National Enteric Disease Surveillance: NTPFS Annual Summary, 2012

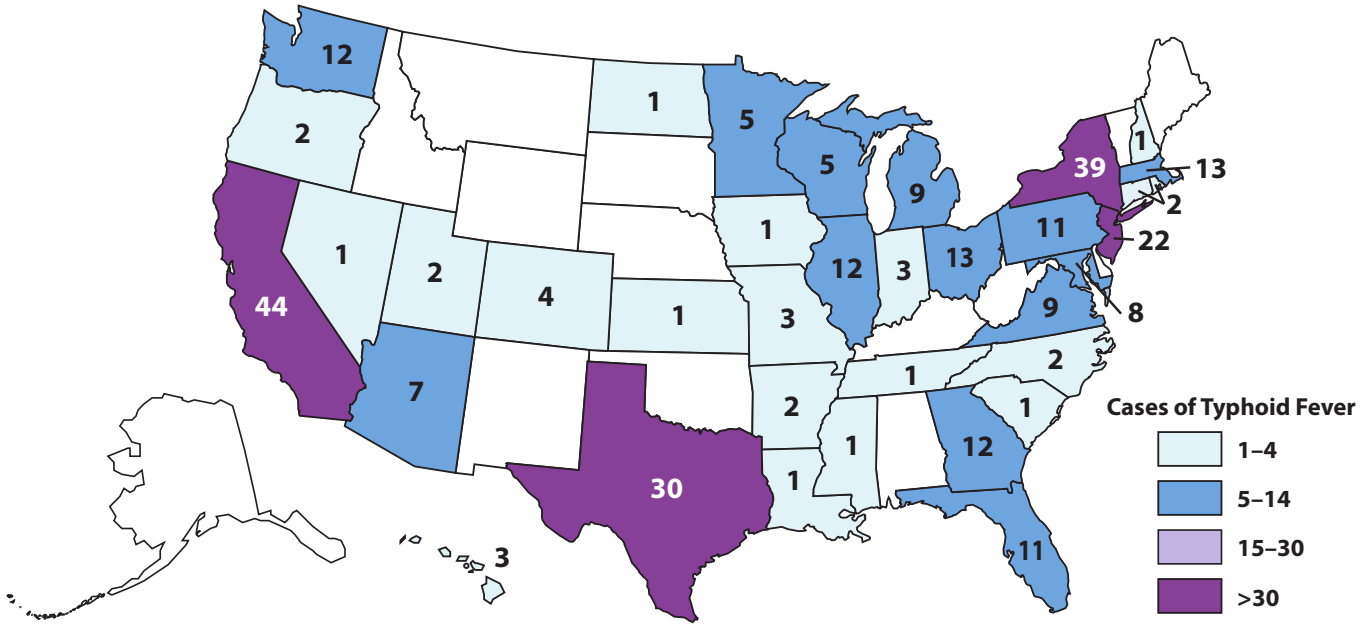
An overview of the National Typhoid and Paratyphoid Fever Surveillance (NTPFS) system is available at http://www.cdc.gov/ncezid/dfwed/PDFs/typhi_surveillance_overview_508c.pdf.

National Typhoid and Paratyphoid Fever Surveillance Data

States reporting at least one typhoid or paratyphoid fever[1] case to the NTPFS during 2012 are shown in Figures 1 and 2.

- 37 states reported 297 typhoid fever cases (Figure 1)
- 19 states reported 82 paratyphoid fever cases (all were Paratyphi A) (Figure 2)

Figure 1. States reporting at least one typhoid fever case to National Typhoid and Paratyphoid Fever Surveillance, 2012 (n=297)



[1] 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.

National Center for Emerging and Zoonotic Infectious Diseases
Division of Foodborne, Waterborne, and Environmental Diseases

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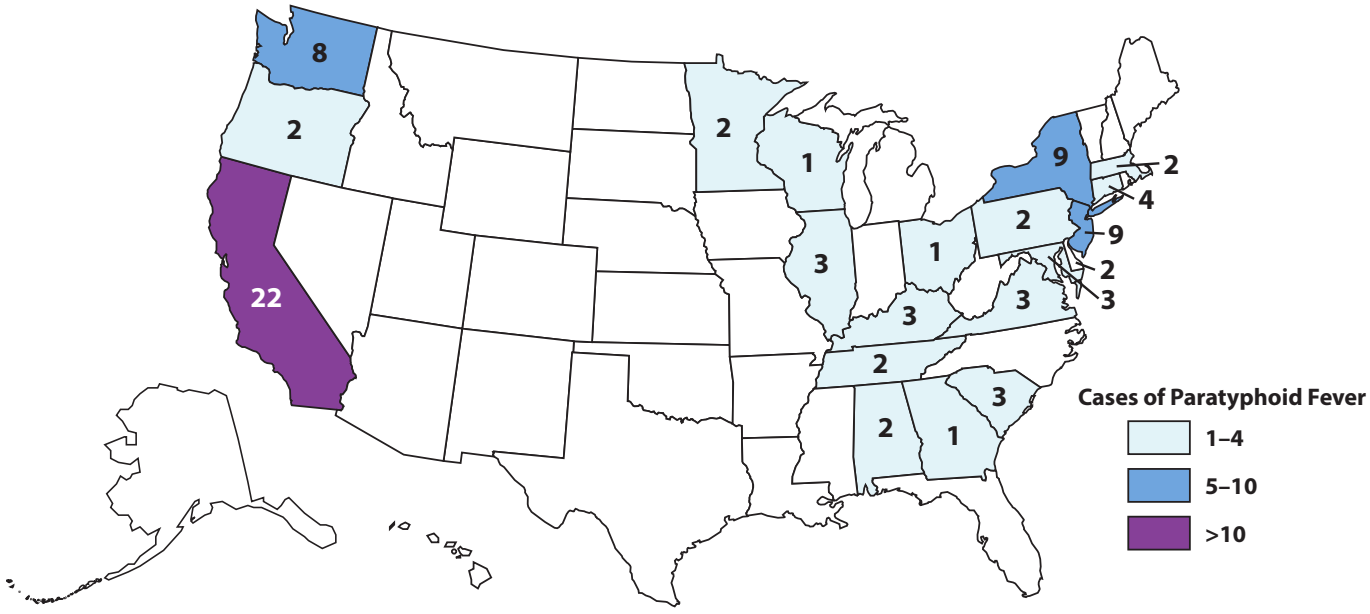
Figure 2. States reporting at least one paratyphoid fever case to National Typhoid and Paratyphoid Fever Surveillance, 2012 (n=82; all were Paratyphi A)



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 24 years
- The median age of patients with paratyphoid fever was 28 years
- Three patients with typhoid fever died (1%)
- One patient with paratyphoid fever died (1%)

Table 1. Demographic and clinical characteristics of patients with typhoid fever reported to National Typhoid and Paratyphoid Fever Surveillance, 2012 (n=297).

Characteristic (total number)	Count	Percent
Median age in years (range)	24 (1-93)	--
Female Female (n=295)	140	47
US Citizen (n=133)	89	67
Foreign travel (n=281)	228	77
Vaccinated* (n=186)	7	4
Site of isolation (n=297)		
Blood	246	83
Stool	32	11
Gall bladder	12	4
Other	7	3
Hospitalized (n=288)	233	81
Died (n=270)	3	1

* Received typhoid vaccination within 5 years before onset of illness; of the 7 cases in vaccinated persons, 2 received Vi capsular polysaccharide vaccine (ViCPS), 1 received oral, live attenuated vaccine (Ty21a), and the vaccine type was not reported for the other 4.

Table 2. Demographic and clinical characteristics of patients with paratyphoid fever reported to National Typhoid and Paratyphoid Fever Surveillance, 2012 (n=82; all were Paratyphi A).

Characteristic (total number)	Count	Percent
Median age in years (range)	28 (1-63)	--
Female (n=82)	37	45
US Citizen (n=40)	27	68
Foreign travel (n=79)	71	89
Site of isolation (n=82)		
Blood	75	91
Stool	5	6
Gall bladder	2	2
Other	0	0
Hospitalized (n=79)	49	62
Died (n=71)	1	1

* Received typhoid vaccination within 5 years before onset of illness (Note that typhoid vaccination does not protect against paratyphoid fever). Of the 8 cases in vaccinated persons, 4 received Vi capsular polysaccharide vaccine (ViCPS), 3 received oral, live attenuated vaccine (Ty21a), and the vaccine type was not reported for one patient.

Travel destinations are shown in Table 3.

- Two-hundred and twenty-eight (77%) patients with typhoid fever reported traveling or living outside the United States in the 30 days before illness onset, 44 (15%) reported no travel, and travel status was not reported for 25 (8%) patients.
- Seventy-one (87%) patients with paratyphoid fever reported traveling or living outside the United States in the 30 days before illness onset, 4 (5%) reported no travel, and travel status was not reported for 7 (9%) patients.
- Of those patients reporting travel, 214 (94%) patients with typhoid fever and 65 (79%) patients with paratyphoid fever reported travel to a single destination (Table 3).
- Visiting friends or relatives was the most common reason for travel for patients with typhoid fever (52%) and paratyphoid fever (42%).

Table 3. Travel destinations for patients who reported a single destination country, National Typhoid and Paratyphoid Fever Surveillance, 2012.

Travel Destination	Typhoid (n=303)	Paratyphoid (n=93)
	no. (%)	no. (%)
India	143 (67)	53 (82)
Bangladesh	24 (11)	2 (3)
Pakistan	17 (7)	3 (5)
Mexico	5 (2)	--
Nepal	--	4 (6)
Other	29 (14)*	3 (5)**
Unknown	1 (<1)	--

* Patients reported travel to Mexico (5), Guatemala (3), Iceland (2), Samoa (2), Burma (1), China (1), Dominican Republic (1), Ecuador (1), El Salvador (1), Haiti (1), Indonesia (1), Iraq (1), Lebanon (1), Mali (1), Marshall Islands (1), Niger (1), Nigeria (1), Philippines (1), Singapore (1), Uganda (1), and Zimbabwe (1)

**Patients reported travel to Burma (1), China (1), and Italy (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 (2).

State-specific summaries were sent to state epidemiologists in September 2014. 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), 2000–2012.

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Number of jurisdictions reporting typhoid fever cases to NTPFS[1]	50	50	50	50	50	50	50	50	50	50	50	49	50
Number of case reports received	258	231	202	279	248	207	327	413	439	346	432	348	297
Number of cases reported to NNDSS	377	368	321	356	322	324	354	435	449	398	472	396	350
NTPFS cases as a percentage of NNDSS reports[2,3]	68%	63%	63%	78%	77%	64%	92%	95%	98%	87%	92%[3]	88%	85%
Reporting timeliness													
Proportion of reports completed within 30 days of specimen isolation date[4]	55%	49%	61%	54%	64%	60%	38%	40%	44%	47%	44%	41%	27%
Reporting completeness													
Proportion of reports with "complete" demographic information[5]	93%	97%	95%	95%	92%	94%	93%	96%	87%	78%	88%	94%	92%
Proportion of reports with "complete" epidemiologic information[6]	95%	94%	95%	95%	88%	92%	73%	74%	82%	77%	86%	71%	71%
Proportion of reports with "complete" travel destination information[7]	98%	97%	99%	99%	98%	98%	98%	99%	98%	99%	99%	99%	99%
Proportion of reports with "complete" vaccination information[8]	96%	98%	99%	97%	97%	99%	99%	96%	96%	95%	97%	80%	94%
Proportion of reports with "complete" vaccine type information[9]	20%	10%	75%	33%	36%	50%	57%	44%	24%	57%	46%	44%	43%

[1] Includes District of Columbia and Guam

[2] Two jurisdictions do not report to NNDSS, these cases were excluded in the comparison

[3] Is not calculable where no cases are reported to NNDSS; can be greater than 100% if more cases are reported to NTPFS than to NNDSS

[4] Is not calculable where no NTPFS reports are received or where specimen isolation date or date of form completion is not completed

[5] For purposes of this report, "complete" demographic information is defined as information for all of the following: Age or Date of birth, Sex and Hospitalization status

[6] For purposes of this report, "complete" epidemiologic information is defined as information for all of the following: Travel, whether the patient was a food handler, Outbreak status, and Citizenship

[7] 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

[8] 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 onset of illness

[9] For the 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), 2007–2012.

	2007	2008	2009	2010	2011	2012
Number of jurisdictions reporting paratyphoid fever cases to NTPFS[1]	50	50	50	50	49	50
Number of case reports received[2]	4	85	78	115	107	82
Reporting timeliness						
Proportion of reports completed within 30 days of specimen isolation date[4]	25%	44%	24%	33%	34%	37%
Reporting completeness						
Proportion of reports with "complete" demographic information[5]	100%	88%	77%	94%	96%	91%
Proportion of reports with "complete" epidemiologic information[6]	100%	91%	90%	90%	80%	66%
Proportion of reports with "complete" travel destination information[7]	100%	99%	100%	100%	100%	100%
Proportion of reports with "complete" vaccination information[8]	100%	90%	94%	97%	74%	95%
Proportion of reports with "complete" vaccine type information[9]	100%	60%	83%	69%	100%	88%

[1] Includes District of Columbia and Guam

[2] Two jurisdictions do not report to NNDSS, these cases were excluded in the comparison

[3] Is not calculable where no cases are reported to NNDSS; can be greater than 100% if more cases are reported to NTPFS than to NNDSS

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[9] For the 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 (2012)	Paratyphoid Current Performance (2012)	2014 Goal	2016 Goal	Typhoid Performance Status (2012)	Paratyphoid Performance Status (2012)
Number of jurisdictions reporting to NTPFS[1]	50	50	All	All	Needs improvement	Needs improvement
NTPFS cases as a percentage of NNDSS reports[3]	85%	--	≥95%	≥100%	Needs improvement	--
Reporting timeliness						
Proportion of reports completed within 30 days of specimen isolation date[4]	27%	37%	85%	100%	Needs improvement	Needs improvement
Reporting completeness						
Proportion of reports with "complete" demographic information[5]	92%	91%	85%	95%	Meets 2014 goal	Meets 2014 goal
Proportion of reports with "complete" epidemiologic information[6]	71%	66%	85%	95%	Needs improvement	Needs improvement
Proportion of reports with "complete" travel destination information[7]	99%	100%	99%	100%	Meets 2014 goal	Meets 2016 goal
Proportion of reports with "complete" vaccination information[8]	94%	95%	95%	100%	Needs improvement	Needs improvement
Proportion of reports with "complete" vaccine type information[9]	43%	88%	85%	100%	Needs improvement	Needs improvement

[1] Includes District of Columbia and Guam

[2] Two jurisdictions do not report to NNDSS, these cases were excluded in the comparison

[3] Is not calculable where no cases are reported to NNDSS; can be greater than 100% if more cases are reported to NTPFS than to NNDSS

[4] Is not calculable where no NTPFS reports are received or where specimen isolation date or date of form completion is not completed

[5] For purposes of this report, "complete" demographic information is defined as information for all of the following: Age or Date of birth, Sex and Hospitalization status

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[7] 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

[8] 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 onset of illness

[9] For the 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 µg/mL) and possible fluoroquinolone treatment failure. For *Salmonella* serotypes Typhi and Paratyphi multidrug resistant was defined as resistant to the traditional first-line antimicrobial agents ampicillin, chloramphenicol, and trimethoprim-sulfamethoxazole (ACT/S).

The NARMS annual report data for 2012 (1) showed the following:

For *Salmonella* serotype Typhi isolates

- 69% were resistant to nalidixic acid
- 6% were resistant to ciprofloxacin
- No isolates were resistant to ceftriaxone
- 9% were ACT/S resistant

For *Salmonella* serotype Paratyphi A isolates

- 95% were resistance to nalidixic acid
- 3% were resistant to ciprofloxacin
- No isolates were resistant to ceftriaxone
- No isolates were ACT/S 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. Reports can be found at http://cdc.gov/outbreaknet/surveillance_data.html.

- In 2012, no typhoid fever outbreaks were reported.

References

1. CDC. National Antimicrobial Resistance Monitoring System for Enteric Bacteria (NARMS): Human Isolates Final Report, 2012. Atlanta, Georgia: U.S. Department of Health and Human Services, CDC, 2014.
2. Fullerton KE, Newton AE, Heiman KE, Silk BJ. Cholera, vibriosis, typhoid and paratyphoid fever: National Surveillance. 2012 Council of State and Territorial Epidemiologists Annual Conference, Omaha, NE; June 3–7, 2012.

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