.0	0.0
Croatia	6	0.1	10	0.2	22	0.5	13	0.3	14	0.3	0.4
Cyprus	ND	NR	ND	NR	ND	NR	ND	NR	ND	NR	NR
Czechia	564	5.3	687	6.5	714	6.7	771	7.2	849	7.9	7.9
Denmark	ND	NR	ND	NR	4	0.1	ND	NR	ND	NR	NR
Estonia	80	6.1	84	6.4	85	6.4	82	6.2	70	5.3	5.1
Finland	61	1.1	82	1.5	79	1.4	69	1.3	91	1.6	1.6
France	15	0.0	2	0.0	25	0.0	4	0.0	46	0.1	0.1
Germany	353	0.4	486	0.6	583	0.7	444	0.5	705	0.8	0.8
Greece	0	0.0	0	0.0	2	0.0	0	0.0	0	0.0	0.0
Hungary	14	0.1	14	0.1	30	0.3	17	0.2	18	0.2	0.2
Iceland	ND	NR	ND	NR	ND	NR	ND	NR	ND	NR	NR
Ireland	0	0.0	0	0.0	0	0.0	1	0.0	0	0.0	0.0
Italy	48	0.1	24	0.0	39	0.1	37	0.1	55	0.1	0.1
Latvia	91	4.6	178	9.1	100	5.2	118	6.1	149	7.8	7.6
Liechtenstein	ND	NR	ND	NR	ND	NR	ND	NR	ND	NR	NR
Lithuania	633	21.9	474	16.6	384	13.7	711	25.4	679	24.3	23.6
Luxembourg	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0.0
Malta	ND	NR	ND	NR	ND	NR	ND	NR	ND	NR	NR
Netherlands	4	NR	3	NR	6	NR	3	NR	5	NR	NR
Norway	12	0.2	16	0.3	26	0.5	35	0.7	41	0.8	0.8
Poland	211	0.6	196	0.5	148	0.4	197	0.5	114	0.3	0.3
Portugal	ND	NR	ND	NR	ND	NR	ND	NR	ND	NR	NR
Romania	0	0.0	1	0.0	4	0.0	0	0.0	0	0.0	0.0
Slovakia	169	3.1	75	1.4	156	2.9	161	3.0	185	3.4	3.4
Slovenia	83	4.0	102	4.9	153	7.4	111	5.3	187	8.9	8.7
Spain	0	0.0	0	0.0	0	0.0	1	0.0	0	0.0	0.0
Sweden	238	2.4	0	0.0	359	3.5	355	3.5	267	2.6	2.6
UK	ND	NR	ND	NR	2	0.0	2	0.0	ND	NR	NR
EU/EEA	**2 679**	**0.6**	**2 561**	**0.6**	**3 094**	**0.6**	**3 243**	**0.7**	**3 734**	**0.9**	**0.9**

Source: Country reports
ASR: age-standardised rate
ND: no data reported
NR: no rate calculated
Data were not collected from the UK in 2020, as the country left the EU on 31 January 2020. Rates were not calculated for the Netherlands because the surveillance system does not have national coverage.

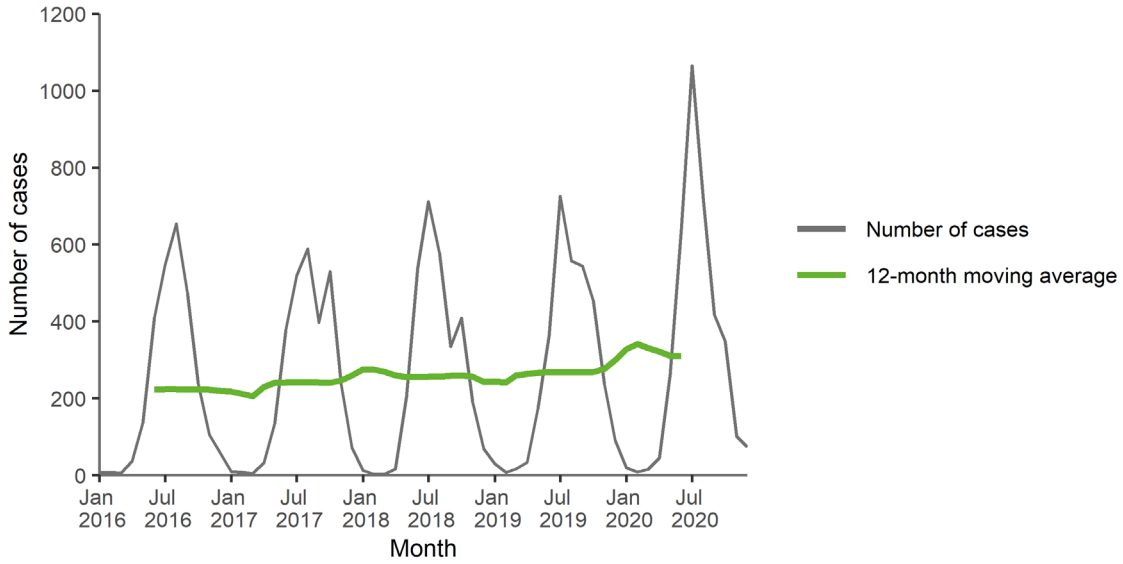
TBE cases generally display a seasonal peak in the months of July and August. In 2020, reported cases showed the expected pronounced seasonality, with 95% of confirmed cases reported from May to November. A total of 1 016 cases were reported during the peak in July, representing 27% of confirmed cases (Figures 2, 3). The number of cases reported from April to August exceeded the maximum number of cases from previous years (2016–2019), while the number of cases reported in the following months was below the mean number of cases reported previously (2016–2019) (Figure 3).

Figure 1. Distribution of confirmed tick-borne encephalitis cases per 100 000 population by country, EU/EEA, 2020



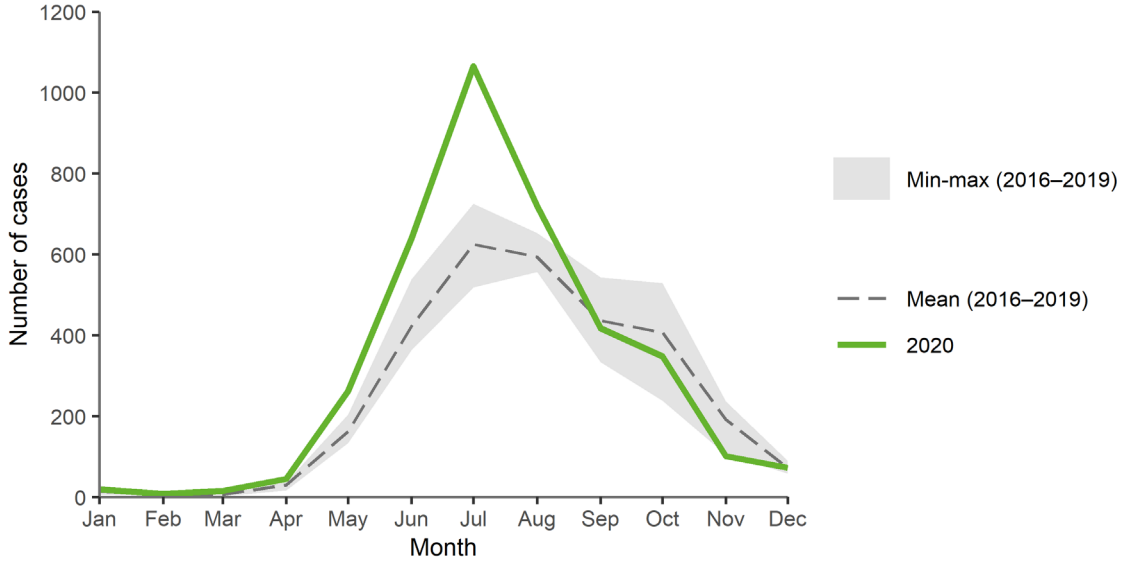
Source: Country reports from Austria, Belgium, Bulgaria, Croatia, Czechia, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, the Netherlands, Norway, Poland, Romania, Slovakia, Slovenia, Spain, and Sweden

Figure 2. Distribution of confirmed tick-borne encephalitis cases by month, EU/EEA, 2016–2020



Source: Country reports from Austria, Czechia, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, the Netherlands, Norway, Poland, Romania, Slovakia, Slovenia, Spain, and Sweden

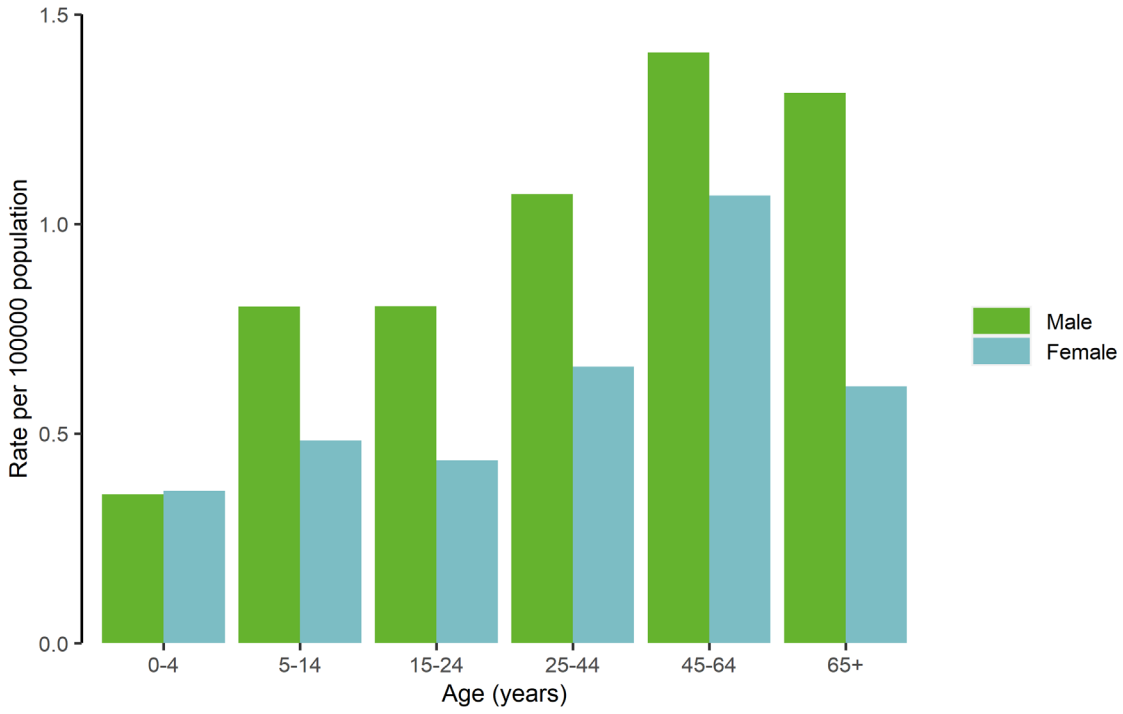
Figure 3. Distribution of confirmed tick-borne encephalitis cases by month, EU/EEA, 2020 and 2016–2019



Source: Country reports from Austria, Czechia, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, the Netherlands, Norway, Poland, Romania, Slovakia, Slovenia, Spain, and Sweden

For 2020, the largest proportion of cases was reported in the age group 45–64 years (n = 1 420; 38.0%). The male-to-female ratio was 1.5:1 and notification rates were higher among males in all age groups except for 0-4 years (Figure 4).

Figure 4. Distribution of confirmed tick-borne encephalitis rate per 100 000 population, by age and gender, EU/EEA, 2020



Discussion

TBE became notifiable in the EU in 2012 and the current case definition was adopted in 2018 [7]. Even though the number of reporting countries has varied since 2012, reporting has been consistent for 24 countries since 2016. As the two countries with inconsistent reporting (Denmark and the UK) have reported very few cases, their inconsistency has little effect on comparison of case counts over this period. Comparison of notification rates, however, should be done with caution due to larger fluctuations in population counts.

Since 2017, there has been a gradual increase of reported TBE cases, with a maximum of 3 734 confirmed cases in 2020. The EU/EEA notification rate for TBE remained stable at 0.6 cases per 100 000 population from 2016 to 2018; since then, it has increased to 0.7 in 2019 and 0.9 in 2020. This increase for 2020 can be partially explained by the smaller denominator, as the UK no longer reports data. However, the rise in cases suggests that there has been a true increase. Since 2016 Lithuania has reported the highest notification rate in the EU/EEA. For 2020, Lithuania is followed by Slovenia and Czechia, owing to a strong increase in the notification rate of Slovenia (5.3 to 8.9 per 100 000 population) compared to 2019.

As in previous years, notification rates are higher among males and among adults aged 45-64 years, possibly due to more frequent exposure to tick bites during outdoor activities associated with occupation or leisure [8]. In addition, recent studies conducted in Scandinavian countries have shown that females have a higher risk perception than males and are therefore more likely to use protective measures and be knowledgeable about tick-borne disease [9-11]. The majority of cases continue to be diagnosed during the warmer months, with no evidence of a major shift in seasonal pattern [3].

The reasons behind fluctuations in case numbers are multifactorial. Demographic and environmental factors have been shown to partially explain yearly variation [12]. However, predictions for Austria based on these factors alone underestimated the high case numbers for 2020 [13]. Other factors, such as human behaviour, can influence TBE transmission but are more difficult to account for and to predict [8,12].

The COVID-19 pandemic might have influenced the epidemiology of TBE in different ways. Changes in case finding, diagnosis and reporting of TBE cases due to altered care-seeking behaviour and an overburdened work force might have accentuated an underestimation of the true incidence [14-16]. Non-pharmaceutical interventions and restrictions, on the other hand, may have resulted in increased outdoor activities in endemic areas [14,15]. However, these are merely hypotheses that cannot be validated by the available data. Furthermore, it is likely that several factors had varying impacts in the EU/EEA, given the different trends in various countries.

Afghanistan has been indicated as the probable place of infection for one imported case reported by France. The presence of TBEV in Afghanistan has previously been suggested by serological evidence. However, cross-reactivity with other viruses should be considered [17].

Public health implications

TBE is an important zoonotic disease for many countries in central, northern, and eastern Europe. Residents of and travellers to regions where TBEV is endemic should be aware of the risk of exposure to ticks and should apply personal protective measures against tick bites [18], avoid the consumption of raw dairy products and consider vaccination against TBE for the most effective protection (in line with relevant national recommendations), particularly if they engage in outdoor activities.

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