



Public Health
England

Protecting and improving the nation's health

Enteric fever (typhoid and paratyphoid) England, Wales and Northern Ireland: 2017

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Introduction

Enteric fever (also known as typhoid and paratyphoid) is an illness caused by the bacteria *Salmonella enterica* subspecies *enterica* serovar Typhi (typhoid) or serovars Paratyphi A, B or C (paratyphoid). Typhoid fever is a serious disease and can be life-threatening unless treated promptly with antibiotics. The disease may last several weeks and convalescence takes some time. In the literature, paratyphoid is considered to be typically milder than typhoid and of shorter duration [1, 2].

The bacteria that cause typhoid and paratyphoid only occur in humans, who can acquire infection through eating food or drinking water that has been contaminated with infected faeces or urine or through person-to-person transmission. In the UK, most cases of typhoid and paratyphoid are acquired abroad in countries and regions of the world where hygiene or sanitation is poor.

This report summarises the epidemiology of laboratory-confirmed cases of *S. Typhi* (typhoid) and *S. Paratyphi* (paratyphoid) reported in England, Wales and Northern Ireland in 2017. It includes both reference laboratory and enhanced enteric fever surveillance data.

Data sources

Confirmed symptomatic cases of *S. Typhi* and *Paratyphi* in England, Wales and Northern Ireland are diagnosed by the Public Health England (PHE) *Salmonella* Reference Service (SRS), within the Gastrointestinal Bacteria Reference Unit (GBRU)*. Data for laboratory-confirmed cases from 2007 onwards was extracted from the reference laboratory database using 'date received by the laboratory'. All *S. Typhi* and *Paratyphi* isolates referred to the SRS undergo routine whole genome sequencing and single nucleotide polymorphism (SNP) typing. Cases are then clustered using single linkage clustering in 7 hierarchical levels [3,4]. Microbiological clusters in this report are defined as encompassing all cases whose isolates fall within a 5-SNP single linkage cluster. Epidemiological information was obtained from enhanced enteric fever surveillance [5]. Cases occasionally are tested multiple times for confirmation and to check the infection has cleared, so data has been deduplicated so that only 1 laboratory report for each case is counted. Confirmed asymptomatic, probable and possible cases are analysed separately at the end of this report.

All data was analysed using MS Excel.

*As we only collect data from the PHE *Salmonella* Reference Service, local reports of cases of enteric fever may differ for Wales and Northern Ireland.

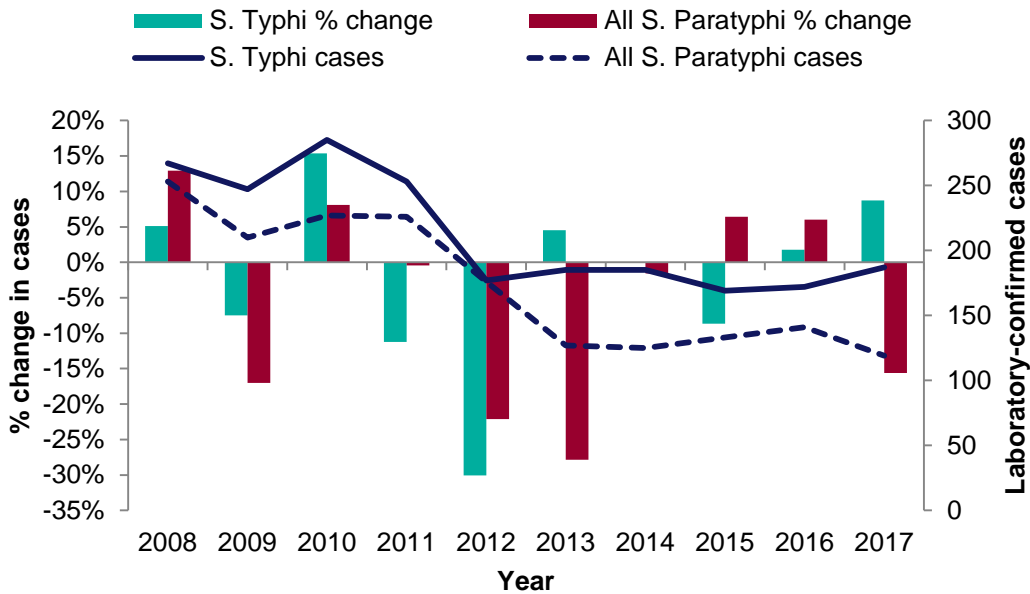
General trend

In 2017, 306 laboratory-confirmed symptomatic cases of *S. Typhi* and *S. Paratyphi* were reported by the PHE SRS in England, Wales and Northern Ireland (EWNI), which is a small (2%) decrease compared to 313 cases reported in 2016 [Table 1 and Figure 1]. Cases of *S. Typhi* and *S. Paratyphi* have decreased by an average of 7% year on year since 2011 (range -26% to +4%). In 2017, 61% of cases were caused by *S. Typhi* and 39% by *S. Paratyphi* A and B [Table 1]. There were no cases of *S. Paratyphi* C reported in 2017. Cases of *S. Paratyphi* B have remained at expected levels [Table 1] after the increase in 2015, which was due to a cluster of cases associated with travel to the Middle East in the summer of 2015 [6].

Table 1. Laboratory-confirmed symptomatic cases of enteric fever, England, Wales and Northern Ireland by organism: 2008 to 2017

Year	S.Typhi	S. Paratyphi A	S. Paratyphi B	S. Paratyphi C	Mixed infection	Total	% S. Typhi
2008	267	235	18	-	-	520	51.30%
2009	247	185	25	-	-	457	54.10%
2010	285	211	16	-	-	512	55.70%
2011	253	219	7	-	1	480	52.70%
2012	177	162	12	2	1	354	50.00%
2013	185	121	6	-	-	312	59.30%
2014	185	114	10	1	1	311	59.50%
2015	169	107	26	-	-	302	56.00%
2016	172	133	8	-	-	313	55.00%
2017	187	104	15	-	-	306	61.10%

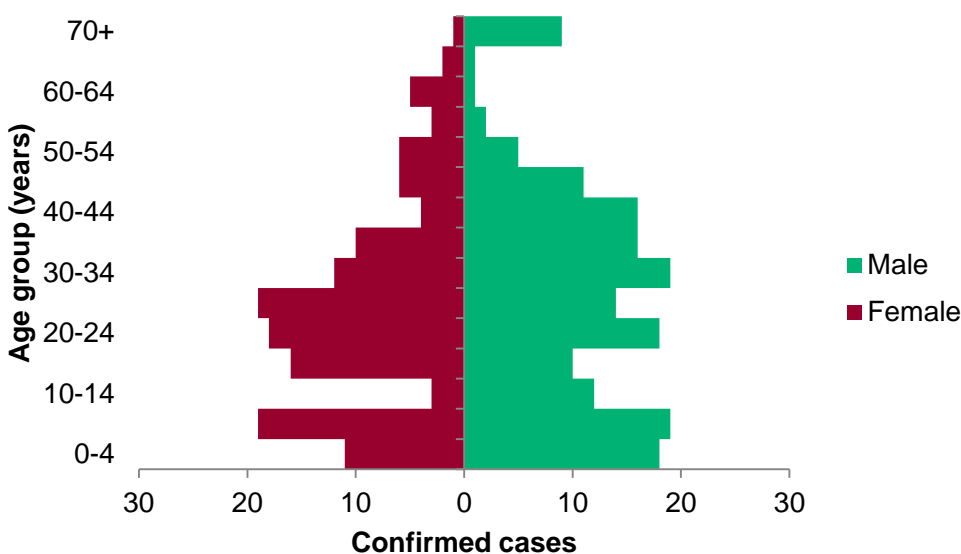
Figure 1. Laboratory-confirmed cases of S. Typhi and S. Paratyphi, with % change year to year, England, Wales and Northern Ireland: 2008 to 2017



Age and sex

In 2017, age and sex were known for all 306 cases; 41% were adults aged between 20 and 39 years [Figure 2]; the median age was 26 years (range 0-87 years). Those aged 16 years and under accounted for 30% of cases, with 4% (N=12) of the total in children under 2 years (and thus ineligible for vaccination). Overall, there were slightly more male (56%) than female cases.

Figure 2. Laboratory-confirmed cases of enteric fever, England, Wales and Northern Ireland by age and sex: 2017 (N=306)



Geographical distribution

Geographical areas were assigned based on patient postcode; where patient postcode was missing the sending laboratory postcode was used. The largest proportion of English cases of *S. Typhi* and *S. Paratyphi* in 2017 was reported in London (34%) which is broadly consistent with previous years (35% in 2016) [Table 2]. The largest relative increase in cases reported in 2017 compared to 2016 was seen in the East Midlands with no clear explanation for the increase. Cases in the North East, South West, East of England, Yorkshire and Humber, West Midlands and London decreased compared to 2016.

Table 2. Laboratory-confirmed cases of *S. Typhi* and *S. Paratyphi*, England, Wales and Northern Ireland by geographical distribution: 2016 and 2017

Geographical area (PHE centre)	2017	2016	% change
London	103	107	-4%
South East	45	30	50%
West Midlands	41	45	-9%
North West	26	26	0%
East Midlands	23	11	109%
Yorkshire and Humber	21	31	-32%
East of England	18	29	-38%
South West	11	14	-21%
North East	5	9	-44%
England total	293	302	-3%
Wales	10	9	11%
Northern Ireland	3	2	50%
EWNI total	306	313	-2.2%

Travel history

Travel history is well completed for enteric fever cases [Figure 3]. In 2017, 99% (303/306) of symptomatic laboratory-confirmed cases of *S.Typhi* and *S. Paratyphi* had travel history information (that is whether travelled or not), mostly from enhanced surveillance or, where the enhanced surveillance form was missing, from the sending laboratory request form. In 2017, 93% (284/303) of confirmed symptomatic cases with travel history information were presumed acquired abroad, similar to 2016 (93%). Of these, 267/283 (93%) had travelled abroad from EWN I and were therefore presumed to be UK residents, while the remainder were foreign visitors to EWN I (N=8) or new entrants to EWN I (N=9). For 19 cases no travel abroad was reported (compared to 22 in 2016) and for 3 cases, travel history was not stated.

Figure 3. Laboratory-confirmed cases of enteric fever, England, Wales and Northern Ireland by travel history: 2008 to 2017

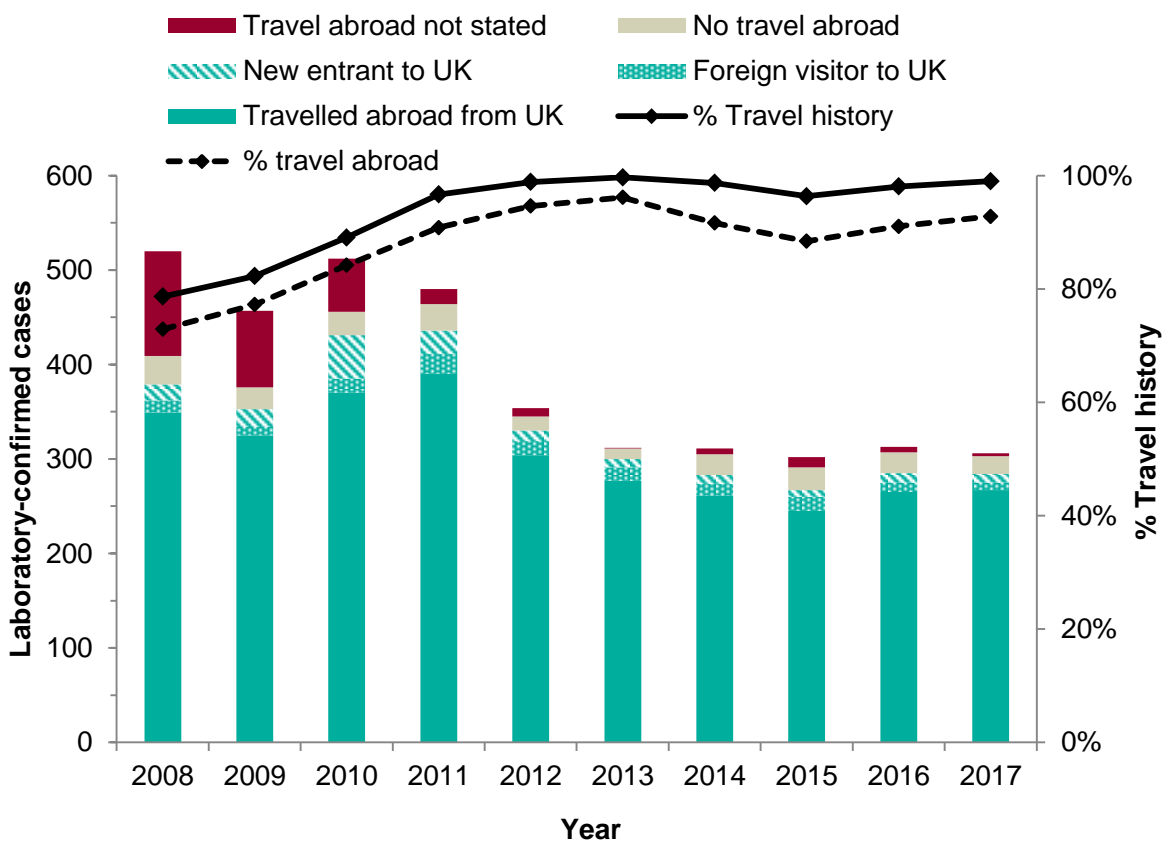
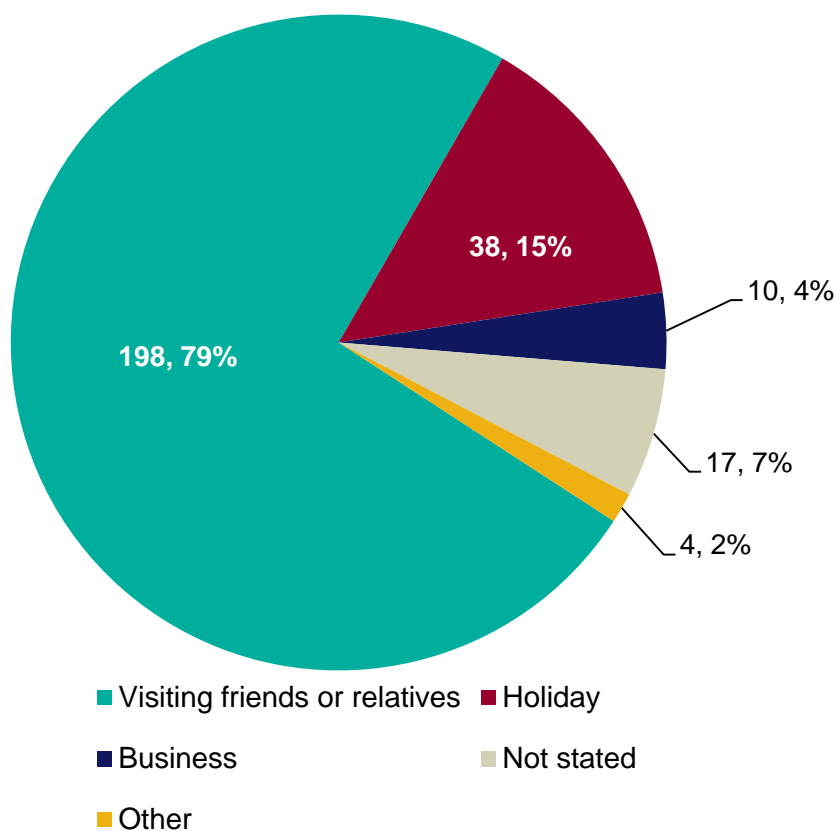


Figure 4. Reason for travel for laboratory-confirmed cases of enteric fever that travelled abroad from England, Wales and Northern Ireland: 2017 (N=267)



Where reason for travel was known (N=250), the most common reason for travel for cases that travelled abroad from EWNl was to visit friends and relatives (VFR) (198/250, 79%) [Figure 4]. The majority travelled to countries of their ethnic origin, mostly to countries in the Indian subcontinent [Table 3].

Table 3. Countries of travel and ethnicity for laboratory-confirmed cases of enteric fever that travelled abroad from England, Wales and Northern Ireland to visit friends and relatives: 2017 (N=203*)

Presumed country of infection	Ethnicity							Total
	Indian	Pakistani	Bangladeshi	Asian other	Black African	Other/mixed	Not stated	
India	84	1	-	-	-	2	10	97
Pakistan	1	55	1	1	-	-	8	66
Bangladesh	-	-	20	-	-	-	1	21
Sub-Saharan Africa	-	-	-	-	5	-	1	6
Other Asia	1	-	-	4	2	5	1	13
Total	86	56	21	5	7	7	21	203*

Reasons for travel for UK resident cases, other than visiting friends and relatives (N=69) included holidays (38), business/work (paid and voluntary) (10) and studying abroad (1). Cases that did not travel to visit friends and relatives travelled to a number of countries including: India (37), other parts of the Indian subcontinent (18), South America (17), South East Asia (11), North Africa and the Middle East (5), Sub-Saharan Africa (3) and Central America (1). Other cases stated travel to Spain (1) and Turkey (1)*. Spain is not a typical risk country for typhoid as defined by the National Travel Health Network and Centre [7], however, this case has been designated as a travel-associated case in the absence of an obvious source of infection in the UK. For 20 cases reason for travel was not stated.

* Note that some cases travelled to more than one country; all countries are included here so the totals will be higher than the actual number of cases.

Non travel-associated cases

In 2017, there were 19 confirmed cases of symptomatic enteric fever where no travel abroad was reported; 17 were caused by *S. Typhi*, 1 by *S. Paratyphi A* and 1 by *S. Paratyphi B*.

Of the 19 non-travel-associated cases, 9 cases were identified as part of 3 different epidemiological and/or microbiological clusters and 10 were not linked to any other cases epidemiologically or microbiologically. Of these 3 clusters, 1 was identified using whole genome sequencing (5-SNP clusters) supported by epidemiology and the remaining 2 clusters were identified as being part of 5-SNP clusters using whole genome sequencing alone, where no epidemiological links could be identified. In the 5-SNP cluster supported by epidemiology, 4 of the non travel-associated cases were linked to a friend or family member who was a travel-associated case. There was no potential source identified for the other 2 cases in this cluster. Of the remaining 10 cases with no known epidemiological or microbiological links to other cases, 1 had a visitor to the household from an endemic country, 3 may have been carriers and have since developed active infection and no potential source was identified for the remaining 6 cases.

Confirmed asymptomatic cases

In 2017, there were 5 confirmed cases of asymptomatic enteric fever caused by *S. Paratyphi A* (n=1) and *S. Typhi* (n=4). Of these 5 cases, 1 was linked to a household contact that was a confirmed symptomatic case in a co-traveller and 2 were identified as chronic carriers. A chronic carrier is defined as a person who continues to excrete *S. Typhi* or *S. Paratyphi* for 12 months or more [8]. Two cases had no known links to any confirmed cases, although 1 reported travel abroad.

Probable and possible cases

In 2017, there were 7 probable and 7 possible cases of enteric fever as defined in the Public Health Operational Guidelines for Enteric Fever [8]. Of these, all 14 travelled abroad from the UK. Travel history information for the probable and possible cases is detailed in Table 4. Caution should be used when interpreting this data as it has not been confirmed by the PHE reference laboratory.

Table 4. Regions of and reason for travel for probable and possible cases of enteric fever that travelled abroad from England, Wales and Northern Ireland: 2017(n=14)

World region of travel	Reason for travel			Total
	VFR	Holiday	Not stated	
India	3	1	1	5
Pakistan	2	-	-	2
Ghana	1	-	1	2
Bangladesh	1	-	-	1
Thailand	-	1	-	1
Nigeria	1	-	-	1
Ethiopia	1	-	-	1
Bolivia	-	1	-	1
Total	9	3	2	14

Information resources

- NaTHNaC typhoid and paratyphoid fact sheet: <http://travelhealthpro.org.uk/typhoid-and-paratyphoid/>
- NaTHNaC food and water hygiene advice: <http://travelhealthpro.org.uk/food-and-water-hygiene/>
- PHE typhoid and paratyphoid page: www.gov.uk/government/collections/typhoid-and-paratyphoid-guidance-data-and-analysis
- Typhoid: health advice for travellers (Asian languages): www.gov.uk/government/publications/typhoid-health-advice-for-travellers
- Travelling overseas to visit friends and relatives – health advice: www.gov.uk/government/publications/travelling-overseas-to-visit-friends-and-relatives-health-advice
- Gastrointestinal bacteria reference unit – reference and diagnostic services: www.gov.uk/guidance/gbru-reference-and-diagnostic-services

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