

National Typhoid and Paratyphoid Fever Surveillance Annual Summary, 2014

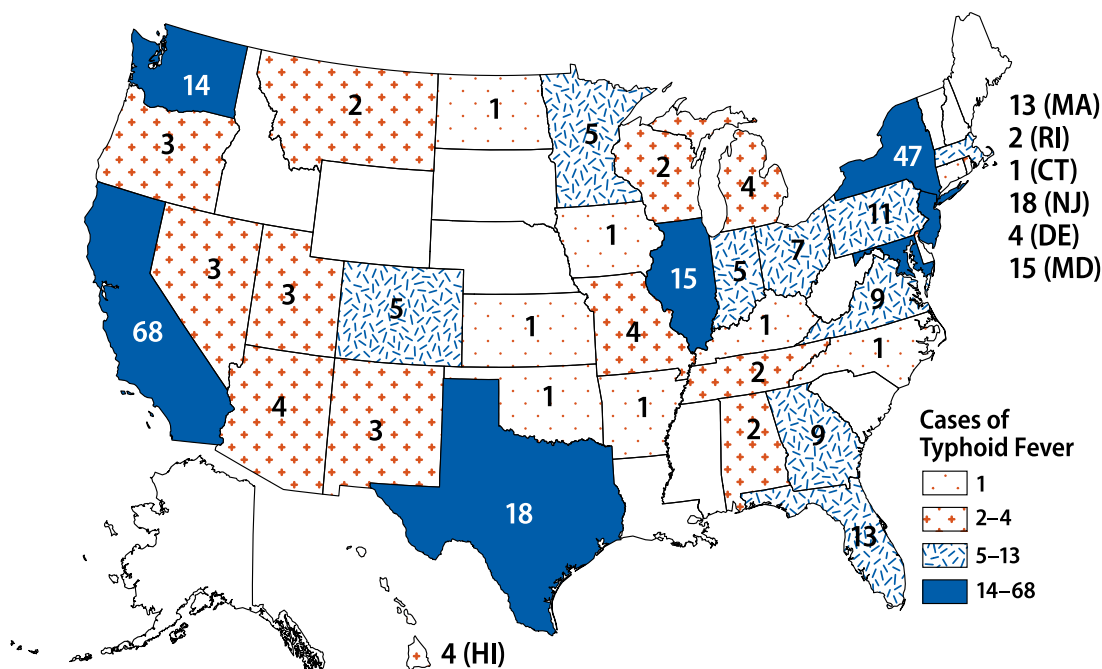
An overview of the National Typhoid and Paratyphoid Fever Surveillance (NTPFS) system is available at http://www.cdc.gov/nceid/dfwed/PDFs/typhi_surveillance_overview_508c.pdf

National Typhoid and Paratyphoid Fever Surveillance Data

Jurisdictions¹ reporting at least one typhoid or paratyphoid fever² case to the NTPFS during 2014 are shown in Figures 1 and 2.

- 38 jurisdictions reported 329 typhoid fever cases (Figure 1)
- 27 jurisdictions reported 93 paratyphoid fever cases (Figure 2). Of these cases, 92 were Paratyphi A and 1 was Paratyphi C.

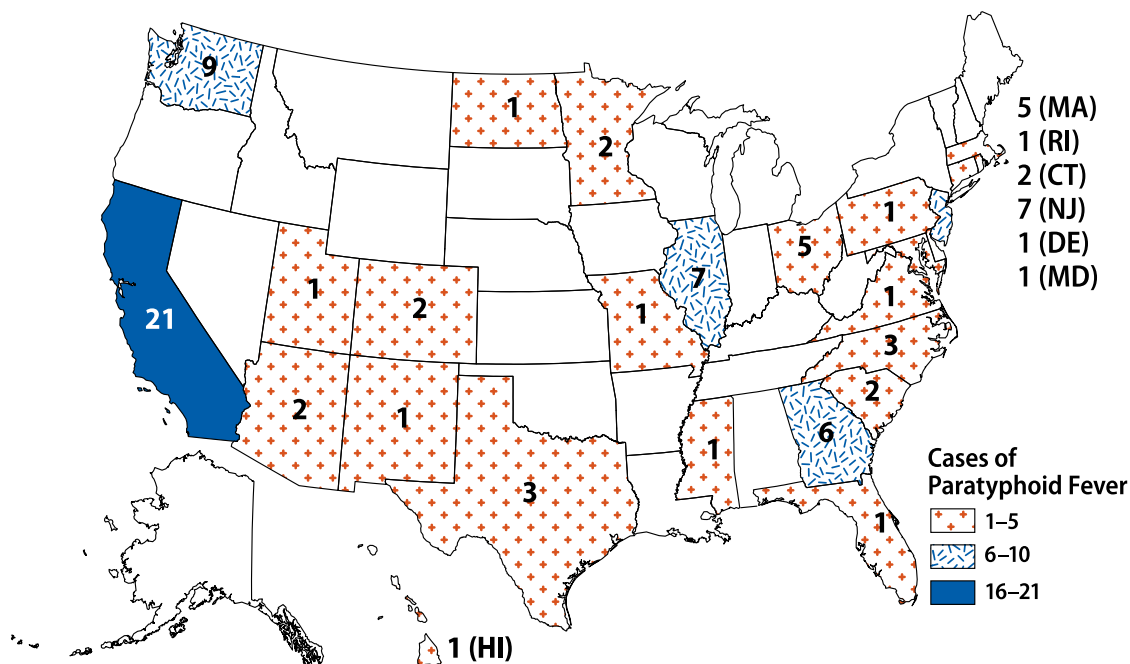
Figure 1. Jurisdictions reporting at least one typhoid fever case to National Typhoid and Paratyphoid Fever Surveillance, 2014 (n = 329)



¹ Includes all 50 states and District of Columbia

² Paratyphoid fever is caused by *Salmonella* serotypes Paratyphi A, Paratyphi B, and Paratyphi C. Two distinct pathotypes of Paratyphi B are recognized; one is associated with paratyphoid fever and the other is associated with uncomplicated gastroenteritis. The two pathotypes have distinct virulence characteristics, and are differentiated based on the ability to ferment tartrate. The paratyphoidal pathotype is unable to ferment tartrate and is designated serotype Paratyphi B; the nonparatyphoidal pathotype ferments tartrate and is designated serotype Paratyphi B var. L(+) tartrate+. Only those isolates laboratory-confirmed as not able to ferment tartrate are included in the annual NTPFS summary. For many Paratyphi B reports submitted to CDC, this information is not available; these reports are therefore excluded from the NTPFS summary.

Figure 2. Jurisdictions reporting at least one paratyphoid fever case to National Typhoid and Paratyphoid Fever Surveillance, 2014 (n = 93)



Demographic and clinical characteristics of patients with typhoid fever and paratyphoid fever are shown in Tables 1 and 2.

- The median age of patients with typhoid fever was 25 years.
- The median age of patients with paratyphoid fever was 27 years.
- One patient with typhoid fever died (<1%).
- No patients with paratyphoid fever died.

Table 1. Demographic and clinical characteristics of patients with typhoid fever reported to National Typhoid and Paratyphoid Fever Surveillance, 2014 (n = 329)

Characteristic (total number)	Count	Percent
Median age in years (range) (n = 217)	25 (1–90)	---
Female (n = 328)	152	46
US Citizen (n = 147)	110	75
Foreign travel ¹ (n = 326)	296	91
Vaccinated ² (n = 244)	13	5
Site of isolation (n = 325)		
Blood	278	86
Gallbladder	5	2
Stool	42	13
Hospitalized (n = 314)	272	87
Died (n = 302)	1	<1

¹ Travel destinations are shown in Table 3a.

² Received typhoid vaccination within 5 years before onset of illness; of the 13 cases in vaccinated persons, 6 received the oral, live attenuated vaccine (Ty21a), 2 received the Vi capsular polysaccharide vaccine (ViCPS), and the vaccine type was not reported for 5.

Table 2. Demographic and clinical characteristics of patients with paratyphoid fever reported to National Typhoid and Paratyphoid Fever Surveillance, 2014 (n = 92 Paratyphi A; n = 1 Paratyphi C)

Characteristic (total number)	Count	Percent
Median age in years (range) (n = 79)	27 (1–73)	---
Female (n = 93)	43	46
US Citizen (n = 45)	39	87
Foreign travel ¹ (n = 88)	83	94
Vaccinated ² (n = 56)	10	18
Site of isolation (n = 92)		
Blood	78	85
Gallbladder	1	1
Stool	13	14
Hospitalized (n = 87)	62	71
Died (n = 84)	0	0

¹ Travel destinations are shown in Table 3b.

² Received typhoid vaccination within 5 years before onset of illness; of the 10 cases in vaccinated persons, 4 received the oral, live attenuated vaccine (Ty21a), 4 received the Vi capsular polysaccharide vaccine (ViCPS), and the vaccine type was not reported for 2.

- Two hundred ninety (90%) patients with typhoid fever reported traveling or living outside the United States in the 30 days before illness onset, 29 (9%) reported no travel, and travel status was not reported for 3 (1%) patients.
- Seventy-nine (90%) patients with paratyphoid fever (all Paratyphi A) reported traveling or living outside the United States in the 30 days before illness onset, 4 (5%) reported no travel (including one Paratyphi C patient), and travel status was not reported for 5 (6%) patients.
- Of patients reporting travel, 268 (92%) patients with typhoid fever and 66 (84%) patients with paratyphoid fever reported travel to a single destination (Tables 3a and 3b).
- Visiting friends or relatives was the most common reason for travel for patients with typhoid fever (52%) and paratyphoid fever (43%).

Table 3a. Travel destinations for patients with typhoid fever who reported a single destination country, National Typhoid and Paratyphoid Fever Surveillance, 2014

Travel Destination	No. (%)
India	157 (57)
Bangladesh	35 (13)
Pakistan	30 (11)
Philippines	13 (5)
Mexico	6 (2)
Other ¹	33 (12)
Total	274 (100)

¹ Patients reported travel to Haiti (4), El Salvador (3), Guatemala (3), Kenya (3), Burma (2), Cambodia (2), Indonesia (2), Marshall Islands (2), Nigeria (2), Bolivia (1), Ethiopia (1), Iraq (1), Morocco (1), Nepal (1), Peru (1), Samoa (1), Sierra Leone (1), Taiwan (1), and Uganda (1).

Table 3b. Travel destinations for patients with paratyphoid fever (all Paratyphi A) who reported a single destination country, National Typhoid and Paratyphoid Fever Surveillance, 2014

Travel Destination	No. (%)
India	44 (63)
Pakistan	13 (19)
Cambodia	6 (9)
Thailand	3 (4)
Afghanistan	1 (1)
Other ¹	3 (4)
Total	70 (100)

¹ Patients reported travel to Bangladesh (1), Indonesia (1), and Sri Lanka (1).

Surveillance Performance Measures

Reporting statistics and goals for National Typhoid and Paratyphoid Fever Surveillance (below) were proposed at the 2012 Council of State and Territorial Epidemiologists (CSTE) Annual Meeting (1).

State-specific summaries were sent to state epidemiologists in July 2015. Health department personnel may request their state's reporting statistics by emailing edebresponse@cdc.gov.

Table 4. National typhoid fever reporting statistics by year, National Typhoid and Paratyphoid Fever Surveillance (NTPFS), 2000–2014

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Number of jurisdictions participating in national typhoid surveillance ¹	50	50	50	50	50	50	50	50	50	50	50	49	50	51	51
Number of case reports received ²	258	232	201	275	248	204	324	414	437	343	434	363	299	288	329
Number of cases reported to NNDSS ³	377	368	321	356	322	324	353	434	449	397	467	390	354	338	349
NTPFS cases as a percentage of NNDSS reports ^{3,4}	68%	63%	63%	77%	77%	63%	92%	95%	97%	86%	93%	93%	85%	85%	94%
Proportion of reports submitted within 30 days after specimen obtained ⁵	61%	52%	64%	64%	70%	68%	47%	48%	56%	57%	48%	57%	33%	49%	44%
Proportion of reports with "complete" demographic information ⁶	84%	92%	91%	87%	93%	85%	85%	89%	80%	76%	84%	90%	88%	86%	88%
Proportion of reports with "complete" epidemiologic information ⁷	86%	91%	89%	89%	78%	90%	71%	72%	80%	75%	85%	70%	68%	47%	47%
Proportion of reports with "complete" travel destination information ⁸	98%	96%	99%	100%	98%	97%	98%	99%	98%	99%	99%	99%	100%	99%	98%
Proportion of reports with "complete" vaccination information ⁹	84%	79%	83%	73%	73%	75%	69%	71%	65%	63%	70%	53%	65%	60%	74%
Proportion of reports with "complete" vaccine type information ¹⁰	80%	20%	75%	33%	43%	50%	64%	39%	32%	57%	46%	44%	50%	25%	62%

¹ Includes all jurisdictions (i.e., all states and District of Columbia) that responded to annual national typhoid data closeout communications and reported cases or reported zero cases.

² The NTPFS data are dynamic; data from previous years may change as surveillance case reports are added or corrected.

³ Includes only probable and confirmed cases according to the CSTE case definition for typhoid fever (<https://wwwn.cdc.gov/nndss/conditions/typhoid-fever/case-definition/1997/>). We adjusted case counts for 2000–2013 by removing suspect cases included in versions of this table published in earlier years. This resulted in minor reductions in the case count and minor increases in the percentage based on the case count for some years before 2014.

⁴ Is not calculable when no cases are reported to NNDSS; can be greater than 100% if more cases are reported to NTPFS than to NNDSS.

⁵ Is not calculable when no NTPFS reports are received or when dates are not submitted.

⁶ For purposes of this report, "complete" demographic information is defined as information for all of the following: age or date of birth, sex, hospitalization status, and case outcome.

⁷ For purposes of this report, "complete" epidemiologic information is defined as information for all of the following: international travel, whether the patient was a food handler, whether part of an outbreak, and citizenship.

⁸ For purposes of this report, "complete" travel destination information is defined as report of at least one travel destination if patient reported travel outside of the US in the 30 days before illness onset.

⁹ For purposes of this report, "complete" vaccination information is defined as a response of "Yes," "No," or "Don't know" regarding receipt of typhoid vaccination primary series or booster within 5 years before illness onset.

¹⁰ For purposes of this report, "complete" vaccine type information was calculated for patients whose reports specified receipt of typhoid fever vaccination within 5 years before illness onset; a response of "unknown" was considered missing for this variable.

Table 5. National paratyphoid fever reporting statistics by year, National Typhoid and Paratyphoid Fever Surveillance (NTPFS), 2007–2014

	2007	2008	2009	2010	2011	2012	2013	2014
Number of jurisdictions participating in national paratyphoid fever surveillance ¹	50	50	50	50	49	50	51	51
Number of case reports received ²	4	86	77	116	111	81	73	93
Proportion of reports submitted within 30 days after specimen obtained ³	25%	61%	30%	35%	43%	41%	39%	42%
Proportion of reports with "complete" demographic information ⁴	100%	81%	77%	89%	89%	84%	95%	89%
Proportion of reports with "complete" epidemiologic information ⁵	100%	80%	87%	89%	67%	67%	49%	60%
Proportion of reports with "complete" travel destination information ⁶	100%	100%	100%	100%	100%	100%	100%	100%
Proportion of reports with "complete" vaccination information ⁷	50%	49%	52%	47%	39%	46%	32%	60%
Proportion of reports with "complete" vaccine type information ⁸	100%	80%	83%	79%	67%	88%		80%

¹ Includes all jurisdictions (i.e., all states and District of Columbia) that responded to annual national paratyphoid data closeout communications and reported cases or reported zero cases.

² The national typhoid fever and paratyphoid fever surveillance data are dynamic; data from previous years may change as surveillance case reports are added or corrected.

³ Is not calculable when no NTPFS reports are received or when dates are not submitted.

⁴ For purposes of this report, "complete" demographic information is defined as information for all of the following: age or date of birth, sex, hospitalization status, and case outcome.

⁵ For purposes of this report, "complete" epidemiologic information is defined as information for all of the following: international travel, whether the patient was a food handler, whether part of an outbreak, and citizenship.

⁶ For purposes of this report, "complete" travel destination information is defined as report of at least one travel destination if patient reported travel outside of the US in the 30 days before illness onset.

⁷ For purposes of this report, "complete" vaccination information is defined as a response of "Yes", "No", or "Don't know" regarding receipt of typhoid vaccination primary series or booster within 5 years before illness onset.

⁸ For purposes of this report, "complete" vaccine type information was calculated for patients whose reports specified receipt of typhoid fever vaccination within 5 years before illness onset; a response of "unknown" was considered missing for this variable.

Table 6. Proposed 2- and 4-year national typhoid and paratyphoid fever reporting goals, National Typhoid and Paratyphoid Surveillance (NTPFS)

	Proposed National Goals					
	Typhoid Current Performance (2014)	Paratyphoid Current Performance (2014)	2014 Goal	2016 Goal	Typhoid Performance Status (2014)	Paratyphoid Performance Status (2014)
Number of jurisdictions participating in national typhoid and paratyphoid fever surveillance ¹	51	51	All	All	Meets goals	Meets goals
NTPFS reports as a percentage of NNDSS reports ²	94%	--	≥95%	≥100%	Needs improvement	--
Reporting timeliness						
Proportion of reports submitted within 30 days after specimen obtained ³	44%	42%	85%	100%	Needs improvement	Needs improvement
Reporting completeness						
Proportion of reports with "complete" demographic information ⁴	88%	89%	85%	95%	Meets 2014 goal	Meets 2014 goal
Proportion of reports with "complete" epidemiologic information ⁵	47%	60%	85%	95%	Needs improvement	Needs improvement
Proportion of reports with "complete" travel destination information ⁶	98%	100%	99%	100%	Needs improvement	Meets 2016 goal
Proportion of reports with "complete" vaccination information ⁷	74%	60%	95%	100%	Needs improvement	Needs improvement
Proportion of reports with "complete" vaccine type information ⁸	62%	80%	85%	100%	Needs improvement	Needs improvement

¹ Includes all jurisdictions (i.e., all states and District of Columbia) that responded to annual national enteric fever data closeout communications and reported cases or reported zero cases

² Is not calculable when no cases are reported to NNDSS; can be greater than 100% if more cases are reported to NTPFS than to NNDSS

³ Is not calculable when no NTPFS reports are received or when dates are not submitted

⁴ For purposes of this report, "complete" demographic information is defined as information for all of the following: age or date of birth, sex, hospitalization status, and case outcome

⁵ For purposes of this report, "complete" epidemiologic information is defined as information for all of the following: international travel, whether the patient was a food handler, whether part of an outbreak, and citizenship

⁶ For purposes of this report, "complete" travel destination information is defined as report of at least one travel destination if patient reported travel outside of the US in the 30 days before illness onset

⁷ For purposes of this report, "complete" vaccination information is defined as a response of "Yes", "No", or "Don't know" regarding receipt of typhoid vaccination primary series or booster within 5 years before illness onset

⁸ For purposes of this report, "complete" vaccine type information was calculated for patients whose reports specified receipt of typhoid fever vaccination within 5 years before illness onset; a response of "unknown" was considered missing for this variable

NNDSS Data

The National Notifiable Disease Surveillance System (NNDSS) collects and compiles reports of nationally notifiable infectious diseases, including typhoid fever. Paratyphoid fever is not nationally notifiable. Reports can be found at http://www.cdc.gov/mmwr/mmwr_nd/index.html

Antimicrobial Resistance Data

The National Antimicrobial Resistance Monitoring System (NARMS) monitors antimicrobial resistance among enteric bacteria (including *Salmonella* serotype Typhi and Paratyphi A and C) from humans. In Enterobacteriaceae, resistance to nalidixic acid, an elementary quinolone, correlates with decreased susceptibility to ciprofloxacin (MIC ≥ 0.12 $\mu\text{g/mL}$) and possible fluoroquinolone treatment failure. For *Salmonella* serotypes Typhi and Paratyphi, resistance to traditional first-line antimicrobial agents, ampicillin, chloramphenicol, and trimethoprim-sulfamethoxazole (ACT/S) were defined as multidrug resistant.

The 2014 data, available at www.cdc.gov/NARMS, showed the following:

For *Salmonella* serotype Typhi isolates

- 72% were resistant to nalidixic acid
- 5% were resistant to ciprofloxacin
- No isolates were resistant to ceftriaxone
- 11% were multidrug resistant

For *Salmonella* serotype Paratyphi A isolates

- 80% were resistant to nalidixic acid
- No isolates were resistant to ciprofloxacin
- No isolates were resistant to ceftriaxone
- No isolates were multidrug resistant

Outbreak Data

The Foodborne Disease Outbreak Surveillance System (FDOSS) collects reports of foodborne disease outbreaks from local, state, tribal, and territorial public health agencies. The most recently published foodborne outbreaks annual report is from 2014, available at <http://www.cdc.gov/foodsafety/pdfs/foodborne-outbreaks-annual-report-2014-508.pdf>.

The Waterborne Disease and Outbreak Surveillance System (WBDOSS) collects reports of waterborne disease outbreaks associated with drinking water and recreational water from local, state, tribal, and territorial public health agencies. Findings for waterborne outbreaks of typhoid fever are preliminary. Reports from years prior are available at <http://www.cdc.gov/healthywater/surveillance/surveillance-reports.html>.

- In 2014, no typhoid fever outbreaks were reported.

References

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