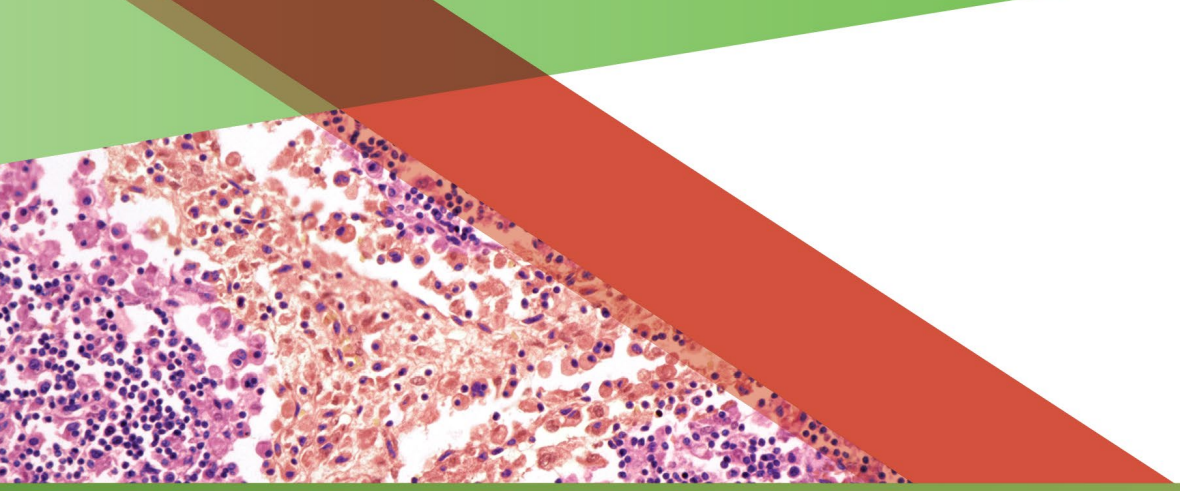


SURVEILLANCE REPORT

Typhoid and paratyphoid fevers

Annual Epidemiological Report for 2017

Key facts

- Typhoid and paratyphoid fevers are relatively rare in the European Union/European Economic Area (EU/EEA) and are mainly acquired during travel to countries outside the EU/EEA, particularly in south Asia.
- For 2017, 22 EU/EEA countries reported a total of 1 098 cases.
- Of the 798 cases with available information, 90.9% were travel-related.
- Cases in the EU/EEA showed clear seasonal trends, with a pronounced peak in September and a small peak in late spring.
- Although three vaccines against typhoid fever are available, it was still more frequently reported than paratyphoid fever, for which a vaccine is not yet available.

Methods

This report is based on data for 2017 retrieved from The European Surveillance System (TESSy) on 11 September 2018. TESSy is a system for the collection, analysis and dissemination of data on communicable diseases. For a detailed description of methods used to produce this report, please refer to the *Methods* chapter [1].

An overview of the national surveillance systems is available online [2].

A subset of the data used for this report is available through ECDC's online *Surveillance atlas of infectious diseases* [3].

For 2017, 29 countries in the European Union/European Economic Area (EU/EEA) reported case-based data on typhoid and paratyphoid fevers. In addition, Bulgaria reported aggregated data for salmonellosis, from which cases of typhoid and paratyphoid fevers could not be extracted. Twenty-five countries reported data using the current EU case definitions for typhoid and paratyphoid fevers published in 2008 and 2012. Denmark, France, Germany and Italy used a case definition described as 'other' and Finland did not specify the definition used [2].

Typhoid and paratyphoid fevers are under mandatory notification in all EU/EEA countries, and all reporting countries had comprehensive surveillance. Surveillance systems for salmonellosis had national coverage in all Member States except France, the Netherlands and Spain. The population coverage in 2017 was estimated at 48% in France and 64% in the Netherlands. Variation in coverage was taken into consideration when calculating the national notification rates. No information on estimated coverage was provided by Spain, thus no notification rate was calculated. Liechtenstein did not report any data in the five-year period covered.

Suggested citation: European Centre for Disease Prevention and Control. Typhoid and paratyphoid fevers. In: ECDC. Annual epidemiological report for 2017. Stockholm: ECDC; 2020.

Stockholm, October 2020

In addition to TESSy reporting, information from event-based surveillance for typhoid and paratyphoid clusters or outbreaks with a potential EU/EEA dimension was collected through the Epidemic Intelligence Information System for Food- and Waterborne Diseases and Zoonoses (EPIS-FWD).

Epidemiology

For 2017, 22 countries reported a total of 1 098 typhoid and paratyphoid fever cases. The EU/EEA notification rate was 0.28 cases per 100 000 population (Table 1). Seven countries did not report any cases: Cyprus, Czechia, Iceland, Latvia, Malta, Romania and Slovenia. France, Italy, and the United Kingdom (UK) accounted for 61.2% of cases, with the UK alone accounting for 29.7%. France and the UK also reported the highest notification rates, of 0.62 and 0.5 cases per 100 000 population respectively (Table 1, Figure 1).

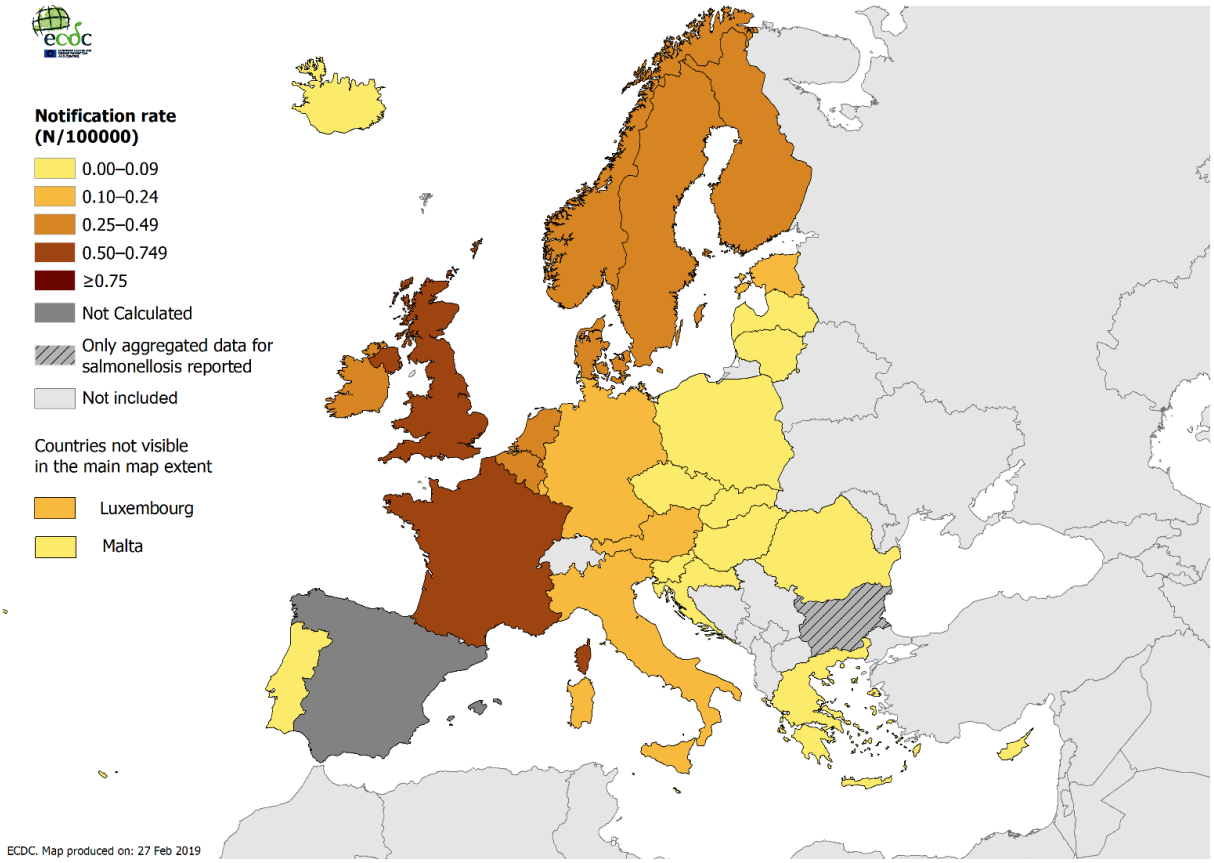
Of the 798 cases with available information, 725 (90.9%) were travel-related. The probable country of infection was available for 588 (81.1%) of these cases, of which 577 (98.1%) were associated with travel to countries outside the EU/EEA. India and Pakistan were the two most visited destinations, accounting for 44.4% and 21.5% of travel-associated cases with available information overall, and for 50.2% and 27.8% of such cases reported by the UK.

Table 1. Distribution of confirmed typhoid and paratyphoid fever cases and rates per 100 000 population by year and country, EU/EEA, 2013–2017

Country	2013		2014		2015		2016		2017		
	Confirmed cases	Rate	Confirmed cases	Rate	Confirmed cases	Rate	Confirmed cases	Rate	Confirmed cases	Rate	Reported cases
Austria	3	0.04	9	0.11	7	0.08	17	0.20	15	0.17	15
Belgium	16	0.00	35	0.00	33	0.29	42	0.37	49	0.43	49
Bulgaria	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0
Croatia	0	0.00	0	0.00	0	0.00	0	0.00	1	0.02	1
Cyprus	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0
Czechia	3	0.03	6	0.06	0	0.00	0	0.00	0	0.00	0
Denmark	19	0.34	27	0.48	18	0.32	24	0.42	23	0.40	23
Estonia	2	0.15	1	0.08	2	0.15	0	0.00	2	0.15	2
Finland	12	0.22	10	0.18	7	0.13	5	0.09	15	0.27	15
France	203	0.64	206	0.65	170	0.53	222	0.69	198	0.62	198
Germany	146	0.18	84	0.10	102	0.13	95	0.12	120	0.15	120
Greece	8	0.07	9	0.08	17	0.16	9	0.08	8	0.07	8
Hungary	0	0.00	0	0.00	0	0.00	3	0.03	1	0.01	1
Iceland	1	0.31	0	0.00	0	0.00	2	0.60	0	0.00	0
Ireland	11	0.24	12	0.26	10	0.21	17	0.36	22	0.46	22
Italy	111	0.19	120	0.20	98	0.16	123	0.20	148	0.24	148
Latvia	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0
Lithuania	2	0.07	1	0.03	2	0.07	3	0.10	1	0.04	1
Luxembourg	1	0.19	2	0.36	1	0.18	1	0.17	1	0.17	1
Malta	1	0.24	0	0.00	0	0.00	0	0.00	0	0.00	0
Netherlands	63	0.38	37	0.22	45	0.27	56	0.33	62	0.36	62
Norway	26	0.51	14	0.27	14	0.27	25	0.48	20	0.38	20
Poland	0	0.00	0	0.00	0	0.00	0	0.00	8	0.02	8
Portugal	12	0.11	19	0.18	8	0.08	9	0.09	9	0.09	9
Romania	2	0.01	0	0.00	4	0.02	1	0.01	0	0.00	0
Slovakia	0	0.00	0	0.00	0	0.00	1	0.02	2	0.04	2
Slovenia	4	0.19	4	0.19	2	0.10	3	0.15	0	0.00	0
Spain	33	0.00	39	0.00	34	0.00	31	0.00	30	0.00	30
Sweden	27	0.28	36	0.37	27	0.28	16	0.16	37	0.37	37
UK	349	0.55	352	0.55	406	0.63	456	0.70	326	0.50	326
EU/EEA	**1 055**	**0.28**	**1 023**	**0.26**	**1 007**	**0.25**	**1 161**	**0.30**	**1 098**	**0.28**	**1 098**

Sources: country reports.
.: no data reported.
-: only aggregated data for salmonellosis reported.
Liechtenstein did not report any data in the five-year period.

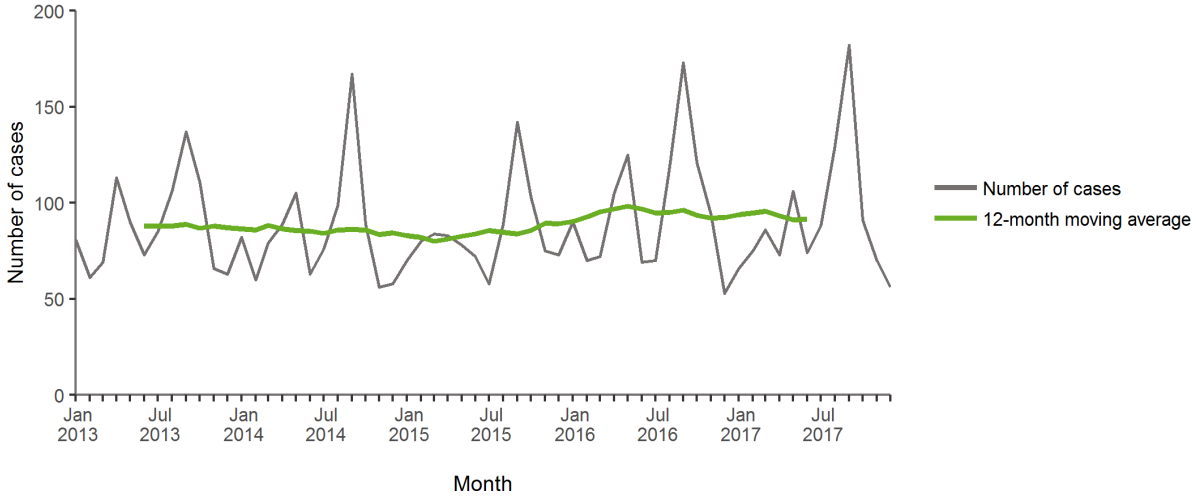
Figure 1. Distribution of confirmed typhoid and paratyphoid fever cases per 100 000 population by country, EU/EEA, 2017



Source: country reports from Austria, Belgium, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, and the UK. No rate calculated for Spain. Liechtenstein did not report any data for the year.

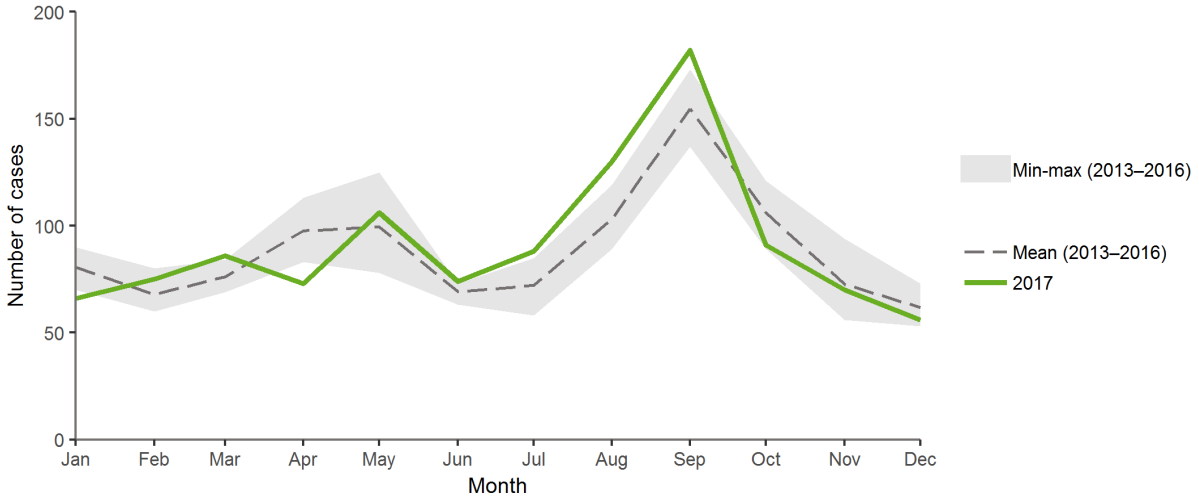
Typhoid and paratyphoid fever cases in the EU/EEA follow a characteristic seasonal trend, with a pronounced peak in September and a small peak in late spring (Figure 2, Figure 3). For 2017, the number of cases reported in April was lower than in previous years, with two small peaks observed in spring. The number of cases reported from July to September was slightly higher than the maximum number of cases reported for the same months in the previous four years.

Figure 2. Distribution of confirmed typhoid and paratyphoid fever cases by month, EU/EEA, 2013–2017



Sources: country reports from Austria, Belgium, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, and the UK.

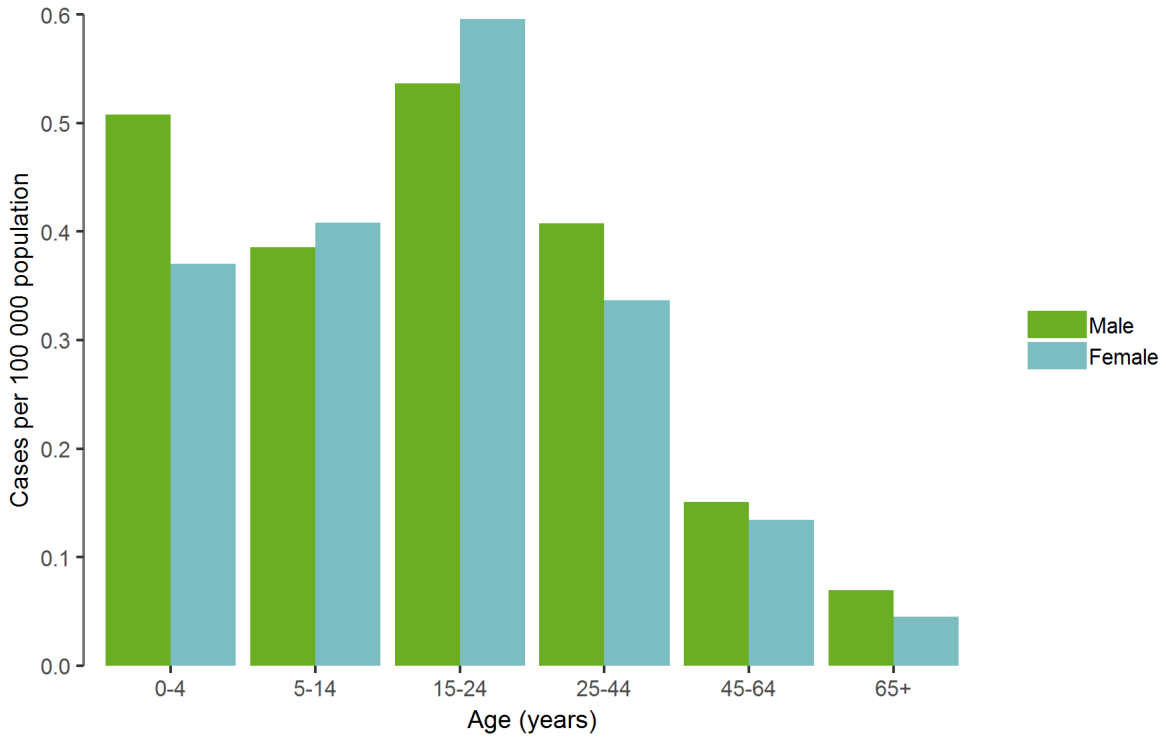
Figure 3. Distribution of confirmed typhoid and paratyphoid fever cases by month, EU/EEA, 2017 and 2013–2016



Sources: country reports from Austria, Belgium, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, and the UK.

The notification rates for children and adults in the age groups 0–4, 5–14, 15–24 and 25–44 years were similar, ranging from 0.34 to 0.6 cases per 100 000 population. The rates were much lower in the 45–64 and >65 years age groups (Figure 3). The overall male-to-female ratio was 1.1:1.

Figure 4. Distribution of confirmed typhoid and paratyphoid fever cases per 100 000 population, by age and gender, EU/EEA, 2017



Typhoid fever accounted for 68% of typhoid/paratyphoid cases (Table 2). Among paratyphoid fever cases with known serotype, *S.* Paratyphi A dominated compared with *S.* Paratyphi B and *S.* Paratyphi C.

Table 2. *Salmonella enterica* serotype Typhi and *Salmonella* Paratyphi cases, EU/EEA, 2017

Serotype	Number of cases	Percentage
Typhi	744	68%
Paratyphi A	216	20%
Paratyphi B	107	10%
Paratyphi C	6	0.6%
Paratyphi (unspecified)	25	2%
Total	**1 098**	**100%**

Source: TESSy data, extracted 29 Aug 2019

Table 3 displays antimicrobial resistance in bacterial isolates from typhoid/paratyphoid cases by the most likely geographical region of acquired infection. Resistance was most common to ciprofloxacin, with 38.8% and 72.0% of isolates acquired in the EU/EEA and in Asia, respectively, being resistant. Resistance to sulfamethoxazole, ampicillin, trimethoprim and chloramphenicol was also common (16.0–28.8%), both in isolates acquired in the EU/EEA and in Asia, while epidemiological resistance to azithromycin (clinical breakpoints lacking) and clinical resistance to cefotaxime was lower. Azithromycin resistance, albeit at a relatively low level, was twice as common in isolates acquired in Asia as those in EU/EEA.

Table 3. Antimicrobial resistance in isolates from typhoid/paratyphoid infections by probable region of infection*, 2017

Region	Chloramphenicol		Ampicillin		Ciprofloxacin		Cefotaxime		Sulfonamide		Trimethoprim		Azithromycin	
	N	% Res	N	% Res	N	% Res	N	% Res	N	% Res	N	% Res	N	% NWT
EU/EEA	79	17.7	80	23.8	80	38.8	90	1.3	66	28.8	67	19.4	39	2.6
Asia	50	24.0	50	20.0	50	72.0	50	2.0	49	22.4	50	16.0	35	5.7

N – number of isolates; % Res – percent clinically resistant; % NWT – percent non-wild type

** For other geographical regions, fewer than 10 isolates were reported and data therefore not shown*

Outbreaks and other threats

France reported an outbreak of typhoid fever through EPIS-FWD in September 2017, linked to a mass gathering event in Italy. The outbreak involved patients from different EU countries, including France, Germany, Italy and Czechia[4,5].

Discussion

Typhoid and paratyphoid fever are rare infections in EU/EEA countries, and most cases are associated with travel. In the UK, which accounted for 29.7% of all reported cases in 2017 in the EU/EEA, most infections were acquired by people visiting friends or relatives in the Indian subcontinent [6]. In France, which accounted for 18.0% of all reported cases in 2017 in the EU/EEA, infections were predominantly acquired during travel to Africa and Asia [7]. The seasonal pattern observed in the EU/EEA, with peaks of cases in September and late spring, most likely reflects travel during holiday periods, with disease onset after returning home. Typhoid and paratyphoid fever cases also follow a seasonal pattern in Asia, with a peak season from May to October [8].

Globally, between 11 million and 21 million cases of typhoid and paratyphoid fever are estimated to occur annually [9]. There is a high burden in low- and middle-income countries, especially in southern Asia [10]. The estimated incidence at study sites in Bangladesh and India in 5–15 year olds from 2003–2004 was as high as 200 and 494 cases per 100 000 person-years, respectively [10]. At study sites in sub-Saharan Africa, the incidence was estimated to be as high as 383 cases per 100 000 person-years [10].

When tested for antimicrobial susceptibility, most isolates of *S.* Typhi and *S.* Paratyphi A from south Asia were resistant to fluoroquinolones applying the latest European Committee on Antimicrobial Susceptibility Testing (EUCAST) clinical breakpoints, and multidrug resistance was not uncommon [11]. *S.* Typhi strains with resistance to fluoroquinolones have also been reported in sub-Saharan Africa [9]. In addition, *S.* Typhi strains with resistance to azithromycin have occasionally been reported [9]. Antimicrobial susceptibility test results reported to ECDC for 2017 confirm these findings.

The World Health Organization (WHO) recommends the programmatic use of three licensed typhoid vaccines, including two that have been recommended since 2008, for endemic and epidemic disease control [9]. Despite the success of several typhoid vaccination strategies, typhoid vaccines remain underused [12].

Public health implications

As of 2017, typhoid and paratyphoid fever are largely travel-associated infections in the EU/EEA. People planning to stay in high-endemicity countries for prolonged periods should consider vaccination in line with national recommendations before travel.

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