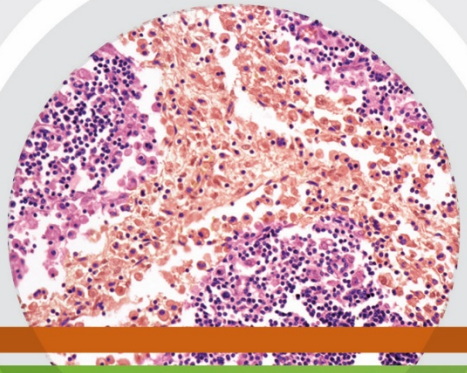

SURVEILLANCE REPORT

Annual Epidemiological Report for 2016

Typhoid and paratyphoid fevers

Key facts

- Typhoid and paratyphoid fevers are relatively rare in the EU/EEA and mainly acquired during travel to countries outside the EU/EEA, particularly in south Asia.
- In 2016, 22 EU/EEA countries reported 1 161 confirmed cases.
- Both the number of cases and the overall notification rate of 0.33 cases per 100 000 population were the highest recorded over the last five years.
- Cases in the EU/EEA show a clear seasonality, with a pronounced peak in September and a small peak in late spring.
- Although there are three vaccines against typhoid fever, it is still more often reported than paratyphoid fever, for which a vaccine is not yet available.

Methods

This report is based on data for 2016 retrieved from The European Surveillance System (TESSy) on 21 February 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 2016, 27 EU/EEA countries reported case-based data on typhoid and paratyphoid fevers. Three additional countries, Bulgaria, Croatia and Poland, reported aggregated data for salmonellosis, from which cases of typhoid and paratyphoid fevers could not be extracted. Twenty-four 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 Belgium and Finland did not specify which definition they used [2].

Twenty-five countries had a compulsory notification system. Belgium, France, Luxembourg and the Netherlands used a voluntary system and the United Kingdom (UK) used another type of surveillance system. All countries had

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comprehensive surveillance of typhoid/paratyphoid fever except the Netherlands, which used a sentinel system, and Spain, which used another system.

Surveillance systems for salmonellosis had national coverage in all Member States except France, the Netherlands and Spain. The population coverage in 2016 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 rates were calculated.

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

Epidemiology

For 2016, 22 countries reported 1 161 confirmed typhoid/paratyphoid fever cases, resulting in an EU/EEA notification rate of 0.33 cases per 100 000 population (Table 1). Both the case number and notification rate were the highest recorded from 2012–2016. Five countries did not report any cases: Cyprus, the Czech Republic, Estonia, Latvia and Malta. Three countries accounted for 68.9% of cases: France, Italy and the UK, with the UK alone accounting for 39.3% of confirmed cases. The highest notification rates in 2016 were reported by the UK (0.70 per 100 000), France (0.69) and Iceland (0.60) (Table 1, Figure 1).

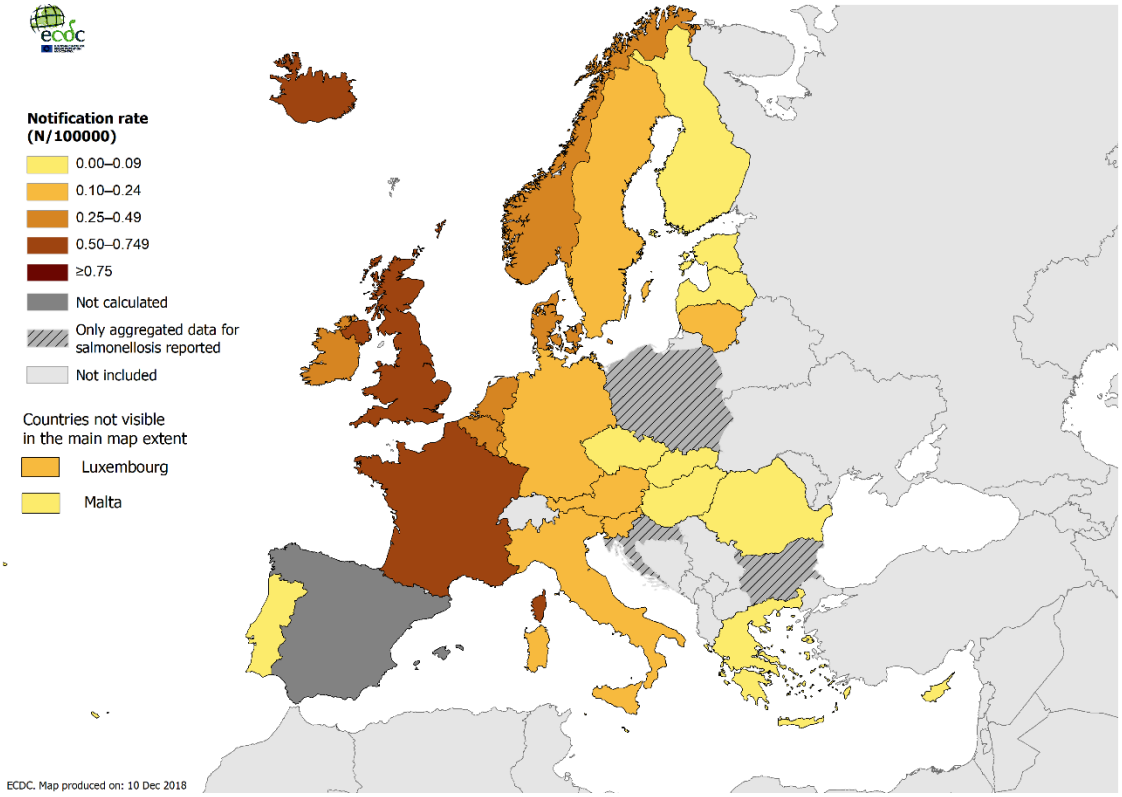
Of the 765 cases with available information, 631 (82.5%) were travel-related. The probable country of infection was available for 586 (92.9%) of these cases, of which 573 (97.8%) were associated with travel to countries outside the EU/EEA. India and Pakistan were the top two travel destinations, accounting for 40.8% and 19.6% of travel-associated cases with available information overall and for 50.7% and 28.7% of such cases reported by the UK. For France, the top two countries were India and Senegal, accounting for 34.3% and 7.4% of travel-associated cases with available information respectively. Greece was the only country that reported a large proportion of cases as domestically acquired (66.7%).

Table 1. Distribution of confirmed typhoid and paratyphoid fever cases by year and country, EU/EEA, 2012–2016

Country	2012		2013		2014		2015		2016		
	Confirmed cases	Rate	Confirmed cases	Rate	Confirmed cases	Rate	Confirmed cases	Rate	Confirmed cases	Rate	Reported cases
Austria	13	0.15	3	0.04	9	0.11	7	0.08	17	0.20	17
Belgium	29	0.26	16	0.14	35	0.31	33	0.29	42	0.37	42
Bulgaria	-	-	-	-	-	-	-	-	-	-	-
Croatia	-	-	-	-	-	-	-	-	-	-	-
Cyprus	1	0.12	0	0.00	0	0.00	0	0.00	0	0.00	0
Czech Republic	6	0.06	3	0.03	6	0.06	0	0.00	0	0.00	0
Denmark	29	0.52	19	0.34	27	0.48	18	0.32	24	0.42	24
Estonia	2	0.15	2	0.15	1	0.08	2	0.15	0	0.00	0
Finland	5	0.09	12	0.22	10	0.18	7	0.13	5	0.09	5
France	165	0.53	203	0.64	206	0.65	170	0.53	222	0.69	222
Germany	101	0.13	146	0.18	84	0.10	102	0.13	95	0.12	95
Greece	6	0.05	8	0.07	9	0.08	17	0.16	9	0.08	9
Hungary	1	0.01	0	0.00	0	0.00	0	0.00	3	0.03	3
Iceland	0	0.00	1	0.31	0	0.00	0	0.00	2	0.60	2
Ireland	14	0.31	11	0.24	12	0.26	10	0.22	17	0.36	17
Italy	131	0.22	111	0.19	120	0.20	98	0.16	123	0.20	123
Latvia	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0
Liechtenstein	.	.	.	.	.	.	.	.	.	.	.
Lithuania	1	0.03	2	0.07	1	0.03	2	0.07	3	0.10	3
Luxembourg	0	0.00	1	0.19	2	0.36	1	0.18	1	0.17	1
Malta	0	0.00	1	0.24	0	0.00	0	0.00	0	0.00	0
Netherlands	65	0.39	63	0.38	37	0.22	45	0.27	56	0.33	56
Norway	20	0.40	26	0.51	14	0.27	14	0.27	25	0.48	25
Poland	-	-	-	-	-	-	-	-	-	-	-
Portugal	14	0.13	12	0.11	19	0.18	8	0.08	9	0.09	9
Romania	0	0.00	2	0.01	0	0.00	4	0.02	1	0.01	1
Slovakia	7	0.13	0	0.00	0	0.00	0	0.00	1	0.02	1
Slovenia	1	0.05	4	0.19	4	0.19	2	0.10	3	0.15	3
Spain	25	0.00	33	0.00	39	0.00	34	0.00	31	0.00	31
Sweden	28	0.30	27	0.28	36	0.37	27	0.28	16	0.16	16
United Kingdom	400	0.63	349	0.55	352	0.55	406	0.63	456	0.70	456
EU/EEA	**1 064**	**0.29**	**1 055**	**0.30**	**1 023**	**0.29**	**1007**	**0.28**	**1 161**	**0.33**	**1 161**

Source: Country reports.
.: no data reported
-: only aggregated data for salmonellosis reported.

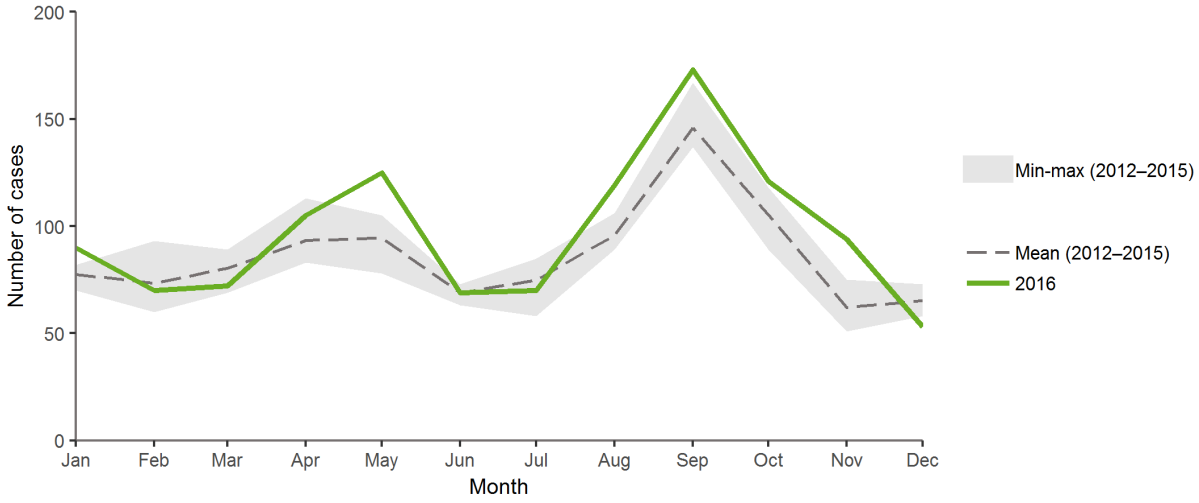
Figure 1. Distribution of confirmed typhoid and paratyphoid fever cases per 100 000 population by country, EU/EEA, 2016



Source: Country reports from Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Portugal, Romania, Slovakia, Slovenia, Sweden and UK. No rate calculated for Spain.

As in previous years, cases reported in 2016 followed a characteristic seasonal trend, with a pronounced peak in September and a small peak in late spring (Figure 2). The number of cases reported in May and from August to September was slightly above the maximum number of cases reported for the same months of the previous four years. From 2012–2016, no clear trend can be detected in the annual number of reported typhoid and paratyphoid fever cases.

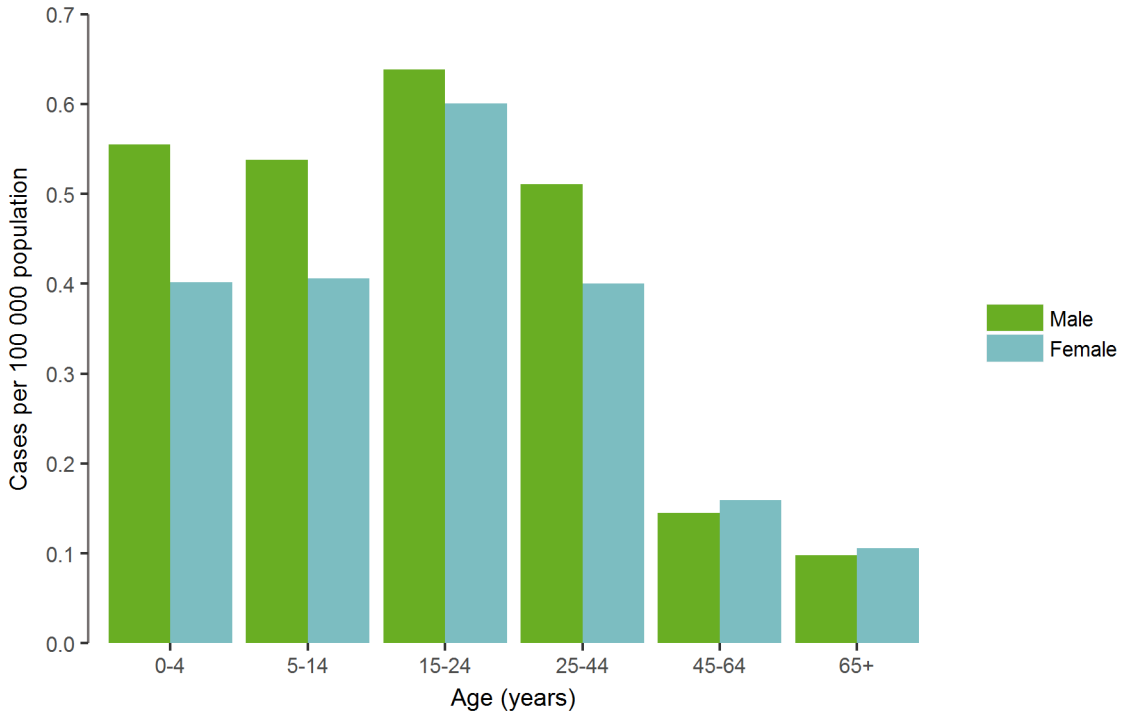
Figure 2. Distribution of confirmed typhoid and paratyphoid fever cases by month, EU/EEA, 2012–2015 and 2016



Source: Country reports from Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and 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 0.48 to 0.62 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 1.2:1.

Figure 3. Distribution of confirmed typhoid and paratyphoid fever cases per 100 000 population, by age and gender, EU/EEA, 2016



Typhoid fever accounted for over 60% of typhoid/paratyphoid cases (Table 2). As in 2015, 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, 2016

Serotype	Number of cases	Percentage
Typhi	722	62.2
Paratyphi A	143	12.3
Paratyphi B	90	7.8
Paratyphi C	18	1.6
Paratyphi (unspecified)	188	16.2
Total	**1 161**	**100**

Source: Country reports from Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and UK.

Outbreaks and other threats

There were no threats reported in 2016 related to typhoid/paratyphoid fever.

Discussion

Typhoid and paratyphoid fever are rare infections in EU/EEA countries and most cases are associated with travel during the incubation period. In the UK, which accounted for 39.3% of reported cases in 2016, most infections were acquired by people visiting friends or relatives in the Indian subcontinent [4]. In France, which accounted for 19.1% of reported cases in 2016, infections are predominantly acquired during travel to Africa and Asia [5]. The seasonal pattern observed in the EU/EEA, with peaks of cases in September and late spring, most probably 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–October [6].

Globally, between 11 and 21 million cases of typhoid and paratyphoid fever are estimated to occur annually [7]. There is a high burden in low- and middle-income countries, especially in south Asia [8]. 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 [8]. At study sites in sub-Saharan Africa, the incidence was estimated to be as high as 383 cases per 100 000 person-years [8].

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 clinical breakpoints and multidrug resistance was not uncommon [9]. *S.* Typhi strains with resistance to fluoroquinolones have also been reported in sub-Saharan Africa [7]. In addition, *S.* Typhi strains with resistance to azithromycin have occasionally been reported [7].

WHO recommends the programmatic use of three licensed typhoid vaccines, including two that have been recommended since 2008, for endemic and epidemic disease control [7]. Despite the demonstrated success of several typhoid vaccination strategies, typhoid vaccines remain underused [10].

Public health implications

Typhoid and paratyphoid fever are mainly travel-associated infections in the EU/EEA. Persons planning to stay in high-endemicity countries for prolonged periods should consider vaccination in line with national recommendations before travel.

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