SHIGA-TOXIN PRODUCING *ESCHERICHIA COLI* (STEC)

CRUDE DATA	STEC
Number of Cases	175
Annual Incidence[a]	
LA County	1.83
California[b, c]	2.37
United States[b, c]	2.20
Age at Diagnosis	
Mean	27
Median	21
Range	0–89 years

[a]Cases per 100,000 population
[b]Calculated from: CDC. *Notice to Readers:* Final 2015 Reports of Nationally Notifiable Infectious Diseases and Conditions *Weekly*/November 25, 2016/65(46);1306–1321. Available at: www.cdc.gov/mmwr/volumes/65/wr/mm6546a9.htm
[c]Incudes E.coli O157:H7; shiga toxin-positive, serogroup non-O157: and Shiga toxin-positive, not serogrouped. All cases are now reported as STEC (Shiga toxin producing *E.coli*) in order to simplify the reporting process

DESCRIPTION

Escherichia coli is a gram-negative bacillus with numerous serotypes. Several of these produce Shiga toxin and are called STEC. Gastrointestinal infection with a Shiga toxin-producing serotype causes abdominal cramps and watery diarrhea, often developing into bloody diarrhea; fever is uncommon. The incubation period is 2-8 days. These organisms naturally occur in the gut of many animals. Likely modes of transmission to humans from animals include foodborne (e.g., undercooked ground beef, raw milk, fresh produce, and contaminated unpasteurized juice), direct exposure to animals and their environments, and exposure to recreational water contaminated with animal or human feces. Person-to-person transmission such as between siblings or within a daycare center is also well documented.

The most common STEC serotype in the US is *E. coli* O157:H7, but several other serotypes occur and cause illness. A positive test for Shiga toxin in stool as well as cultures of STEC are reportable to LAC DPH. All reported positive STEC broths or isolates are confirmed and serotyped by the LAC Public Health Laboratory.

Hemolytic uremic syndrome (HUS) is a disorder consisting of hemolytic anemia, kidney failure, and thrombocytopenia. It is diagnosed clinically and is most frequently associated with recent infection from *E. coli* O157:H7 but may also be caused by other serotypes. Children younger than five years old are at highest risk for HUS. Adults may develop a related condition called thrombotic thrombocytopenic purpura (TTP) after STEC infection.

Increased public education to prevent STEC infection is important. Information should focus on safe food handling practices, proper hygiene, and identifying high-risk foods and activities at home and while eating out. To avoid infection, beef products should be cooked thoroughly. Produce, including pre-washed products, should be thoroughly rinsed prior to eating. In addition, one should drink only treated water and avoid swallowing recreational water. Careful handwashing is essential, especially before eating and after handling raw beef products or coming in contact with or being around animals. Strengthening of national food processing regulations is also important to reduce contamination.

2015 TRENDS AND HIGHLIGHTS

- In 2015, the increased use of new technology to perform bacterial testing was implemented. Polymerase chain reaction (PCR) and real-time PCR were used rather than the traditional culture method. This likely contributed to the increase in cases.
- There were 175 cases reported, and 53% (n=92) of these cases were confirmed by PCR testing.
- The highest incidence rate by age was observed in the 1-4 years old age group (9.1 per 100,000), which has consistently had the highest incidence rate (Figure 2).
- In 2015, White cases had the highest incidence rate of all race/ethnicity groups (2.8 per 100,000) followed by Hispanics (1.5 per 100,000) (Figure 6).
- SPA 5 had the highest rate (4.7 per 100,000) followed by SPA 4 (2.2 per 100,000) (Figure 4).
- Two cases were reported with HUS and were laboratory confirmed with STEC serotype, one

was O157:H7, and the other was STEC (non O157:H7). No deaths occurred.

- There was one LAC outbreak of O157:H7 in 2015 involving a petting zoo investigated by ACDC. ACDC participated in three multistate cluster investigations.

Reported Shiga-toxin Producing *Escherichia coli* (STEC) Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA, LAC, 2011-2015

	2011 (N=88)			2012 (N=97)			2013 (N=102)			2014 (N=90)			2015 (N=175)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	8	9.1	6.7	6	6.2	5.0	5	4.9	4.1	1	1.1	0.8	5	2.9	4.6
1-4	36	40.9	7.5	42	43.3	8.8	43	42.2	8.8	42	46.7	8.6	44	25.1	9.1
5-14	14	15.9	1.2	15	15.5	1.3	17	16.7	1.4	17	18.9	1.4	24	13.7	2.0
15-34	15	17.0	0.5	16	16.5	0.6	24	23.5	0.8	10	11.1	0.4	42	24.0	1.5
35-44	4	4.5	0.3	4	4.1	0.3	4	3.9	0.3	4	4.4	0.3	14	8.0	1.1
45-54	0	0.0	0.0	5	5.2	0.4	3	2.9	0.2	8	8.9	0.6	14	8.0	1.1
55-64	5	5.7	0.5	6	6.2	0.6	1	1.0	0.1	4	4.4	0.4	15	8.6	1.4
65+	6	6.8	0.6	3	3.1	0.3	5	4.9	0.5	4	4.4	0.4	17	9.7	1.4
Unknown	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
Race/Ethnicity															
Asian	6	6.8	0.5	6	6.2	0.5	2	2.0	0.1	5	5.6	0.4	13	7.4	0.9
Black	3	3.4	0.4	4	4.1	0.5	5	4.9	0.6	3	3.3	0.4	11	6.3	1.4
Hispanic	50	56.8	1.1	50	51.5	1.1	57	55.9	1.2	54	60.0	1.2	72	41.1	1.5
White	28	31.8	1.1	34	35.1	1.3	36	35.3	1.4	25	27.8	0.9	74	42.3	2.8
Other	0	-	-	0	-	-	0	-	-	0	-	-	2	1.1	-
Unknown	1	1.1	-	3	3.1	-	2	2.0	-	3	3.3	-	3	1.7	-
SPA															
1	3	3.4	0.8	1	1.0	0.3	5	4.9	1.3	2	2.2	0.5	4	2.3	1.0
2	18	20.5	0.8	27	27.8	1.3	29	28.4	1.3	23	25.6	1.1	42	24.0	1.9
3	11	12.5	0.7	12	12.4	0.7	12	11.8	0.7	20	22.2	1.2	19	10.9	1.1
4	9	10.2	0.8	13	13.4	1.2	11	10.8	1.0	8	8.9	0.7	26	14.9	2.2
5	8	9.1	1.3	8	8.2	1.3	12	11.8	1.9	2	2.2	0.3	31	17.7	4.7
6	11	12.5	1.1	9	9.3	0.9	13	12.7	1.3	7	7.8	0.7	10	5.7	1.0
7	21	23.9	1.6	15	15.5	1.2	13	12.7	1.0	17	18.9	1.3	20	11.4	1.5
8	7	8.0	0.7	12	12.4	1.1	7	6.9	0.6	11	12.2	1.0	23	13.1	2.1
Unknown	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-

*Rates calculated based on less than 19 cases or events are considered unreliable.

Figure 1. Number of Cases of Shiga Toxin-Producing *E. coli* LAC, 2011-2015

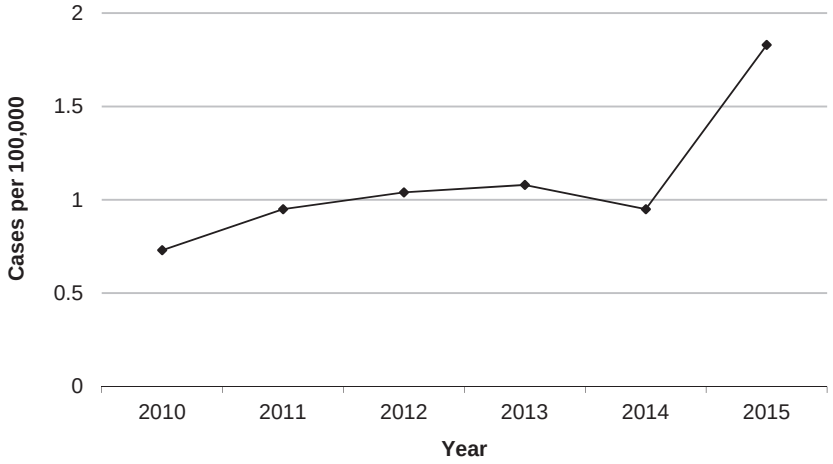


Figure 2. Reported Cases of Shiga Toxin-Producing *E. coli* by Age Group, LAC, 2015 (N=175)

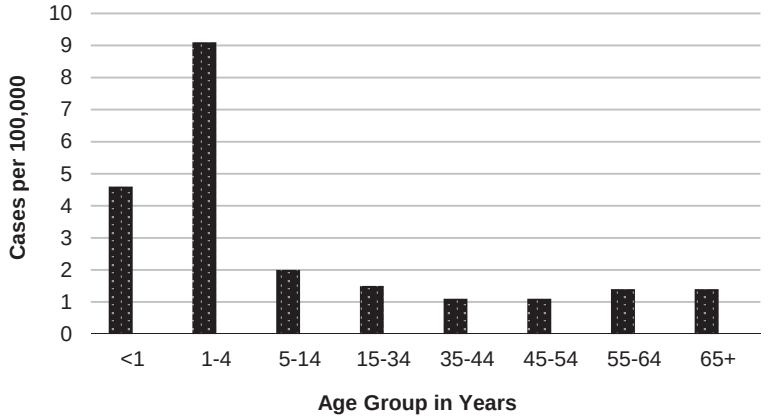


Figure 3. Percent Cases of Shiga Toxin-Producing *E. coli* by Race/Ethnicity, LAC, 2015 (N=175)

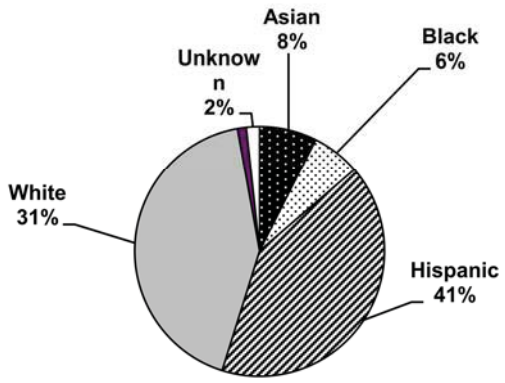


Figure 4. Reported Cases of Shiga Toxin-Producing *E. coli* by SPA, LAC, 2015 (N=175)

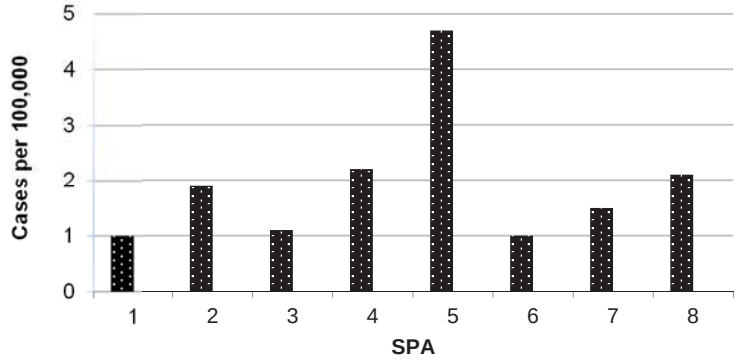


Figure 5. Reported Shiga Toxin-Producing *E. coli* Cases by Serotype Month of Onset, LAC, 2015 (N=175)

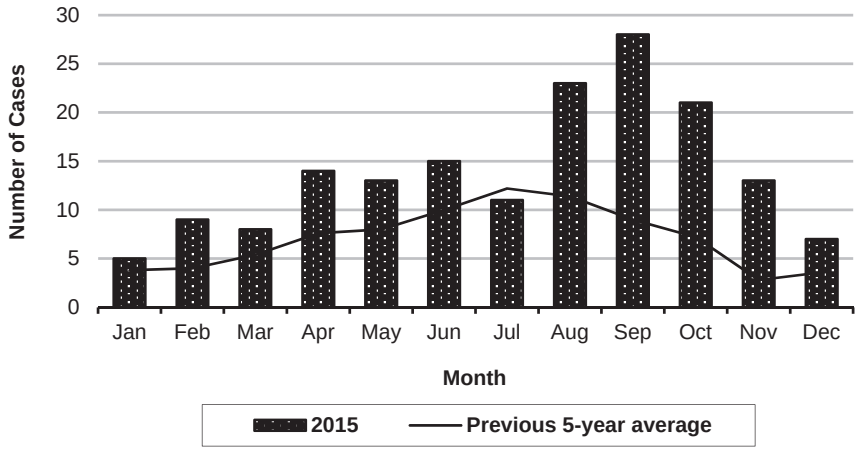
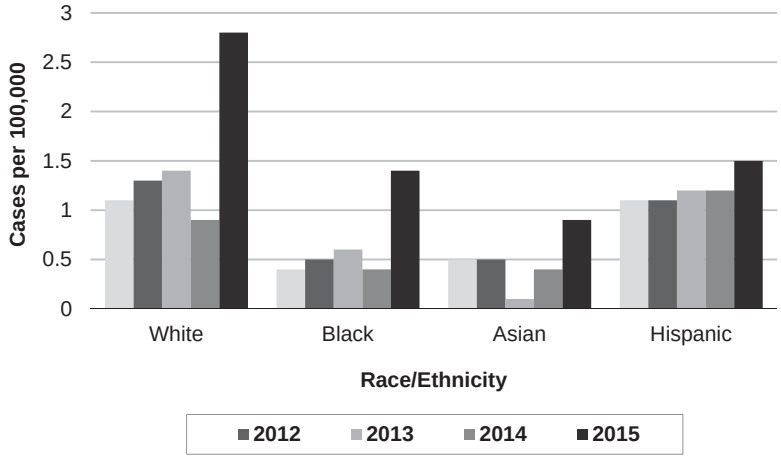
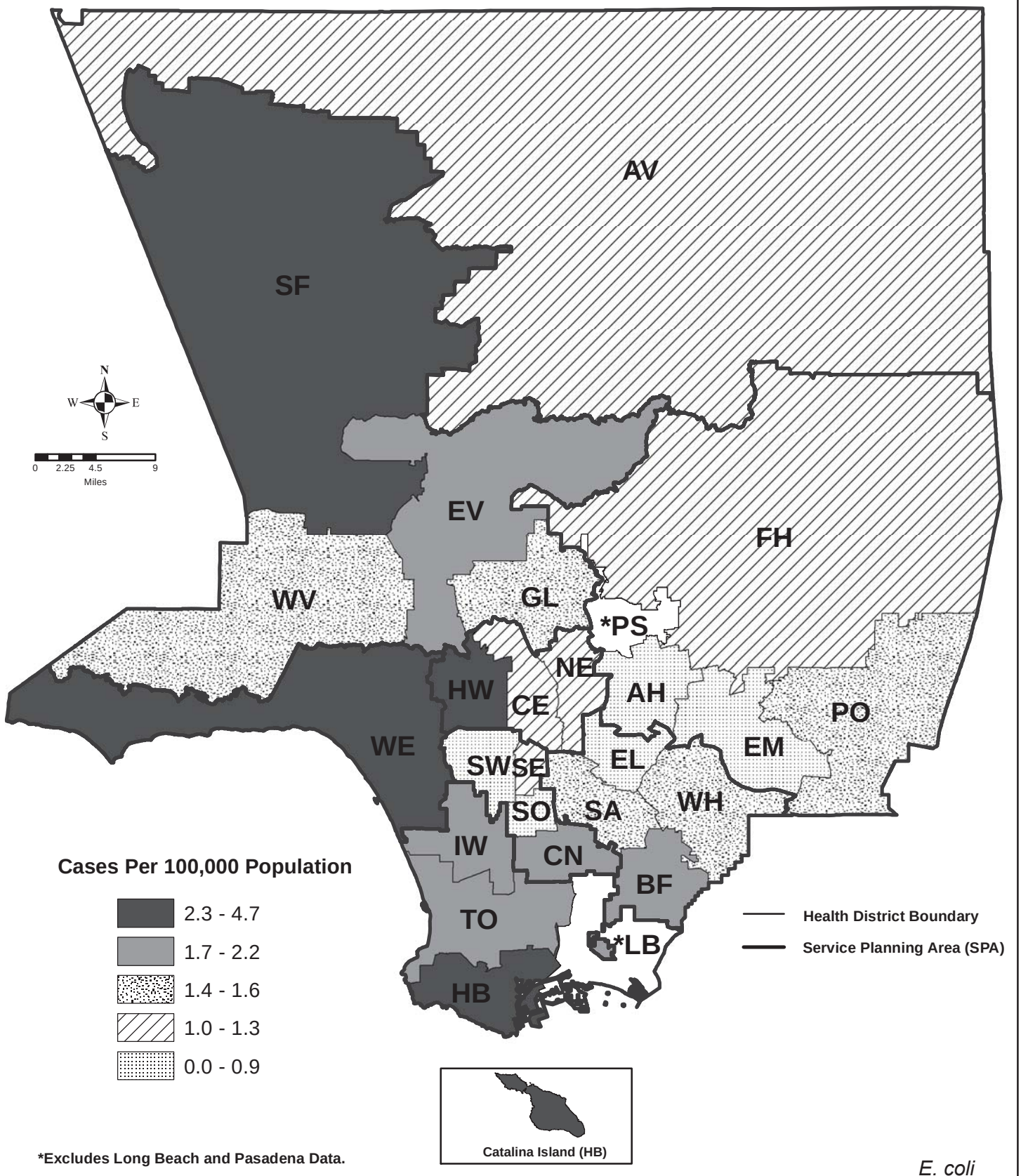


Figure 6. Reported Shiga Toxin-Producing Cases by Race/Ethnicity, LAC, 2010-2015



Map 11. Shiga Toxin-Producing *E. Coli*
Rates by Health District, Los Angeles County, 2015*



*Excludes Long Beach and Pasadena Data.

ESCHERICHIA COLI—SHIGA-TOXIN-PRODUCING (STEC)

CRUDE DATA	STEC
Number of Cases	282
Annual Incidence[a]	
LA County	2.94
California[b, c]	1.92
United States[b, c]	2.12
Age at Diagnosis	
Mean	33.5
Median	30
Range	0–94 years

[a]Cases per 100,000 population
[b]Calculated from: CDC. *Notice to Readers:* Final 2016 Reports of Nationally Notifiable Infectious Diseases and Conditions *Weekly* / January 6, 2018 / 65(52). Available at: https://www.cdc.gov/mmwr/volumes/65/wr/mm6552md.htm?s_cid=mm6552md_w
[c]Includes *E. coli* O157:H7, Shiga toxin-positive, serogroup non-O157, and Shiga toxin-positive, not serogrouped

DESCRIPTION

Escherichia coli is a gram-negative bacillus with numerous serotypes. Several of these produce Shiga toxin and are called STEC. Gastrointestinal infection with a Shiga toxin-producing serotype causes abdominal cramps and watery diarrhea that often develops into bloody diarrhea; fever is uncommon. The incubation period is 2-8 days. These organisms naturally occur in the gut of many animals. Likely modes of transmission to humans from animals include foodborne (e.g., undercooked ground beef, raw milk, fresh produce, and contaminated, unpasteurized juice), direct exposure to animals and their environments, and exposure to recreational water contaminated with animal or human feces. Person-to-person transmission such as between siblings or within a daycare center is also well-documented.

The most common STEC serotype in the US is *E. coli* O157:H7, but several other serotypes occur and cause illness. A positive test for Shiga toxin in stool as well as cultures of STEC are reportable to LAC DPH. All reported positive STEC broths or isolates are confirmed and serotyped by the LAC PHL.

Hemolytic uremic syndrome (HUS) is a disorder consisting of hemolytic anemia, kidney failure, and thrombocytopenia. It is diagnosed clinically and is most frequently associated with recent infection from *E. coli* O157:H7 but may also be caused by other serotypes. Children younger than five years old are at highest risk for HUS. Adults may develop a related condition called thrombotic thrombocytopenic purpura (TTP) after STEC infection.

Increased public education to prevent STEC infection is important. Information should focus on safe food handling practices, proper hygiene, and identifying high-risk foods and activities at home and while eating out. To avoid infection, beef products should be cooked thoroughly. Produce, including pre-washed products, should be thoroughly rinsed prior to eating. In addition, one should drink only treated water and avoid swallowing recreational water. Careful handwashing is essential, especially before eating and after handling raw beef products or coming in contact with or being around animals. Strengthening of national food processing regulations is also important to reduce contamination.

2016 TRENDS AND HIGHLIGHTS

- In 2016, the increased use of new technology to perform bacterial testing was implemented. Polymerase chain reaction (PCR) and real-time PCR were used rather than the traditional culture method. This likely contributed to the increase in cases.
- There were 282 cases reported, and 48% (n=136) of these cases were confirmed by PCR testing.
- The highest incidence rate by age was observed in the <1 and 1-4 years old age groups (9.1 per 100,000), which has

consistently had the highest incidence rate (Figure 2).

- In 2016, Whites had the highest incidence rate of all race/ethnicity groups (5.5 per 100,000) followed by Hispanics (2.3 per 100,000) (Figure 6).
- SPA 5 had the highest rate (8.0 per 100,000) followed by SPA 8 (3.7 per 100,000) (Figure 4).
- Two cases were reported with HUS, and one was laboratory confirmed as a O157:H7. No deaths occurred.
- There were no outbreaks reported in LAC; however, two cases were part of an outbreak in a camp out-of-state. ACDC participated in two multistate cluster investigations.

Reported Shiga-toxin Producing *Escherichia coli* (STEC) Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA, LAC, 2012-2016

	2012 (N=97)			2013 (N=102)			2014 (N=90)			2015 (N=175)			2016 (N=282)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	6	6.2	5.0	5	4.9	4.1	1	1.1	0.8	5	2.9	4.6	10	3.5	9.6
1-4	42	43.3	8.8	43	42.2	8.8	42	46.7	8.6	44	25.1	9.1	45	15.9	9.6
5-14	15	15.5	1.3	17	16.7	1.4	17	18.9	1.4	24	13.7	2.0	41	14.5	3.4
15-34	16	16.5	0.6	24	23.5	0.8	10	11.1	0.4	42	24.0	1.5	57	20.2	2.0
35-44	4	4.1	0.3	4	3.9	0.3	4	4.4	0.3	14	8.0	1.1	29	10.2	2.2
45-54	5	5.2	0.4	3	2.9	0.2	8	8.9	0.6	14	8.0	1.1	23	8.1	1.7
55-64	6	6.2	0.6	1	1.0	0.1	4	4.4	0.4	15	8.6	1.4	21	7.4	1.9
65+	3	3.1	0.3	5	4.9	0.5	4	4.4	0.4	17	9.7	1.4	56	19.8	4.6
Unknown	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
Race / Ethnicity															
Asian	6	6.2	0.5	2	2.0	0.1	5	5.6	0.4	13	7.4	0.9	11	3.9	0.8
Black	4	4.1	0.5	5	4.9	0.6	3	3.3	0.4	11	6.3	1.4	16	5.6	2.0
Hispanic	50	51.5	1.1	57	55.9	1.2	54	60.0	1.2	72	41.1	1.5	108	38.2	2.3
White	34	35.1	1.3	36	35.3	1.4	25	27.8	0.9	74	42.3	2.8	147	52.1	5.5
Other	0	-	-	0	-	-	0	-	-	2	1.1	-	0	-	-
Unknown	3	3.1	-	2	2.0	-	3	3.3	-	3	1.7	-	0	-	-
SPA															
1	1	1.0	0.3	5	4.9	1.3	2	2.2	0.5	4	2.3	1.0	5	1.7	1.3
2	27	27.8	1.3	29	28.4	1.3	23	25.6	1.1	42	24.0	1.9	74	26.2	3.3
3	12	12.4	0.7	12	11.8	0.7	20	22.2	1.2	19	10.9	1.1	27	9.5	1.6
4	13	13.4	1.2	11	10.8	1.0	8	8.9	0.7	26	14.9	2.2	32	11.3	2.7
5	8	8.2	1.3	12	11.8	1.9	2	2.2	0.3	31	17.7	4.7	53	18.7	8.0
6	9	9.3	0.9	13	12.7	1.3	7	7.8	0.7	10	5.7	1.0	21	7.4	2.0
7	15	15.5	1.2	13	12.7	1.0	17	18.9	1.3	20	11.4	1.5	30	10.6	2.3
8	12	12.4	1.1	7	6.9	0.6	11	12.2	1.0	23	13.1	2.1	40	14.1	3.7
Unknown	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-

*Rates calculated based on less than 19 cases or events are considered unreliable.

Figure 1. Number of Cases of Shiga Toxin-Producing *E. coli* LAC, 2011-2016

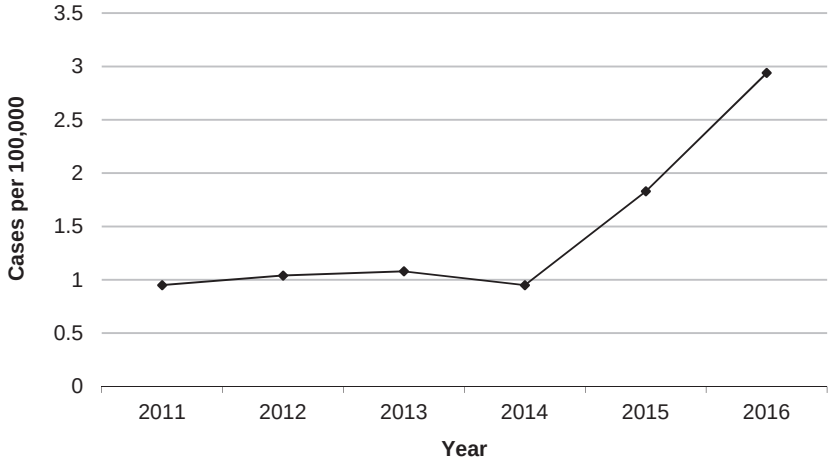


Figure 2. Reported Cases of Shiga Toxin-Producing *E. coli* by Age Group, LAC, 2016 (N=282)

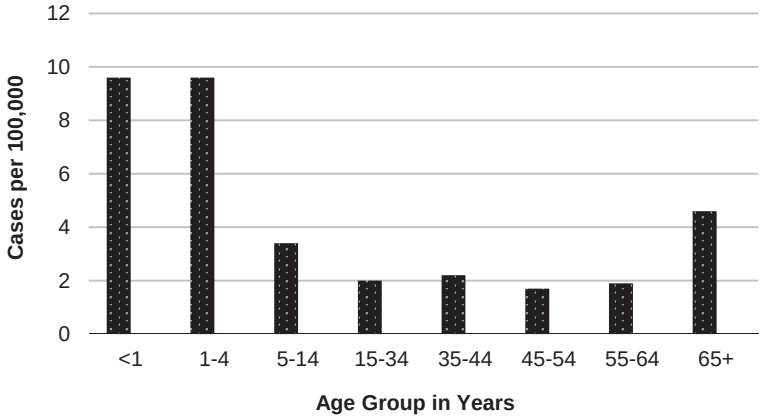


Figure 3. Percent Cases of Shiga Toxin-Producing *E. coli* by Race/Ethnicity, LAC, 2016 (N=282)

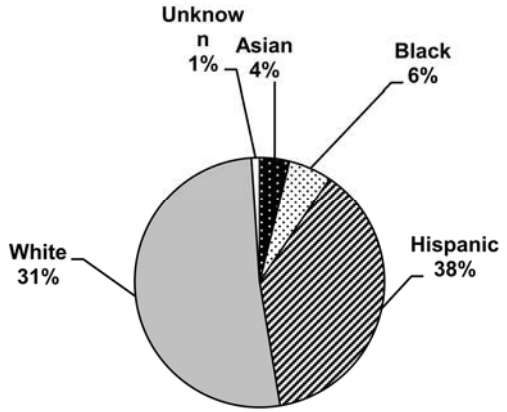


Figure 4. Reported Cases of Shiga Toxin-Producing *E. coli* by SPA, LAC, 2016 (N=282)

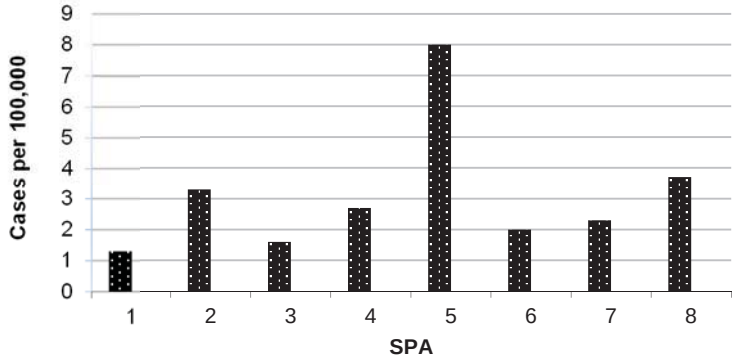


Figure 5. Reported Shiga Toxin-Producing *E. coli* Cases by Serotype Month of Onset, LAC, 2016 (N=282)

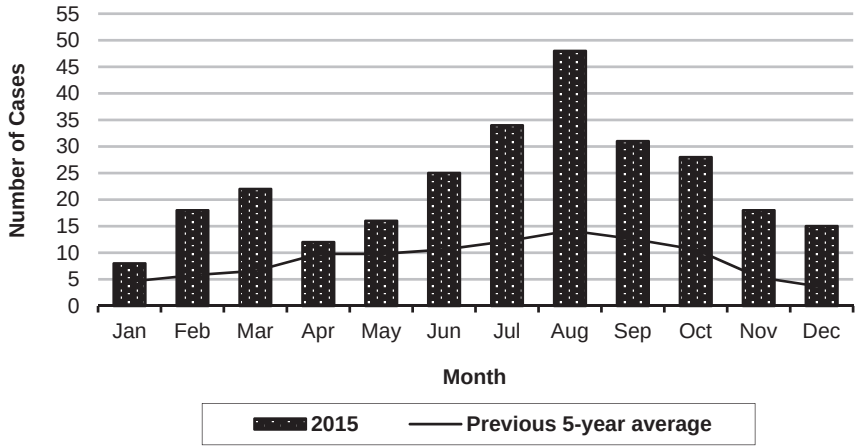
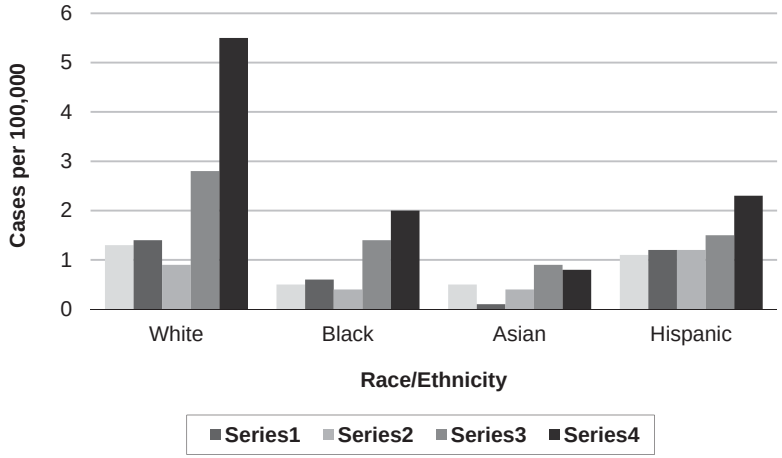
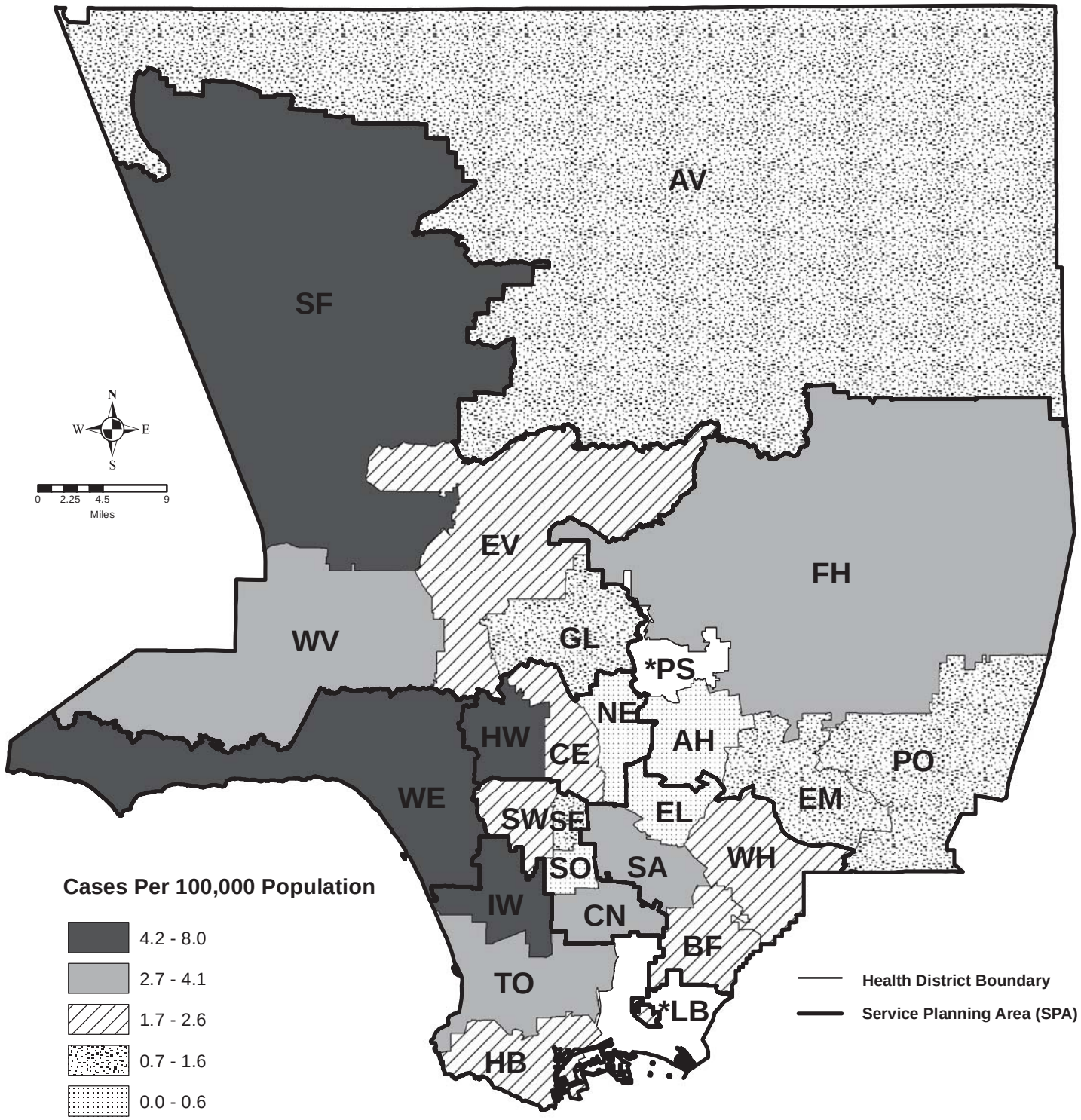


Figure 6. Reported Shiga Toxin-Producing Cases by Race/Ethnicity, LAC, 2012-2016



Map 5. E. Coli--Shiga Toxin-Producing Rates by Health District, Los Angeles County, 2016*



*Excludes Long Beach and Pasadena Data.

ESCHERICHIA COLI O157:H7, Other STEC

CRUDE DATA			
Type	O157:H7	Other Serotypes	All Serotypes
Number of Cases	22	68	90
Annual Incidence[a]			
LA County	0.23	0.72	0.95[c]
California[b]	N/A	N/A	1.82[c]
United States[b]	N/A	N/A	1.94[c]
Age at Diagnosis			
Mean	21	16	17
Median	13	4	6
Range	1-80 years	0-80 years	0-83 years

[a]Cases per 100,000 population.
[b]Calculated from Final 2014 Reports of Nationally Notifiable Infectious Diseases. MMWR 64(36):1019–1033.
[c]Incudes E.coli O157:H7; shiga toxin-positive, serogroup non-O157: and Shiga toxin-positive, not serogrouped. All cases are now reported as STEC (Shiga toxin producing E.coli) in order to simplify the reporting process.

DESCRIPTION

Escherichia coli is a Gram-negative bacillus with numerous serotypes. Gastrointestinal infection with a shiga toxin-producing *E. coli* (STEC) serotype causes abdominal cramps and watery diarrhea, often developing into bloody diarrhea; fever is uncommon. The incubation period is two to eight days. These organisms naturally occur in the gut of many animals; likely modes of transmission to humans from animals include foodborne (e.g., undercooked ground beef; raw milk; fresh produce and unpasteurized juice contaminated with feces), direct exposure to animals and their environments, and exposure to recreational water contaminated with animal or human feces. Person-to-person transmission such as between siblings or within a daycare center is also well described.

The most common STEC serotype in the U.S. is *E. coli* O157:H7, but several other serotypes occur and cause illness. In LAC, a positive test for shiga toxin in stool as well as cultures of STEC are reportable to public health. All reported positive STEC broths or isolates are confirmed and serotyped by the LAC Public Health Laboratory.

Hemolytic uremic syndrome (HUS) is a disorder characterized by hemolytic anemia, kidney failure, and thrombocytopenia. Approximately 5-10% of those diagnosed with an STEC infection will develop HUS. HUS may develop 7 days after the first symptoms, when diarrhea is improving. Clinical symptoms that may be present upon evaluation include decreased frequency of urination, fatigue, and evidence of anemia. It is diagnosed clinically and is most frequently associated with recent infection due to *E. coli* O157:H7, but may also be caused by other serotypes. Children younger than five years of age are at highest risk for HUS.

Adults may develop a related condition called thrombotic thrombocytopenic purpura (TTP) after STEC infection.

Increased public education to prevent STEC infection is important. Information should focus on safe food handling practices, proper hygiene, and identifying high-risk foods and activities both in the home and while eating out. To avoid infection, beef products should be cooked thoroughly. Produce, including pre-washed products, should be thoroughly rinsed prior to eating. In addition, one should drink only treated water and avoid swallowing water during swimming or wading. Careful handwashing is essential, especially before eating and after handling raw beef products or coming in contact with or being around animals. Strengthening of national food processing regulations is also important to reduce contamination.

2014 TRENDS AND HIGHLIGHTS

- There was an 83% increase in the frequency of confirmed *E. coli* O157:H7 cases in 2014 compared with 2013. However the 2014 rate was similar to that of 2011 and 2012 (Figure 1).
- The number of confirmed cases of *E. coli* non-O157:H7 (“other serotypes”) infections decreased 24% compared with 2013. Eight different serotypes were identified with serotypes O103, O111, O26 being predominant.
- Cases of infection with "other serotypes" had a younger mean age than O157:H7 cases (16 vs. 21 years). One possible rationale is

that cases with other serotypes are largely Hispanic (72.3%), a group that has historically had less access to health care with the exception of Hispanic children who have health care coverage through government programs. This would, in effect, drive the mean age down for the "other serotypes" group. By contrast, for serotype O157:H7, infections are associated with undercooked ground beef and salads which are less frequently consumed by the Hispanic population which contributes a lower proportion of cases among that serotype.

- For serotype O157:H7, the highest incidence of infection occurred among persons from 1-4 years old (Table 1). Infection with *E. coli* O157:H7 continues to be most often observed among whites (Figures 3, 6). Cases were reported from all SPAs except SPA 5 and 6. (Table 2, Figure 4).
- For all other serotypes of STEC, the highest incidence also was among children aged 1-4 years (Figure 2) and in the Hispanic population (Figures 3, 7).
- No death associated with STEC infection occurred.
- There was one LAC outbreak of O157:H7 in 2014 involving a petting zoo investigated by ACDC. Three cases were identified during the investigation who reported exposure to sheep, goats and other animals. No case reported hospitalization.
- ACDC participated in three multistate cluster investigations assisting with these investigations by administering supplemental questionnaires and reviewing case history forms to identify additional cases. No source was identified among the three clusters.

Table 1. Reported *Escherichia coli* O157:H7 Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA Los Angeles County, 2010-2014

	2010 (N=12)			2011 (N=21)			2012 (N=19			2013 (N=12)			2014 (N=22)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
1-4	3	25.0	0.6	6	28.5	1.0	3	15.7	0.6	2	16.6	0.4	6	27.2	1.2
5-14	2	16.6	0.2	6	28.5	0.5	5	26.3	0.4	0	0	0	7	31.8	0.6
15-34	5	41.6	0.2	3	14.2	0.1	5	26.3	0.2	7	58.3	0.2	4	18.1	0.1
35-44	0	0	0	2	9.5	0.1	1	5.2	0.1	1	8.3	0.1	3	13.6	0.2
45-54	1	8.3	0.1	0	-	-	1	5.2	0.1	0	0	0	0	-	-
55-64	0	0	0	2	9.5	0.2	1	5.2	0.1	0	0	0	0	-	-
65+	1	8.3	0.1	2	9.5	0.2	3	15.7	0.3	2	16.6	0.2	2	9.0	0.2
Unknown	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
Race/Ethnicity															
Asian	3	25.0	0.2	1	4.7	0.1	5	26.3	0.4	0	0	0	2	9.0	0.1
Black	1	8.3	0.1	1	4.7	0.1	1	5.2	0.1	0	0	0	2	9.0	0..3
Hispanic	2	16.6	--	8	38.0	0.2	1	5.2	0.0	4	33.3	0.1	7	31.8	0.2
White	6	50.0	0.2	11	52.3	0.4	12	63.1	0.5	8	66.6	0.3	11	50.0	0.4
Other	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
Unknown	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
SPA															
1	0	-	-	1	4.7	0.3	0	-	-	0	-	-	1	4.5	0.3
2	5	41.6	0.2	4	19.0	0.2	4	21.0	0.2	3	25.0	0.1	7	31.8	0.3
3	0	-	-	3	14.2	0.2	1	5.2	0.1	1	8.3	0.1	6	27.2	0.4
4	0	-	-	5	23.8	0.4	3	15.7	0.3	1	8.3	0.1	2	9.0	0.2
5	3	25.0	0.5	1	4.7	0.2	3	15.7	0.5	5	41.6	0.8	0	-	-
6	0	-	-	3	14.2	0.3	1	5.2	0.1	0	-	-	0	-	-
7	2	16.1	0.2	1	4.7	0.1	4	21.0	0.3	1	8.3	0.1	2	9.0	0.2
8	2	16.1	0.2	3	14.2	0.2	3	15.7	0.3	1	8.3	0.1	4	18.1	0.4
Unknown	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-

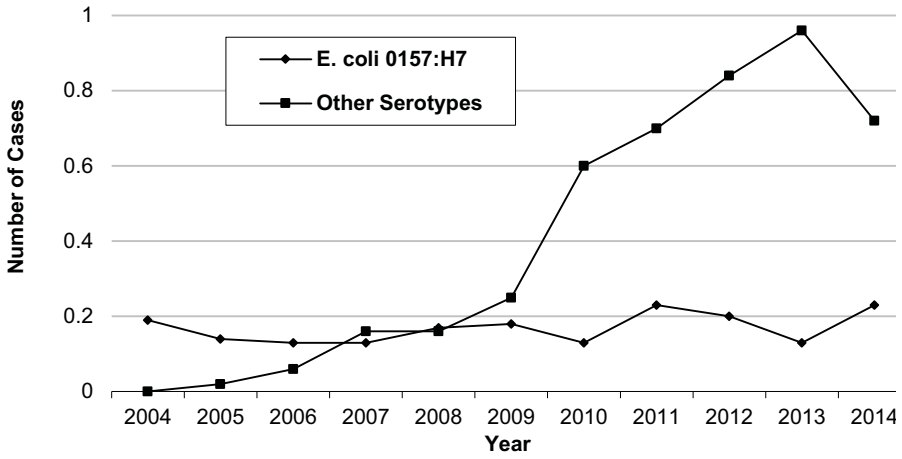
*Rates calculated based on less than 19 cases or events are considered unreliable

Table 2. Reported *Escherichia coli* Non O157:H7 Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA Los Angeles County, 2010-2014

	2010 (N=45)			2011 (N=67)			2012 (N=78)			2013 (N=90)			2014 (N=68)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	4	8.8	3.3	8	11.9	5.7	6	7.6	5.0	5	5.5	4.1	1	1.4	0.8
1-4	23	51.1	4.7	30	44.7	5.2	39	50.0	8.2	41	45.5	8.4	36	52.9	7.4
5-14	2	4.4	0.2	8	11.9	0.6	10	12.8	0.8	17	18.8	1.4	10	14.7	0.8
15-34	8	17.8	0.3	12	17.9	0.4	11	14.1	0.4	17	18.8	0.6	6	8.8	0.2
35-44	1	2.2	0.1	2	2.9	0.1	3	3.8	0.2	3	3.3	0.2	1	1.4	0.1
45-54	6	13.3	0.5	0	0	0	4	5.1	0.3	3	3.3	0.2	8	11.7	0.6
55-64	1	2.2	0.1	3	4.4	0.3	5	6.4	0.5	1	1.1	0.1	4	5.8	0.4
65+	0	-	-	4	5.9	0.4	0	-	-	3	3.3	0.3	2	2.9	0.2
Unknown	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
Race/Ethnicity															
Asian	1	2.2	0.1	5	7.4	0.4	1	1.2	0.1	2	2.2	0.1	3	4.4	0.2
Black	2	4.4	0.3	2	2.9	0.2	3	3.8	0.4	5	5.5	0.6	1	1.4	0.1
Hispanic	31	68.8	0.7	42	62.6	0.9	49	62.8	1.1	53	58.8	1.2	47	69.1	1.0
White	10	22.2	0.4	17	25.3	0.6	22	28.2	0.8	28	31.1	1.1	14	20.5	0.5
Other	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
Unknown	1	2.2	0.1	1	1.4	0.1	0	-	-	2	2.2	0.1	3	4.4	0
SPA															
1	1	2.2	0.3	2	2.9	0.5	1	1.2	0.3	5	5.5	1.3	1	1.4	0.3
2	14	31.1	0.7	14	20.8	0.6	23	29.4	1.1	26	28.8	1.2	16	23.5	0.7
3	7	15.5	0.4	8	11.9	0.5	11	14.1	0.7	11	12.2	0.7	14	20.5	0.9
4	6	40.0	0.5	4	5.9	0.3	10	12.8	0.9	10	11.1	0.9	6	8.8	0.5
5	3	6.6	0.5	7	10.4	1.1	5	6.4	0.8	7	7.7	10.1	2	2.9	0.3
6	4	8.8	0.4	8	11.9	0.7	8	10.2	0.8	13	14.4	1.3	7	10.2	0.7
7	6	13.1	0.5	20	29.8	1.5	11	14.1	0.8	12	13.3	0.9	15	22.0	1.1
8	4	8.8	0.4	4	5.9	0.4	3	3.8	0.3	6	6.6	0.6	7	10.2	0.6
Unknown	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-

*Data not available for 2005. Rates calculated based on less than 19 cases or events are considered unreliable.

Figure 1. Number Cases of Shiga Toxin-producining *E. coli*
LAC, 2004-2014



*Other STEC data not available before 2005

Figure 2. Reported Cases of Shiga Toxin-producing *E. coli*
by Serotype and Age Group
LAC, 2014

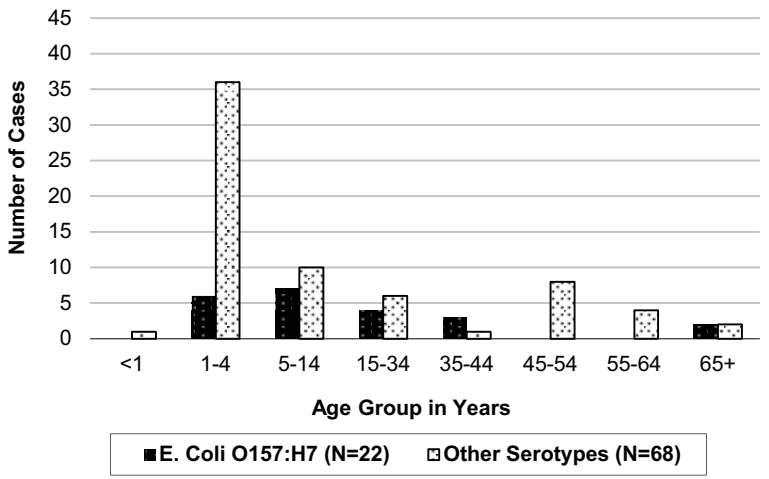


Figure 3. Percent Cases of Shiga Toxin-producing *E. coli*,
by Race/Ethnicity, LAC, 2014

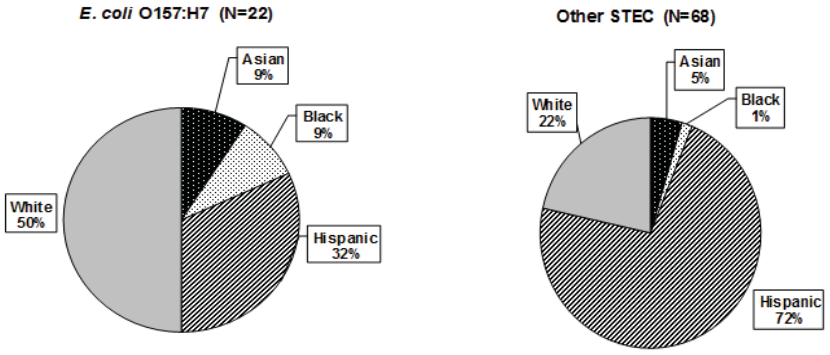


Figure 4. Reported Cases of Shiga Toxin-producing
***E. coli* by Serotype and SPA**
LAC, 2014

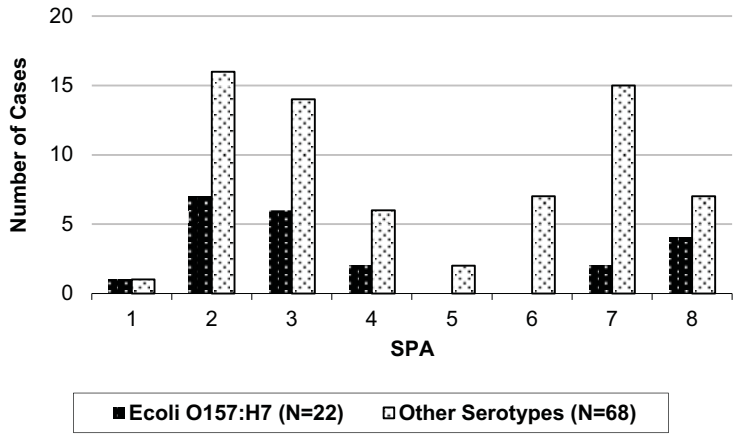


Figure 5. Reported Shiga Toxin-producing *E. coli* Cases by Serotype Month of Onset, LAC, 2014

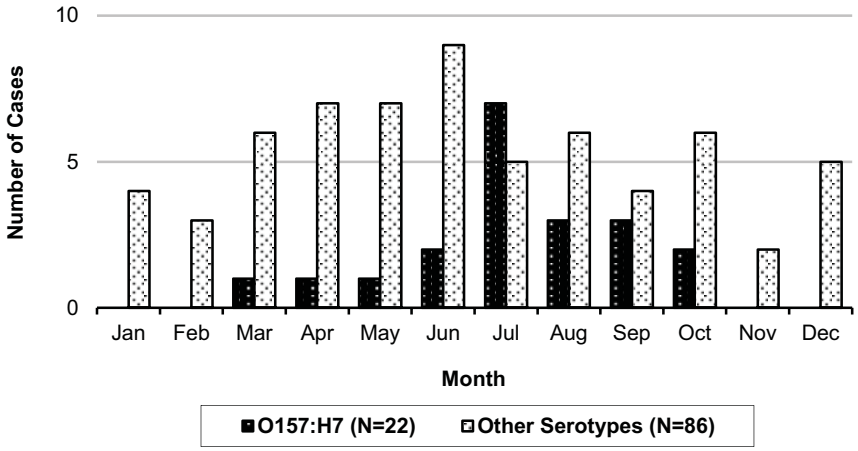


Figure 6. Reported *E. coli* O157:H7 Cases by Race/Ethnicity LAC, 2009-2014

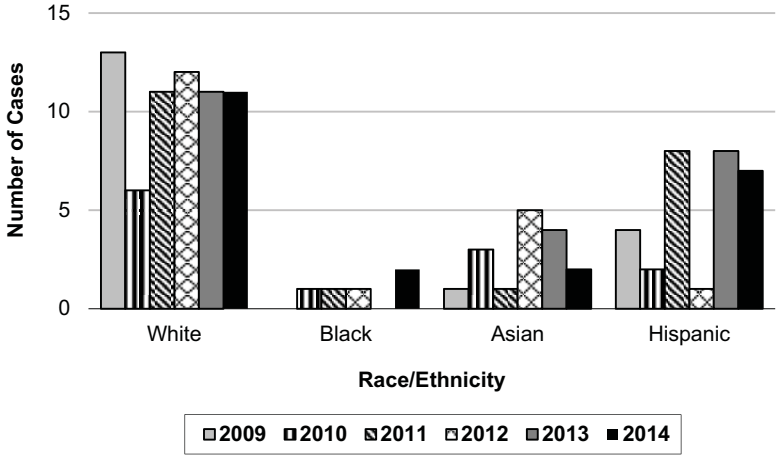
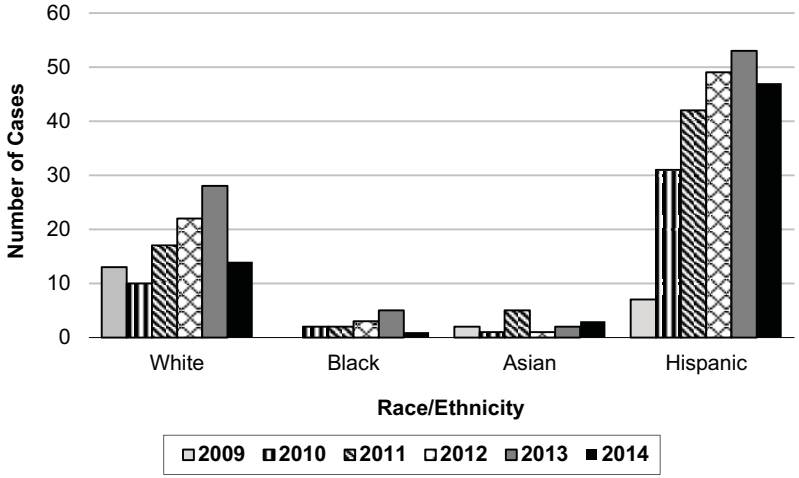
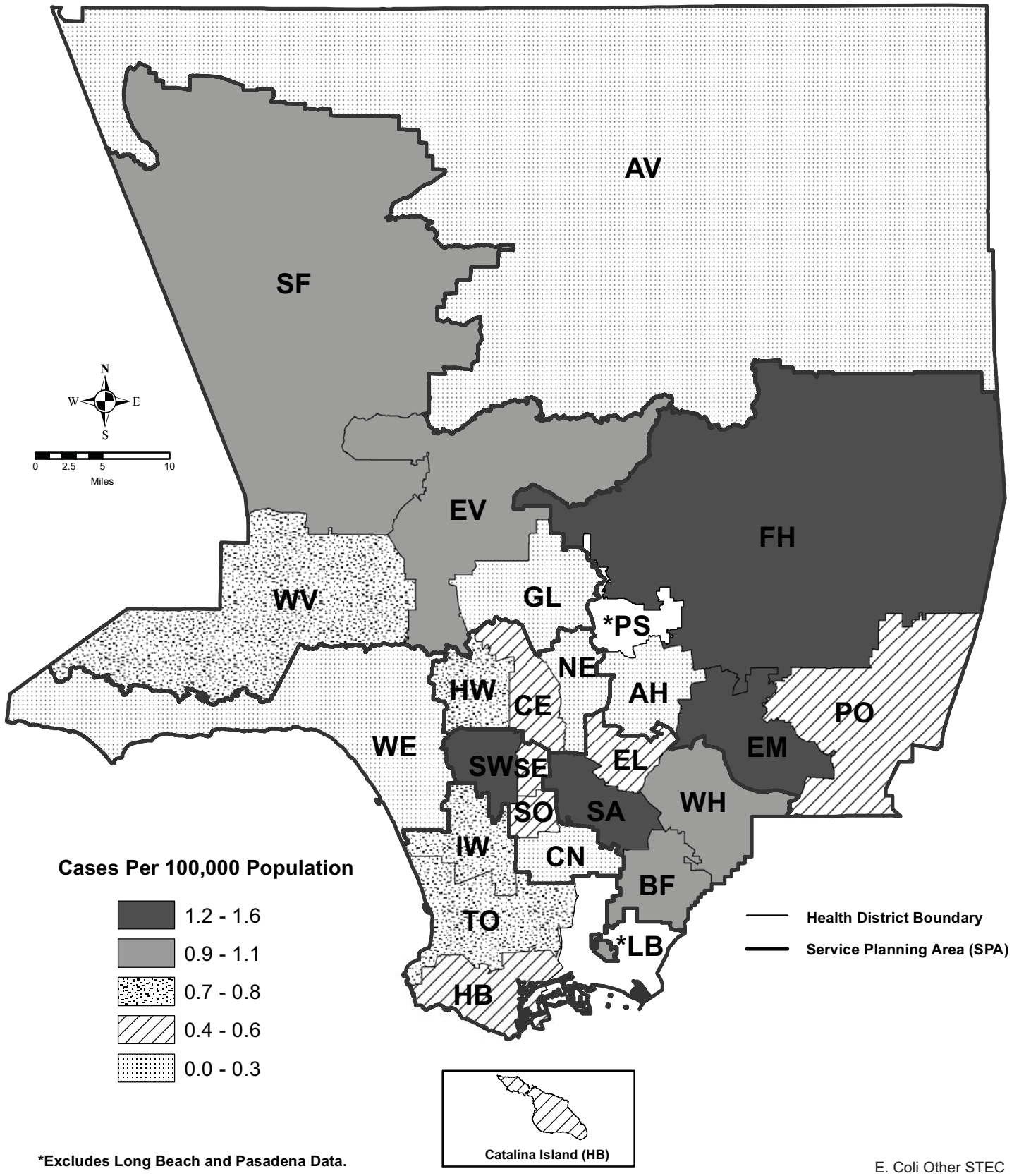


Figure 7. Reported Cases of *E. coli* Non-O157:H7 Serotype by Race/Ethnicity LAC, 2009-2014



Map 6. E. Coli Other Stec
Rates by Health District, Los Angeles County, 2014*



*Excludes Long Beach and Pasadena Data.

ESCHERICHIA COLI O157:H7, Other STEC

CRUDE DATA	O157:H7	Other Serotypes	All Serotypes
Number of Cases	12	90	102
Annual Incidence[a]			
LA County	0.13	0.96	1.09[c]
California[b]	--	--	1.17[c]
United States[b]	--	--	1.72[c]
Age at Diagnosis			
Mean	30	12	
Median	28	4	
Range	2-77	0-80	

[a] Cases per 100,000 population.
[b] See Final Summary of Nationally Notifiable Infectious Diseases, United States on MMWR website http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6233a6.htm.
[c] Incudes E.coli O157:H7; shiga toxin-positive, serogroup non-O157: and Shiga toxin-positive, not serogrouped. All cases are now reported as STEC (Shiga toxin producing E.coli) in order to simplify the reporting process.

DESCRIPTION

Escherichia coli is a Gram-negative bacillus with numerous serotypes, several of which produce shiga toxin, called STEC. Gastrointestinal infection with a shiga toxin-producing serotype causes abdominal cramps and watery diarrhea, often developing into bloody diarrhea; fever is uncommon. Incubation period is two to eight days. These organisms naturally occur in the gut of many animals; likely modes of transmission to humans from animals include foodborne (e.g., undercooked ground beef; raw milk; fresh produce and unpasteurized juice contaminated with feces), direct exposure to animals and their environments, and exposure to recreational water contaminated with animal or human feces. Person-to-person transmission such as between siblings or within a daycare center is also well described.

The most common STEC serotype in the US is *E. coli* O157:H7, but several other serotypes occur and cause illness. A positive test for shiga toxin in stool as well as cultures of STEC are reportable to Public Health. All reported positive STEC broths or isolates are confirmed and serotyped by the Public Health Laboratory.

Hemolytic uremic syndrome (HUS) is a disorder consisting of hemolytic anemia, kidney failure, and thrombocytopenia. It is diagnosed clinically and is most frequently associated with recent infection due to *E. coli* O157:H7, but may also be caused by other serotypes. Children younger than five years of age are at highest risk for HUS. Adults may develop a related condition called thrombotic thrombocytopenic purpura (TTP) after STEC infection.

Increased public education to prevent STEC infection is important. Information should focus on safe food handling practices, proper hygiene, and identifying high-risk foods and activities both in the home and while eating out. To avoid infection, beef products should be cooked thoroughly. Produce, including pre-washed products, should be thoroughly rinsed prior to eating. In addition, one should drink only treated water and avoid swallowing water during swimming or wading. Careful handwashing is essential, especially before eating and after handling raw beef products or coming in contact with or being around animals. Strengthening of national food processing regulations is also important to reduce contamination.

2013 TRENDS AND HIGHLIGHTS

- There was a 37% decrease in the frequency of confirmed *E. coli* O157:H7 cases in 2013 (Figure1).
- Cases of *E. coli* "other serotypes" had a younger mean age than O157:H7 cases (12 vs. 30 years). One possible rationale is that cases with other serotypes are largely Hispanic (58.8%), a group that has historically had less access to health care to be diagnosed, with the exception of Hispanic children who have health care coverage through government programs. This would, in effect, drive the mean age down for the "other serotypes" group.
- The number of confirmed cases of other STEC (non-O157:H7) infections increased by 15% (n=90) compared with 2012. They included ten different serotypes with serotypes O103, O111, O26 being predominant.
- For serotype O157:H7, the highest number of cases reported was among persons ages 15-34 years (n=7) (Figure 2); it continues to

be mainly observed among whites (n=8) (Figures 3, 6). Cases were reported from all SPAs except SPA 1 and 6. (Table 2, Figure 4).

- For all other serotypes of STEC, the highest number of cases reported was among children aged 1-4 years (n=41) (Figure 2) and in the Hispanic population (n=53) (Figures 3, 7). The reasons for the differences with O175:H7 are unknown.
- Six cases were reported with HUS and three were laboratory confirmed and serotyped; two were other STEC (non-O157:H7) and one was O157:H7. Three of six cases reported did not have laboratory confirmation however they met case definition. One death occurred.
- There was one Los Angeles County outbreak of STEC in 2013 involving a daycare investigated by the Community Health Services (CHS). Acute Communicable Disease Control Program participated in four multistate cluster investigations.

Table 1. Reported *Escherichia coli* O157:H7 Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA Los Angeles County, 2009-2013

	2009 (N=18)			2010 (N=12)			2011 (N=21)			2012 (N=19)			2013 (N=12)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1-4	5	27.7	1.0	3	25.0	0.6	6	28.5	1.0	3	15.7	0.6	2	16.6	0.4
5-14	3	16.6	0.2	2	16.6	0.2	6	28.5	0.5	5	26.3	0.4	0	0	0
15-34	5	27.7	0.2	5	41.6	0.2	3	14.2	0.1	5	26.3	0.2	7	58.3	0.2
35-44	2	11.1	0.1	0	0	0	2	9.5	0.1	1	5.2	0.1	1	8.3	0.1
45-54	0	0	0	1	8.3	0.1	0	0	0	1	5.2	0.1	0	0	0
55-64	1	5.5	0.1	0	0	0	2	9.5	0.2	1	5.2	0.1	0	0	0
65+	2	11.1	0.2	1	8.3	0.1	2	9.5	0.2	3	15.7	0.3	2	16.6	0.2
Unknown	0	0	0	0	0	0	0	0	0						
Race/Ethnicity															
Asian	1	5.5	0.1	3	25.0	0.2	1	4.7	0.1	5	26.3	0.4	0	0	0
Black	0	0	0	1	8.3	0.1	1	4.7	0.1	1	5.2	0.1	0	0	0
Hispanic	4	22.2	0.1	2	16.6	--	8	38.0	0.2	1	5.2	0.0	4	33.3	0.1
White	13	72.2	0.5	6	50.0	0.2	11	52.3	0.4	12	63.1	0.5	8	66.6	0.3
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SPA															
1	1	5.5	0.3	0	0	0	1	4.7	0.3	0	0	0	0	0	0
2	5	27.7	0.2	5	41.6	0.2	4	19.0	0.2	4	21.0	0.2	3	25.0	0.1
3	1	5.5	0.1	0	0	0	3	14.2	0.2	1	5.2	0.1	1	8.3	0.1
4	0	0	0	0	0	0	5	23.8	0.4	3	15.7	0.3	1	8.3	0.1
5	3	16.6	0.5	3	25.0	0.5	1	4.7	0.2	3	15.7	0.5	5	41.6	0.8
6	0	0	0	0	0	0	3	14.2	0.3	1	5.2	0.1	0	0	0
7	4	22.2	03	2	16.1	0.2	1	4.7	0.1	4	21.0	0.3	1	8.3	0.1
8	4	22.2	0.4	2	16.1	0.2	3	14.2	0.2	3	15.7	0.3	1	8.3	0.1
Unknown				0	0	0	0	0	0	0	0	0	0	0	0

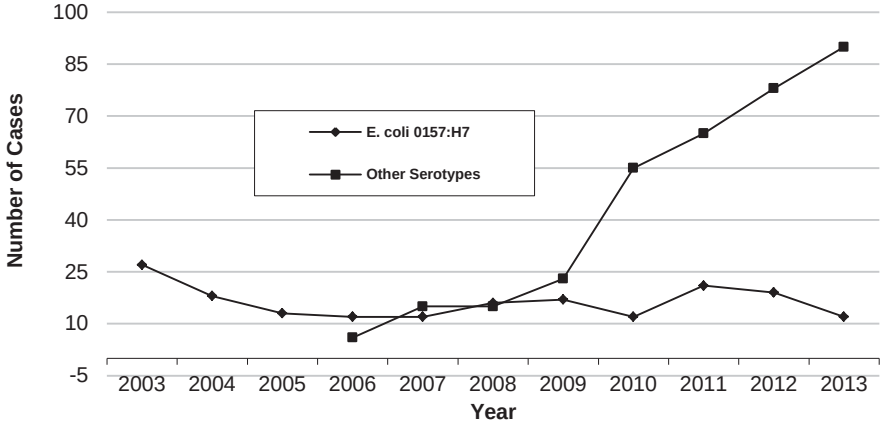
*Rates calculated based on less than 19 cases or events are considered unreliable

Table 2. Reported *Escherichia coli* Non O157:H7 Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA Los Angeles County, 2009-2013

	2009 (N=22)			2010 (N=45)			2011 (N=67)			2012 (N=78)			2013 (N=90)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0	0	4	8.8	3.3	8	11.9	5.7	6	7.6	5.0	5	5.5	4.1
1-4	10	45.4	2.0	23	51.1	4.7	30	44.7	5.2	39	50.0	8.2	41	45.5	8.4
5-14	1	4.5	0.1	2	4.4	0.2	8	11.9	0.6	10	12.8	0.8	17	18.8	1.4
15-34	6	27.2	0.2	8	17.8	0.3	12	17.9	0.4	11	14.1	0.4	17	18.8	0.6
35-44	1	4.5	0.1	1	2.2	0.1	2	2.9	0.1	3	3.8	0.2	3	3.3	0.2
45-54	1	4.5	0.1	6	13.3	0.5	0	0	0	4	5.1	0.3	3	3.3	0.2
55-64	1	4.2	0.1	1	2.2	0.1	3	4.4	0.3	5	6.4	0.5	1	1.1	0.1
65+	2	9.0	0.2	0	0	0	4	5.9	0.4	0	0	0	3	3.3	0.3
Unknown	0	0	0	0	0	0				0	0	0	0	0	0
Race/Ethnicity															
Asian	2	9.0	0.2	1	2.2	0.1	5	7.4	0.4	1	1.2	0.1	2	2.2	0.1
Black	0	0	0	2	4.4	0.3	2	2.9	0.2	3	3.8	0.4	5	5.5	0.6
Hispanic	7	31.8	0.2	31	68.8	0.7	42	62.6	0.9	49	62.8	1.1	53	58.8	1.2
White	13	59.0	0.5	10	22.2	0.4	17	25.3	0.6	22	28.2	0.8	28	31.1	1.1
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	1	2.2	0	1	1.4	0	0	0	0	2	2.2	0
SPA															
1	0	0	0	1	2.2	0.3	2	2.9	0.5	1	1.2	0.3	5	5.5	1.3
2	4	18.1	0.2	14	31.1	0.7	14	20.8	0.6	23	29.4	1.1	26	28.8	1.2
3	3	13.6	0.2	7	15.5	0.4	8	11.9	0.5	11	14.1	0.7	11	12.2	0.7
4	5	22.7	0.4	6	40.0	0.5	4	5.9	0.3	10	12.8	0.9	10	11.1	0.9
5	6	27.5	1.0	3	6.6	0.5	7	10.4	1.1	5	6.4	0.8	7	7.7	10.1
6	0	0	0	4	8.8	0.4	8	11.9	0.7	8	10.2	0.8	13	14.4	1.3
7	2	9.0	0.2	6	13.1	0.5	20	29.8	1.5	11	14.1	0.8	12	13.3	0.9
8	2	9.0	0.2	4	8.8	0.4	4	5.9	0.4	3	3.8	0.3	6	6.6	0.6
Unknown	0	0	0				0	0	0	0	0	0			

*Data not available for 2005. Rates calculated based on less than 19 cases or events are considered unreliable.

Figure 1. Number Cases of Shiga Toxin-producining *E. coli*
LAC, 2003-2013



*Other STEC data not available before 2005

Figure 2. Reported Cases of Shiga Toxin-producing *E. coli*
by Serotype and Age Group
LAC, 2013

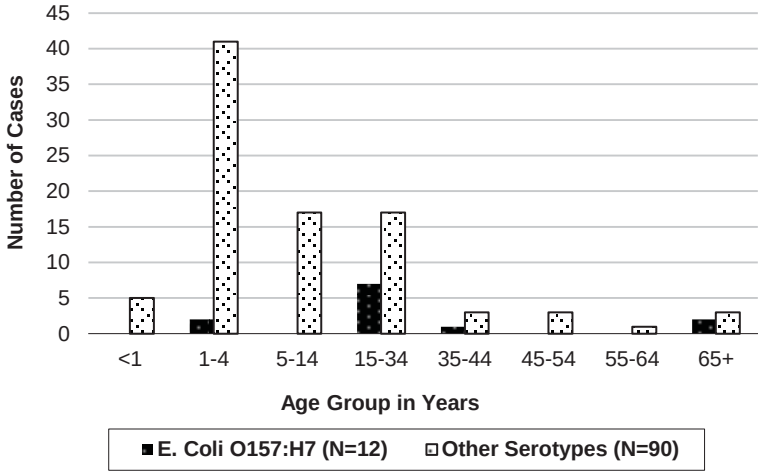


Figure 3. Percent Cases of Shiga Toxin-producing *E. coli*,
by Race/Ethnicity, LAC, 2013

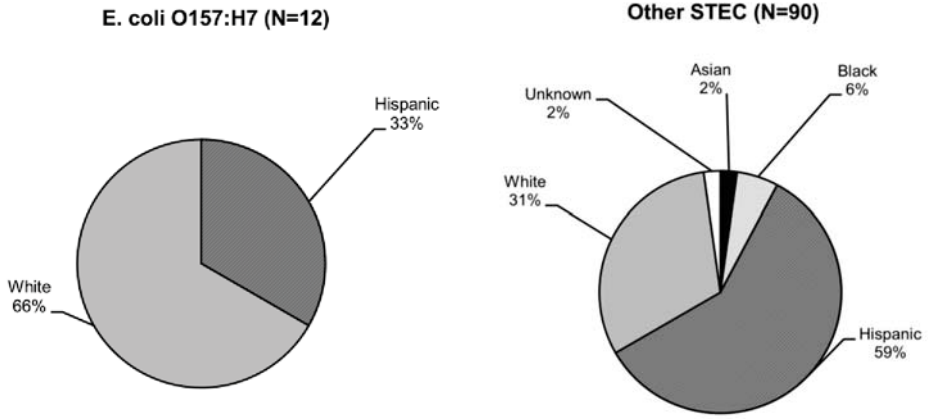


Figure 4. Reported Cases of Shiga Toxin-producing
***E. coli* by Serotype and SPA**
LAC, 2013

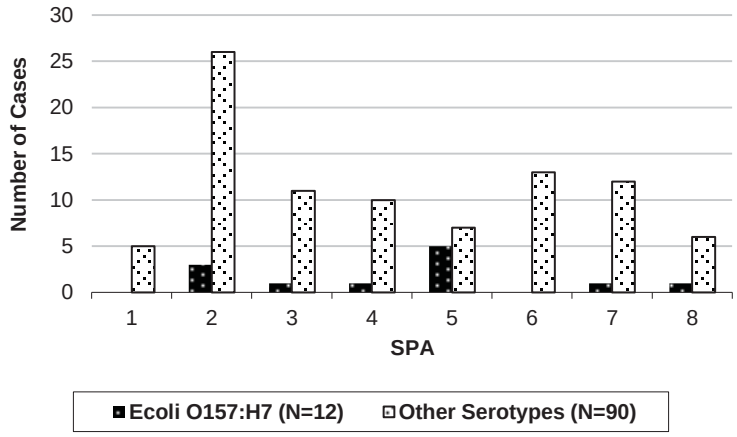
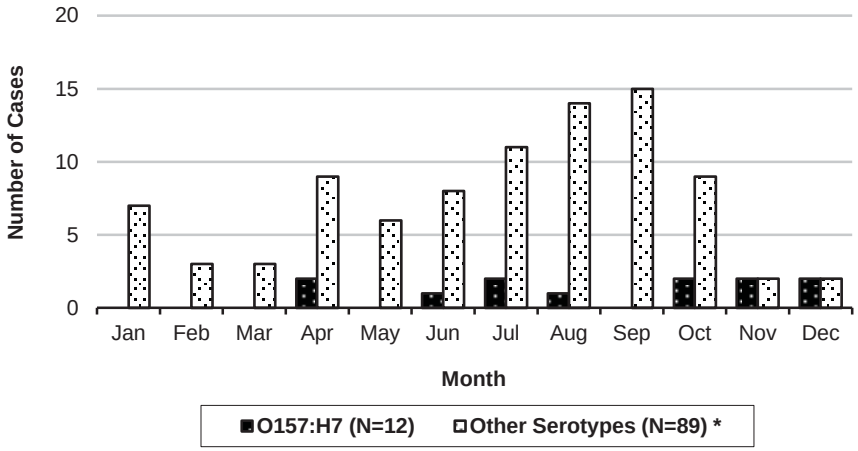


Figure 5. Reported Shiga Toxin-producing *E. coli* Cases by Serotype Month of Onset, LAC, 2013



* One case did not provide an onset date.

Figure 6. Reported *E. coli* O157:H7 Cases by Race/Ethnicity LAC, 2008-2013

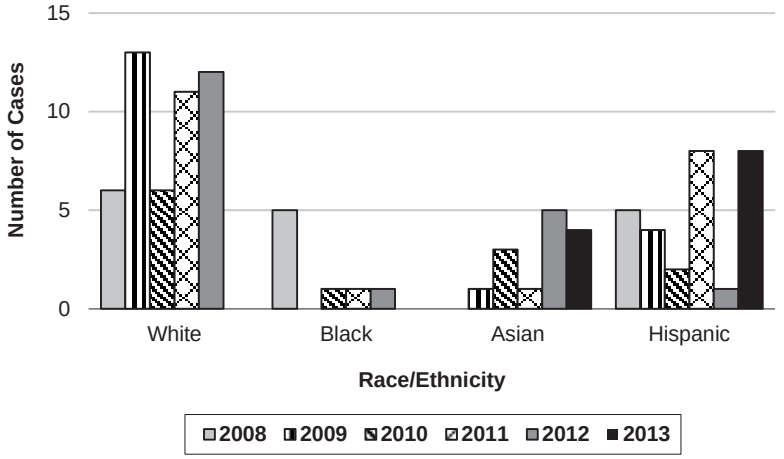
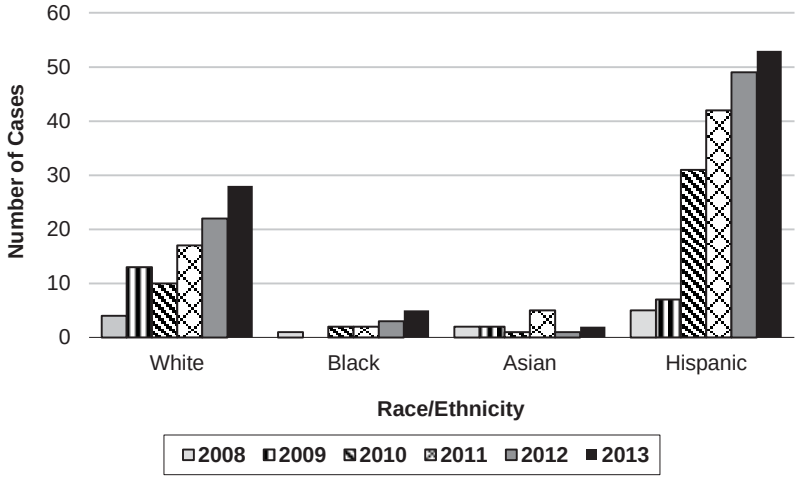
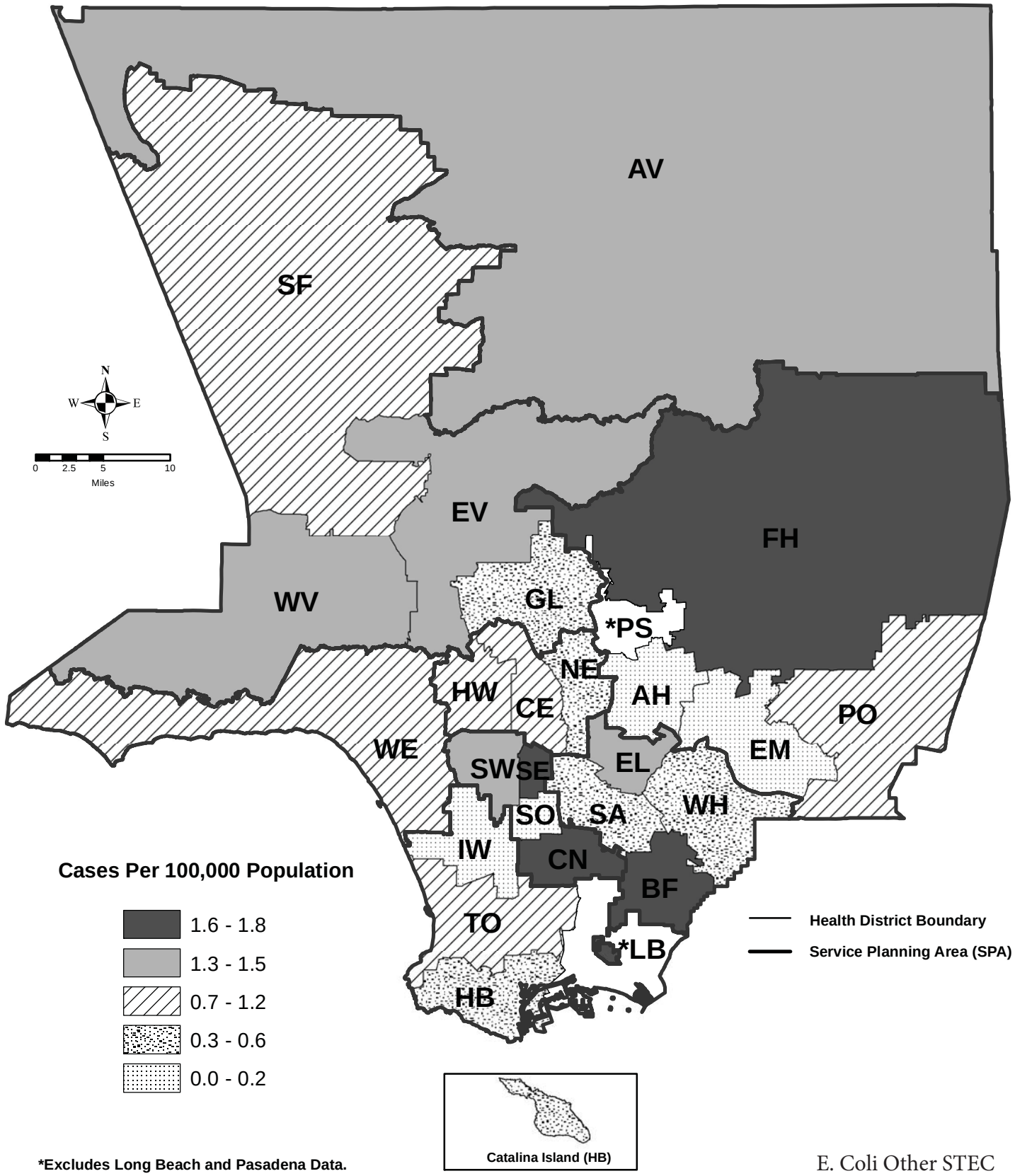


Figure 7. Reported Cases of *E. coli* Non-O157:H7 Serotype by Race/Ethnicity LAC, 2008-2013



Map 5. E. Coli Other Stec
Rates by Health District, Los Angeles County, 2013*



*Excludes Long Beach and Pasadena Data.

ESCHERICHIA COLI O157:H7, Other STEC

CRUDE DATA	O157:H7	Other Serotypes	All Serotypes
Number of Cases	19	78	97
Annual Incidence[a]			
LA County	0.20	0.84	1.04[c]
California[b]	--	--	1.32[c]
United States[b]	--	--	1.79[c]
Age at Diagnosis			
Mean	29	13	
Median	28	3	
Range	1-69	0-60	

[a] Cases per 100,000 population.
[b] See Final Summary of Nationally Notifiable Infectious Diseases, United States on MMWR website http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6233a6.htm.
[c] Incudes E.coli O157:H7; shiga toxin-positive, serogroup non-O157: and Shiga toxin-positive, not serogrouped. All cases are now reported as STEC (Shiga toxin producing E.coli) in order to simplify the reporting process.

DESCRIPTION

Escherichia coli is a Gram-negative bacillus with numerous serotypes, several of which produce shiga toxin, called STEC. Gastrointestinal infection with a shiga toxin-producing serotype causes abdominal cramps and watery diarrhea, often developing into bloody diarrhea; fever is uncommon. Incubation period is two to eight days. These organisms naturally occur in the gut of many animals; likely modes of transmission to humans from animals include foodborne (e.g., undercooked ground beef; raw milk; fresh produce and unpasteurized juice contaminated with feces), direct exposure to animals and their environments, and exposure to recreational water contaminated with animal or human feces. Person-to-person transmission such as between siblings or within a daycare center is also well described.

The most common STEC serotype in the US is *E. coli* O157:H7, but several other serotypes occur and cause illness. A positive test for shiga toxin in stool as well as cultures of STEC are reportable to Public Health. All reported positive STEC broths or isolates are confirmed and serotyped by the Public Health Laboratory.

Hemolytic uremic syndrome (HUS) is a disorder consisting of hemolytic anemia, kidney failure, and thrombocytopenia. It is diagnosed clinically and is most frequently associated with recent infection due to *E. coli* O157:H7, but may also be caused by other serotypes. Children younger than five years of age are at highest risk for HUS. Adults may develop a related condition called thrombotic thrombocytopenic purpura (TTP) after STEC infection.

Increased public education to prevent STEC infection is important. Information should focus on safe food handling practices, proper hygiene, and identifying high-risk foods and activities both in the home and while eating out. To avoid infection, beef products should be cooked thoroughly. Produce, including pre-washed products, should be thoroughly rinsed prior to eating. In addition, one should drink only treated water and avoid swallowing water during swimming or wading. Careful handwashing is essential, especially before eating and after handling raw beef products or coming in contact with or being around animals. Strengthening of national food processing regulations to decrease contamination is also important to reduce contamination.

2012 TRENDS AND HIGHLIGHTS

- There was a 9% (n=19) decrease in the frequency of confirmed *E. coli* O157:H7 cases in 2012 (Figure1).
- Cases of *E. coli* "other serotypes" had a younger mean age than O157:H7 cases (3 vs. 13 years). One possible rationale is that cases with other serotypes are largely Hispanic (62.8%), a group that has historically had less access to health care to be diagnosed, with the exception of Hispanic children who have health care coverage through government programs. This would, in effect, drive the mean age down for the "other serotypes" group.
- The number of confirmed cases of other STEC (non-O157:H7) infections increased by 20% (n=78) compared to 2011. They included ten different serotypes with serotypes O103, O111, O26 being predominant.
- For serotype O157:H7, the highest number of cases reported was among persons ages

5-34 years (n=10) (Figure 2); it continues to be mainly observed among whites (n=12) (Figures 3, 6). Cases were reported from all SPAs except SPA 1. (Table 2, Figure 4).

- For all other serotypes of STEC, the highest number of cases reported was among children aged 1-4 years (n=30) (Figure 2) and in the Hispanic population (n=42) (Figures 3, 7). The reasons for these differences are unknown.
- Two HUS cases were reported and were laboratory confirmed with STEC serotype other STEC (non-O157:H7). No deaths occurred.
- There were no Los Angeles County outbreaks of STEC in 2012. Acute Communicable Disease Control Program participated in four multistate cluster investigations.

Table 1. Reported *Escherichia coli* O157:H7 Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA Los Angeles County, 2008-2012

	2008 (N=16)			2009 (N=18)			2010 (N=12)			2011 (N=21)			2012 (N=19)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	1	6.3	0.7	0	0	0	0	0	0	0	0	0	0	0	0
1-4	4	25.0	0.7	5	27.7	0.9	3	25.0	0.5	6	28.5	1.0	3	15.7	0.6
5-14	3	18.8	0.2	3	16.6	0.2	2	16.6	0.2	6	28.5	0.5	5	26.3	0.4
15-34	4	25.0	0.1	5	27.7	0.2	5	41.6	0.2	3	14.2	0.1	5	26.3	0.2
35-44	1	6.3	0.1	2	11.1	0.1	0	0	0	2	9.5	0.1	1	5.2	0.1
45-54	1	6.3	0.1	0	0	0	1	8.3	0.1	0	0	0	1	5.2	0.1
55-64	0	0.0	0.0	1	5.5	0.1	0	0	0	2	9.5	0.2	1	5.2	0.1
65+	2	12.5	0.2	2	11.1	0.2	1	8.3	0.1	2	9.5	0.2	3	15.7	0.3
Unknown	0	0.0		0	0	0	0	0	0	0	0	0			
Race/Ethnicity															
Asian	0	0.0	0.0	1	5.5	0.1	3	25.0	0.2	1	4.7	0.1	5	26.3	0.4
Black	5	31.3	0.6	0	0	0	1	8.3	0.1	1	4.7	0.1	1	5.2	0.1
Hispanic	5	31.3	0.1	4	22.2	0.1	2	16.6	--	8	38.0	0.2	1	5.2	0.0
White	6	37.5	0.2	13	72.2	0.4	6	50.0	0.2	11	52.3	0.4	12	63.1	0.5
Other	0	0.0	0.0	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0.0		0	0	0	0	0	0	0	0	0	0	0	0
SPA															
1	0	0.0	0.0	1	5.5	0.3	0	0	0	1	4.7	0.3	0	0	0
2	5	31.3	0.2	5	27.7	0.2	5	41.6	0.2	4	19.0	0.2	4	21.0	0.2
3	1	6.3	0.1	1	5.5	0.1	0	0	0	3	14.2	0.2	1	5.2	0.1
4	3	18.8	0.2	0	0	0	0	0	0	5	23.8	0.4	3	15.7	0.3
5	6	37.5	0.9	3	16.6	0.5	3	25.0	0.5	1	4.7	0.2	3	15.7	0.5
6	0	0.0	0.0	0	0	0	0	0	0	3	14.2	0.3	1	5.2	0.1
7	0	0.0	0.0	4	22.2	03	2	16.1	0.1	1	4.7	0.1	4	21.0	0.3
8	1	6.3	0.1	4	22.2	0.4	2	16.1	0.1	3	14.2	0.2	3	15.7	0.3
Unknown	0	0.0					0	0	0				0	0	0

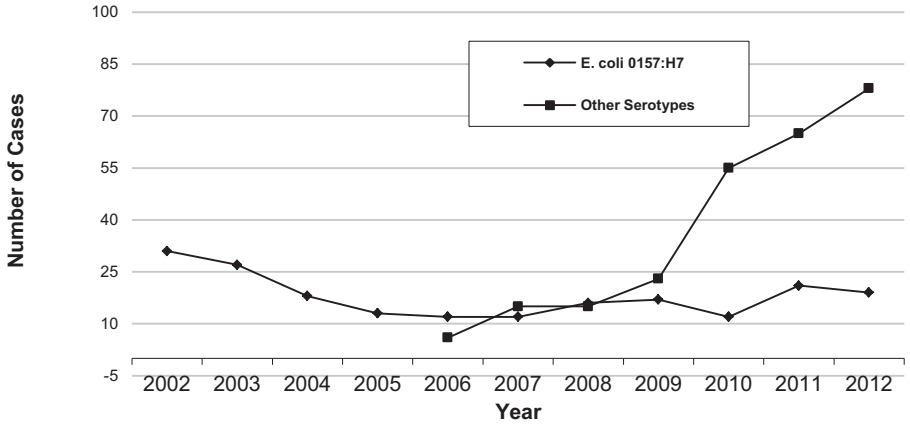
*Rates calculated based on less than 19 cases or events are considered unreliable

Table 2. Reported *Escherichia coli* Non O157:H7 Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA Los Angeles County, 2008-2012

	2008 (N=11)			2009 (N=20)			2010 (N=45)			2011 (N=67)			2012 (N=78)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0	0	0	0	0	4	8.8	2.9	8	11.9	5.7	6	7.6	5.0
1-4	1	14.2	0.2	9	42.8	1.6	23	51.1	4.0	30	44.7	5.2	39	50.0	8.2
5-14	1	7.1	0.1	2	9.5	0.1	2	4.4	0.2	8	11.9	0.6	10	12.8	0.8
15-34	7	50.0	0.2	4	23.8	0.1	8	17.8	0.3	12	17.9	0.4	11	14.1	0.4
35-44	0	7.1	0	1	4.7	0.1	1	2.2	0.1	2	2.9	0.1	3	3.8	0.2
45-54	1	7.1	0.1	1	4.7	0.1	6	13.3	0.4	0	0	0	4	5.1	0.3
55-64	0	0	0	1	4.7	0.1	1	2.2	0.1	3	4.4	0.3	5	6.4	0.5
65+	2	14.2	0.2	2	9.5	0.2	0	0	0	4	5.9	0.4	0	0	0
Unknown	0	0	0	0	0	0	0	0	0				0	0	0
Race/Ethnicity															
Asian	2	21.4	0.2	2	9.5	0.2	1	2.2	0.1	5	7.4	0.4	1	1.2	0.1
Black	1	7.1	0.1	0	0	0	2	4.4	0.2	2	2.9	0.2	3	3.8	0.4
Hispanic	5	42.8	0.1	6	28.5	0.1	31	68.8	0.7	42	62.6	0.9	49	62.8	1.1
White	4	28.5	0.1	12	61.9	0.4	10	22.2	0.3	17	25.3	0.6	22	28.2	0.8
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	1	2.2	0	1	1.4	0	0	0	0
SPA															
1	1	14.2	0.3	0	0	0	1	2.2	0.3	2	2.9	0.5	1	1.2	0.3
2	3	14.2	0.1	4	19.0	0.2	14	31.1	0.6	14	20.8	0.6	23	29.4	1.1
3	1	14.2	0.1	3	14.2	0.2	7	15.5	0.4	8	11.9	0.5	11	14.1	0.7
4	2	21.4	0.2	3	19.0	0.2	6	40.0	0.5	4	5.9	0.3	10	12.8	0.9
5	4	28.5	0.6	6	28.5	0.9	3	6.6	0.5	7	10.4	1.1	5	6.4	0.8
6	0	0	0	0	0	0	4	8.8	0.4	8	11.9	0.7	8	10.2	0.8
7	1	7.1	0.1	2	9.5	0.1	6	13.1	0.4	20	29.8	1.5	11	14.1	0.8
8	0	0	0	2	9.5	0.2	4	8.8	0.4	4	5.9	0.4	3	3.8	0.3
Unknown	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

*Data not available for 2005. Rates calculated based on less than 19 cases or events are considered unreliable.

Figure 1. Number Cases of Shiga Toxin-producining *E. coli*
LAC, 2002-2012



*Other STEC data not available before 2005

Figure 2. Reported Cases of Shiga Toxin-producing *E. coli*
by Serotype and Age Group
LAC, 2012

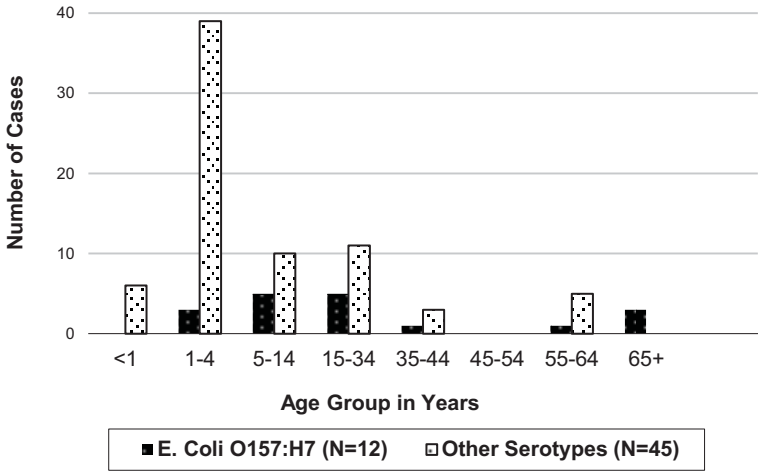


Figure 3. Percent Cases of Shiga Toxin-producing *E. coli*,
by Race/Ethnicity, LAC, 2012

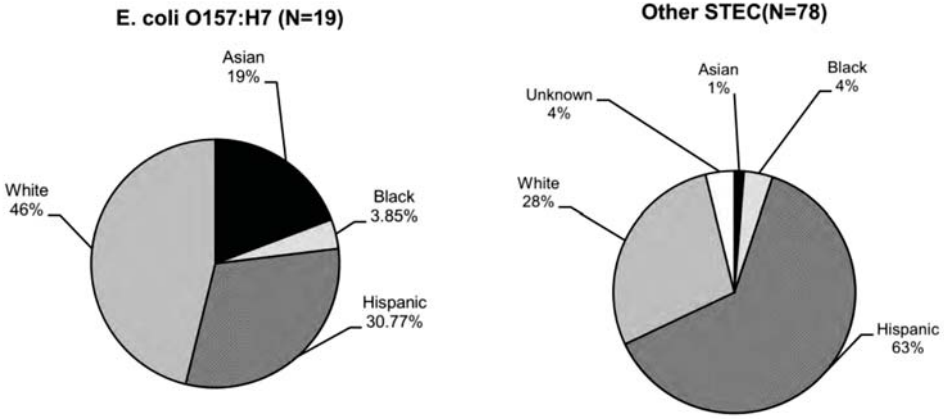


Figure 4. Reported Cases of Shiga Toxin-producing
***E. coli* by Serotype and SPA**
LAC, 2012

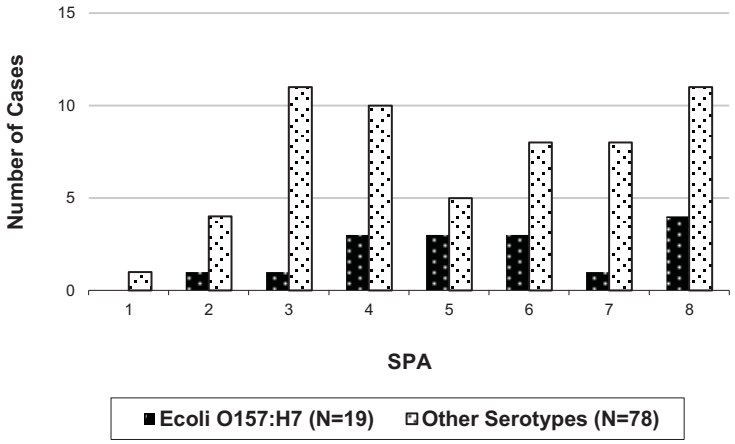


Figure 5. Reported Shiga Toxin-producing *E. coli* Cases by Serotype Month of Onset, LAC, 2012

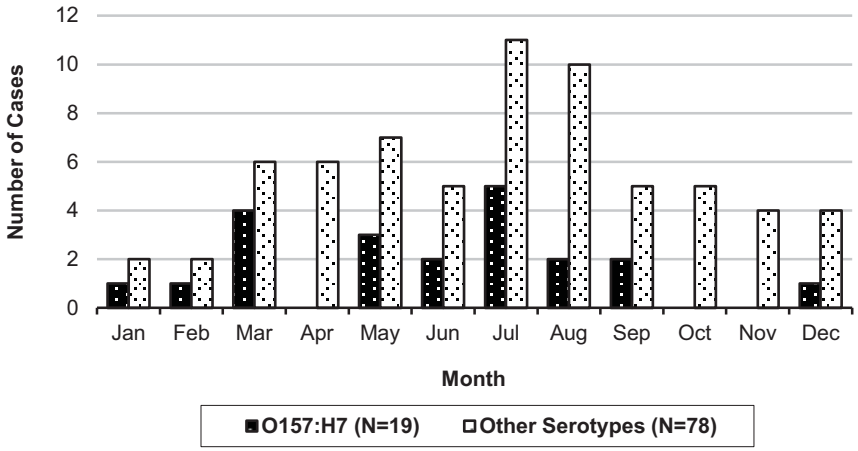


Figure 6. Reported *E. coli* O157:H7 Cases by Race/Ethnicity LAC, 2007-2012

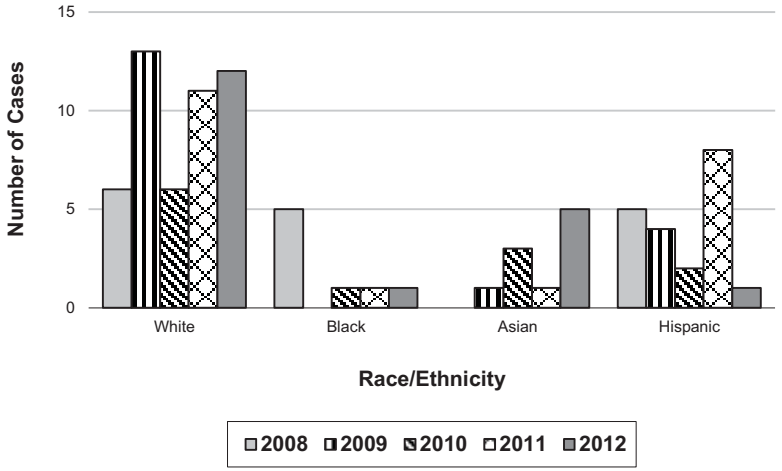
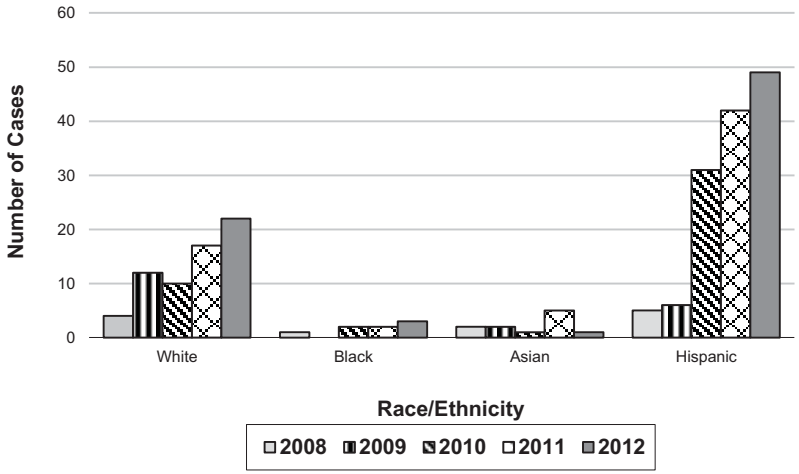
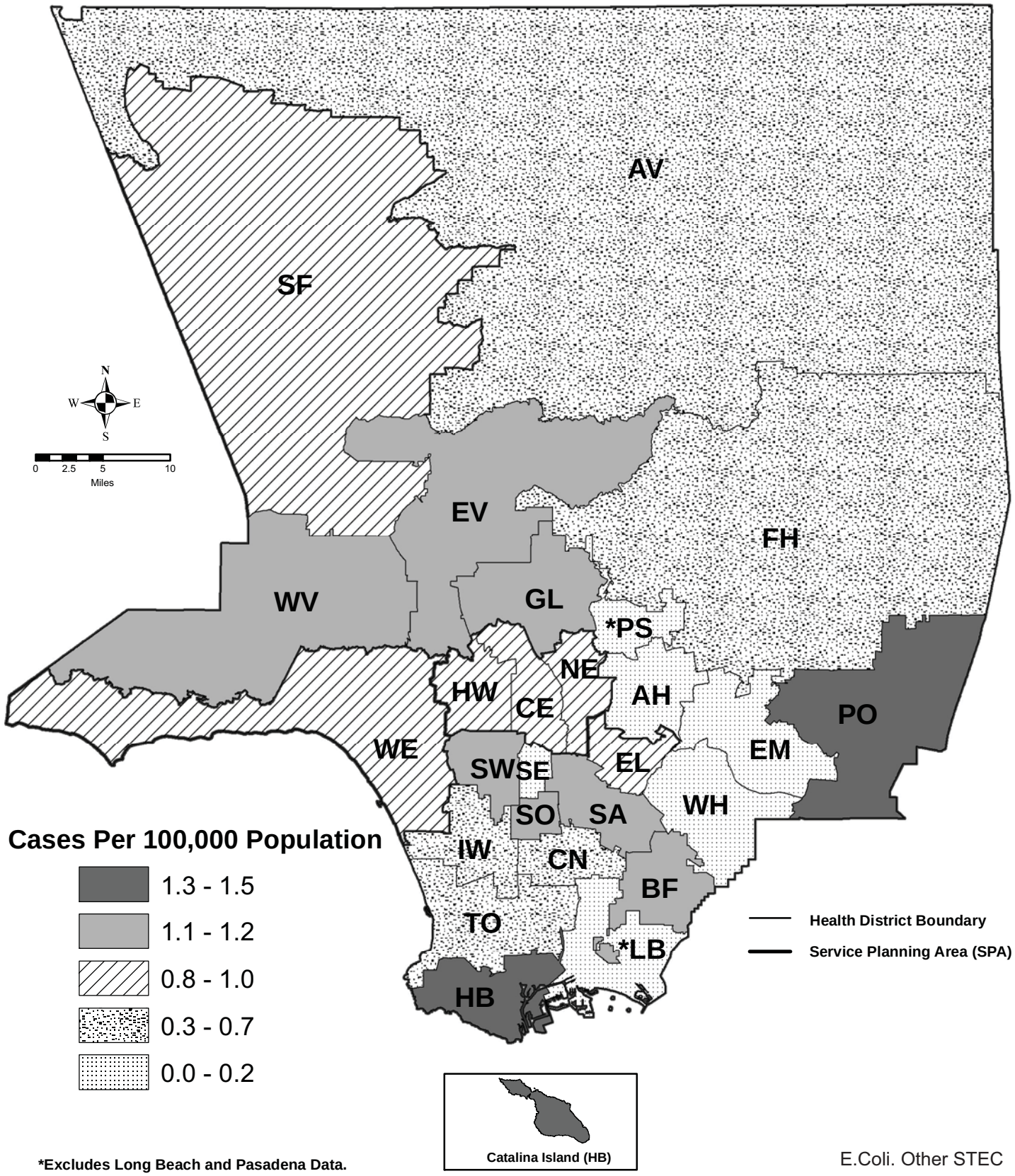


Figure 7. Reported Cases of *E. coli* Non-O157:H7 Serotype by Race/Ethnicity LAC, 2007-2012



Map 5. E. Coli Other Stec
Rates by Health District, Los Angeles County, 2012*



*Excludes Long Beach and Pasadena Data.

ESCHERICHIA COLI O157:H7 / HEMOLYTIC UREMIC SYNDROME

CRUDE DATA	
Number of Cases	16
Annual Incidence[a]	
LA County	0.16[b]
California	0.77[c]
United States	1.76 [c]
Age at Diagnosis	
Mean	21.68
Median	10
Range	0-80

[a]Cases per 100,000 population.
[b]Rates calculated based on less than 19 cases or events are considered unreliable.
[c]Calculated from Final 2008 Reports of Nationally Notifiable Infectious Disease. MMWR 58(31);856-857;859-869.

DESCRIPTION

Escherichia coli O157:H7, a Gram-negative bacillus, is a specific serotype of the shiga toxin producing class of *E. coli* (STEC) and the most common such serotype in the US. Shiga toxins cause abdominal cramps and watery diarrhea, often developing into bloody diarrhea; fever is uncommon. Incubation period is 2 to 8 days. Likely modes of transmission include foodborne (e.g., undercooked ground beef, fresh produce, unpasteurized juice, and raw milk) and person-to-person (e.g., daycare settings). There also have been outbreaks associated with exposure to animals and their environments and recreational water exposure. All *E.coli* O157:H7 isolates are confirmed by the Los Angeles County Public Health Laboratory.

Hemolytic uremic syndrome (HUS) is a disease diagnosed clinical that may or may not be associated with *E. coli* O157:H7 infection. Children younger than five years of age are at highest risk for HUS, consisting of hemolytic anemia, thrombocytopenia, and kidney failure. Adults may develop a related condition called thrombotic thrombocytopenic purpura (TTP) after infection after STEC infection.

Increased public education to prevent STEC infection is important. Information should focus on safe food handling practices, proper hygiene, and identifying high-risk foods and activities both in the home and while eating out. To avoid infection, beef products should be cooked thoroughly. Produce, including pre-washed products, should be thoroughly rinsed prior to eating. In addition, one should drink only treated water and avoid swallowing water during swimming or wading. Careful handwashing is essential, especially before eating and after handling raw beef products or coming in contact with or being around animals. The strengthening of national food processing regulations to decrease contamination is also important to reduce infection.

2008 TRENDS AND HIGHLIGHTS

- There was a 33% (n=16) increase in the frequency of confirmed *E. coli* O157:H7 case in 2008 (Figure1).
- There were 13 cases of other STEC (non-O157:H7) reported with different serotypes.
- Two HUS cases were reported; one case was laboratory confirmed with *E. coli* O157:H7.
- No reported outbreaks related *E. coli* O157:H7 nor non-*E.coli* O157:H7.
- The number of cases increased in ages 15 to 34 (Figure 2).
- There was an increase in black cases due to a family cluster; however, the highest number of cases continues to be observed among the whites. (Figure 3 and 6).
- SPA 5 had an increase in cases due to a family cluster (Figure 4).
- The monthly incidence in October peaked above the previous five-year average due to a family cluster (Figure 5).

Reported *Escherichia coli* O157:H7 Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2004-2008

	2004 (N=18)			2005 (N=13)			2006 (N=12)			2007 (N=12)			2008 (N=16)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	1	6.3	0.7
1-4	1	5.6	0.2	2	15.4	0.3	5	41.7	0.9	6	50.0	1.0	4	25.0	0.7
5-14	4	22.2	0.3	4	30.8	0.3	3	25.0	0.2	3	25.0	0.2	3	18.8	0.2
15-34	8	44.4	0.3	5	38.5	0.2	4	33.3	0.1	0	0.0	0.0	4	25.0	0.1
35-44	1	5.6	0.1	1	7.7	0.1	0	0.0	0.0	1	8.3	0.1	1	6.3	0.1
45-54	0	0.0	0.0	1	7.7	0.1	0	0.0	0.0	1	8.3	0.1	1	6.3	0.1
55-64	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
65+	1	5.6	0.1	0	0.0	0.0	0	0.0	0.0	1	8.3	0.1	2	12.5	0.2
Unknown	3	16.7		0	0.0		0	0.0		0	0.0		0	0.0	
Race/Ethnicity															
Asian	6	33.3	0.5	0	0.0	0.0	1	8.3	0.1	0	0.0	0.0	0	0.0	0.0
Black	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	3	25.0	0.4	5	31.3	0.6
Hispanic	2	11.1	0.0	1	7.7	0.0	3	25.0	0.1	5	41.7	0.1	5	31.3	0.1
White	10	55.6	0.3	12	92.3	0.4	7	58.3	0.2	4	33.3	0.1	6	37.5	0.2
Other	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Unknown	0	0.0		0	0.0		1	8.3		0	0.0		0	0.0	
SPA															
1	0	0.0	0.0	1	7.7	0.3	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
2	7	38.9	0.3	1	7.7	0.0	6	50.0	0.3	3	25.0	0.1	5	31.3	0.2
3	5	27.8	0.3	1	7.7	0.1	3	25.0	0.2	2	16.7	0.1	1	6.3	0.1
4	1	5.6	0.1	1	7.7	0.1	1	8.3	0.1	0	0.0	0.0	3	18.8	0.2
5	1	5.6	0.2	2	15.4	0.3	0	0.0	0.0	2	16.7	0.3	6	37.5	0.9
6	0	0.0	0.0	1	7.7	0.1	0	0.0	0.0	2	16.7	0.2	0	0.0	0.0
7	1	5.6	0.1	2	15.4	0.1	1	8.3	0.1	1	8.3	0.1	0	0.0	0.0
8	3	16.7	0.3	4	30.8	0.4	1	8.3	0.1	2	16.7	0.2	1	6.3	0.1
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	

*Rates calculated based on less than 19 cases or events are considered unreliable.

**Figure 1. Number Cases of *E. coli* O157:H7
LAC, 1999-2008**

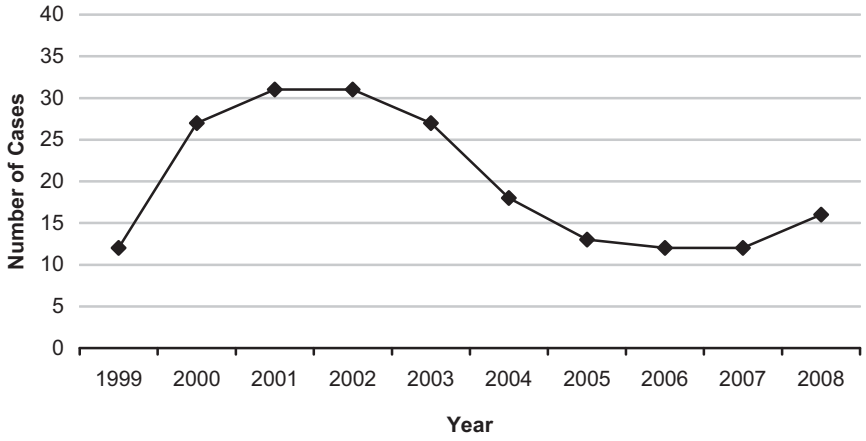


**Figure 2. Reported Cases of *E. coli* O157:H7 by Age Group
LAC, 2008**

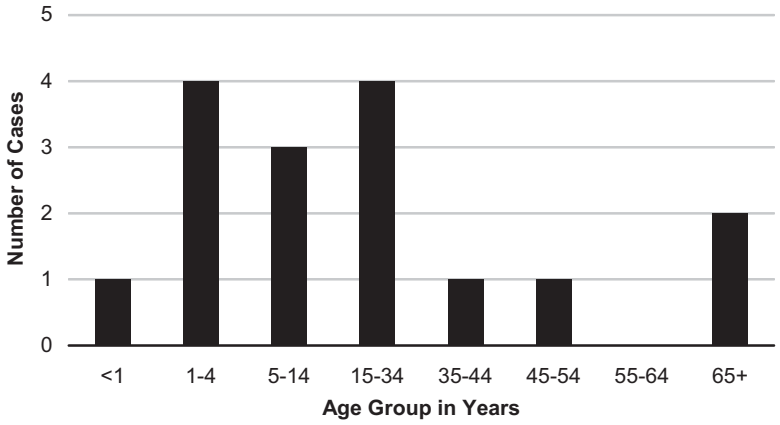


**Figure 3. Percent Cases of *E. coli* O157:H7
by Race/Ethnicity, LAC, 2008**

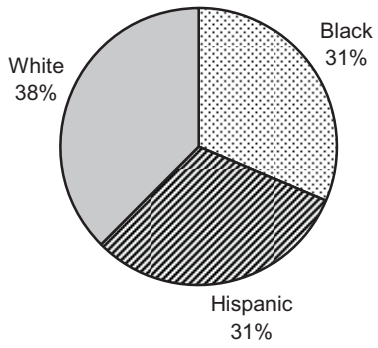


**Figure 4. Reported Cases of *E. coli* O157:H7 by SPA
LAC, 2008**

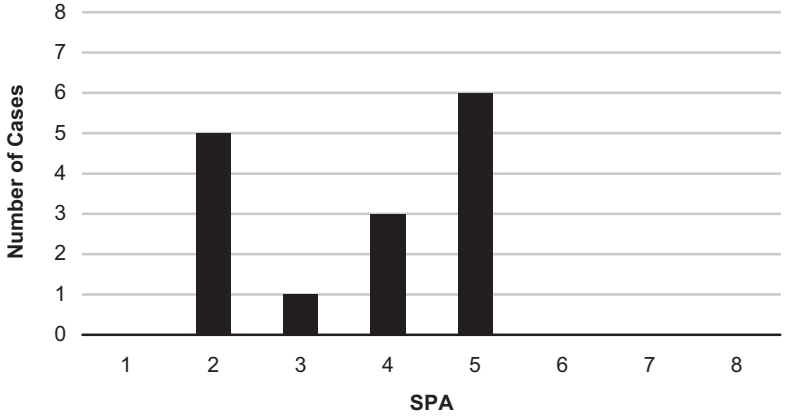


Figure 5. Reported *E. coli* O157:H7 Cases by Month of Onset, LAC, 2008

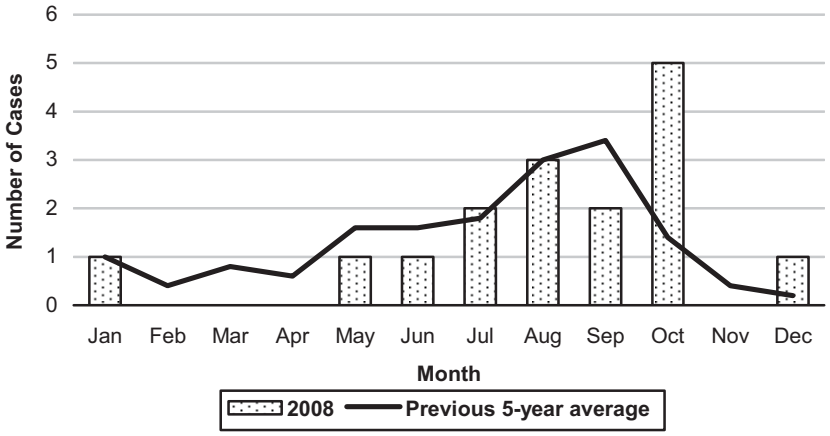
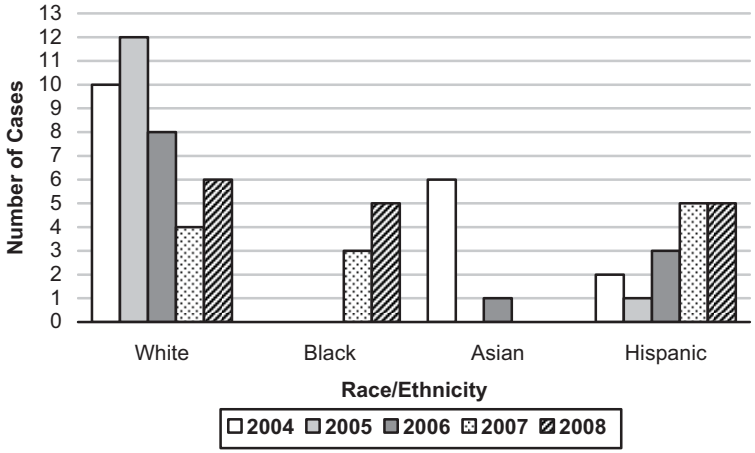


Figure 6. *E. coli* O157:H7 Incidence by Race/Ethnicity LAC, 2004-2008



ESCHERICHIA COLI O157:H7, Other STEC

CRUDE DATA	O157:H7	Other Serotypes	All Serotypes
Number of Cases	21	67	88
Annual Incidence[a]			
LA County	0.21	0.68	0.89 [c]
California[b]	--	--	0.11 [c]
United States[b]	--	--	0.15 [c]
Age at Diagnosis			
Mean	22.8	13.6	
Median	13	3	
Range	1-74	0-81	

[a] Cases per 100,000 population.
[b] See Final Summary of Nationally Notifiable Infectious Diseases, United States on MMWR website http://www.cdc.gov/mmwr/mmwr_nd/index.html.
[c] Incudes E.coli O157:H7; shiga toxin-positive, serogroup non-O157: and Shiga toxin-positive, not serogrouped. All cases are now reported as STEC (Shiga toxin producing E.coli) in order to simplify the reporting process.

DESCRIPTION

Escherichia coli is a Gram-negative bacillus with numerous serotypes, several of which produce shiga toxin, called STEC. Gastrointestinal infection with a shiga toxin-producing serotype causes abdominal cramps and watery diarrhea, often developing into bloody diarrhea; fever is uncommon. Incubation period is two to eight days. These organisms naturally occur in the gut of many animals; likely modes of transmission to humans from animals include foodborne (e.g., undercooked ground beef; raw milk; fresh produce and unpasteurized juice contaminated with feces), direct exposure to animals and their environments, and exposure to recreational water contaminated with animal or human feces. Person-to-person transmission such as between siblings or within a daycare center is also well described.

The most common STEC serotype in the US is *E. coli* O157:H7, but several other serotypes occur and cause illness. A positive test for shiga toxin in stool as well as cultures of STEC are reportable to Public Health. All reported positive STEC broths or isolates are confirmed and serotyped by the Public Health Laboratory.

Hemolytic uremic syndrome (HUS) is a disorder consisting of hemolytic anemia, kidney failure, and thrombocytopenia. It is diagnosed clinically and is most frequently associated with recent infection due to *E. coli* O157:H7, but may also be caused by other serotypes. Children younger than five years of age are at highest risk for HUS. Adults may develop a related condition called thrombotic thrombocytopenic purpura (TTP) after STEC infection.

Increased public education to prevent STEC infection is important. Information should focus on safe food handling practices, proper hygiene, and identifying high-risk foods and activities both in the home and while eating out. To avoid infection, beef products should be cooked thoroughly. Produce, including pre-washed products, should be thoroughly rinsed prior to eating. In addition, one should drink only treated water and avoid swallowing water during swimming or wading. Careful handwashing is essential, especially before eating and after handling raw beef products or coming in contact with or being around animals. Strengthening of national food processing regulations to decrease contamination is also important to reduce contamination.

2011 TRENDS AND HIGHLIGHTS

- There was a 75% (n=21) increase in the frequency of confirmed *E. coli* O157:H7 cases in 2011 (Figure1).
- Cases of *E. coli* "other serotypes" had a younger mean age than O157:H7 cases (13.6 vs. 22.8 years). One possible rationale is that cases with other serotypes are largely Hispanic, a group that has historically had less access to health care to be diagnosed, with the exception of Hispanic children who have health care coverage through government programs. This would, in effect, drive the mean age down for the "other serotypes" group.
- The number of confirmed cases of other STEC (non-O157:H7) infections increased by 48% (n=67) compared to 2010. They included ten different serotypes with serotypes O103, O111, O26 being predominant. The increase is most likely due to increased screening for shiga-like toxin

done by major labs in accordance with the CDC 2009 recommendations.[1]

- For serotype O157:H7, the highest number of cases reported was among persons ages 1-14 years (n=12) (Figure 2); it continues to be mainly observed among whites (n=11) (Figures 3, 6). Cases were reported from all SPAs (Table 2, Figure 4).
- For all other serotypes of STEC, the highest number of cases reported was among children aged 1-4 years (n=30) (Figure 2) and in the Hispanic population (n=42) (Figures 3, 7). The reasons for these differences are unknown.
- Seven HUS cases were reported of which four were laboratory confirmed with STEC serotype O157:H7. One reported death was associated with HUS, however, this was not the underlying cause; the case had multiple medical problems that included congestive heart failure and chronic pulmonary disease.
- There were no Los Angeles County outbreaks of STEC in 2011. Acute Communicable Disease Control Program participated in two multistate cluster investigations.

[1] Centers for Disease Control and Prevention. Recommendations for Diagnosis of Shiga Toxin–Producing *Escherichia coli* Infections by Clinical Laboratories. MMWR 2009;58(No. RR-#):1-14.

Table 1. Reported *Escherichia coli* O157:H7 Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA Los Angeles County, 2007-2011

	2007 (N=12)			2008 (N=16)			2009 (N=18)			2010 (N=12)			2011 (N=21)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0.0	0.0	1	6.3	0.7	0	0	0	0	0	0	0	0	0
1-4	6	50.0	1.0	4	25.0	0.7	5	27.7	0.9	3	25.0	0.5	6	28.5	1.0
5-14	3	25.0	0.2	3	18.8	0.2	3	16.6	0.2	2	16.6	0.2	6	28.5	0.5
15-34	0	0.0	0.0	4	25.0	0.1	5	27.7	0.2	5	41.6	0.2	3	14.2	0.1
35-44	1	8.3	0.1	1	6.3	0.1	2	11.1	0.1	0	0	0	2	9.5	0.1
45-54	1	8.3	0.1	1	6.3	0.1	0	0	0	1	8.3	0.1	0	0	0
55-64	0	0.0	0.0	0	0.0	0.0	1	5.5	0.1	0	0	0	2	9.5	0.2
65+	1	8.3	0.1	2	12.5	0.2	2	11.1	0.2	1	8.3	0.1	2	9.5	0.2
Unknown	0	0.0		0	0.0		0	0	0	0	0	0	0	0	0
Race/Ethnicity															
Asian	0	0.0	0.0	0	0.0	0.0	1	5.5	0.1	3	25.0	0.2	1	4.7	0.1
Black	3	25.0	0.4	5	31.3	0.6	0	0	0	1	8.3	0.1	1	4.7	0.1
Hispanic	5	41.7	0.1	5	31.3	0.1	4	22.2	0.1	2	16.6	--	8	38.0	0.2
White	4	33.3	0.1	6	37.5	0.2	13	72.2	0.4	6	50.0	0.2	11	52.3	0.4
Other	0	0.0	0.0	0	0.0	0.0	0	0	0	0	0	0	0	0	0
Unknown	0	0.0		0	0.0		0	0	0	0	0	0	0	0	0
SPA															
1	0	0.0	0.0	0	0.0	0.0	1	5.5	0.3	0	0	0	1	4.7	0.3
2	3	25.0	0.1	5	31.3	0.2	5	27.7	0.2	5	41.6	0.2	4	19.0	0.2
3	2	16.7	0.1	1	6.3	0.1	1	5.5	0.1	0	0	0	3	14.2	0.2
4	0	0.0	0.0	3	18.8	0.2	0	0	0	0	0	0	5	23.8	0.4
5	2	16.7	0.3	6	37.5	0.9	3	16.6	0.5	3	25.0	0.5	1	4.7	0.2
6	2	16.7	0.2	0	0.0	0.0	0	0	0	0	0	0	3	14.2	0.3
7	1	8.3	0.1	0	0.0	0.0	4	22.2	03	2	16.1	0.1	1	4.7	0.1
8	2	16.7	0.2	1	6.3	0.1	4	22.2	0.4	2	16.1	0.1	3	14.2	0.2
Unknown	0	0.0		0	0.0										

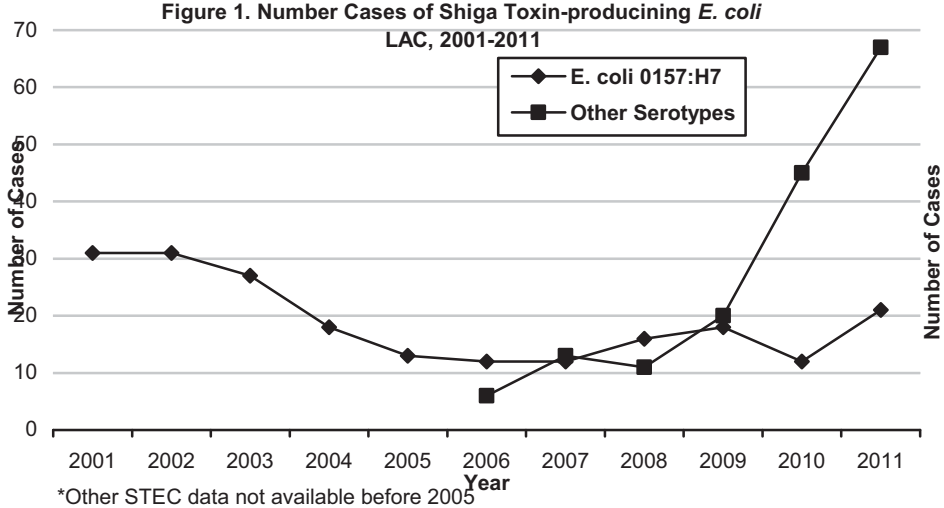
*Rates calculated based on less than 19 cases or events are considered unreliable

Table 2. Reported *Escherichia coli* Non O157:H7 Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA Los Angeles County, 2007-2011

	2007 (N=6)			2008 (N=11)			2009 (N=20)			2010 (N=45)			2011 (N=67)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0	0	0	0	0	0	0	0	4	8.8	2.9	8	11.9	5.7
1-4	8	60.0	1.4	1	14.2	0.2	9	42.8	1.6	23	51.1	4.0	30	44.7	5.2
5-14	1	6.6	0.1	1	7.1	0.1	2	9.5	0.1	2	4.4	0.2	8	11.9	0.6
15-34	2	13.3	0.1	7	50.0	0.2	4	23.8	0.1	8	17.8	0.3	12	17.9	0.4
35-44	0	0	0	0	7.1	0	1	4.7	0.1	1	2.2	0.1	2	2.9	0.1
45-54	2	20	0.2	1	7.1	0.1	1	4.7	0.1	6	13.3	0.4	0	0	0
55-64	0	0	0	0	0	0	1	4.7	0.1	1	2.2	0.1	3	4.4	0.3
65+	0	0	0	2	14.2	0.2	2	9.5	0.2	0	0	0	4	5.9	0.4
Unknown	0	0	0	0	0	0	0	0	0	0	0	0			
Race/Ethnicity															
Asian	1	6.6	0.1	2	21.4	0.2	2	9.5	0.2	1	2.2	0.1	5	7.4	0.4
Black	0	0	0	1	7.1	0.1	0	0	0	2	4.4	0.2	2	2.9	0.2
Hispanic	6	53.3	0.1	5	42.8	0.1	6	28.5	0.1	31	68.8	0.7	42	62.6	0.9
White	6	40.0	0.2	4	28.5	0.1	12	61.9	0.4	10	22.2	0.3	17	25.3	0.6
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	1	2.2	--	1	1.4	--
SPA															
1	0	0	0	1	14.2	0.3	0	0	0	1	2.2	0.3	2	2.9	0.5
2	2	13.3	0.1	3	14.2	0.1	4	19.0	0.2	14	31.1	0.6	14	20.8	0.6
3	1	6.6	0.1	1	14.2	0.1	3	14.2	0.2	7	15.5	0.4	8	11.9	0.5
4	1	13.3	0.1	2	21.4	0.2	3	19.0	0.2	6	40.0	0.5	4	5.9	0.3
5	2	13.3	0.3	4	28.5	0.6	6	28.5	0.9	3	6.6	0.5	7	10.4	1.1
6	0	6.6	0	0	0	0	0	0	0	4	8.8	0.4	8	11.9	0.7
7	1	13.3	0.1	1	7.1	0.1	2	9.5	0.1	6	13.1	0.4	20	29.8	1.5
8	6	33.3	0.5	0	0	0	2	9.5	0.2	4	8.8	0.4	4	5.9	0.4
Unknown	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

*Data not available for 2005. Rates calculated based on less than 19 cases or events are considered unreliable.

Figure 1. Number Cases of Shiga Toxin-producining *E. coli*
LAC, 2001-2011



*Other STEC data not available before 2005

Figure 2. Reported Cases of Shiga Toxin-producing *E. coli* by Serotype and Age Group
LAC, 2011

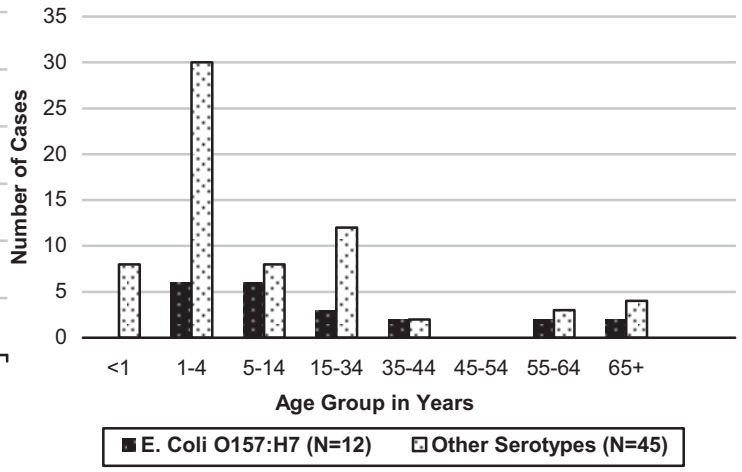


Figure 3. Percent Cases of Shiga Toxin-producing *E. coli*, by Race/Ethnicity, LAC, 2011

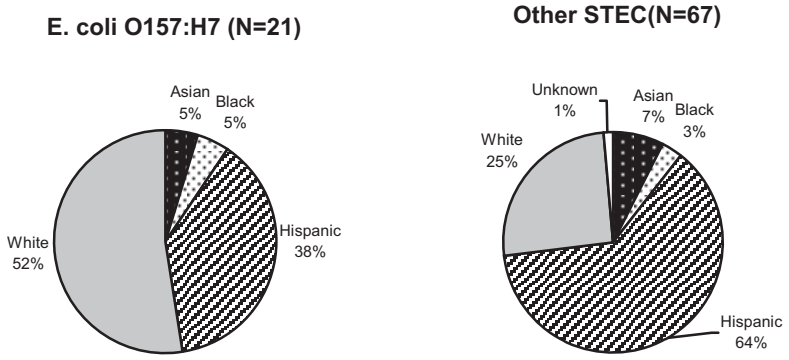


Figure 4. Reported Cases of Shiga Toxin-producing *E. coli* by Serotype and SPA
LAC, 2011

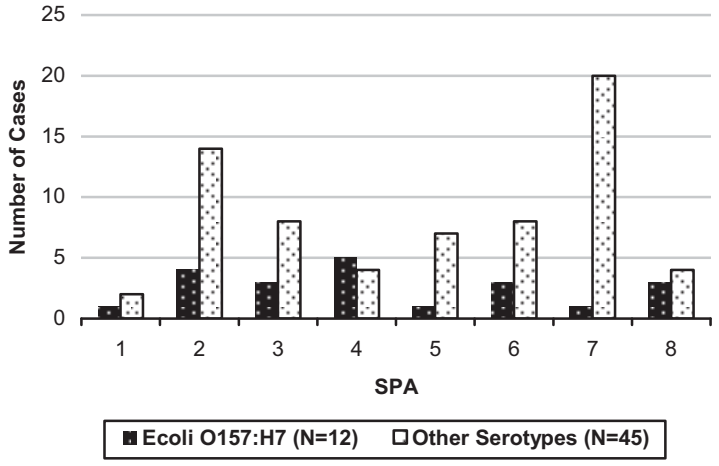


Figure 5. Reported Shiga Toxin-producing *E. coli* Cases by Serotype Month of Onset, LAC, 2011

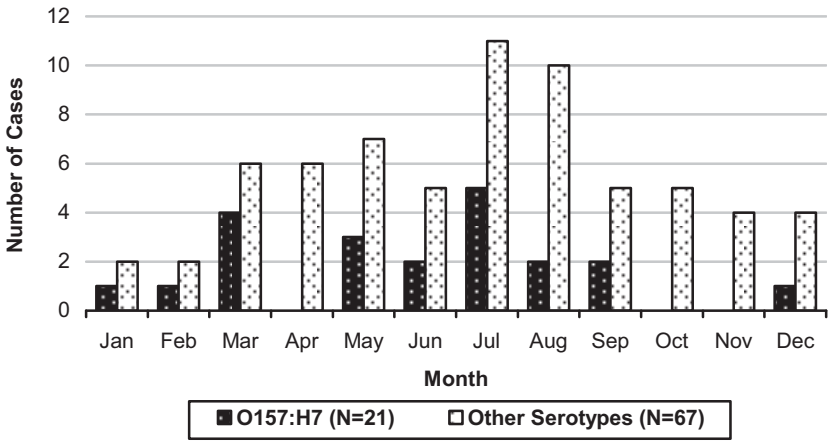


Figure 6. Reported *E. coli* O157:H7 Cases by Race/Ethnicity LAC, 2007-2011

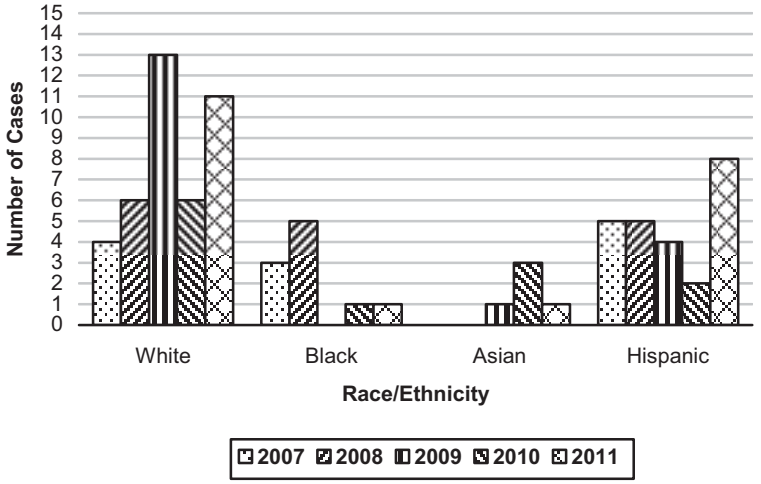
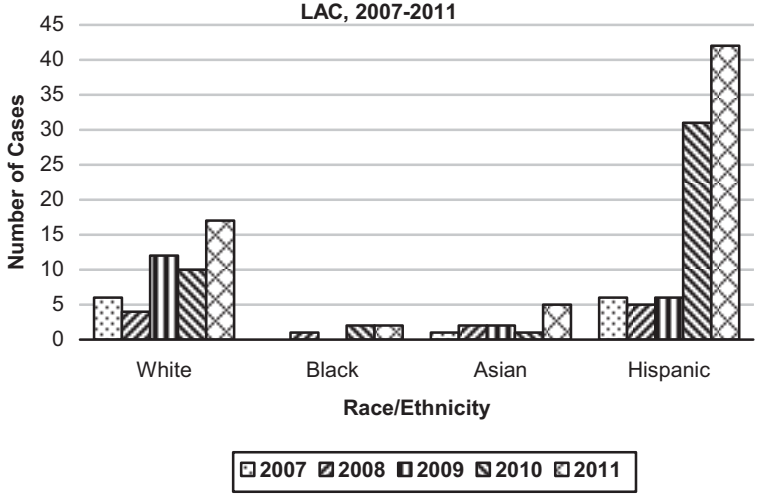
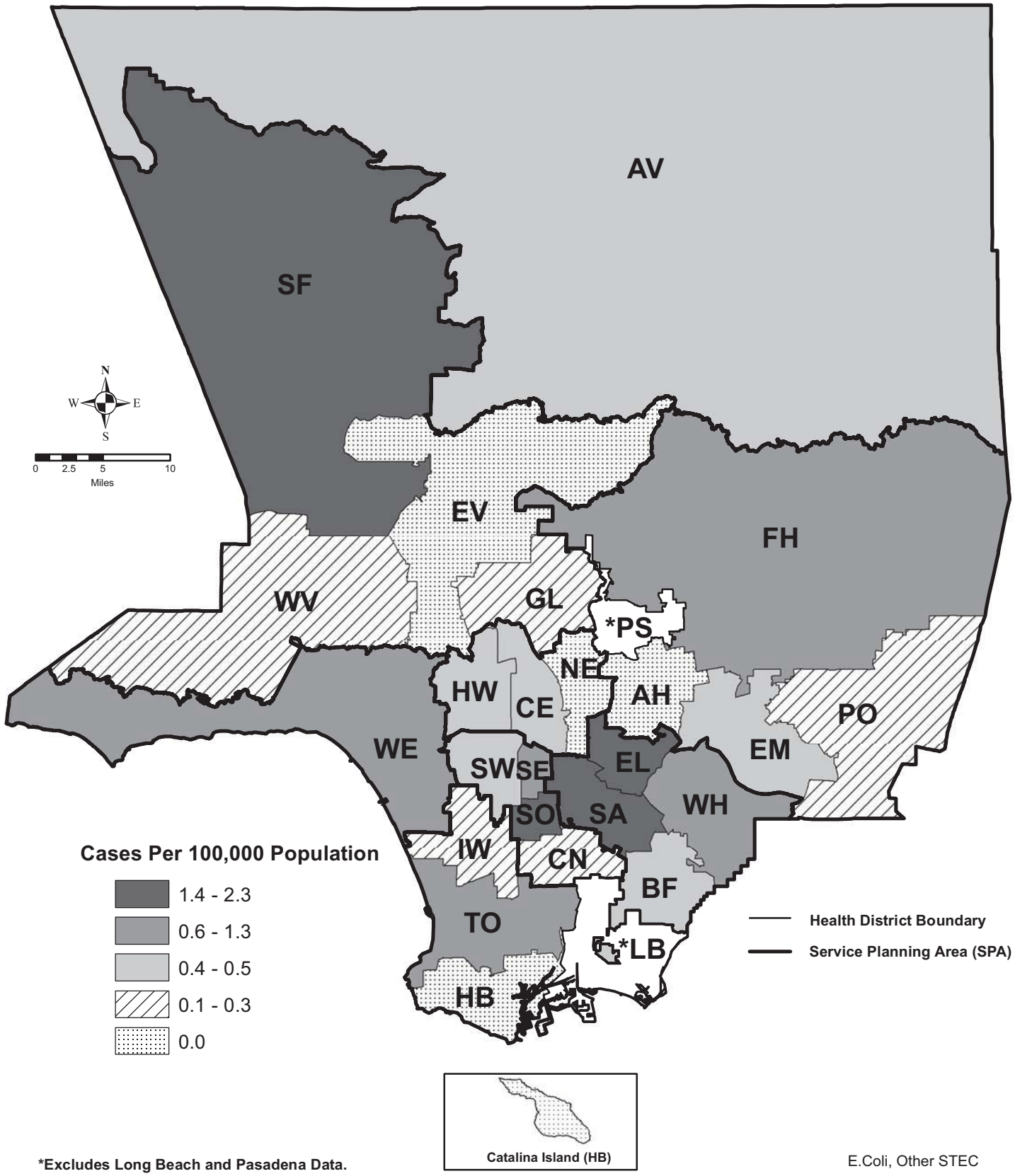


Figure 7. Reported Cases of *E. coli* Non-O157:H7 Serotype by Race/Ethnicity LAC, 2007-2011



Map 6. E. Coli Other Stec
Rates by Health District, Los Angeles County, 2011*



*Excludes Long Beach and Pasadena Data.

ESCHERICHIA COLI O157:H7, Other STEC

CRUDE DATA	O157:H7	Other Serotypes	All Serotypes
Number of Cases	12	45	57
Annual Incidence[a]			
LA County	0.12[b]	0.46	0.58[d]
California[c]	--	--	0.80[d]
United States[c]	--	--	0.15[d]
Age at Diagnosis			
Mean	21.3	13.5	
Median	15	3	
Range	1-69	0-62	

[a] Cases per 100,000 population.
[b] Rates calculated based on less than 19 cases or events are considered unreliable.
[c] See Final Summary of Nationally Notifiable Infectious Diseases, United States on MMWR website http://www.cdc.gov/mmwr/mmwr_nd/index.html.
[d] Incudes E.coli O157:H7; shiga toxin-positive, serogroup non-O157: and Shiga toxin-positive, not serogrouped. All cases are now reported as STEC (Shiga toxin producing E.coli) in order to simplify the reporting process.

DESCRIPTION

Escherichia coli is a Gram-negative bacillus with numerous serotypes, several of which produce shiga toxin, called STEC. Gastrointestinal infection with a shiga toxin-producing serotype causes abdominal cramps and watery diarrhea, often developing into bloody diarrhea; fever is uncommon. Incubation period is two to eight days. These organisms naturally occur in the gut of many animals; likely modes of transmission to humans from animals include foodborne (e.g., undercooked ground beef; raw milk; fresh produce and unpasteurized juice contaminated with feces), direct exposure to animals and their environments, and exposure to recreational water contaminated with animal or human feces. Person-to-person transmission such as between siblings or within a daycare center is also well described.

The most common STEC serotype in the US is *E. coli* O157:H7, but several other serotypes occur and cause illness. A positive test for shiga toxin in stool as well as cultures of STEC are reportable to Public Health. All positive STEC broths or isolates are confirmed and serotyped by the Public Health Laboratory.

Hemolytic uremic syndrome (HUS) is a disorder consisting of hemolytic anemia, kidney failure, and thrombocytopenia. It is diagnosed clinically and is most frequently associated with recent infection due to *E. coli* O157:H7, but may also be caused by other serotypes. Children younger than five years of age are at highest risk for HUS. Adults may develop a related condition called thrombotic thrombocytopenic purpura (TTP) after STEC infection.

Increased public education to prevent STEC infection is important. Information should focus on safe food handling practices, proper hygiene, and identifying high-risk foods and activities both in the home and while eating out. To avoid infection, beef products should be cooked thoroughly. Produce, including pre-washed products, should be thoroughly rinsed prior to eating. In addition, one should drink only treated water and avoid swallowing water during swimming or wading. Careful handwashing is essential, especially before eating and after handling raw beef products or coming in contact with or being around animals. Strengthening of national food processing regulations to decrease contamination is also important to reduce infection.

2010 TRENDS AND HIGHLIGHTS

- There was a 33.3% (n=12) decrease in the frequency of confirmed *E. coli* O157:H7 cases in 2010 (Figure1).
- For reasons that are unclear, cases of *E. coli* "other serotypes" had a younger mean age than O157: H7 cases (13.5 vs. 21.3 years). One possibility is that cases with other serotypes are largely Hispanic compared to the O157:H7 cases, a group that has historically had less access to health care to be diagnosed, with the exception of Hispanic children who have health care coverage through government programs. This would, in effect, drive the mean age down for the "other serotypes" group.
- The number of confirmed cases of other STEC (non-O157:H7) infections increased

by 125% (n=45) compared to 2009. They included ten different serotypes with serotypes O103, O111, O26 being predominant. The increase is most likely due to increased screening for shiga-like toxin done by major labs in accordance with the CDC 2009 recommendations.[1]

- Two HUS cases were reported; neither had a confirmed etiologic agent.
- No outbreaks of STEC were identified.
- For serotype O157:H7, the highest number of cases reported was among persons aged 15-34 years (n=5) (Figure 2); it continues to be mainly observed among whites (n=6) (Figures 3, 6). Four SPAs reported no cases of disease (Table 2, Figure 4).
- For all other serotypes of STEC, the highest number of cases reported was among children aged 1-4 years (n=23) (Figure 2); and was predominantly observed in the Hispanic population (n=31) (Figures 3, 7). The reasons for these differences are unknown. SPA 1 did not report any cases.

[1] Centers for Disease Control and Prevention. Recommendations for Diagnosis of Shiga Toxin–Producing *Escherichia coli* Infections by Clinical Laboratories. MMWR 2009;58(No. RR-#):1-14..

Table 1. Reported *Escherichia coli* O157:H7 Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA Los Angeles County, 2006-2010

	2006 (N=12)			2007 (N=12)			2008 (N=16)			2009 (N=18)			20010 (N=12)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0.0	0.0	0	0.0	0.0	1	6.3	0.7	0	0	0	0	0	0
1-4	5	41.7	0.9	6	50.0	1.0	4	25.0	0.7	5	27.7	0.9	3	25.0	0.5
5-14	3	25.0	0.2	3	25.0	0.2	3	18.8	0.2	3	16.6	0.2	2	16.6	0.2
15-34	4	33.3	0.1	0	0.0	0.0	4	25.0	0.1	5	27.7	0.2	5	41.6	0.2
35-44	0	0.0	0.0	1	8.3	0.1	1	6.3	0.1	2	11.1	0.1	0	0	0
45-54	0	0.0	0.0	1	8.3	0.1	1	6.3	0.1	0	0	0	1	8.3	0.1
55-64	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	1	5.5	0.1	0	0	0
65+	0	0.0	0.0	1	8.3	0.1	2	12.5	0.2	2	11.1	0.2	1	8.3	0.1
Unknown	0	0.0		0	0.0		0	0.0		0	0	0	0	0	0
Race/Ethnicity															
Asian	1	8.3	0.1	0	0.0	0.0	0	0.0	0.0	1	5.5	0.1	3	25.0	0.2
Black	0	0.0	0.0	3	25.0	0.4	5	31.3	0.6	0	0	0	1	8.3	0.1
Hispanic	3	25.0	0.1	5	41.7	0.1	5	31.3	0.1	4	22.2	0.1	2	16.6	--
White	7	58.3	0.2	4	33.3	0.1	6	37.5	0.2	13	72.2	0.4	6	50.0	0.2
Other	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0	0	0	0	0
Unknown	1	8.3		0	0.0		0	0.0		0	0	0	0	0	0
SPA															
1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	1	5.5	0.3	0	0	0
2	6	50.0	0.3	3	25.0	0.1	5	31.3	0.2	5	27.7	0.2	5	41.6	0.2
3	3	25.0	0.2	2	16.7	0.1	1	6.3	0.1	1	5.5	0.1	0	0	0
4	1	8.3	0.1	0	0.0	0.0	3	18.8	0.2	0	0	0	0	0	0
5	0	0.0	0.0	2	16.7	0.3	6	37.5	0.9	3	16.6	0.5	3	25.0	0.5
6	0	0.0	0.0	2	16.7	0.2	0	0.0	0.0	0	0	0	0	0	0
7	1	8.3	0.1	1	8.3	0.1	0	0.0	0.0	4	22.2	03	2	16.1	0.1
8	1	8.3	0.1	2	16.7	0.2	1	6.3	0.1	4	22.2	0.4	2	16.1	0.1
Unknown	0	0.0		0	0.0		0	0.0							

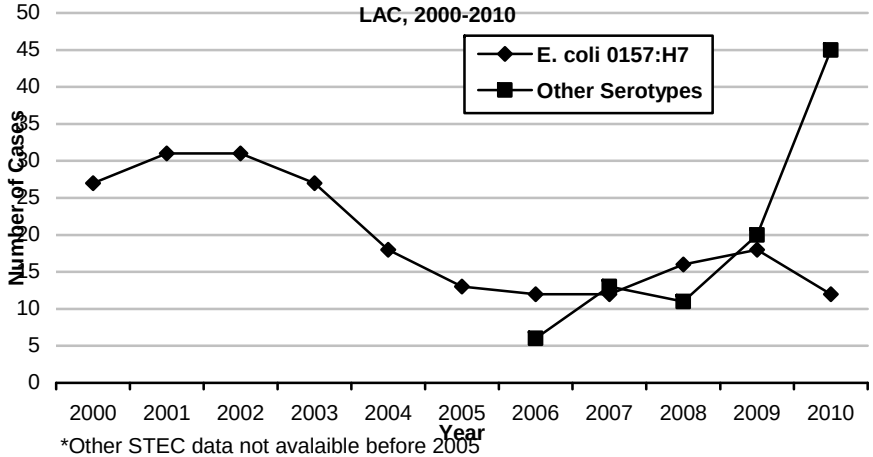
*Rates calculated based on less than 19 cases or events are considered unreliable

Table 2. Reported *Escherichia coli* Non O157:H7 Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA Los Angeles County, 2006-2010

	2006 (N=6)05 (N=0)			2007 (N=13)2006 (N=6)			2008 (N=12)			2009 (N=20)			2010 (N=45)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0	0	0	0	0	0	0	0	0	0	0	4	8.8	2.9
1-4	1	14.2	0.2	8	60.0	1.4	1	14.2	0.2	9	42.8	1.6	23	51.1	4.0
5-14	0	0	0	1	6.6	0.1	1	7.1	0.1	2	9.5	0.1	2	4.4	0.2
15-34	1	28.6	0	2	13.3	0.1	7	50.0	0.2	4	23.8	0.1	8	17.8	0.3
35-44	1	14.2	0.1	0	0	0	0	7.1	0	1	4.7	0.1	1	2.2	0.1
45-54	1	14.2	0.1	2	20	0.2	1	7.1	0.1	1	4.7	0.1	6	13.3	0.4
55-64	1	14.2	0.1	0	0	0	0	0	0	1	4.7	0.1	1	2.2	0.1
65+	1	14.2	0.1	0	0	0	2	14.2	0.2	2	9.5	0.2	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Race/Ethnicity															
Asian	0	0	0	1	6.6	0.1	2	21.4	0.2	2	9.5	0.2	1	2.2	0.1
Black	0	0	0	0	0	0	1	7.1	0.1	0	0	0	2	4.4	0.2
Hispanic	3	42.9	0.1	6	53.3	0.1	5	42.8	0.1	6	28.5	0.1	31	68.8	0.7
White	3	57.1	0.1	6	40.0	0.2	4	28.5	0.1	12	61.9	0.4	10	22.2	0.3
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0	1	2.2	--
SPA															
1	0	14.2	0	0	0	0	1	14.2	0.3	0	0	0	1	2.2	0.3
2	0	0	0	2	13.3	0.1	3	14.2	0.1	4	19.0	0.2	14	31.1	0.6
3	2	28.6	0.1	1	6.6	0.1	1	14.2	0.1	3	14.2	0.2	7	15.5	0.4
4	1	14.2	0.1	1	13.3	0.1	2	21.4	0.2	3	19.0	0.2	6	40.0	0.5
5	0	0	0	2	13.3	0.3	4	28.5	0.6	6	28.5	0.9	3	6.6	0.5
6	0	0	0	0	6.6	0	0	0	0	0	0	0	4	8.8	0.4
7	1	14.2	0.1	1	13.3	0.1	1	7.1	0.1	2	9.5	0.1	6	13.1	0.4
8	2	28.6	0.2	6	33.3	0.5	0	0	0	2	9.5	0.2	4	8.8	0.4
Unknown	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

*Data not available for 2005. Rates calculated based on less than 19 cases or events are considered unreliable.

Figure 1. Number Cases of Shiga Toxin-producining *E. coli*
LAC, 2000-2010



*Other STEC data not avalaible before 2005

Figure 2. Reported Cases of Shiga Toxin-producing *E. coli* by Serotype and Age Group
LAC, 2010

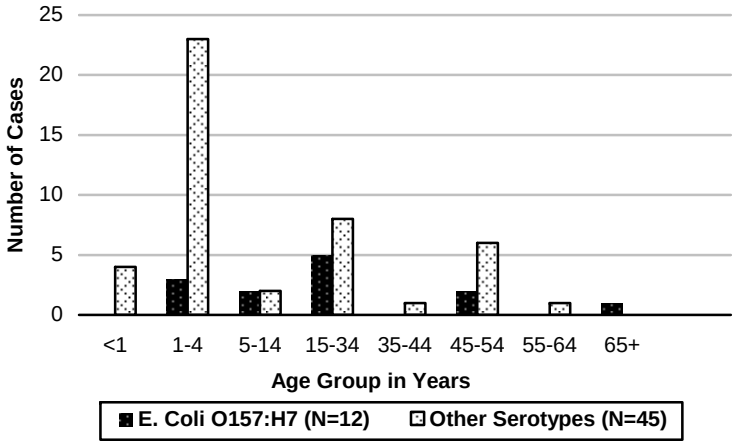


Figure 3. Percent Cases of Shiga Toxin-producing *E. coli*, by Race/Ethnicity, LAC, 2010

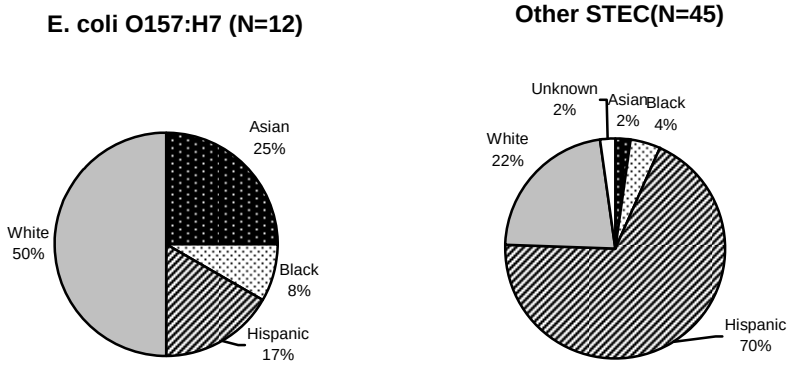


Figure 4. Reported Cases of Shiga Toxin-producing *E. coli* by Serotype and SPA
LAC, 2010

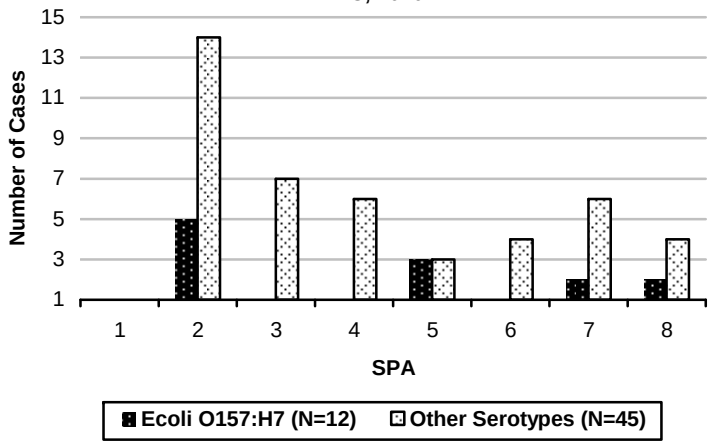


Figure 5. Reported Shiga Toxin-producing *E. coli* Cases by Serotype Month of Onset, LAC, 2010

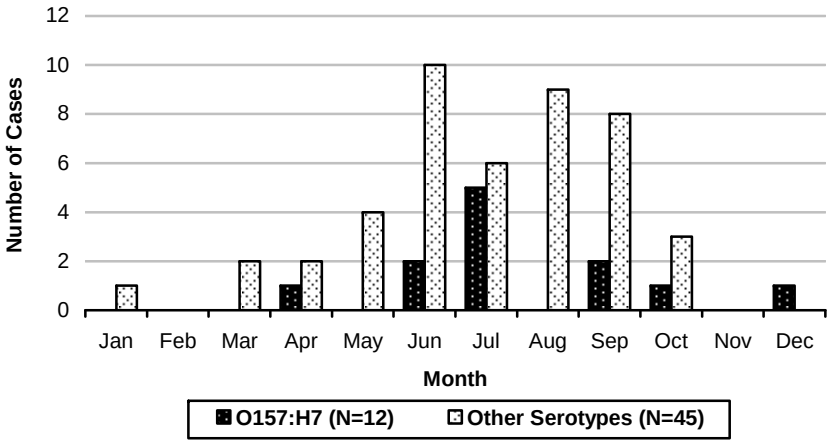


Figure 6. Reported *E. coli* O157:H7 Cases by Race/Ethnicity LAC, 2006-2010

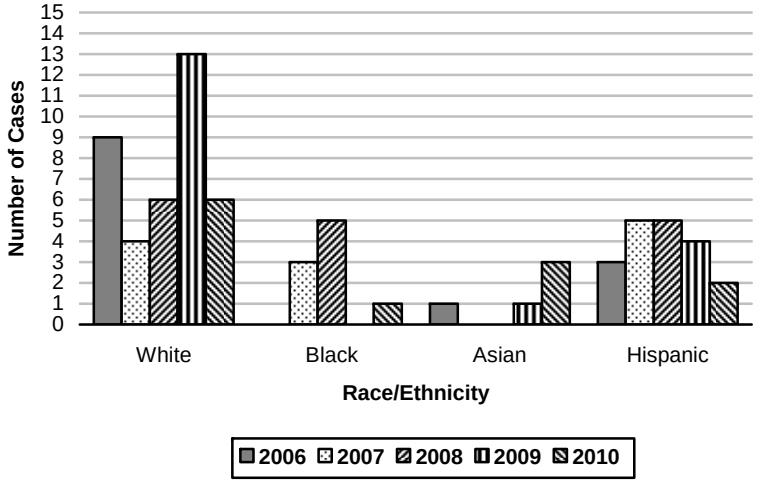
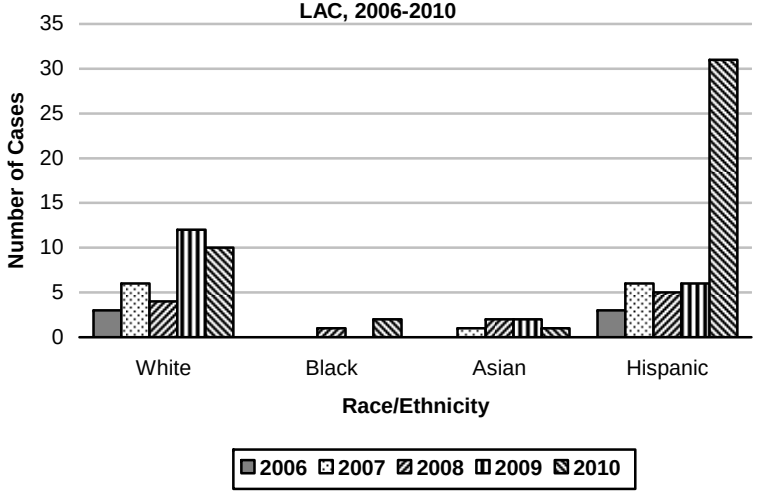


Figure 7. Reported Cases of *E. coli* Non-O157:H7 Serotype by Race/Ethnicity LAC, 2006-2010



ESCHERICHIA COLI O157:H7, Other STEC, & HEMOLYTIC UREMIC SYNDROME

CRUDE DATA	O157:H7	Other Serotypes
Number of Cases	18	20
Annual Incidence[a]		
LA County	0.18[b]	0.21
California	N/A	N/A
United States	N/A	N/A
Age at Diagnosis		
Mean	24.7	23.6
Median	17	8
Range	0-78	1-95

[a]Cases per 100,000 population.
[b]Rates calculated based on less than 19 cases or events are considered unreliable.

DESCRIPTION

Escherichia coli is a Gram-negative bacillus with numerous serotypes, several of which produce shiga toxin, called STEC. Gastrointestinal infection with a shiga toxin-producing serotype causes abdominal cramps and watery diarrhea, often developing into bloody diarrhea; fever is uncommon. Incubation period is two to eight days. These organisms naturally occur in the gut of many animals; likely modes of transmission to humans from animals include foodborne (e.g., undercooked ground beef; raw milk; fresh produce and unpasteurized juice contaminated with feces), direct exposure to animals and their environments, and exposure to recreational water contaminated with animal or human feces. Person-to-person transmission such as between siblings or within a daycare center is also well described.

The most common STEC serotype in the US is *E. coli* O157:H7, but several other serotypes cause illness. A positive test for shiga toxin in stool as well as cultures of STEC are reportable to Public Health. All positive STEC broths or isolates are confirmed and serotyped by the Public Health Laboratory.

Hemolytic uremic syndrome (HUS) is a disorder consisting of hemolytic anemia, kidney failure, and thrombocytopenia. It is diagnosed clinically and is most frequently associated with infection due to *E. coli* O157:H7 but may also be caused by other serotypes. Children younger than five years of age are at highest risk for HUS. Adults may develop a related condition called thrombotic thrombocytopenic purpura (TTP) after STEC infection.

Increased public education to prevent STEC infection is important. Information should focus on safe food handling practices, proper hygiene, and identifying high-risk foods and activities both in the home and while eating out. To avoid infection, beef products should be cooked thoroughly. Produce, including pre-washed products, should be thoroughly rinsed prior to eating. In addition, one should drink only treated water and avoid swallowing water during swimming or wading. Careful handwashing is essential, especially before eating and after handling raw beef products or coming in contact with or being around animals. Strengthening of national food processing regulations to decrease contamination is also important to reduce infection.

2009 TRENDS AND HIGHLIGHTS

- There was a 12.5% (n=18) increase in the frequency of confirmed *E. coli* O157:H7 cases in 2009 (Figure1).
- The number of confirmed cases reported as other STEC (non-O157:H7) increased by 61.5% (n=20) compared to 2009. They included eight different serotypes with serotypes O103 and O111 being predominant.
- Three HUS cases were reported which all were laboratory confirmed with *E. coli* O157:H7.
- No outbreaks of STEC were identified.
- For serotype O157:H7, the highest number of cases reported was among children aged 1-4 years (n=5) and 15-34 years (n=5) (Figure 2); and continues to be observed among whites (n=13) (Figures 3, 6).
- For all other serotypes of STEC, the highest number of cases reported was among children aged 1-4 years (n=9) (Figure2); and continues to be among whites (n=12) (Figures 3, 7).

Table 1. Reported *Escherichia coli* O157:H7 Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA Los Angeles County, 2005-2009

	2005 (N=13)			2006 (N=12)			2007 (N=12)			2008 (N=16)			2009 (N=18)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	1	6.3	0.7	0	0	0
1-4	2	15.4	0.3	5	41.7	0.9	6	50.0	1.0	4	25.0	0.7	5	27.7	0.9
5-14	4	30.8	0.3	3	25.0	0.2	3	25.0	0.2	3	18.8	0.2	3	16.6	0.2
15-34	5	38.5	0.2	4	33.3	0.1	0	0.0	0.0	4	25.0	0.1	5	27.7	0.2
35-44	1	7.7	0.1	0	0.0	0.0	1	8.3	0.1	1	6.3	0.1	2	11.1	0.1
45-54	1	7.7	0.1	0	0.0	0.0	1	8.3	0.1	1	6.3	0.1	0	0	0
55-64	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	1	5.5	0.1
65+	0	0.0	0.0	0	0.0	0.0	1	8.3	0.1	2	12.5	0.2	2	11.1	0.2
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0	0
Race / Ethnicity															
Asian	0	0.0	0.0	1	8.3	0.1	0	0.0	0.0	0	0.0	0.0	1	5.5	0.1
Black	0	0.0	0.0	0	0.0	0.0	3	25.0	0.4	5	31.3	0.6	0	0	0
Hispanic	1	7.7	0.0	3	25.0	0.1	5	41.7	0.1	5	31.3	0.1	4	22.2	0.1
White	12	92.3	0.4	7	58.3	0.2	4	33.3	0.1	6	37.5	0.2	13	72.2	0.4
Other	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0	0
Unknown	0	0.0		1	8.3		0	0.0		0	0.0		0	0	0
SPA															
1	1	7.7	0.3	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	1	5.5	0.3
2	1	7.7	0.0	6	50.0	0.3	3	25.0	0.1	5	31.3	0.2	5	27.7	0.2
3	1	7.7	0.1	3	25.0	0.2	2	16.7	0.1	1	6.3	0.1	1	5.5	0.1
4	1	7.7	0.1	1	8.3	0.1	0	0.0	0.0	3	18.8	0.2	0	0	0
5	2	15.4	0.3	0	0.0	0.0	2	16.7	0.3	6	37.5	0.9	3	16.6	0.5
6	1	7.7	0.1	0	0.0	0.0	2	16.7	0.2	0	0.0	0.0	0	0	0
7	2	15.4	0.1	1	8.3	0.1	1	8.3	0.1	0	0.0	0.0	4	22.2	03
8	4	30.8	0.4	1	8.3	0.1	2	16.7	0.2	1	6.3	0.1	4	22.2	0.4
Unknown	0	0.0		0	0.0		0	0.0		0	0.0				

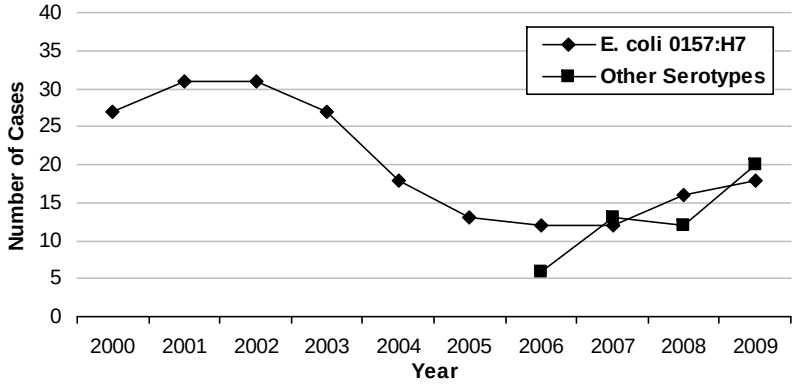
*Rates calculated based on less than 19 cases or events are considered unreliable

Table 2. Reported *Escherichia coli* Non O157:H7 Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA Los Angeles County, 2005-2009

	2005 (N=0)			2006 (N=6)			2007 (N=13)			2008 (N=12)			2009 (N=20)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1				0	0	0	0	0	0	0	0	0	0	0	0
1-4				1	14.2	0.2	8	60.0	1.4	1	14.2	0.2	9	42.8	1.6
5-14				0	0	0	1	6.6	0.1	1	7.1	0.1	2	9.5	0.1
15-34				1	28.6	0	2	13.3	0.1	7	50.0	0.2	4	23.8	0.1
35-44				1	14.2	0.1	0	0	0	0	7.1	0	1	4.7	0.1
45-54				1	14.2	0.1	2	20	0.2	1	7.1	0.1	1	4.7	0.1
55-64				1	14.2	0.1	0	0	0	0	0	0	1	4.7	0.1
65+				1	14.2	0.1	0	0	0	2	14.2	0.2	2	9.5	0.2
Unknown				0	0	0	0	0	0	0	0	0	0	0	0
Race / Ethnicity															
Asian				0	0	0	1	6.6	0.1	2	21.4	0.2	2	9.5	0.2
Black				0	0	0	0	0	0	1	7.1	0.1	0	0	0
Hispanic				3	42.9	0.1	6	53.3	0.1	5	42.8	0.1	6	28.5	0.1
White				3	57.1	0.1	6	40.0	0.2	4	28.5	0.1	12	61.9	0.4
Other				0	0	0	0	0	0	0	0	0	0	0	0
Unknown				0	0	0	0	0	0	0	0	0	0	0	0
SPA															
1				0	14.2	0	0	0	0	1	14.2	0.3	0	0	0
2				0	0	0	2	13.3	0.1	3	14.2	0.1	4	19.0	0.2
3				2	28.6	0.1	1	6.6	0.1	1	14.2	0.1	3	14.2	0.2
4				1	14.2	0.1	1	13.3	0.1	2	21.4	0.2	3	19.0	0.2
5				0	0	0	2	13.3	0.3	4	28.5	0.6	6	28.5	0.9
6				0	0	0	0	6.6	0	0	0	0	0	0	0
7				1	14.2	0.1	1	13.3	0.1	1	7.1	0.1	2	9.5	0.1
8				2	28.6	0.2	6	33.3	0.5	0	0	0	2	9.5	0.2
Unknown				0	0	0	0	0	0	0	0	0	0	0	0

*Data not available for 2005. Rates calculated based on less than 19 cases or events are considered unreliable.

Figure 1. Number Cases of Shiga Toxin-producining *E. coli*
LAC, 1999-2009



*Other STEC data not avalaible before 2005

Figure 2. Reported Cases of Shiga Toxin-producing *E. coli* by Serotype and Age Group
LAC, 2009

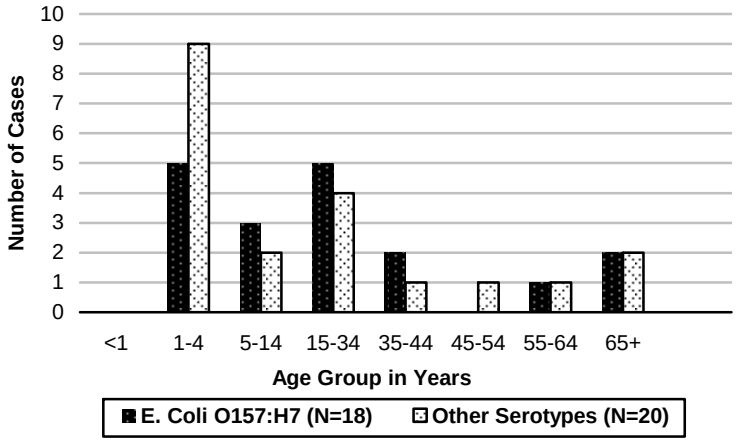


Figure 3. Percent Cases of Shiga Toxin-producing *E. coli*, by Race/Ethnicity, LAC, 2009

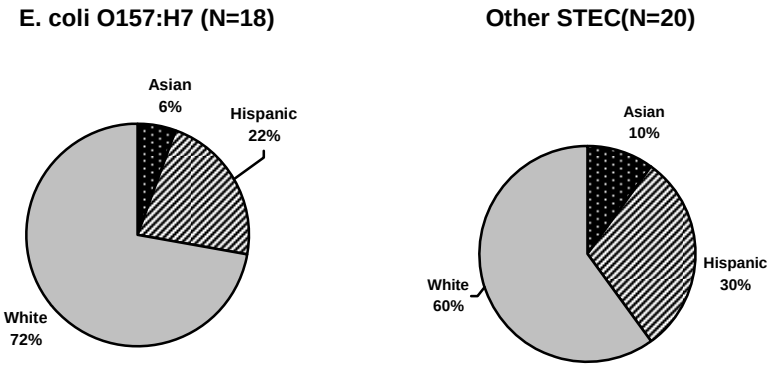


Figure 4. Reported Cases of Shiga Toxin-producing *E. coli* by Serotype and SPA
LAC, 2009

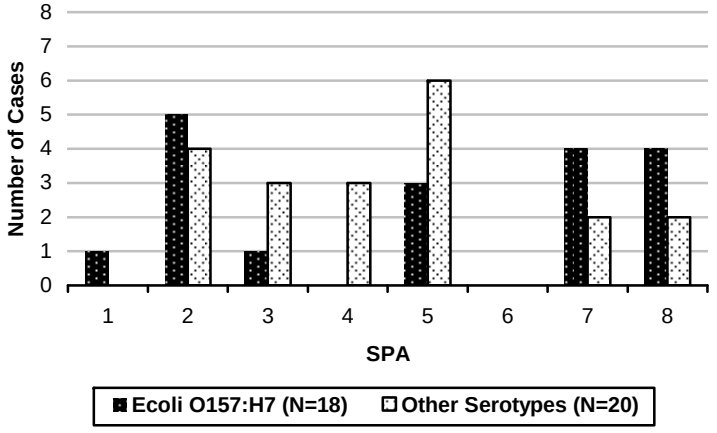


Figure 5. Reported Shiga Toxin-producing *E. coli* Cases by Serotype Month of Onset, LAC, 2009

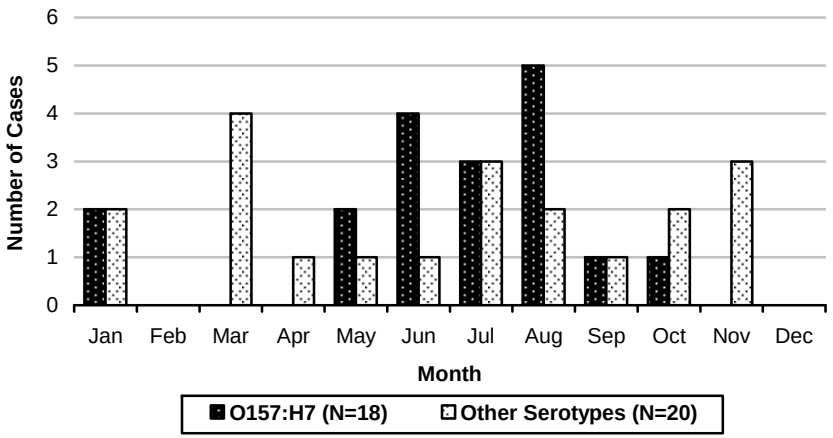


Figure 6. Reported *E. coli* O157:H7 Cases by Race/Ethnicity LAC, 2005-2009

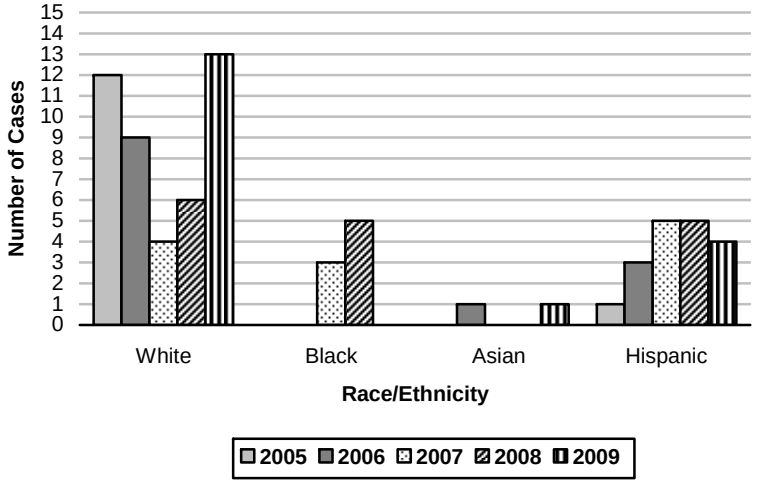
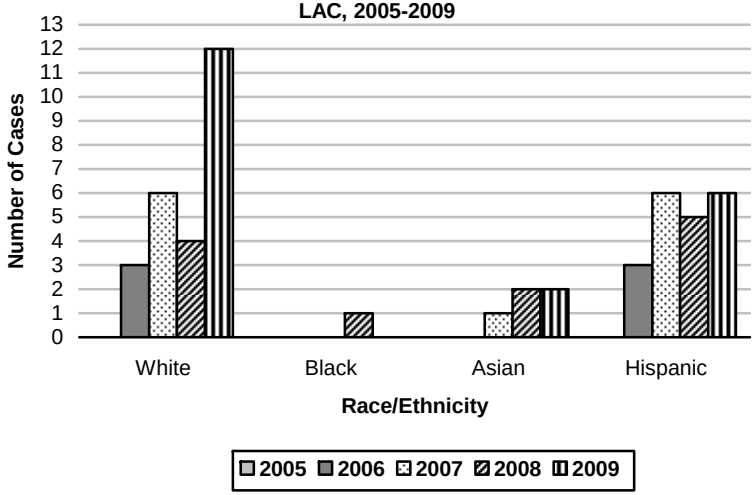


Figure 7. Reported Cases of *E. coli* Non-O157:H7 Serotype by Race/Ethnicity LAC, 2005-2009

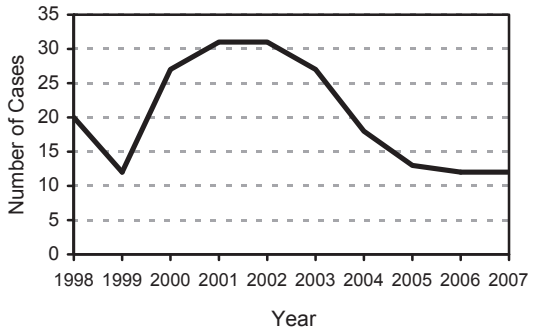


ESCHERICHIA COLI O157:H7 / HEMOLYTIC UREMIC SYNDROME

CRUDE DATA	
Number of Cases	12
Annual Incidence[a]	
LA County	0.12[b]
California	25
United States	
Age at Diagnosis	
Mean	16.67
Median	4.5
Range	1-65 years

[a] Cases per 100,000 population.
[b] Rates based on less than 19 observations are unreliable.

Figure 1
Escherichia coli O157:H7
Cases by Year of Onset
LAC 1998–2007



DESCRIPTION

Escherichia coli O157:H7, a Gram-negative bacillus, is a specific serotype of the Shiga toxin producing class of *E. coli* (STEC) and the most common such serotype in the US. Incubation period is 2-8 days. Shiga toxins cause abdominal cramps and watery diarrhea, often developing into bloody diarrhea; fever is uncommon. Likely modes of transmission include foodborne (e.g., undercooked ground beef, fresh produce, unpasteurized juice, and raw milk) and person-to-person (e.g., day-care settings). There also have been outbreaks associated with exposure to animals and their environments and recreational water exposure. All *E.coli* O157:H7 isolates are confirmed and fingerprinted by the Los Angeles County Public Health Laboratory and submitted to the national Pulse-Net database.

Hemolytic uremic syndrome (HUS) is a clinical diagnosis often associated with *E. coli* O157:H7. Children younger than five years of age are at highest risk for HUS, a clinical complication consisting of hemolytic anemia, thrombocytopenia, and kidney failure. Adults may develop thrombotic thrombocytopenic purpura after STEC infection.

DISEASE ABSTRACT

- The number of cases remained the same from 2006 to 2007.
- There were no reported cases of HUS and no Los Angeles County (LAC) outbreaks in 2007.

STRATIFIED DATA

Trends: After peaking in 2001 and 2002, rates of *E.coli* O157:H7 infection have been steadily decreasing and in 2007 leveled off. This is the fourth year since 1999 with fewer than twenty cases in LAC (Figure 1). There were no cases of HUS reported during 2007.

Seasonality: In 2007, 83% of confirmed cases occurred between May and September with a peak of 4 cases in September (Figure 2). This is consistent with the 5-year average.

Age: In 2007, there were more cases in children (n=9, 75%) than in adults. All cases were sporadic and not linked to a local outbreak.

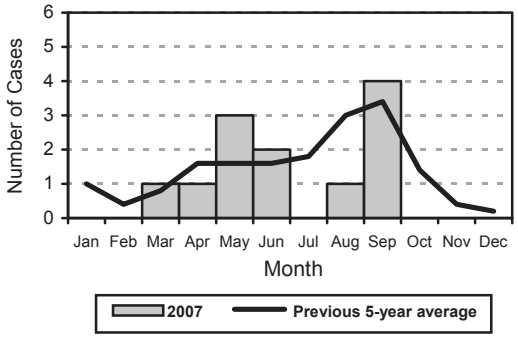
Sex: The male to female ratio was 3:1.

Severity of Illness: Most cases reported bloody diarrhea (n=9, 75%) and abdominal cramps (n=10, 83%). Only three cases reported having fever (mean temperature was 99.7^{0}F). Four cases (33%) required hospitalization. There were no reported deaths in confirmed cases.

Risk Factors: In the week prior to onset, cases with available information reported the consumption of ground beef (58%), steak (17%), apple juice/cider (25%), lettuce (50%), and fast food (58%). One confirmed case received antibiotic therapy, which increases the risk of HUS, but did not develop HUS.

HUS: In 2007, there were no reported HUS cases.

Figure 2
Esherichia coli O157:H7
Cases by Month of Onset
LAC, 2007



COMMENTS

There were 14 cases of other STEC (non-O157:H7) reported with different serotypes. There were no outbreaks related to *E. coli* O157:H7 in LAC during 2007.

Collaborative efforts among physicians, laboratories, and the health department are important for enhancement of surveillance. Physicians should request testing for *E. coli* O157:H7 or Shiga toxin on all bloody stools and consider *E. coli* O157:H7 in their diagnoses by asking about consumption of high-risk foods, attendance at day-care centers or farms, and exposure to other individuals with diarrhea. The collection of detailed food histories is important to understand underlying sources of infection. All cases of HUS should be reported immediately, and physicians should request stool testing for *E.coli* O157:H7 for these patients.

PREVENTION

Increased public education to prevent STEC infection is important. Information should focus on safe food handling practices, proper hygiene, and identifying high-risk foods and activities both in the home and while eating out. To avoid infection, beef products should be cooked thoroughly. Produce, including pre-washed products, should be thoroughly rinsed prior to eating. In addition, one should drink only treated water and avoid swallowing water during swimming or wading. Careful handwashing is essential, especially before eating and after handling raw beef products or coming in contact with or being around animals. The strengthening of national food processing regulations to decrease contamination is also important to reduce infection.

ADDITIONAL RESOURCES

General information about E.Coli – http://www.cdc.gov/ecoli/

FoodNet Foodborne disease active surveillance – http://www.cdc.gov/foodnet

Gateway to Government Food Safety – http://www.foodsafety.gov

OutbreakNet Team: national surveillance on foodborne infections and illnesses – http://www.cdc.gov/foodborneoutbreaks/index.htm

LAC general information and reporting information on foodborne infections and illnesses – http://www.lapublichealth.org/acd/food.htm

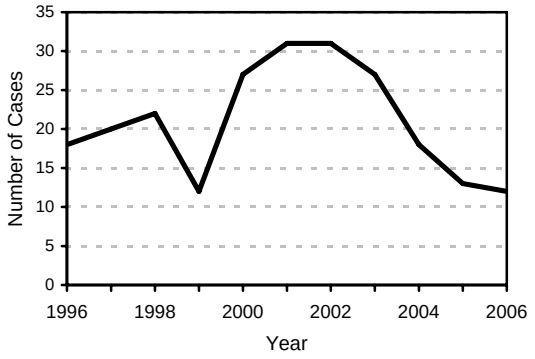
ESCHERICHIA COLI O157:H7 / HEMOLYTIC UREMIC SYNDROME

CRUDE DATA	
Number of Cases	12
Annual Incidence[a]	
LA County	---[b]
California	25
United States	
Age at Diagnosis	
Mean	10.4
Median	7
Range	1-27 years

[a] Cases per 100,000 population.

[b] Rates based on less than 19 observations are unreliable.

Figure 1
Escherichia coli O157:H7
Cases by Year of Onset
LAC 1996–2006



DESCRIPTION

Escherichia coli O157:H7, a Gram-negative bacillus, is a specific serotype of the Shiga toxin producing class of *E. coli* (STEC) and the most common such serotype in the US. Incubation period is 2-8 days. Shiga toxins cause abdominal cramps and watery diarrhea, often developing into bloody diarrhea; fever is uncommon. Likely modes of transmission include foodborne (e.g., undercooked ground beef, fresh produce, unpasteurized juice, and raw milk) and person-to-person (e.g., day-care settings). There also have been outbreaks associated with exposure to animals and their environments and recreational water exposure. All *E.coli* O157:H7 isolates are confirmed and fingerprinted by the Los Angeles County Public Health Laboratory and submitted to the national Pulse-Net database.

Hemolytic uremic syndrome (HUS) is a clinical diagnosis often associated with *E. coli* O157:H7. Children younger than five years of age are at highest risk for HUS, a clinical complication consisting of hemolytic anemia, thrombocytopenia, and kidney failure. Adults may develop thrombotic thrombocytopenic purpura after STEC infection.

DISEASE ABSTRACT

- There was a decrease in confirmed cases in 2006.
- There were no LAC outbreaks in 2006.

STRATIFIED DATA

Trends: After peaking in 2001 and 2002, rates of *E.coli* O157:H7 infection have been steadily decreasing. This is the third year with fewer than twenty cases in LAC since 1999 (Figure 1). There were eight cases of HUS in addition to the 12 cases of O157.

Seasonality: In 2006, 58% of confirmed cases occurred during the summer with a peak of three cases in September (Figure 2). This is consistent with the 5-year average, although the peak was later in the summer months.

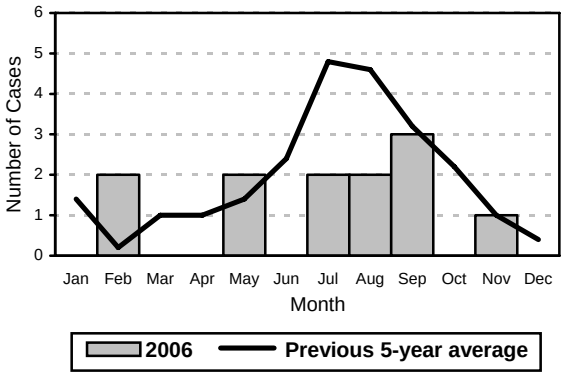
Age: In 2006, there were more cases in children (67%; n=8) than in adults. There were two family clusters involving siblings. One family cluster involving two siblings both with O157:H7 isolated and the second family cluster involved one sibling with O157:H7 and the other with HUS only (without lab confirmation of 0157:H7 infection). All other cases were sporadic and not linked to an outbreak.

Sex: The male to female ratio was 1:1.

Race/Ethnicity: Eight cases were reported in whites, three in Latinos, and one in Asians. There were no confirmed cases among blacks.

Location: SPA 2 had six confirmed cases, all unrelated. SPA 3 had three cases but they were unrelated. SPAs 5, 7, and 8 had one case each.

Figure 2
Escherichia coli O157:H7
Cases by Month of Onset
LAC, 2006



Severity of Illness: Most cases (75%; n=9) reported bloody diarrhea and abdominal cramps, and only two cases reported having fever (mean temperature was 101.0^{0}F). Two cases (16%) required hospitalization. There were no reported deaths in confirmed cases.

Risk Factors: In the week prior to onset, cases with available information reported the consumption of raw milk (8%), ground beef (25%), steak (25%), fast food (75%) or food from other types of restaurants (16%). Eight percent (N= 1) traveled to Texas. One confirmed case received antibiotic therapy, which increases the risk of HUS, but did not develop HUS.

HUS: In 2006, there were eight reported HUS cases without lab confirmation of *E. coli* O157:H7 infection. All eight cases were one to four years of age. All cases required hospitalization with no deaths. No cases reported any recent antibiotic therapy prior to the onset of HUS. Two cases required dialysis. No case reported the consumption of raw milk; however consumption of ground beef (50%) steak (25%), cider (12%), and lettuce (12%) was reported. No travel was reported.

COMMENTS

There were six cases of other STEC (non-O157:H7) reported with different serotypes. There were no outbreaks related to *E. coli* O157:H7 in LAC during 2006.

Collaborative efforts among physicians, laboratories and the health department are important for enhancement of surveillance. Physicians should request testing for *E. coli* O157:H7 or Shiga toxin on all bloody stools, and consider *E. coli* O157:H7 in their diagnoses by asking about consumption of high-risk foods, attendance at day-care centers or farms, and exposure to other individuals with diarrhea. The collection of detailed food histories is important to understand underlying sources of infection. All cases of HUS should be reported immediately and physicians should request stool testing for *E.coli* O157:H7 for these patients.

PFGE has been helpful in detecting clusters of *E. coli* O157:H7. PulseNet is a nationwide network of laboratories that perform PFGE, or “DNA fingerprinting” of foodborne bacteria. This network permits rapid comparison of fingerprint patterns to identify clusters and enhance outbreak investigation.

PREVENTION

Increased public education to prevent STEC infection is needed. Information should focus on safe food handling practices, proper hygiene and identifying high-risk foods and activities both in the home and while eating out. To avoid infection, beef products should be cooked thoroughly. Produce, including pre-washed products should be thoroughly rinsed prior to eating. In addition, one should drink only treated water and avoid swallowing water during swimming or wading. Careful handwashing is essential, especially before eating and after handling raw beef products or coming in contact with or being around animals. The strengthening of national food processing regulations to decrease contamination is also important to reduce infection.

ADDITIONAL RESOURCES

General information about this disease can be found at:
www.cdc.gov/ncidod/diseases/submenus/sub_ecoli.htm.

Foodborne disease active surveillance is available from FoodNet (CDC) at: www.cdc.gov/foodnet.

Information from the Gateway to Government Food Safety is available at: www.foodsafety.gov.

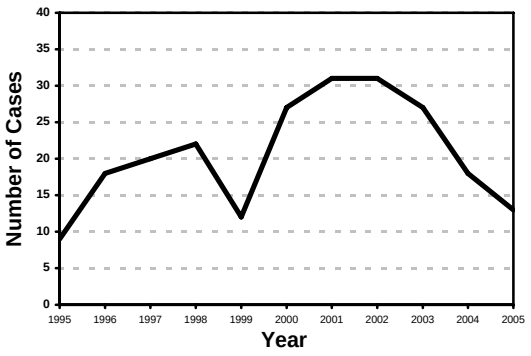
Information about outbreaks (nationwide) is available from the Outbreak Response and Surveillance Team of the CDC at: www.cdc.gov/foodborneoutbreaks/index.htm.

General information and reporting information about this and other foodborne diseases in LAC is available at: www.lapublichealth.org/acd/food.htm.

ESCHERICHIA COLI O157:H7 / HEMOLYTIC UREMIC SYNDROME

CRUDE DATA	
Number of Cases	13
Annual Incidence[a]	
LA County	--- [b]
California	157
United States	2,461
Age at Diagnosis	
Mean	16.2
Median	17
Range	3-45 years
Case Fatality	
LA County	0.0%
United States	N/A

Figure 1
Escherichia coli O157:H7
Cases by Year of Onset
LAC 1996–2005*



[a] Cases per 100,000 population.
[b] Rates based on less than 20 observations are unreliable.

DESCRIPTION

Escherichia coli O157:H7, a Gram-negative bacillus, is a specific serotype of the shiga toxin producing class of *E. coli* (STEC) and the most common such serotype in the US. Incubation period is 2-8 days. Shiga toxins cause abdominal cramps and watery diarrhea, often developing into bloody diarrhea; fever is uncommon. Likely modes of transmission include foodborne (e.g., undercooked ground beef, fresh produce, unpasteurized juice, raw milk) and person-to-person (e.g., day-care settings). There also have been outbreaks associated with exposure to animals and their environments and recreational water exposure. All *E.coli* O157:H7 isolates are confirmed by the Los Angeles County Public Health Laboratory.

Hemolytic uremic syndrome (HUS) is a clinical diagnosis and may or may not be associated with *E. coli* O157:H7. Children younger than five years of age are at highest risk for hemolytic uremic syndrome (HUS), a clinical complication consisting of hemolytic anemia, thrombocytopenia, and kidney failure. Adults may acquire thrombotic thrombocytopenic purpura (TTP) after infection after STEC infection.

DISEASE ABSTRACT

- There was a decrease in confirmed cases in 2005.
- There were no LAC outbreaks in 2005, although two cases were associated with a multi state cluster possibly associated with ground beef.

STRATIFIED DATA

Trends: After peaking in 2001, rates of *E.coli* O157:H7 infection have been steadily decreasing. This is the second time there have been fewer than twenty cases in LAC since 1999 (Figure 1). There were three cases of HUS in addition to the 13 cases of O157:H7.

Seasonality: In 2005, 85% of confirmed cases occurred during the summer and fall months (Figure 2). This is consistent with previous years.

Age: In 2005, there were more cases in adults (54%; n=7) than in children. All cases were sporadic and not linked to an outbreak.

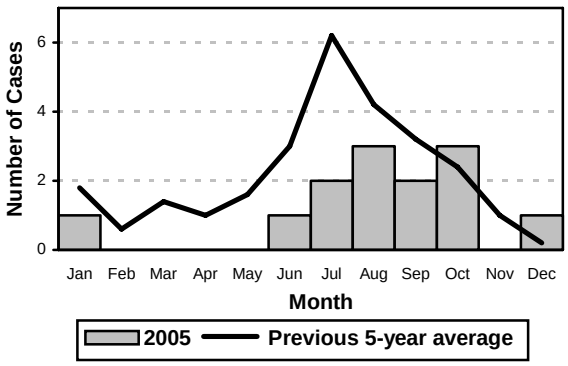
Sex: There were 8 male and 5 female cases.

Race/Ethnicity: Twelve cases were reported in Whites and one in a Latino. Asians and Blacks had no confirmed cases.

Location: SPA 8 had five confirmed cases but they were unrelated. The remaining SPAs had 1 or 2 cases each.

Severity of Illness: All cases reported bloody diarrhea, six reported abdominal cramps, and only three reported having fever (mean temperature was 100.0^{0}F). Seven cases required hospitalization. There were no reported deaths in confirmed cases.

Figure 2
Esherichia coli O157:H7
Cases by Month of Onset
LAC, 2005



HUS: One LAC case had both confirmed *E. coli* O157:H7 enterocolitis and HUS; two HUS cases did not have lab confirmation of *E. coli* O157:H7 infection. Two were school aged children and the third a seventy-one year old adult, with multiple medical problems. All three required hospitalization, and the adult expired. Two had some sort of recent antibiotic therapy prior to onset of HUS. All three cases required dialysis. The adult did not have a clear history of risk exposure. The other unconfirmed case was in a seven y/o boy who regularly consumed raw milk from a natural food market. There were no other cases associated with raw milk consumption. He was admitted to the hospital with complaints of bloody stool and acute renal failure and tested negative for *E.coli* O157:H7.

Risk Factors: In the week prior to onset, cases with available information reported eating ground beef (62%), lettuce (31%), fast food (69%) or food from other types of restaurants (62%). Thirty-one percent (N= 4) traveled, one inside California and three outside California. Three confirmed cases received antibiotic therapy for entercolitis, and one of these developed HUS. There were no confirmed cases associated with raw milk consumption during this period.

COMMENTS

There were no outbreaks of confirmed *E. coli* O157:H7 investigated in LAC during 2005. Two cases were identified as part of a multi-state clusters of *E. coli* O157:H7 but were unrelated to each other.

Collaborative efforts among physicians, laboratories and the health department are important for enhancement of surveillance activities. Physicians should request testing for *E. coli* O157:H7 or shiga toxin on all bloody stools. Physicians should consider *E. coli* O157:H7 in their diagnoses by asking about consumption of high-risk foods, attendance at day-care centers or farms, and exposure to other individuals with diarrhea. All cases of HUS should be reported immediately and physicians should request stool testing for *E.coli* O157:H7 for these patients.

Laboratory analysis with PFGE has been helpful in detecting clusters of *E. coli* O157:H7. PulseNet is a nationwide network of laboratories that perform PFGE, or “DNA fingerprinting” of foodborne bacteria. This network permits rapid comparison of fingerprint patterns to identify clusters and enhance outbreak investigation. In 2005, two LAC isolates were identified as matches to patterns in the PulseNet database, but no epidemiological links were found.

PREVENTION

Increased public education to prevent *E. coli* O157:H7 infection is needed. Information should focus on safe food handling practices, proper hygiene and identifying high-risk foods and activities both in the

home and while eating out. To avoid infection, beef products should be cooked thoroughly. Produce, including pre-washed products should be thoroughly rinsed prior to eating. In addition, one should drink only treated water and avoid swallowing water during swimming or wading. Careful handwashing is essential, especially before eating and after handling raw beef products or coming in contact with or being around animals. The collection of detailed food histories is important to understand underlying sources of infection. The strengthening of national food processing regulations to decrease contamination is also important to reduce infection.

ADDITIONAL RESOURCES

General information about this disease can be found at:
www.cdc.gov/ncidod/diseases/submenus/sub_ecoli.htm

Foodborne disease active surveillance is available from FoodNet (CDC) at: www.cdc.gov/foodnet

Information from the Gateway to Government Food Safety is available at:
www.foodsafety.gov

Information about outbreaks (nationwide) is available from the Outbreak Response and Surveillance Unit of the CDC at: www.cdc.gov/foodborneoutbreaks/index.htm

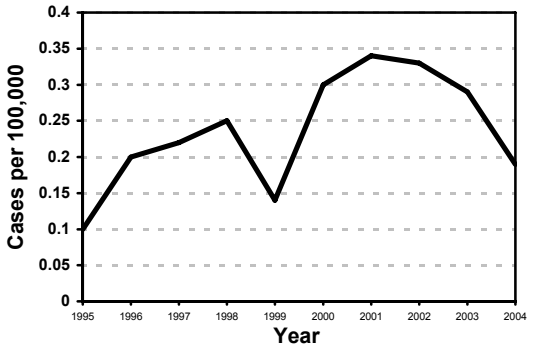
General information and reporting information about this and other foodborne diseases in LAC is available at: www.lapublichealth.org/acd/food.htm

ESCHERICHIA COLI O157:H7 / HEMOLYTIC UREMIC SYNDROME

CRUDE DATA	
Number of Confirmed Cases	18
Annual Incidence[a]	
LA County	---[b]
California	0.67
United States	0.87
Age at Diagnosis	
Mean	20.3
Median	17
Range	3-79 years
Case Fatality	
LA County	0.0%
United States	N/A

[a] Cases per 100,000 population.
[b] Rates based on less than 20 observations are unreliable.

Figure 1
Escherichia coli O157:H7
Incidence Rates by Year of Onset
LAC 1995–2004*



* Rates based on less than 20 observations are unreliable.

DESCRIPTION

Escherichia coli O157:H7, a gram-negative bacillus, is a specific serotype of the Shiga-toxin producing class of *E. coli* (STEC). Incubation period is 2-8 days. Shiga-toxins cause abdominal cramps and watery diarrhea often developing into bloody diarrhea; fever is uncommon. Likely modes of transmission include foodborne (e.g., undercooked ground beef, fresh produce, unpasteurized juice, raw milk) and person-to-person (e.g., day-care settings). There also have been outbreaks associated with exposure to animals and their environments and recreational water exposure.

Children younger than five years of age are at highest risk for hemolytic uremic syndrome (HUS), a clinical complication consisting of hemolytic anemia, thrombocytopenia, and kidney failure. Adults may acquire thrombotic thrombocytopenic purpura (TTP) after infection.

DISEASE ABSTRACT

- There was a 33 % decrease in the frequency of confirmed cases in 2004.
- There were no LAC outbreaks in 2004, although one traveler was associated with an outbreak in Alberta, Canada.

STRATIFIED DATA

Trends: After peaking in 2001, rates of *E.coli* O157:H7 have been steadily decreasing. Eighteen cases is the first time there have been fewer than twenty cases in LAC since 1999 (Figure 1).

Seasonality: In 2004, 83% of confirmed cases occurred during the spring and summer months with a peak in August (Figure 2). This was consistent with the 5-year average, although the 2004 peak was

later. Late winter cases were not seen in 2004.

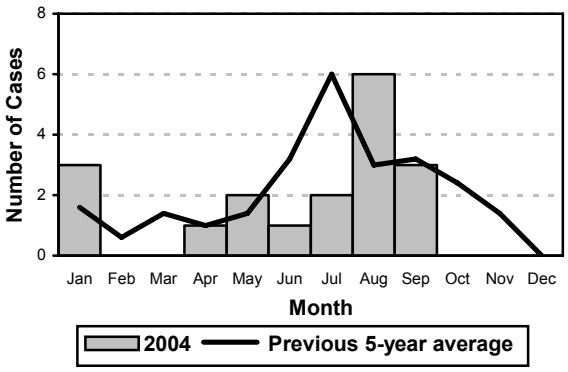
Age: In 2004, more laboratory confirmed cases were in adults (56%). All but one adult case were sporadic and not linked to an outbreak.

Sex: The male to female ratio of confirmed cases was 2:1.

Race/Ethnicity: The highest percentage of confirmed cases was again among Whites (55%; N=10). Asians (33%; N=6) and Latinos (11%; N=2) had higher representations when compared to 2003. Blacks had no confirmed cases.

Location: SPA 2 again had the most confirmed cases (39%; N= 7) followed by SPA 3 (28%; N= 5) and SPA 8 (16%; N=3). SPAs 7, 5 and 4 each had a single confirmed case. SPAs 2 and 4 each had an HUS only case.

Figure 2
Esherichia coli O157:H7
Cases by Month of Onset
LAC, 2004



Severity of Illness: Of confirmed cases with available information, 94% reported diarrhea, 77% reported abdominal cramps, 72% had bloody diarrhea, and 33% reported having fever (mean temperature was 100.7^{0}F). One confirmed case was asymptomatic and was tested as a household contact to a case. Ten confirmed cases (55%) required hospitalization. There were no reported deaths in confirmed cases.

HUS: In 2004, there was one LAC case with both confirmed *E. coli* O157:H7 and HUS and two reported cases of HUS without lab confirmation of *E. coli* O157:H7. Two were aged one to three years of age; the third was a 53 y/o man. All three required hospitalization. All three had some sort of recent antibiotic therapy prior to onset of HUS. Two cases required dialysis. The male adult was immunocompromised with a history of travel to Mexico where he had become ill and received quinolone therapy. He returned to the US, where he died in January 2004. The other unconfirmed case was in a two y/o girl with probable strep pneumonia and diarrhea who tested negative for *E.coli* O157:H7.

Risk Factors: In the week prior to onset, confirmed cases with available information reported eating ground beef (56%), lettuce (56%), fast food (72%) or food from other types of restaurants (56%). Seventeen percent (N= 3) traveled, two outside the US and one outside California. Three confirmed cases received antibiotic therapy; one of these developed HUS.

COMMENTS

There were no outbreaks of confirmed *E. coli* O157:H7 investigated in LAC during 2004. There was one traveler who was interviewed as part of an outbreak from Canada associated with an ethnic dish made with ground meat. There were three family clusters identified with a total of six cases.

Collaborative efforts among physicians, laboratories and the health department are important for enhancement of surveillance activities. Physicians should request testing for *E. coli* O157:H7 on all bloody stools. Physicians should consider *E. coli* O157:H7 in their diagnoses by asking about consumption of high-risk foods, attendance at day-care centers or farms and exposure to other individuals with diarrhea. All cases of HUS should be reported immediately and physicians should request testing for *E.coli* O157:H7 for these patients.

Laboratory analysis through PFGE has been helpful in detecting clusters of *E. coli* O157:H7. PulseNet is a nationwide network of laboratories that performs PFGE, or “DNA fingerprinting” of foodborne bacteria.

This network permits rapid comparison of the fingerprint patterns to identify clusters and enhance outbreak investigation. In 2004, five LAC isolates were identified as matches to patterns in the PulseNet database, but no epidemiological links were found.

PREVENTION

Increased public education to prevent *E. coli* O157:H7 infection is needed. Information should focus on safe food handling practices, proper hygiene and identifying high-risk foods and activities both in the home and while eating out. To avoid infection, beef products should be cooked thoroughly. Produce, including pre-washed products should be thoroughly rinsed prior to eating. In addition, one should drink only treated water and avoid swallowing water during swimming or wading. Careful handwashing is essential, especially before eating and after handling raw beef products or coming in contact with or being around animals. The collection of detailed food histories is important to understand underlying sources of infection. The strengthening of national food processing regulations to decrease contamination is also important to reduce infection.

ADDITIONAL RESOURCES

General information about this disease can be found at:
www.cdc.gov/ncidod/diseases/submenus/sub_ecoli.htm

Foodborne disease active surveillance is available from FoodNet (CDC) at: www.cdc.gov/foodnet

Information from the Gateway to Government Food Safety is available at:
www.foodsafety.gov

Information about outbreaks (nationwide) is available from the Outbreak Response and Surveillance Unit of the CDC at: www.cdc.gov/foodborneoutbreaks/index.htm

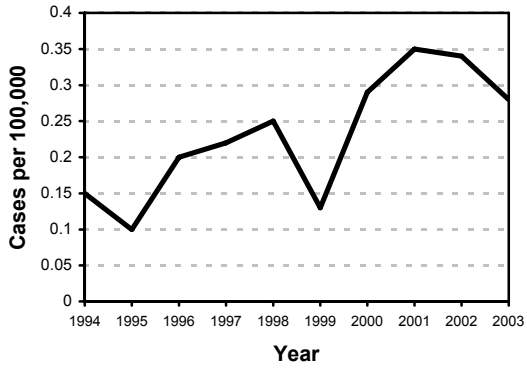
General information and reporting information about this and other foodborne diseases in LAC is available at: www.lapublichealth.org/acd/food.htm

ESCHERICHIA COLI O157:H7 / HEMOLYTIC UREMIC SYNDROME

CRUDE DATA	
Number of Cases	27
Annual Incidence[a]	
LA County	0.28
California	0.72
United States	0.88
Age at Diagnosis	
Mean	23.6
Median	14
Range	1–80 years
Case Fatality	
LA County	0.0%
United States	N/A

[a] Cases per 100,000 population.

Figure 1
Escherichia coli O157:H7
Incidence by Year of Onset
LAC, 1994–2003



DESCRIPTION

Escherichia coli O157:H7, a gram-negative bacillus, is a specific serotype of the Shiga-toxin producing class of *E. coli* (STEC). Incubation period is 2-8 days. Shiga-toxins cause abdominal cramps and watery diarrhea often developing into bloody diarrhea; fever is uncommon. Likely modes of transmission include foodborne (e.g., undercooked ground beef, fresh produce, unpasteurized juice, raw milk) and person-to-person (e.g., day-care settings). There also have been outbreaks associated with recreational water exposure and exposure to animals and their environments.

Children younger than five years of age are at highest risk for hemolytic uremic syndrome (HUS), a clinical complication consisting of hemolytic anemia, thrombocytopenia, and kidney failure. Adults may acquire thrombotic thrombocytopenic purpura (TTP) after infection.

DISEASE ABSTRACT

- There was a 10 % decrease in the number of confirmed cases in 2003.
- Two outbreaks were identified in LAC during 2003.

STRATIFIED DATA

Trends: The rate decreased again in 2003 (Figure 1). There had been a 3-year trend of increasing incidence from 1999 to 2001.

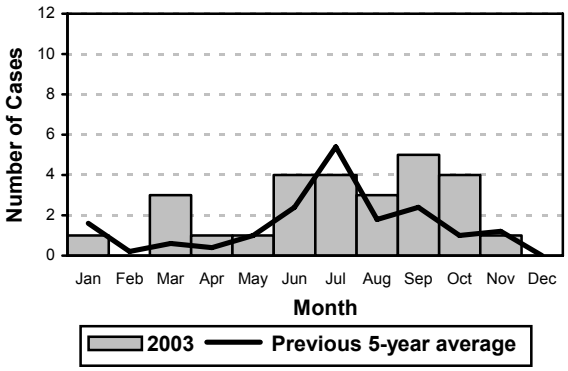
Seasonality: In 2003, 59% of cases occurred during the late spring and summer months with a peak in September (Figure 2). This was consistent with the 5-year average, although the peak was later in the summer months.

Age: In 2003, more laboratory confirmed cases were in adults (56%). Eighty percent of the adult cases were sporadic and not linked to an outbreak.

Sex: The male to female ratio was 1:1.4.

Race/Ethnicity: The highest percentage of cases was again among Whites (63%). Asians had a higher representation with 22% and Latinos had a lower representation (7%) when compared to 2002 and to the five-year average. Blacks had 7% no change.

Figure 2
Esherichia coli O157:H7
Cases by Month of Onset
LAC, 2003



Location: SPA 2 had 30 % of all confirmed cases followed by SPA 8 (22%). SPAs 3 and 5 each had 15% of confirmed cases. A multi jurisdictional outbreak involved three individuals living in SPA 3; another outbreak (four cases) occurred in SPAs 5 and 8. Although most cases in SPA 2 were reported sporadically, two cases did have a similar if not indistinguishable PFGE pattern. These two cases could not be linked epidemiologically.

Severity of Illness: Of confirmed cases with available information, 96% reported diarrhea, 92% reported abdominal cramps, 81% had bloody diarrhea, 38% had nausea or vomiting, and 42% reported having fever (mean temperature was 100.9^0F). One confirmed case had only mild cramping and was not seen by a physician; testing of this case was conducted as part of an outbreak investigation. Eleven confirmed cases (42%) required hospitalization. There were no reported deaths.

HUS: In 2003, there was one LAC case with confirmed *E. coli* O157:H7 with HUS and six reported cases of HUS without lab confirmation of *E. coli* O157:H7. Of these seven cases of diagnosed HUS, 6 (86%) were one to three years of age. Two cases required dialysis. There were no deaths among the HUS cases.

Risk Factors: In the week prior to onset, confirmed cases with available information reported eating ground beef (54%), lettuce (81%), fast food (62%) or food from other types of restaurants (54%). There were no reports of travel.

COMMENTS

There were two outbreaks of confirmed *E. coli* O157:H7 investigated in LAC during 2003, one was associated with ground meats and the other was a multi jurisdictional outbreak associated with romaine lettuce.

Collaborative efforts among physicians, laboratories and the health department are important for enhancement of surveillance activities. Physicians should request testing for *E. coli* O157:H7 on all bloody stools. Physicians should consider *E. coli* O157:H7 in their diagnoses by asking about consumption of high-risk foods, attendance at day-care centers or farms and exposure to other individuals with diarrhea. All cases of HUS should be reported immediately and physicians should request testing for *E.coli* O157:H7 for these patients.

Lab analysis through PFGE has been helpful in detecting clusters of *E. coli* O157:H7. PulseNet is a nationwide network of laboratories that performs PFGE, or “DNA fingerprinting” of foodborne bacteria.

This network permits rapid comparison of the fingerprint patterns to identify clusters and enhance outbreak investigation.

PREVENTION

Increased public education to prevent *E. coli* infection is needed. Information should focus on safe food handling practices, proper hygiene and identifying high-risk foods and activities. To avoid infection, beef products should be cooked thoroughly. In addition, one should drink only treated water and avoid swallowing water during swimming or wading. Careful handwashing is essential, especially before eating and after handling raw beef products or coming in contact with or being around animals. The collection of detailed food histories is important to understand underlying sources of infection. The strengthening of national food processing regulations to decrease contamination is also important to reduce infection.

ADDITIONAL RESOURCES

General information about this disease can be found at:
www.cdc.gov/ncidod/diseases/submenus/sub_ecoli.htm

Foodborne disease active surveillance is available from FoodNet (CDC) at: www.cdc.gov/foodnet

Information from the Gateway to Government Food Safety is available at:
www.foodsafety.gov

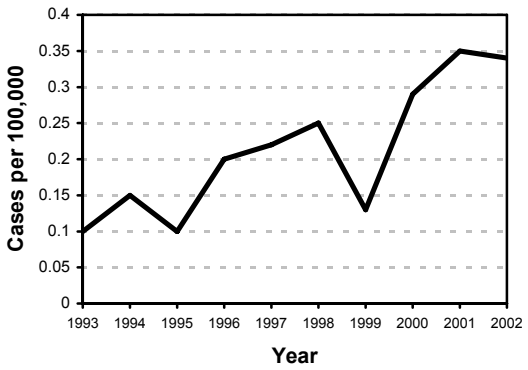
Information about outbreaks (nationwide) is available from the Outbreak Response and Surveillance Unit of the CDC at: www.cdc.gov/foodborneoutbreaks/index.htm

General information and reporting information about this and other foodborne diseases in LAC is available at: www.lapublichealth.org/acd/food.htm

ESCHERICHIA COLI O157:H7 / HEMOLYTIC UREMIC SYNDROME

CRUDE DATA	
Number of Cases	30
Annual Incidence[a]	
LA County	0.3
California[b]	0.9
United States[b]	1.4
Age at Diagnosis	
Mean	29
Median	9
Range	1–99 years
Case Fatality	
LA County	3.2%
United States	N/A

Figure 1
Escherichia coli O157:H7
Incidence by Year of Onset
LAC, 1993–2002



[a] Cases per 100,000 population.
[b] Data via the National Electronic Telecommunications System for Surveillance.

DESCRIPTION

Escherichia coli O157:H7, a gram-negative bacillus, is a specific serotype of the Shiga-toxin producing class of *E. coli* (STEC). Shiga-toxins cause abdominal cramps and watery diarrhea often developing into bloody diarrhea; fever is uncommon. Likely modes of transmission include foodborne (e.g., undercooked ground beef, unpasteurized juice, raw milk) and person-to-person (e.g., day-care settings). There also have been outbreaks associated with recreational water exposure.

Children younger than five years of age are at highest risk for hemolytic uremic syndrome (HUS), a clinical complication consisting of hemolytic anemia, thrombocytopenia, and kidney failure. Adults may acquire thrombotic thrombocytopenic purpura (TTP) after infection.

DISEASE ABSTRACT

- The total number of confirmed cases remained stable in 2002.
- Two outbreaks were identified in LAC during 2002; there were no outbreaks identified in 2000 or 2001.

STRATIFIED DATA

Trends: The number and rate of confirmed cases remained stable in 2002, ending a 3-year trend of increasing incidence.

Seasonality: In 2002, the greatest number of cases again occurred during the summer with a peak in July (10 cases). This was, in part, due to two outbreaks occurring in that month. Five sporadic cases also occurred in that month.

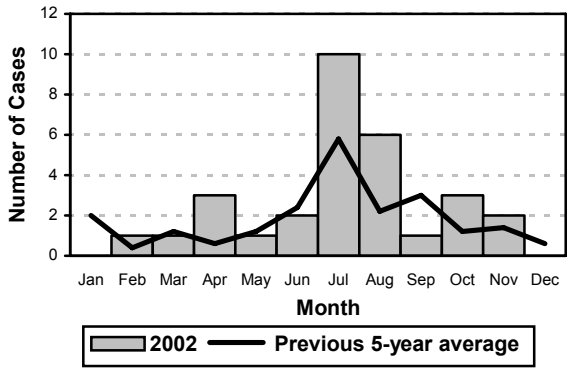
Age: The greatest number of cases occurred among persons under age 14 years. The number of confirmed cases in persons aged 65 years and older was greater than the 5-year average, partly due to an outbreak occurring in a senior living facility.

Sex: The male to female rate ratio was 1:1.3.

Race/Ethnicity: The highest percentage of cases was again among Whites (50%). Latinos and Asians represented a larger percentage in 2002 than 2001, with 33% and 10% respectively. Both outbreaks involved only Whites.

Location: SPA 2 had 35 % of all confirmed cases followed by SPA 3 (23%) and SPA 7 (16%). SPA 6 had no cases. One outbreak (three cases) occurred in SPAs 1 and 2. The other outbreak (two cases) occurred in SPA 5.

Figure 2
Esherichia coli O157:H7
Cases by Month of Onset
LAC, 2002

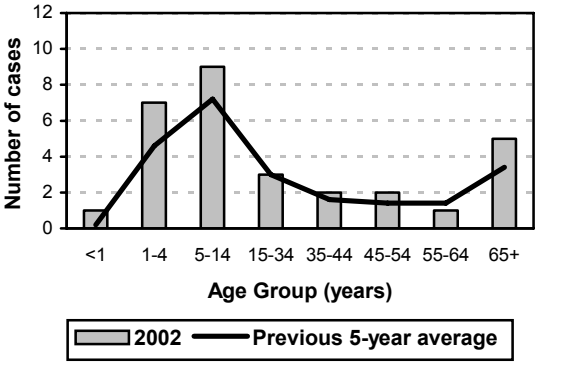


COMMENTS

E. coli O157:H7 was first recognized as an important human pathogen causing foodborne illness in 1982. In 1994, LAC requested laboratories and health care providers to voluntarily report suspected *E. coli* O157:H7 cases. Mandatory reporting of *E. coli* O157:H7 cases in California began in July 1995.

During 2002, confirmed cases had symptoms of diarrhea (93%), abdominal cramps (86%), bloody diarrhea (80%), vomiting (60%), and fever (43%; mean temperature was 100.8^{0}F). One confirmed case was asymptomatic; testing of this case was conducted since the case was a household contact to a confirmed case. Two cases were on antibiotics the week prior to onset; of these, one person developed HUS. Most confirmed cases (47%, n=14) required hospitalization.

Figure 3
Esherichia coli O157:H7
Cases by Age Group
LAC, 2002



In 2002, there were three LAC cases with confirmed *E. coli* O157:H7 and HUS and three reported cases of HUS without lab confirmation of *E. coli* O157:H7. Of these six cases of diagnosed HUS, one with lab confirmation died and two without lab confirmation died. The confirmed case was a 99 year-old man who was part of an outbreak.

Regarding the two outbreaks of confirmed *E. coli* O157:H7 investigated in LAC during 2002, both were associated with ground beef; one outbreak occurred at a senior living facility, the other was connected to a national outbreak of recalled ground beef.

Collaborative efforts among physicians, laboratories and the health department are important for enhancement of surveillance activities. It is important that physicians request testing for *E. coli* O157:H7 on all bloody stools. Physicians should consider *E. coli* O157:H7 in their diagnoses by asking about consumption of high-risk foods, attendance at day-care centers or farms and exposure to other

individuals with diarrhea. Lab analysis through PFGE has been notable in detecting clusters of *E. coli* O157:H7. PulseNet is a nationwide network of laboratories that performs PFGE, or "DNA fingerprinting" of foodborne bacteria. This network permits rapid comparison of the fingerprint patterns to identify clusters and enhance outbreak investigation.

PREVENTION

Increased public education to prevent *E. coli* infection is needed. Information should focus on safe food handling practices, proper hygiene and identifying high-risk foods and activities. To avoid infection, beef products should be cooked thoroughly, one should drink only treated water and avoid swallowing water during swimming or wading. Careful handwashing is essential, especially before eating and after handling raw beef products or coming in contact with animals. The collection of detailed food histories is important to understand underlying sources of infection. The strengthening of national food processing regulations to decrease contamination is also important to reduce infection.

ADDITIONAL RESOURCES

Information from the Foodborne and Diarrheal Diseases Branch of the CDC is available at: www.cdc.gov/ncidod/dbmd/foodborne.htm

Information about outbreaks (nationwide) is available from the Outbreak Response and Surveillance Unit of the CDC at: www.cdc.gov/ncidod/dbmd/outbreak

Foodborne disease active surveillance is available from FoodNet (CDC) at: www.cdc.gov/foodnet/

Information from Center for Food Safety and Applied Nutrition is available at: www.vm.cfsan.gov/list.html

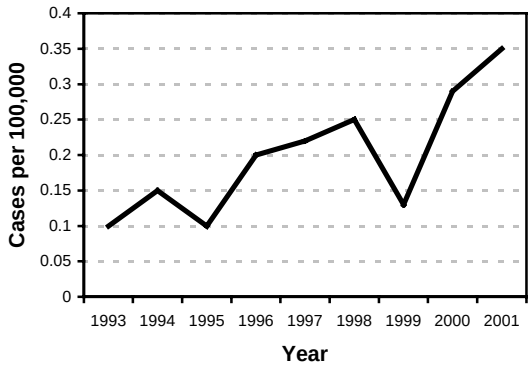
Information from the Gateway to Government Food Safety is available at: www.foodsafety.gov

General information and reporting information about this and other foodborne diseases in LAC is available at: www.lapublichealth.org/acd/food.htm

ESCHERICHIA COLI O157:H7 / HEMOLYTIC UREMIC SYNDROME

CRUDE DATA	
Number of Cases	31
Annual Incidence[a]	
LA County	0.4
California[b]	0.7
United States[b]	1.2
Age at Diagnosis	
Mean	26
Median	15
Range	3-88 years
Case Fatality	
LA County	0.0%
United States	N/A

Figure 1
***Escherichia coli* O157:H7**
Incidence by Year of Onset
LAC, 1993-2001*



* Data prior to 1993 is not available.

[a] Cases per 100,000 population.

[b] Data via the National Electronic Telecommunications System for Surveillance.

DESCRIPTION

Escherichia coli O157:H7, a gram-negative bacillus, is a specific serotype of the Shiga-toxin producing class of *E. coli* (STEC). Shigatoxins cause abdominal cramps and watery diarrhea developing into bloody diarrhea; fever is uncommon. The common modes of transmission are foodborne (e.g. undercooked ground beef, unpasteurized juice, raw milk) and person-to-person (e.g. day-care settings). There have been outbreaks associated with recreational water exposure.

Children under five are at highest risk for hemolytic uremic syndrome (HUS), a clinical complication which consists of hemolytic anemia, thrombocytopenia, and kidney failure. Adults may get thrombotic thrombocytopenic purpura (TTP) after infection.

DISEASE ABSTRACT

- In 2001, LAC saw the largest number of *E. coli* O157:H7 cases within the last six years. The reason for this increase is not known.
- No outbreaks were identified in LAC during 2001.

STRATIFIED DATA

Trends: In 2001, there was a 17 % increase in the rate of *E. coli* O157:H7 cases. This increase is consistent with a trend of increasing incidence that started in 1996 but was interrupted in 1999. The reason for the drop in reported cases in 1999 is not known.

Seasonality: In 2001, the greatest number of cases was again observed during the summer with a peak in July (8 cases). This could be due to increased consumption of ground beef during

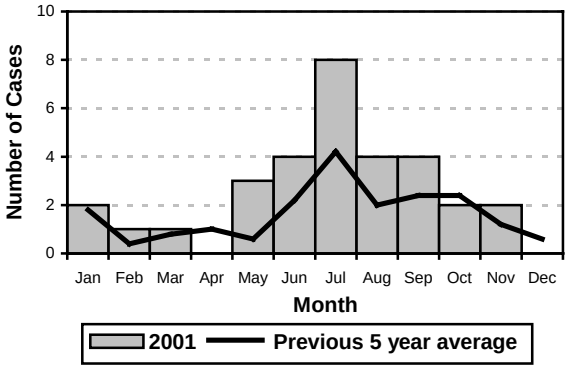
barbeques, cooking involving hamburger, travel and recreational water exposure.

Age: The greatest number of cases was seen in persons aged 5 -14 years. The number of cases in this age group and persons aged15-34 years and 45 to 54 years were higher than the five-year average.

Sex: The male to female rate ratio was 1.3:1.

Race/Ethnicity: The highest percentage of cases was seen among Whites (61%), followed by Latinos (19%), and Blacks (19%). There were no cases reported among Asians in 2001.

Figure 2
***Escherichia coli* O157:H7**
Cases by Month of Onset
LAC, 2001



Location: SPA 8 had the highest rate at 0.7 per 100,000 population. SPA 3 and SPA 5 had rates of 0.4 per 100,000 population and 0.3 per 100,000 population respectively.

COMMENTS

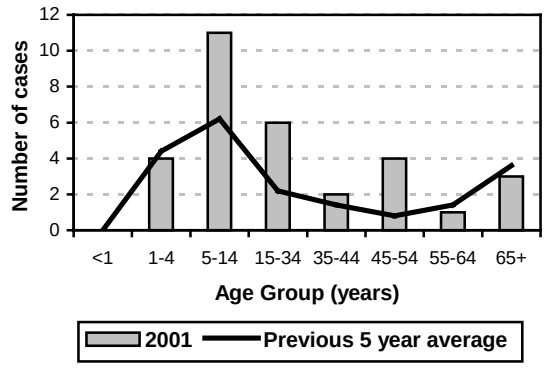
E. coli O157:H7 was first recognized as an important human pathogen causing foodborne illness in 1982. In 1994, LAC requested laboratories and health care providers to voluntarily report suspected *E. coli* O157:H7 cases. Mandatory reporting of *E. coli* O157:H7 cases in California was instituted in July 1995.

In 2001, in LAC, there was one case with confirmed *E. coli* O157:H7 and HUS. There was one case with confirmed *E. coli* O157:H7 and TTP. There were five cases of HUS and two cases of HUS and TTP without confirmation of *E. coli* O157:H7.

Reported cases had symptoms of diarrhea (100%), abdominal cramps (97%), bloody diarrhea (84%), nausea (68%), vomiting (65%), and fever (48%; mean temperature was 101.4). One case was on antibiotics the week prior to onset. Fifty-five percent of reported cases were hospitalized. There were no deaths.

There were no outbreaks detected within LAC. No cases were associated with outbreaks in other jurisdictions.

Figure 3
***Escherichia coli* O157:H7**
Cases by Age Group
LAC, 2001



Collaborative efforts among physicians, laboratories and the health department are important for enhancement of surveillance activities. Physicians should consider *E. coli* O157:H7 in their diagnoses by asking about consumption of high-risk foods, attendance at day-care centers or farms, and exposure to other individuals with diarrhea. It is important that physicians request testing for *E. coli* O157:H7 on all bloody stools. Lab analysis through PulseNet has been notable in detecting clusters of *E. coli* O157:H7. PulseNet is a nationwide network that performs PFGE or “DNA fingerprinting” of foodborne bacteria. This network permits

rapid comparison of the fingerprint patterns to identify clusters and enhance outbreak investigation.

PREVENTION

The public needs increased education regarding food handling practices, proper hygiene and high-risk foods. To avoid infection, it is recommended to cook beef products thoroughly, drink only treated water, and avoid swallowing water during swimming or wading. Collection of detailed food histories and strengthening of national food processing regulations to decrease contamination should be emphasized.

ADDITIONAL RESOURCES

Information from the Foodborne and Diarrheal Diseases Branch of the CDC is available at: www.cdc.gov/ncidod/dbmd/foodborne.htm

Information about outbreaks (nationwide) is available from the Outbreak Response and Surveillance Unit of the CDC at: www.cdc.gov/ncidod/dbmd/outbreak

Foodborne disease active surveillance is available from FoodNet (CDC) at: www.cdc.gov/foodnet/

Information from Center for Food Safety and Applied Nutrition is available at: www.vm.cfsan.gov/list.html

Information from the Gateway to Government Food Safety is available at: www.foodsafety.gov