

National Enteric Disease Surveillance: Shiga toxin-producing *Escherichia coli* (STEC) Annual Report, 2012

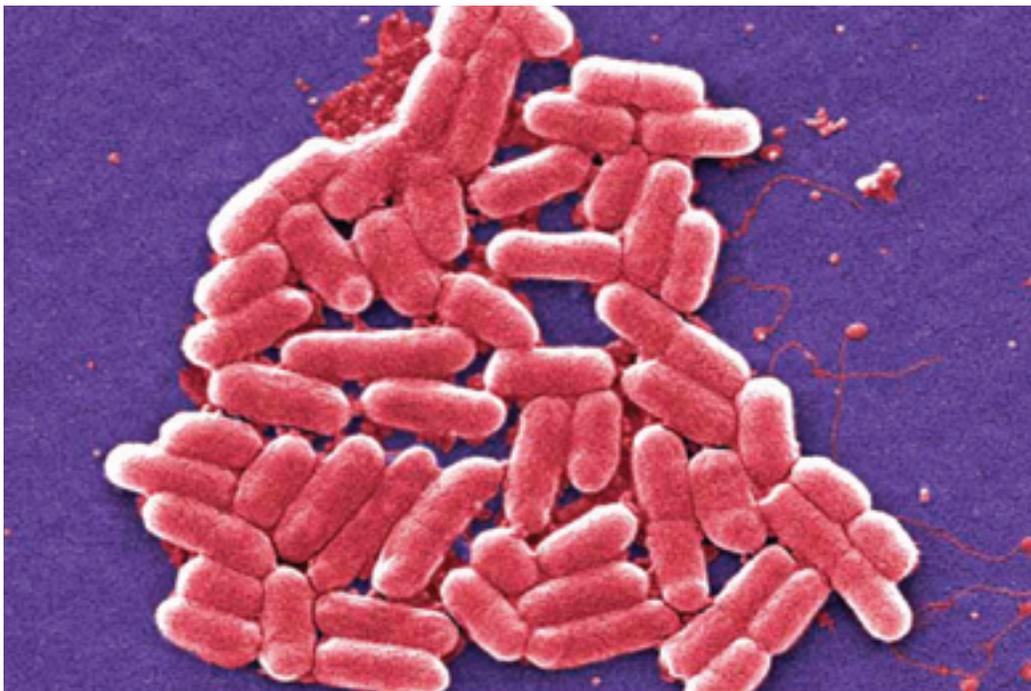
An overview of surveillance methods and systems for Shiga toxin-producing *Escherichia coli* (STEC) infections is available at <http://www.cdc.gov/ncezid/dfwed/PDFs/national-stec-surveillance-overview-508c.pdf> (1).

Human Surveillance Data: Laboratory-based Enteric Disease Surveillance (LEDS)

The Laboratory-based Enteric Disease Surveillance (LEDS) system collects reports of isolates from laboratory-confirmed human STEC infections from state public health laboratories. Reporting to LEDS is voluntary, and the number of states submitting reports varies somewhat from year to year, although almost all states report every year. Occasionally, more than one isolate is reported from a single episode of infection in a person; this report includes only one isolate of a given STEC serotype per person within a 30-day period.

In this report, we summarize the number of infections reported, and also report incidence rates (cases per 100,000 population), which are calculated as the number of STEC infections reported for a given year divided by the state population for that year. Data were received from all 51 reporting jurisdictions (50 states plus the District of Columbia) in 2012.

Data in this report current as of 7/25/2014.



Colorized scanning electron micrograph (SEM) of Gram-negative *Escherichia coli* O157:H7.

Table 1. Laboratory-confirmed STEC infections reported to CDC, with the 20 most frequently reported serogroups listed individually, United States, 2012

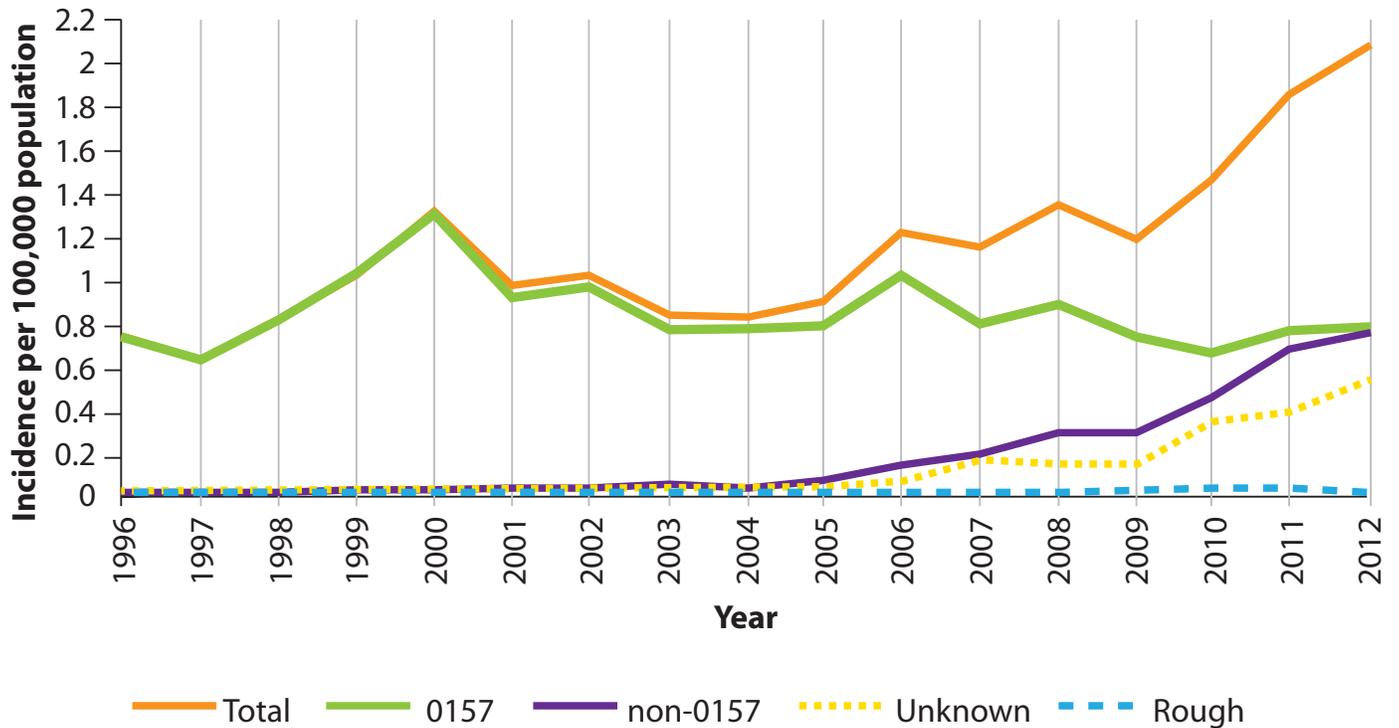
Rank	Serogroup	Number Reported	Percent
1	O157	2460	51.7
2	O26	655	13.8
3	O103	568	11.9
4	O111	365	7.7
5	O121	163	3.4
6	O45	120	2.5
7	O145	109	2.3
8	O118	38	0.8
9	O186	28	0.6
10	O5	24	0.5
10	O69	24	0.5
12	O71	23	0.5
13	O91	18	0.4
14	O146	13	0.3
15	O165	11	0.2
16	O181	8	0.2
16	O76	8	0.2
18	O84	7	0.1
19	O113	5	0.1
	Subtotal	4654	97.9
	Non-O157, other serogroups	73	1.5
	Rough*	29	0.6
	Subtotal	102	2.1
		4756	100.0

* When isolates are rough, the O group cannot be determined by serology. These isolates can be O157 or non-O157.

State public health laboratories reported 4,756 cases with laboratory evidence of STEC infections to CDC through LEDS. An additional 1,749 STEC infections were reported, but are of unknown serogroup and not laboratory-confirmed.

- The top 7 serogroups in 2012 were O157 (51.7%), O26 (13.8%), O103 (11.9%), O111 (7.7%), O121 (3.4%), O45 (2.5%), and O145 (2.3%)

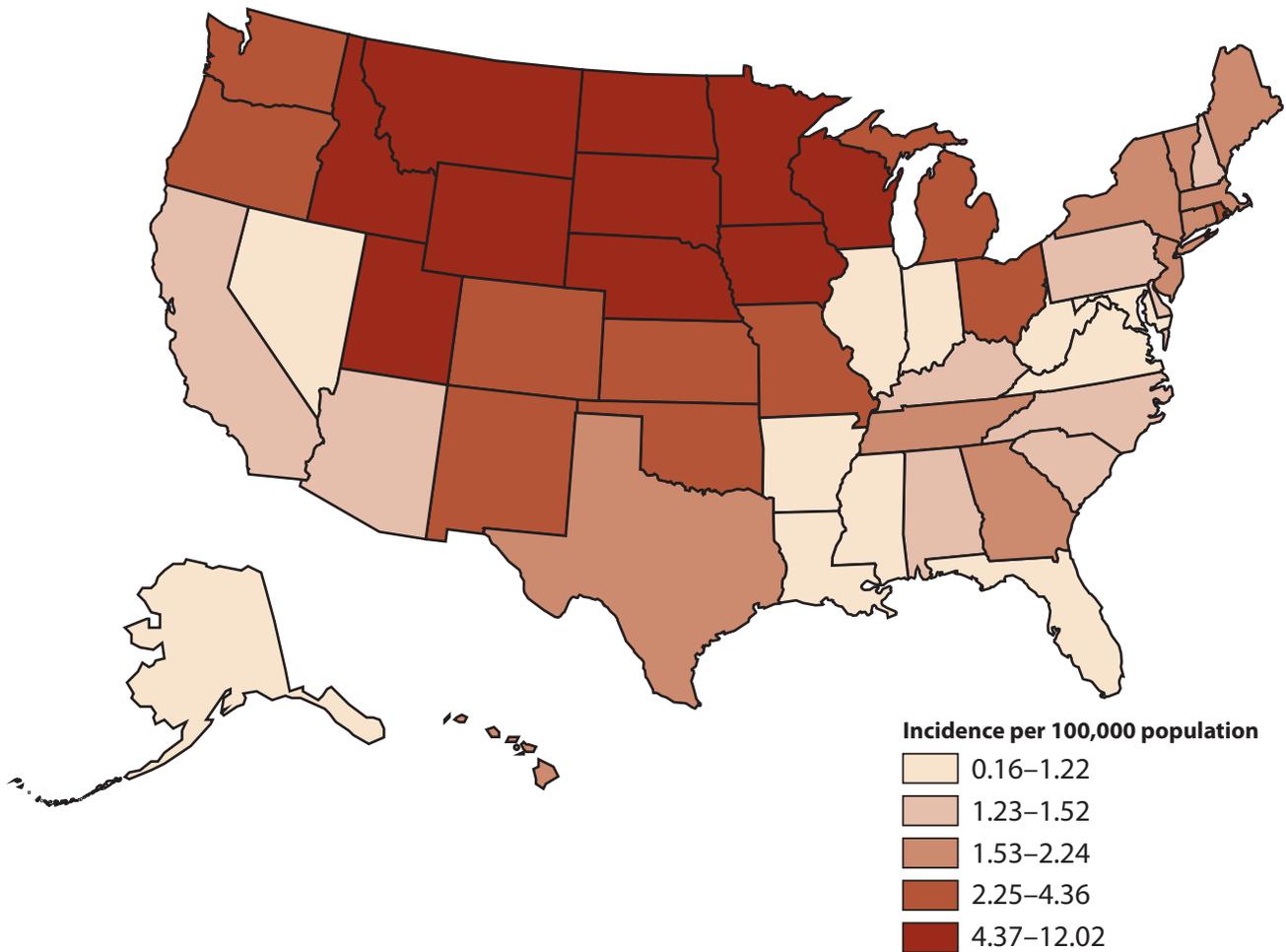
Figure 1. Incidence rate of STEC infection reported to CDC, by serogroup, United States, 1996–2012 (n=55,596)



The overall incidence rate of STEC infection in 2012 (2.1) was higher than in 2011 (1.8).

- The incidence rate of STEC infection of unknown serogroup increased markedly from 2000 to 2012, likely caused by increased testing of diarrheal stools for Shiga toxin in clinical laboratories, without concomitant bacterial culture and serotyping. An unknown proportion of reports with unknown serogroup may represent Shiga toxin-positive stool specimens from which an STEC was not isolated; these reports do not meet the Council of State and Territorial Epidemiologists (CSTE) case definition for laboratory-confirmed STEC infection.

Figure 2a. Incidence rates of STEC infection reported to CDC, by reporting jurisdiction, United States, 2012 (n=6,506)*

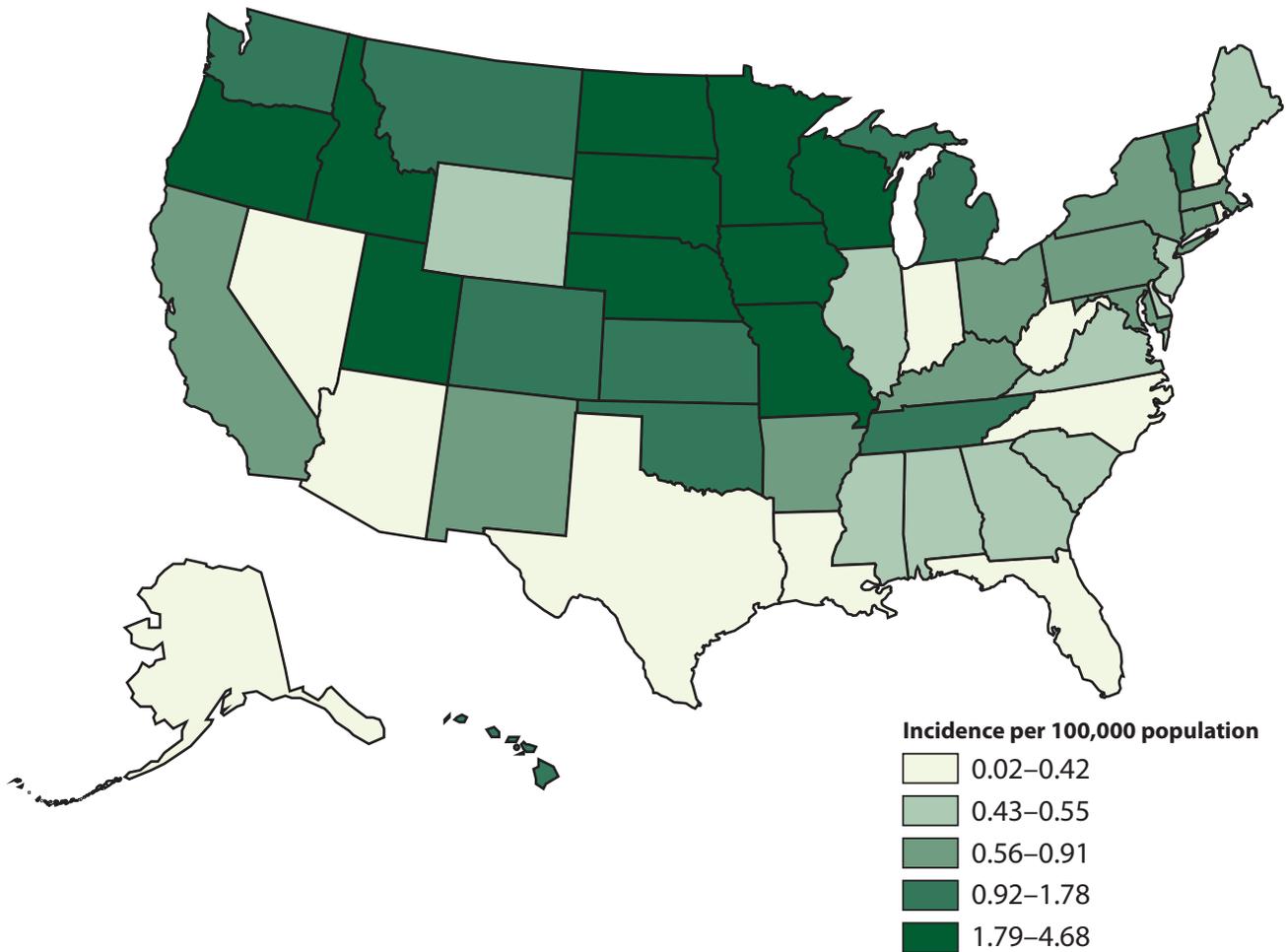


* Includes infections of rough serotype and not laboratory-confirmed.

All jurisdictions reported STEC infections in 2012. The overall incidence rate (cases per 100,000 population) was 2.1, moderately higher than in 2011 (1.8).

- Incidence rates were generally highest in the northern-latitude jurisdictions. The jurisdictions with the highest rates were Nebraska (9.9), Idaho (6.3), and South Dakota (6.0).

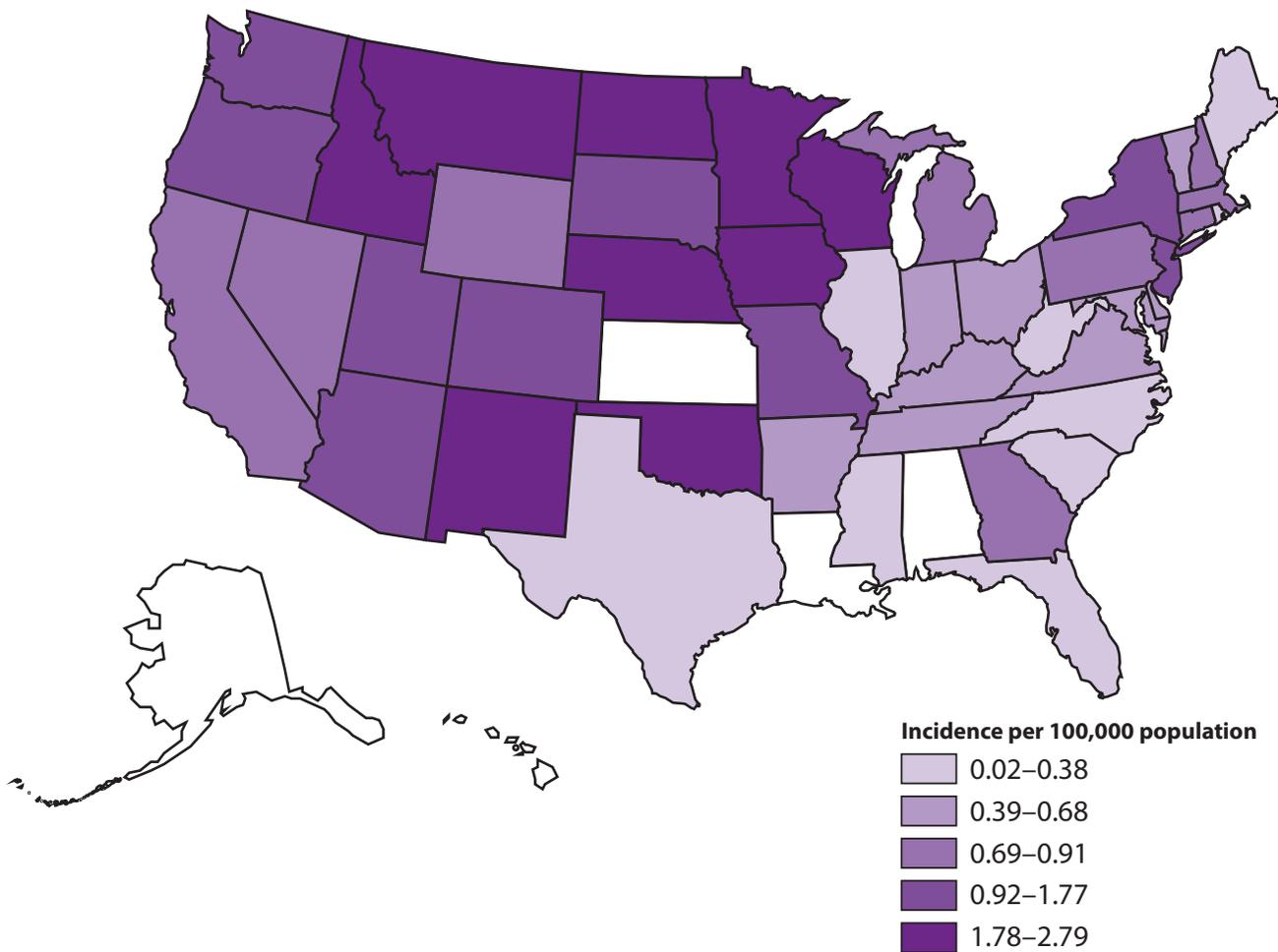
Figure 2b. Incidence rate of laboratory-confirmed STEC O157 infection reported to CDC, by reporting jurisdiction, United States, 2012 (n=2,460)



Jurisdictions reported 2,460 STEC O157 infections, corresponding to an incidence rate (cases per 100,000 population) of 0.78.

- The highest incidence rates were in geographically varied regions, although they tended to cluster in northern latitude jurisdictions in the central and western United States, whereas southern latitude jurisdictions generally had lower incidence rates. The jurisdictions with the highest reported incidence rates were South Dakota (4.7), Idaho (3.5), and Utah (2.5).

Figure 2c. Incidence rate of laboratory-confirmed non-O157 STEC infection reported to CDC, by reporting jurisdiction, United States, 2012 (n=2,267)*

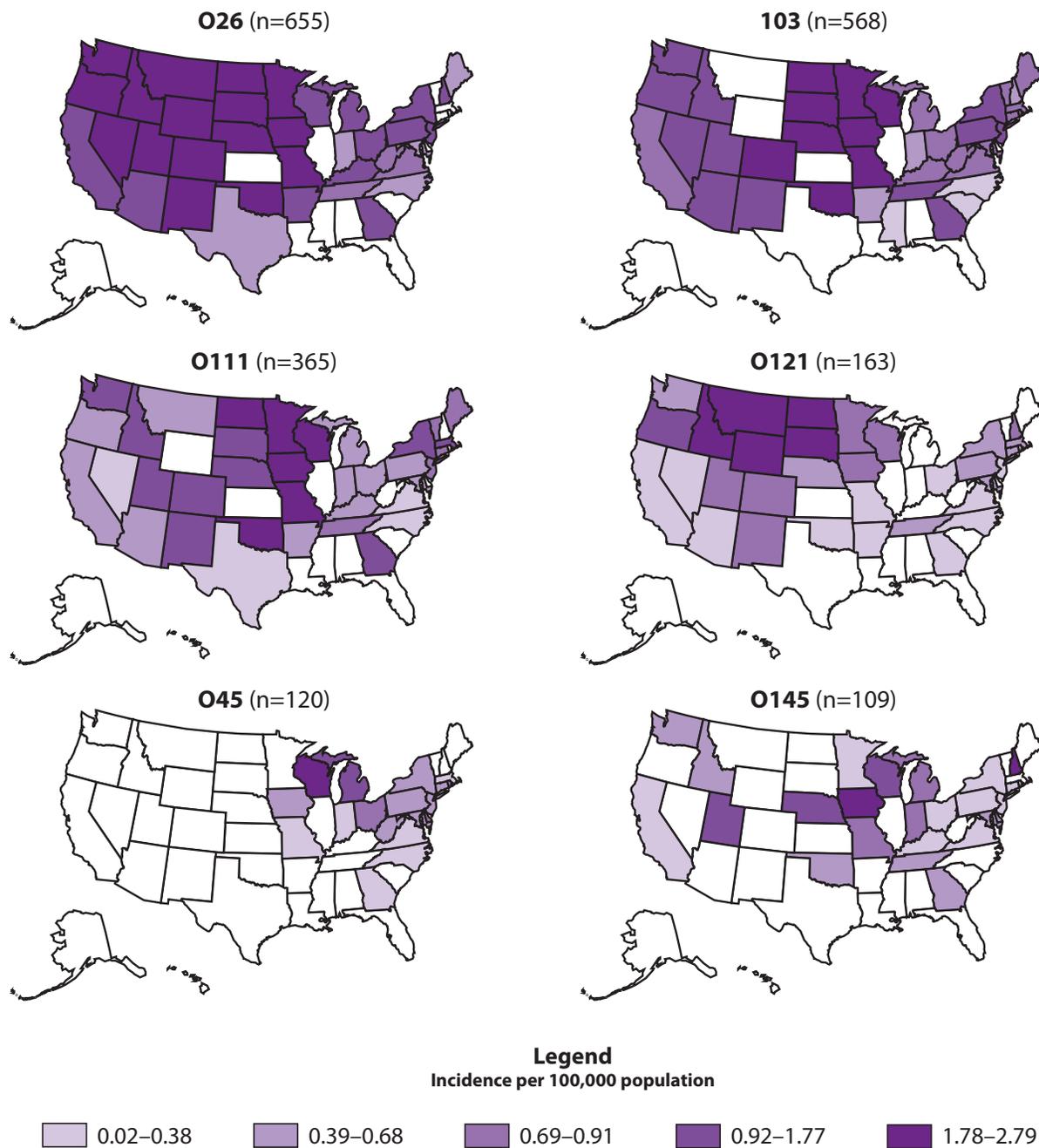


* Unshaded reporting jurisdictions are those that reported no non-O157 STEC infections (i.e., no infections were diagnosed or the jurisdiction did not report to CDC).

Forty-five jurisdictions reported a total of 2,267 non-O157 STEC infections, corresponding to an overall incidence rate (cases per 100,000 population) of 0.72.

- The jurisdictions with the highest reported incidence rates were Montana (2.8), Idaho (2.8), and Wisconsin (2.5).
- The geographic distribution of non-O157 STEC infections was similar to that of O157 STEC infections.

Figure 2d. Incidence rates of laboratory-confirmed non-O157 STEC infections, top 6 non-O157 STEC serogroups reported to CDC, by reporting jurisdiction, United States, 2012 (n=1,980)*



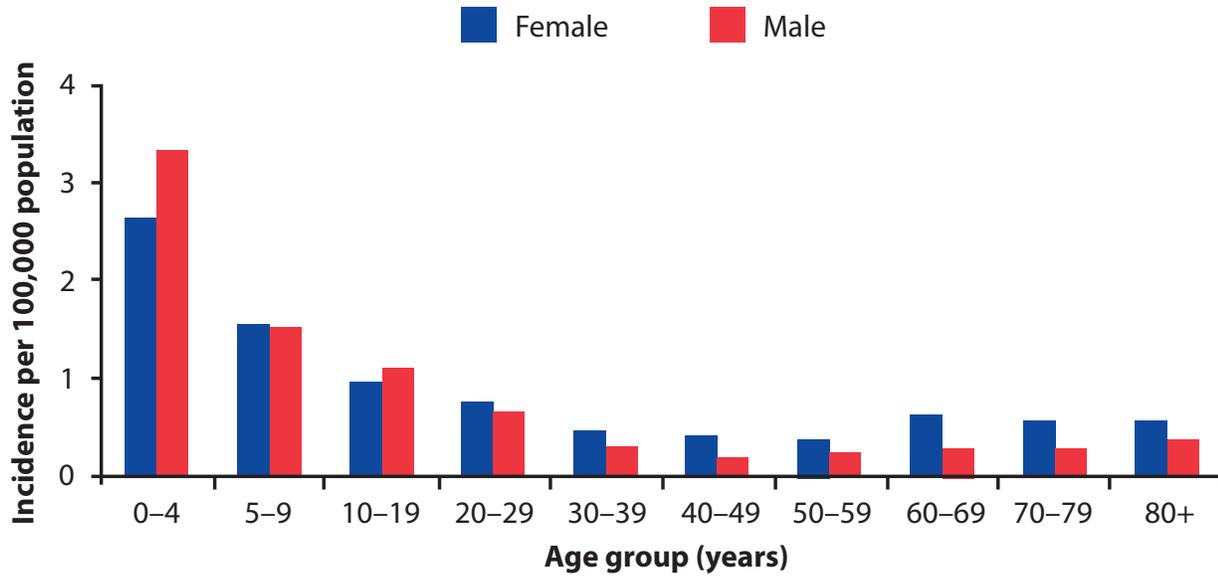
* Unshaded reporting jurisdictions are those that reported no non-O157 STEC infections (i.e., no infections were diagnosed or the jurisdiction did not report to CDC).

The 6 non-O157 STEC serogroups that caused the most infections during 2012 were O26, O103, O111, O121, O45 and O145. Fewer jurisdictions reported non-O157 STEC infections to LEDS than reported STEC O157 infections. This, in part, reflects variation in clinical testing practices and public health reporting practices among jurisdictions.

See the National STEC Surveillance Overview for further information:
<http://www.cdc.gov/ncezid/dfwed/PDFs/national-stec-surveillance-overview-508c.pdf>

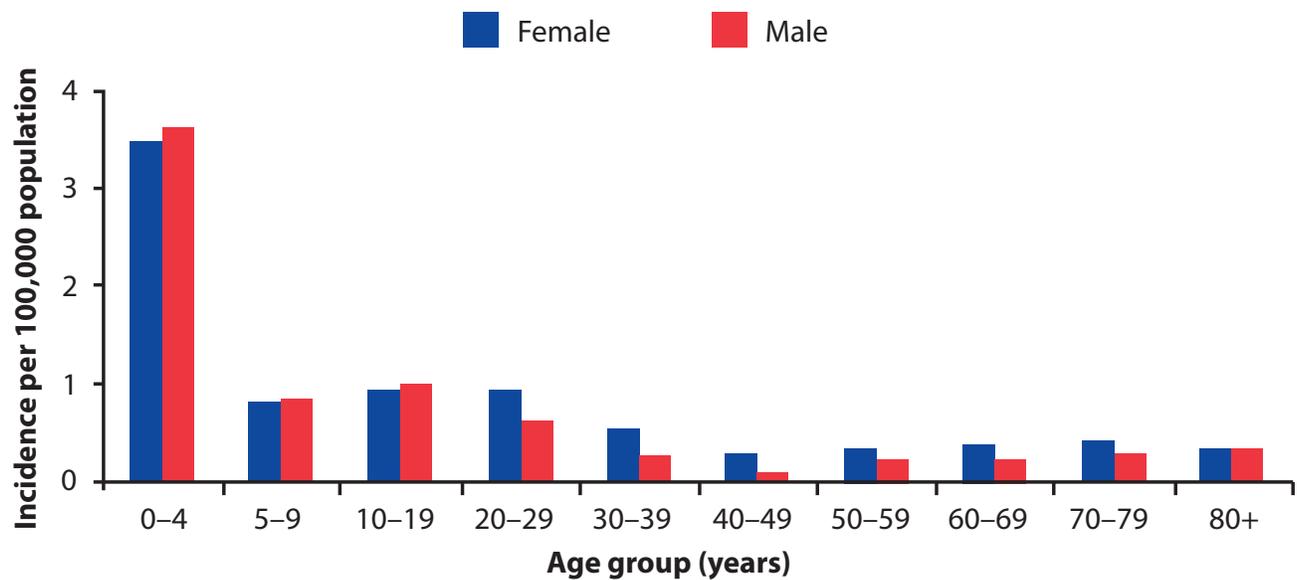
- Thirty-nine reporting jurisdictions reported 655 STEC O26 infections, corresponding to an incidence rate (cases per 100,000 population) of 0.21.
- Thirty-nine reporting jurisdictions reported 568 STEC O103 infections, corresponding to an incidence rate of 0.18.
- Thirty-seven reporting jurisdictions reported 365 STEC O111 infections, corresponding to an incidence rate of 0.12.
- Thirty-two reporting jurisdictions reported 163 STEC O121 infections, corresponding to an incidence rate of 0.05.
- Seventeen reporting jurisdictions reported 120 STEC O45 infections, corresponding to an incidence rate of 0.04.
- Twenty-six reporting jurisdictions reported 109 STEC O145 infections, corresponding to an incidence rate of 0.03.
- The jurisdictions with the highest incidence rate for each of the top 6 non-O157 serogroups were the following: STEC O26 Idaho (1.7 cases per 100,000 population), STEC O103 Nebraska (1.1), STEC O111 Oklahoma (0.8), STEC O121 (1.2), STEC O45 (0.4), and STEC O145 (0.3).

Figure 3a. Incidence rate of laboratory-confirmed STEC O157 infection reported to CDC by age group and sex, United States, 2012 (n=2,358)



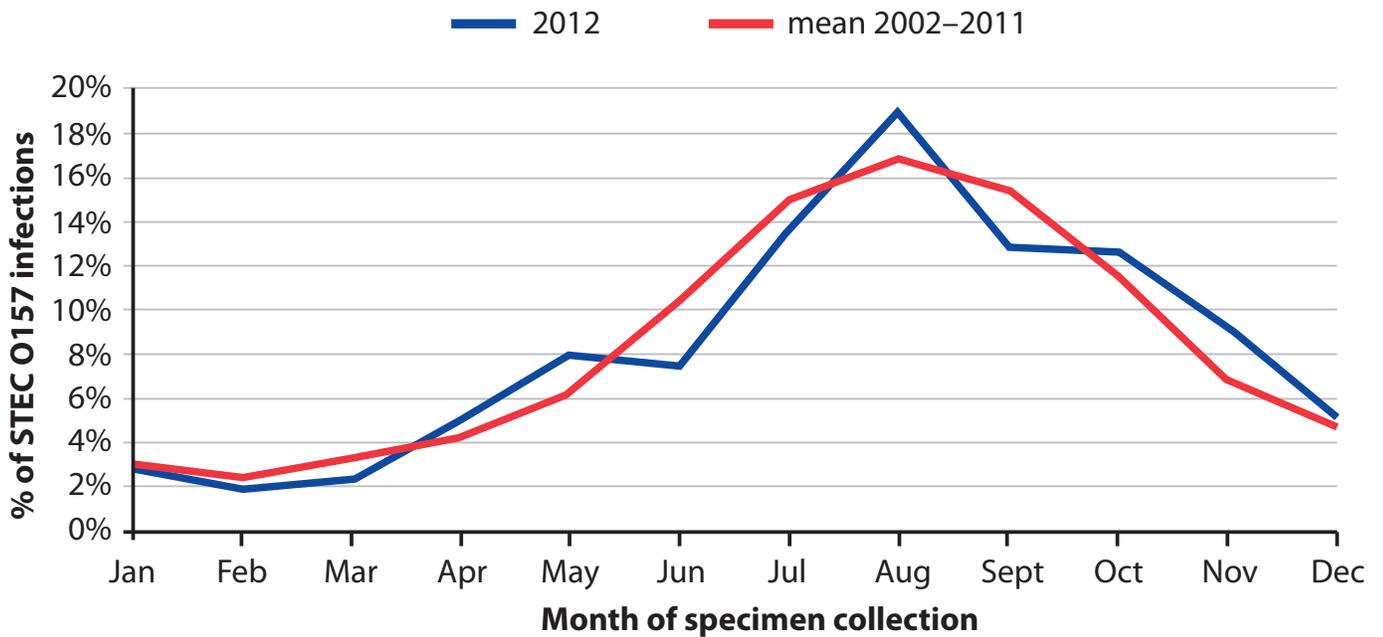
The highest incidence rates of STEC O157 infection were in children under 5 years old; this rate was considerably greater than the incidence rate in children 5 to 9 years old for both boys and girls.

Figure 3b. Incidence rate of laboratory-confirmed non-O157 STEC infection reported to CDC by age group and sex, United States, 2012 (n=2,212)



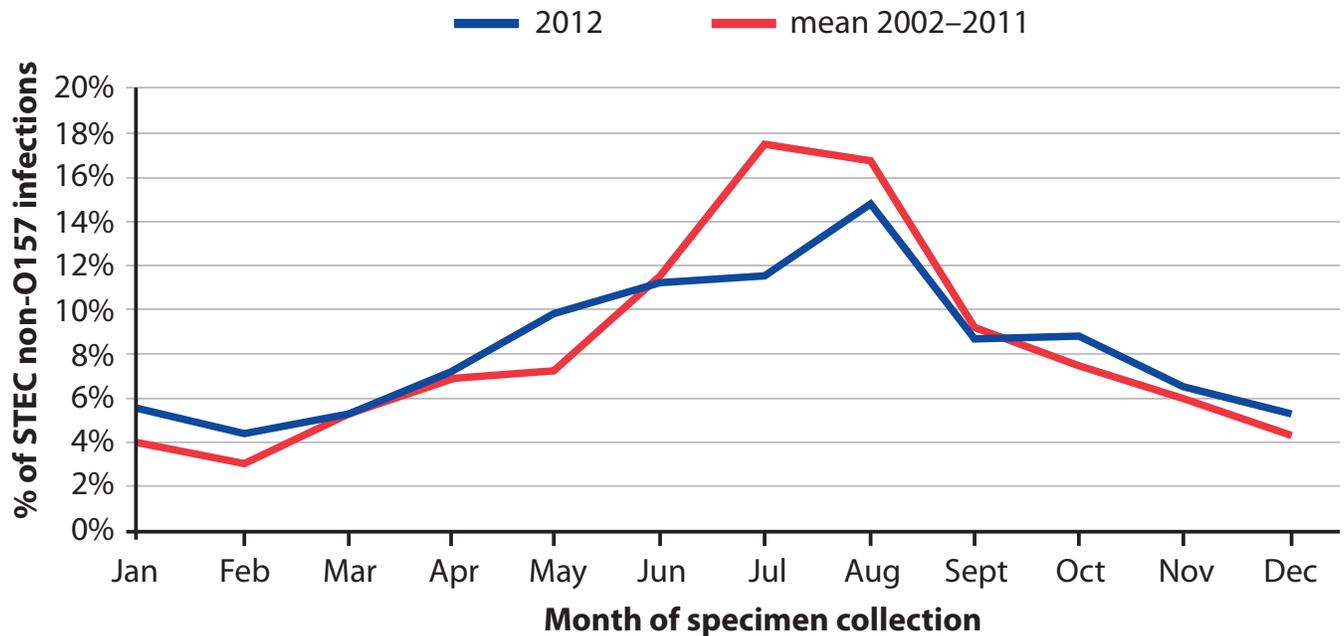
The highest incidence rates of infection with non-O157 STEC were in children under 5 years old; this rate was nearly 3 times the incidence rate in children 5 to 9 years old.

Figure 4. Percentage of laboratory-confirmed STEC O157 infections reported to CDC, by month of specimen collection, United States, 2012 and mean annual percentage during 2002–2011



STEC O157 infections reported during 2012 had seasonal variation similar to those during 2002-2011.

Figure 5. Percentage of laboratory-confirmed non-O157 STEC infections reported to CDC, by month of specimen collection, United States, 2012 and mean annual percentage during 2002–2011



Non-O157 STEC infections reported during 2012 had seasonal variation similar to those during 2002-2011.

Human Surveillance Data: National Notifiable Diseases Surveillance Systems (NNDSS)

The National Notifiable Disease Surveillance System (NNDSS) collects and compiles reports of nationally notifiable infectious diseases, including STEC. This system includes reports of laboratory-confirmed cases and probable cases (clinically compatible cases with an epidemiological link to a confirmed case). The STEC case definition is available at: <http://wwwn.cdc.gov/NNDSS/script/casedef.aspx?CondYrID=951&DatePub=1/1/2014 12:00:00 AM>

The report for 2012 was not yet available when this report was written. Reports are available at http://www.cdc.gov/mmwr/mmwr_nd/index.html

Human Antimicrobial Resistance Data: National Antimicrobial Resistance Monitoring System (NARMS)

The National Antimicrobial Resistance Monitoring System (NARMS) monitors antimicrobial resistance among enteric bacteria (including STEC) isolated from humans. Reports are available at <http://www.cdc.gov/narms/reports/index.html>

Human Outbreak Data: Foodborne Disease Outbreak Surveillance System (FDOSS) and Waterborne Disease Outbreak Surveillance System (WBD OSS)

The Foodborne Disease Outbreak Surveillance System (FDOSS) collects reports of foodborne disease outbreaks from local, state, tribal, and territorial public health agencies.

Reports are available at <http://www.cdc.gov/foodsafety/fdoss/data/annual-summaries/index.html>.

The Waterborne Disease and Outbreak Surveillance System (WBD OSS) collects reports of waterborne disease outbreaks associated with drinking water and recreational water from local, state, tribal, and territorial public health agencies.

The report for 2012 was not yet available when this report was written. Reports are available at <http://www.cdc.gov/healthywater/surveillance/surveillance-reports.html>.

References

1. Centers for Disease Control and Prevention (CDC). National STEC Surveillance Overview. Atlanta, Georgia: US Department of Health and Human Services, CDC, 2012.

Recommended Citation:

Centers for Disease Control and Prevention (CDC). Shiga toxin-producing *Escherichia coli* (STEC) National Surveillance Annual Summary, 2012. Atlanta, Georgia: US Department of Health and Human Services, CDC, 2014.

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APPENDICES (separate document; listed here for reference)

Appendix 1. Laboratory-confirmed Shiga toxin-producing *Escherichia coli* (STEC) infections reported to CDC by serogroup, age group, and sex, 2012

Appendix 2. Laboratory-confirmed Shiga toxin-producing *Escherichia coli* (STEC) infections reported to CDC by serogroup and reporting jurisdiction, 2012

Appendix 3. Laboratory-confirmed Shiga toxin-producing *Escherichia coli* (STEC) infections reported to CDC by serogroup and year, 2001-2012

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Recommended Citation:

Centers for Disease Control and Prevention (CDC). National Shiga toxin-producing *Escherichia coli* (STEC) — Surveillance Appendices, 2012. Atlanta, Georgia: US Department of Health and Human Services, CDC, 2014.

Appendix 1. Laboratory-confirmed Shiga toxin-producing *Escherichia coli* (STEC) infections reported to CDC by serogroup, age group and sex, 2012

Serogroup	Age Group	Sex			Total
		Female	Male	Unknown	
All	< 1 Year	50	65	2	117
	1 to 4 Years	542	636	29	1207
	5 to 9 Years	235	248	15	498
	10 to 19 Years	392	454	27	873
	20 to 29 Years	364	282	12	658
	30 to 39 Years	198	115	4	317
	40 to 49 Years	146	61	6	213
	50 to 59 Years	167	99	9	275
	60 to 69 Years	163	76	8	247
	70 to 79 Years	94	47	6	147
	≥ 80 Years	69	31	3	103
	Unknown Age	8	10	54	72
	Total		2428	2124	175
O157	< 1 Year	17	20		37
	1 to 4 Years	241	319	18	578
	5 to 9 Years	154	160	8	322
	10 to 19 Years	200	237	15	452
	20 to 29 Years	159	143	2	304
	30 to 39 Years	92	64	2	158
	40 to 49 Years	87	38	4	129
	50 to 59 Years	92	52	5	149
	60 to 69 Years	101	45	5	151
	70 to 79 Years	55	24	3	82
	≥ 80 Years	42	16	3	61
	Unknown Age	3	4	30	37
	Total		1243	1122	95
Non-O157	< 1 Year	33	45	2	80
	1 to 4 Years	301	317	11	629
	5 to 9 Years	81	88	7	176
	10 to 19 Years	192	217	12	421
	20 to 29 Years	205	139	10	354
	30 to 39 Years	106	51	2	159
	40 to 49 Years	59	23	2	84
	50 to 59 Years	75	47	4	126
	60 to 69 Years	62	31	3	96
	70 to 79 Years	39	23	3	65
	≥ 80 Years	27	15		42
	Unknown Age	5	6	24	35
	Total		1185	1002	80

Appendix 2. Laboratory-confirmed Shiga toxin-producing *Escherichia coli* (STEC) infections reported to CDC by serogroup and reporting jurisdiction, 2012

Serogroup	AK	AL	AR	AZ	CA	CO	CT	DC	DE	FL	GA	HI	IA	ID	IL	IN	KS
O103			3	15	62	20	4		2		20		19	4		4	
O111			2	6	29	13	4		1		19		16	4		5	
O113				1	1												
O118			1		6	1	1				14					1	
O119					1												
O121			1	2	10	8	4				4		4	8			
O123					1												
O124				1													
O126										1							
O128					2												
O130					1					1							
O145				2	14	1	1		1		8		10	1		6	
O146				2	6		1										
O156							1										
O157	1	26	17	25	272	68	27	7	4	3	50	21	72	56	71	11	28
O165				1	1	1					2						
O174					2					1							
O175					1	1											
O178					1	1					1						
O179				1		1											
O181					5	1					1						
O186				1	10		1				1				1		
O21				1													
O26			5	18	94	33	5				13		14	27		4	
O33															1		
O38				1	1												
O45							3		1		1		3			3	
O49					1												
O5				3	7	2	1									1	
O50						1										1	
O51				1													
O6					1												
O69				1	8		1			3	1						
O71			1	5	8		1				1						
O76					2						1					1	
O77						1					1						
O78				1													
O8				1	1												
O80											1						
O84				1	1												
O91				1	4						1					1	
O98					1												
Rough					12	1				1	6						
Total	1	26	30	91	566	154	ss	7	9	10	146	21	138	100	73	38	28

Appendix 2. Laboratory-confirmed Shiga toxin-producing *Escherichia coli* (STEC) infections reported to CDC by serogroup and reporting jurisdiction, 2012

Serogroup	States																
	KY	LA	MA	MD	ME	MI	MN	MO	MS	MT	NC	ND	NE	NH	NJ	NM	NV
O1			1												1		
O103	6		10	8	2	11	35	31	1		4	4	21	1	31	5	5
O111	3		13	3	2	8	18	25		1	3	3	4		11	5	1
O112																1	
O113												1			1	1	
O118			1				1								1		1
O121			7	3			8	3		12	1	5	1	4	4	3	1
O124															1		
O125															1		
O128				1											1		
O137																1	
O141	1																
O145	2			3		7	2	10					3	3	3		
O156															1		
O157	32	8	50	33	7	101	128	147	15	15	41	14	42	5	41	15	5
O165	1															1	
O172																1	
O174	1																
O177																	1
O178																1	
O181															1		
O182			1														
O186			1												4		
O21			1														
O26	13		8	5	1	20	39	24		15	5	3	15	4	23	17	12
O45			3	3		28		1			1				6		
O5																1	
O68															1		
O69			1	1											3		
O71															1		1
O73	1																
O76			1													1	
O8															1		
O84				1												1	
O87															1		
O88				1													
Rough	2			1			1					1			1		
Total	62	8	98	63	12	175	232	241	16	43	55	31	86	17	139	54	27

Appendix 2. Laboratory-confirmed Shiga toxin-producing *Escherichia coli* (STEC) infections reported to CDC by serogroup and reporting jurisdiction, 2012

Serogroup	States																
	NY	OH	OK	OR	PA	RI	SC	SD	TN	TX	UT	VA	VT	WA	WI	WV	WY
O1				1													
O103	41	14	35	11	34		2	3	15		9	12	1	17	43	3	
O104	2											1					
O111	37	8	31	3	8			2	8	11	5	2	1	12	38		
O118	1		4	3					1						1		
O121	16	1	1	10	10			4	4		4	2		7	9		2
O126														1			
O128															1		
O130	1																
O145	4	3	3		1				4		3	1		6	7		
O146				1											3		
O156	1											1					
O157	143	105	41	95	97	1	20	39	69	14	71	41	6	123	128	6	3
O158												1					
O163												1					
O165	1			2								1					
O172												1					
O177	1		2														
O181	1			1													
O186	5			1					3								
O25	1																
O26	43	24	13	29	25	1		3	7	16	19	11		24	18	3	2
O28	1																
O39									2								
O45	17	16			10							2			21	1	
O5	1			4									2		2		
O69	4											1					
O71	3			2													
O76	1			1													
O79															1		
O80	2																
O84	1													2			
O91	10														1		
Rough				2								1					
Total	338	171	130	166	185	2	22	51	113	41	111	79	10	192	273	13	7

Appendix 3. Laboratory-confirmed Shiga toxin-producing *Escherichia coli* (STEC) infections reported to CDC by serogroup and year, 2002–2012

Serogroup	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Total
O1	1	1			1	1			1	1	3	9
O10		1			1							2
O100							2		1			3
O101							1					1
O103	16	12	15	43	89	105	181	235	358	548	568	2170
O104						1				7	3	11
O107									1			1
O108									2			2
O109						2	1					3
O11					1	1	1			1		4
O110			1	1		1	1	1	3	1		9
O111	13	20	17	34	71	112	241	153	236	322	365	1584
O112									1	1	1	3
O113		1				1	3	1	2	6	5	19
O114									1			1
O116				1				1		1		3
O117				1			1	1				3
O118		5	1	1	8	4	9	19	22	47	38	154
O119		1				3	1	1	2	2	1	11
O12					1							1
O121	10	12	8	16	23	61	55	62	74	176	163	660
O123						1	1	4	3	4	1	14
O124		1				1		5	2	3	2	14
O125						1	3	1	1	4	1	11
O126	1	1	1	2		2	1	3	3	1	2	17
O127									2			2
O128					4	3	4	1	2	3	5	22
O13									1			1
O130		1			1	1	1	1	4	2	3	14
O132			1									1
O134						1						1
O135						1						1
O136		1							1			2
O137						1				1	1	3
O14							2					2
O140									1	1		2
O141							1				1	2
O143						1			1	1		3
O145	7	9	5	8	17	19	35	24	74	74	109	381
O146	2					2	4	2	6	5	13	34
O149							1					1

Appendix 3. Laboratory-confirmed Shiga toxin-producing *Escherichia coli* (STEC) infections reported to CDC by serogroup and year, 2002–2012

Serogroup	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Total
O15					1	1			1			3
O151						1	1	2	1			5
O152						1				2		3
O153	1			2		5	1	2	4	8		23
O154						1						1
O156				1	4	2		4	2	2	4	19
O157	2740	2222	2234	2314	3014	2360	2669	2215	2046	2366	2460	26640
O158			1						2	1	1	5
O159										1		1
O160							1					1
O162				1		2						3
O163							1	2	2	2	1	8
O164										1		1
O165	1	2	1		8	5	5	4	6	6	11	49
O166					1				3			4
O168						1						1
O169						1						1
O171					1					1		2
O172						1	1	2	3	1	2	10
O174		1	2			3	2	2	1	6	4	21
O175					1			1		2	2	6
O177				3	5	1		2	2	4	4	21
O178						2	4	1	3	2	4	16
O179					4		1				2	7
O18		1			1		2					4
O181				2					4	2	10	18
O182											1	1
O185										1		1
O186										4	28	32
O19			1									1
O2						1			1	1		3
O20						1						1
O21						1					2	3
O22		1	1			1	1	1		3		8
O23										1		1
O24									1			1
O25								1			1	2
O26	17	24	25	53	120	158	222	248	434	611	655	2567
O28				4	5	3	1	3	1		1	18
O3					3	1						4
O33		1									1	2

Appendix 3. Laboratory-confirmed Shiga toxin-producing *Escherichia coli* (STEC) infections reported to CDC by serogroup and year, 2002–2012

Serogroup	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Total
O38		1					1			1	2	5
O39										1	2	3
O4					1							1
O42							2		1	1		4
O43					2				1	1		4
O44						1						1
O45	6	8	9	13	27	34	65	65	70	135	120	552
O46		1										1
O49					1				4	2	1	8
O5									3	9	24	36
O50						1	3				2	6
O51		1									1	2
O52										2		2
O54										1		1
O55		3								2		5
O6						1		1	1	1	1	5
O60								1		1		2
O63	2			1								3
O68											1	1
O69					4	7	6	15	12	22	24	90
O7										2		2
O70							1					1
O71					1			1	3	6	23	34
O73											1	1
O74							1	1	2	3		7
O75									1			1
O76		2		1	4	4	3	3	9	14	8	48
O77										1	2	3
O78											1	1
O79					2					1	1	4
O8				1	1	2		5	3	2	3	17
O80					1					5	3	9
O82						2	1	1		1		5
O84		1		1	1	2	1	2	2	5	7	22
O86						1			1			2
O87											1	1
O88						3			1	1	1	6

Appendix 3. Laboratory-confirmed Shiga toxin-producing *Escherichia coli* (STEC) infections reported to CDC by serogroup and year, 2002–2012

Serogroup	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Total
O9					1							1
O91	2	2		4	3	5	6	8	13	14	18	75
O96	1					1				1		3
O98						1			1	1	1	4
Undetermined									4	8		12
Rough			1	15	9	31	41	43	81	79	29	329
Unknown	67	53	49	75	174	499	466	462	1000	1200	1749	5794
Total	2887	2390	2373	2598	3617	3474	4059	3613	4535	5763	6505	41814

Data compiled as of 7/25/2014

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