

SURVEILLANCE REPORT

Annual Epidemiological Report for 2015

Typhoid and paratyphoid fever

Key facts

- Typhoid and paratyphoid fever are relatively rare diseases in the EU/EEA, mainly acquired while travelling to countries outside of the EU/EEA, particularly in south Asia.
- In 2015, 18 EU/EEA countries reported a total of 845 confirmed cases. Nine countries reported zero cases.
- The EU/EEA notification rate was 0.23 cases per 100 000 population.
- The number of typhoid/paratyphoid fever cases has decreased in the EU/EEA over the last five years.
- Although there are two vaccines against typhoid fever, the disease is still more often reported than paratyphoid fever, for which a vaccine is not yet available.

Methods

This report is based on data for 2015 retrieved from The European Surveillance System (TESSy) on 30 June 2017. 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 2015, 27 EU/EEA countries reported data on typhoid and paratyphoid fever. Twenty-four countries reported data using the 2012 or 2008 EU case definition for typhoid/paratyphoid fever, four used another definition, and two had not specified the definition used (Table 3 and [2]). Typhoid and paratyphoid fever cases could not be extracted from the datasets for Belgium, Bulgaria, Croatia and Poland because these countries reported aggregated data for salmonellosis.

The disease is under mandatory notification in all EU/EEA countries. The surveillance systems for typhoid/paratyphoid fever have national coverage in all but three Member States (Belgium, France, and Spain). The population coverage is estimated to be 30% in Spain and 48% in France. The variation in coverage was taken into consideration when calculating the national notification rates. No information on estimated coverage was provided by Belgium, which prevented the calculation of notification rates. Three countries (Belgium, the Czech

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Republic and Slovakia) have active surveillance systems while the rest have passive surveillance. Three countries submit data through their national reference laboratories from a separate data source (not shown in Table 3).

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

Epidemiology

In 2015, 18 EU/EEA countries reported 845 confirmed typhoid/paratyphoid fever cases, resulting in an EU/EEA notification rate of 0.23 cases per 100 000 population (Table 1). Both case numbers and notification rate were the lowest recorded in the period 2011–2015.

The highest notification rates in 2015 were reported by the United Kingdom (0.63 cases per 100 000 population), France (0.53 per 100 000), and Denmark (0.32 cases per 100 000) (Table 1, Figure 1). Nine countries did not report any cases of typhoid or paratyphoid fever (Belgium, Cyprus, the Czech Republic, Hungary, Iceland, Italy, Latvia, Malta, and Slovakia).

Of the 566 cases with available information, 474 (84%) of typhoid and paratyphoid fever cases were acquired while travelling, almost exclusively (444 cases, 94%) in countries outside the EU/EEA: countries in south Asia dominated the list of destinations. India, Pakistan and Bangladesh were the top three countries for travel-associated typhoid and paratyphoid fever cases. Only Greece reported a large proportion of their cases with known travel status as domestically acquired (71%).

Table 1. Distribution of confirmed cases of typhoid/paratyphoid fever per 100 000 population, EU/EEA, 2011–2015

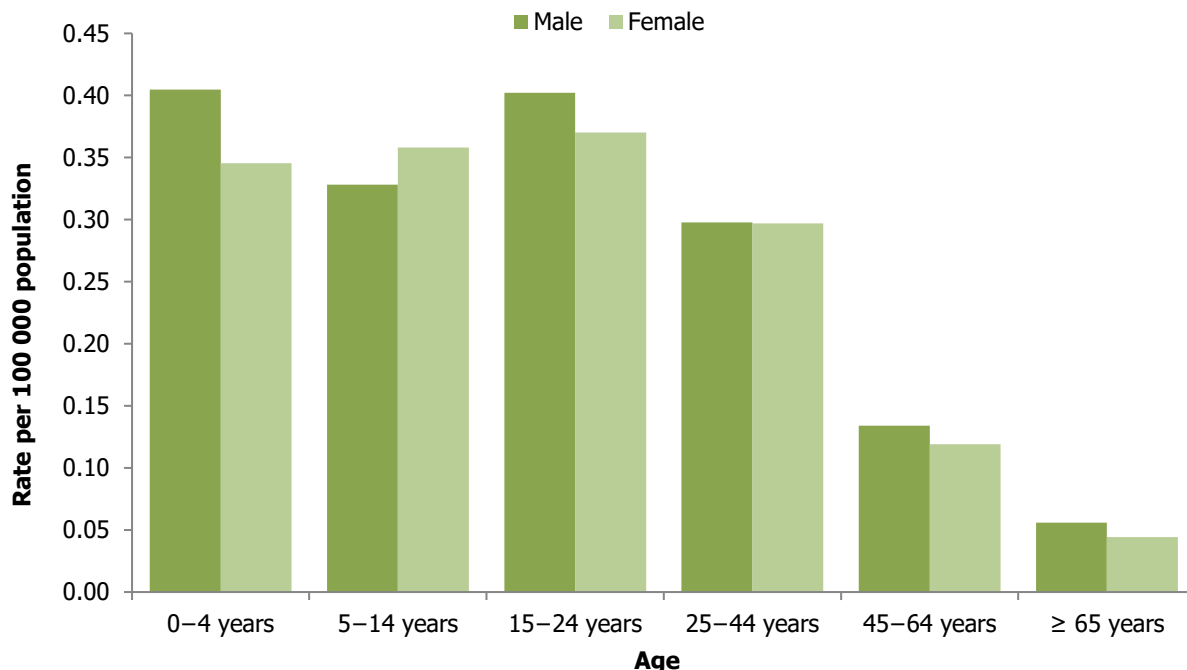
Country	2011		2012		2013		2014		National coverage	Reported cases	2015		
	Confirmed cases		Confirmed cases		Confirmed cases		Confirmed cases				Confirmed cases		
	Number	Rate	Number	Rate	Number	Rate	Number	Rate			Number	Rate	ASR
Austria	4	0.0	13	0.2	3	0.0	9	0.1	Y	7	7	0.1	0.1
Belgium	50	-	29	-	16	-	35	-	N	0	0	-	-
Bulgaria	.	.	.	.	.	.	.	.	.	.	.	.	.
Croatia	.	.	.	.	.	.	.	.	.	.	.	.	.
Cyprus	1	0.1	1	0.1	0	0.0	0	0.0	Y	0	0	0.0	0.0
Czech Republic	7	0.1	6	0.1	3	0.0	6	0.1	Y	0	0	0.0	0.0
Denmark	24	0.4	29	0.5	19	0.3	27	0.5	Y	18	18	0.3	0.3
Estonia	0	0.0	2	0.2	2	0.2	1	0.1	Y	2	2	0.2	0.2
Finland	9	0.2	5	0.1	12	0.2	10	0.2	Y	7	7	0.1	0.1
France	146	0.5	165	0.5	203	0.6	206	0.7	48%	170	170	0.5	0.5
Germany	114	0.1	101	0.1	146	0.2	84	0.1	Y	102	102	0.1	0.1
Greece	8	0.1	6	0.1	8	0.1	9	0.1	Y	17	17	0.2	0.2
Hungary	0	0.0	1	0.0	0	0.0	0	0.0	Y	0	0	0.0	0.0
Ireland	16	0.4	14	0.3	11	0.2	12	0.3	Y	10	10	0.2	0.2
Italy	124	0.2	0	0.0	0	0.0	0	0.0	Y	0	0	0.0	0.0
Latvia	1	0.0	0	0.0	0	0.0	0	0.0	Y	0	0	0.0	0.0
Lithuania	2	0.1	1	0.0	2	0.1	1	0.0	Y	2	2	0.1	0.1
Luxembourg	0	0.0	0	0.0	1	0.2	2	0.4	Y	1	1	0.2	0.2
Malta	2	0.5	0	0.0	1	0.2	0	0.0	Y	0	0	0.0	0.0
Netherlands	56	0.3	65	0.4	63	0.4	37	0.2	Y	45	45	0.3	0.3
Poland	.	.	.	.	.	.	.	.	.	.	.	.	.
Portugal	14	0.1	14	0.1	12	0.1	19	0.2	Y	8	8	0.1	0.1
Romania	0	0.0	0	0.0	2	0.0	0	0.0	Y	4	4	0.0	0.0
Slovakia	2	0.0	7	0.1	0	0.0	0	0.0	Y	0	0	0.0	0.0
Slovenia	3	0.1	1	0.0	4	0.2	4	0.2	Y	2	2	0.1	0.1
Spain	47	0.4	25	0.2	33	0.2	39	0.2	45%	3	3	0.0	0.0
Sweden	24	0.3	28	0.3	27	0.3	36	0.4	Y	27	27	0.3	0.3
United Kingdom	524	0.8	400	0.6	349	0.5	352	0.5	Y	406	406	0.6	0.6
EU	1178	0.3	913	0.3	917	0.3	889	0.3	.	831	831	0.2	0.2
Iceland	0	0.0	0	0.0	1	0.3	0	0.0	Y	0	0	0.0	0.0
Liechtenstein	.	.	.	.	.	.	.	.	.	.	.	.	.
Norway	26	0.5	20	0.4	26	0.5	14	0.3	Y	14	14	0.3	0.3
EU/EEA	1204	0.3	933	0.3	944	0.3	903	0.3	.	845	845	0.2	0.2

Source: Country reports. Legend: Y = yes, N = no, C = case based, A = aggregated, . = no data reported, ASR = age-standardised rate, - = no report

¹ Provisional data for 2015. Notification rates not calculated.

There was no major difference in typhoid/paratyphoid fever overall by gender (male-to-female ratio: 1.06:1). The notification rates in children, young adults and adults were rather similar, ranging between 0.30 and 0.39 cases per 100 000 population). These rates were much higher than in older adults and elderly individuals (Figure 2).

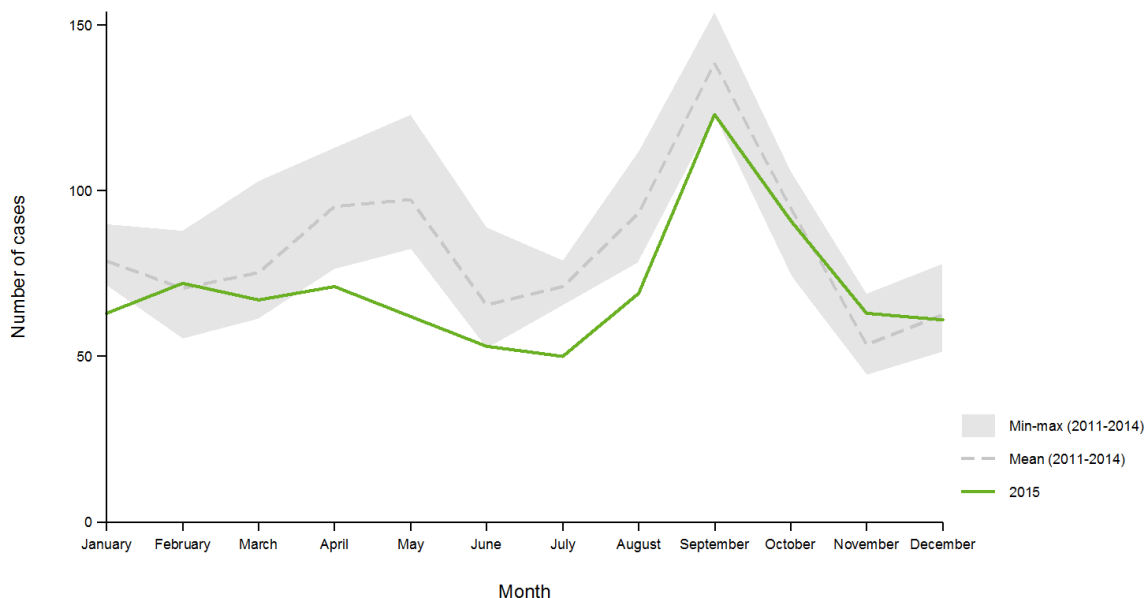
Figure 2. Rate of confirmed typhoid/paratyphoid fever cases per 100 000 population, by age and gender, EU/EEA, 2015



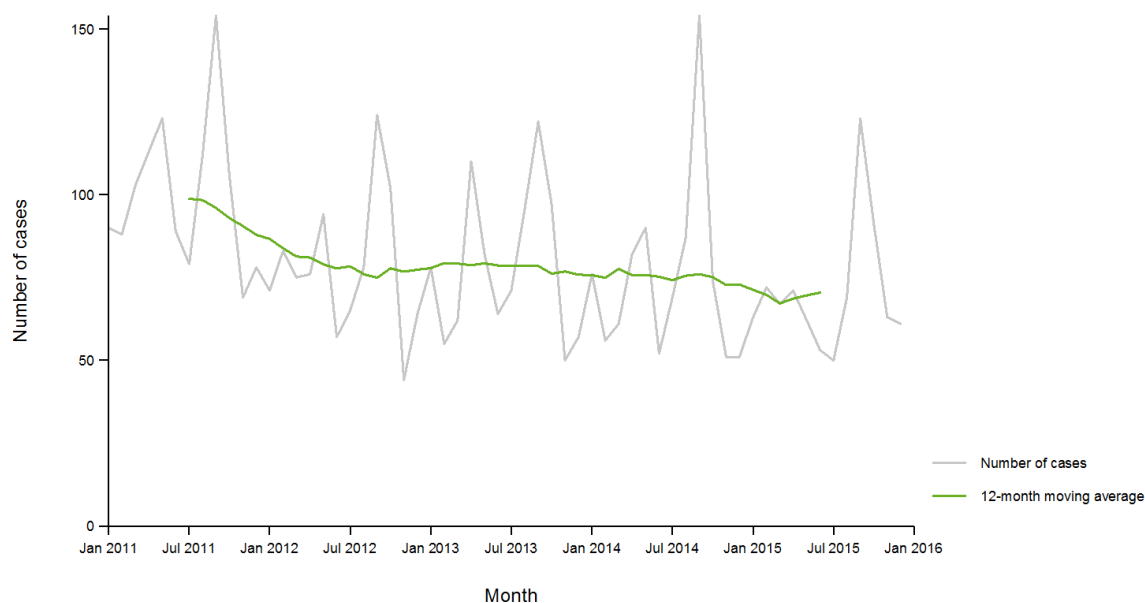
Source: Country reports from Austria, Belgium, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and the United Kingdom.

As in previous years, cases reported in 2015 followed a characteristic seasonal trend, with a pronounced peak in September (Figure 3). Unlike in previous years, there was no peak in May. The number of cases reported between April and August 2015 was below the minimum number of cases reported in the previous four years. A decreasing trend was observed in typhoid and paratyphoid cases in the EU/EEA during this period (Figure 4).

Figure 3. Number of confirmed cases of typhoid/paratyphoid fever by month in 2015 compared with 2011–2015, EU/EEA



Source: Country reports from Belgium, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and the United Kingdom. Austria did not report data over the whole period at the level of detail required for the analysis.

Figure 4. Number of confirmed cases of typhoid/paratyphoid fever and 12-month moving average, EU/EEA, 2011–2015

Source: Country reports from Belgium, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and the United Kingdom. Austria did not report data over the whole period at the level of detail required for the analysis.

Typhoid fever accounted for almost 60% of the typhoid/paratyphoid cases (serotype data provided for 100% of cases) (Table 2). Among paratyphoid fever cases, *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, 2015

Serotype	Number of cases	%
Typhi	497	58.8
Paratyphi A	93	11.0
Paratyphi B	68	8.0
Paratyphi C	42	5.0
Paratyphi (unspecified)	145	17.2
Total	845	100

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

Threats description for 2015

In November 2015, EPIS FWD postings from Germany and the Netherlands reported nine cases of typhoid fever among asylum seekers who had recently arrived from the Middle East.

Discussion

Typhoid and paratyphoid fever are rare infections in EU/EEA countries. Most cases (84%) are associated with travel during the incubation period, mostly to the Indian subcontinent. In the United Kingdom, which accounted for 48% of the reported cases in 2015, most of the infections were acquired by people visiting friends or relatives in Bangladesh, India and Pakistan [4]. Infections reported in France, a country which accounted for 20% of all reported EU/EEA cases in 2015, were predominantly acquired during travel to Africa, South America and the Indian subcontinent [5]. Globally, the burden of typhoid fever remains high in low- and middle-income countries, especially in south Asia [6], where the incidence in 5–15-year-olds in study sites in Pakistan and India in 2002–2004 was as high as 413 and 494 cases per 100 000 population, respectively [7]. When tested for antimicrobial susceptibility, most isolates of *S. Typhi* and *S. Paratyphi A* from south Asia were resistant to fluoroquinolones (applying the latest EUCAST clinical breakpoints), and multi-drug resistance was not uncommon [8]. In 2008, WHO recommended programmatic use of the two licensed typhoid vaccines for endemic

and epidemic disease control [9]. Despite the demonstrated success of several typhoid vaccination strategies, typhoid vaccines remain underused [10].

The decreasing trend in the number of reported cases and notification rates is possibly due to a surveillance artefact. Several EU/EEA countries reported 0 cases in 2015, some of them for the first time in five years.

The seasonal pattern observed in the EU/EEA, with a peak of cases in September, most likely reflects travelling during the holiday period, with disease onset after returning home.

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 the national recommendations before travelling.

References

1. European Centre for Disease Prevention and Control. Introduction to the Annual epidemiological report. In: ECDC. Annual epidemiological report for 2015. Stockholm: ECDC; 2017. Available from: <https://ecdc.europa.eu/en/annual-epidemiological-reports-2016/methods>.
2. European Centre for Disease Prevention and Control. Surveillance systems overview [internet]. Stockholm: ECDC; 2017. Available from: <https://ecdc.europa.eu/en/publications-data/surveillance-systems-overview-2015>.
3. European Centre for Disease Prevention and Control. Surveillance atlas of infectious diseases [internet]. Stockholm: ECDC; 2017 [cited 30 May 2017]. Available from: <https://ecdc.europa.eu/en/surveillance-atlas-infectious-diseases>.
4. National Health Service, United Kingdom. Health topics: Typhoid fever. Leeds: NHS; 2015 [cited 28 June 2016]. Available from: <http://www.nhs.uk/conditions/typhoid-fever/Pages/Introduction.aspx>.
5. Institut Pasteur, France. Info sheet: Typhoid and paratyphoid fever [in French]. Paris: Institut Pasteur; 2012 [cited 28 June 2017]. Available from: <http://www.pasteur.fr/fr/institut-pasteur/presse/fiches-info/fievres-typhoide-et-paratyphoide>.
6. Mogasale V, Maskery B, Ochiai RL, Lee JS, Mogasale VV, Ramani E, et al. Burden of typhoid fever in low-income and middle-income countries: a systematic, literature-based update with risk-factor adjustment. *Lancet Glob Health*. 2014;2(10):e570-80.
7. Ochiai RL, Acosta CJ, Danovaro-Holliday MC, Baiqing D, Bhattacharya SK, Agtini MD, et al. A study of typhoid fever in five Asian countries: disease burden and implications for controls. *Bull World Health Organ*. 2008;86(4):260-8.
8. Kariuki S, Gordon MA, Feasey N, Parry CM. Antimicrobial resistance and management of invasive Salmonella disease. *Vaccine*. 2015;33 Suppl 3:C21-9.
9. World Health Organization. Typhoid vaccines – position paper. Geneva: WHO; 2008.
10. Date KA, Bentsi-Enchill A, Marks F, Fox K. Typhoid fever vaccination strategies. *Vaccine*. 2015;33 Suppl 3:C55-61.