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SHIGA TOXIN-PRODUCING *E. COLI*

Escherichia coli (*E. coli*) are a large and varied group of bacteria. Many strains are harmless and are part of the normal intestinal flora of humans and animals. Other types may cause diverse illnesses including urinary tract infections, respiratory infections and pneumonia, and meningitis.

Shiga toxin-producing *E. coli* (STEC) are one of six types of *E. coli* that cause diarrhea. STEC are sometimes referred to as entero-hemorrhaghic *E. coli* (EHEC) or verocytotoxic *E. coli* (VTEC), are classified into serogroups based on the O antigen, and produce two types of Shiga toxins (Stx1, Stx2).

E. coli O157 was the first serogroup recognized to cause disease and remains the most commonly reported in the United States. Increased use of non-culture tests for Shiga toxins has resulted in more frequent identification of other serogroups. Although clinical laboratories test for Shiga toxin, specimens must still be sent to public health laboratories for full serogroup identification.

In 2016, 8,169 cases of STEC were reported nationally. However, the Centers for Disease Control and Prevention (CDC) estimates that STEC causes about 265,000 illnesses per year, 36% of which are O157. California received 598 reports in 2016, 33% of which were O157. In San Diego County, there were 288 STEC reports in 2017. Excluding cases in a large outbreak of O157 in a unique military population, there were 46 STEC reports in 2017, including 13 (28%) O157 reports, and between 2013-2017, 24% of San Diego County STEC cases were O157.

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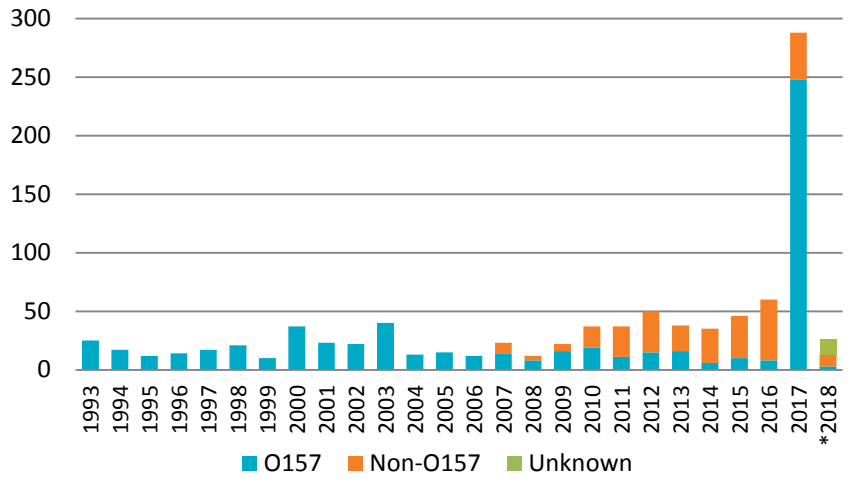
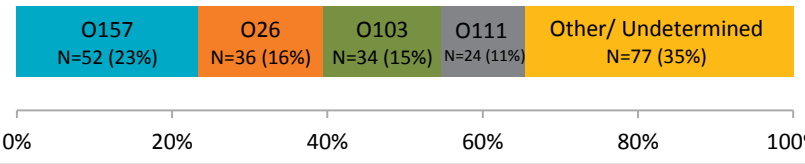
Figure 1. Shiga Toxin-Producing *E. coli* (STEC) Cases, San Diego County, 1993-2018*



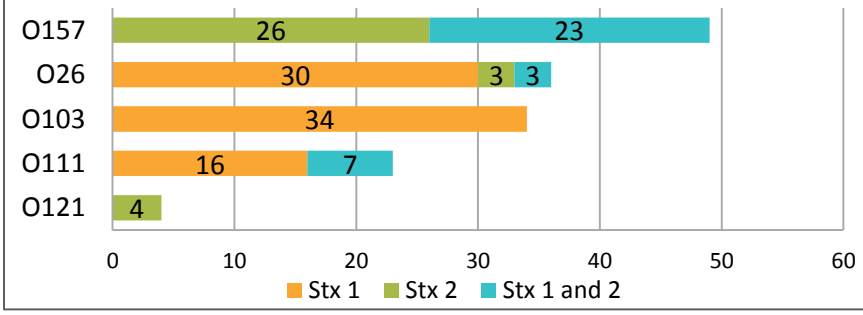
*2018 data are year-to-date; current as of 6/14/2018. Data are provisional and subject to change as additional information becomes available. Grouped by CDC disease years. A new case definition went into effect in 2018; counts include cases detected by culture-independent diagnostic testing, where no serogroup information is available. In 2017, there was a large outbreak of E. coli O157 in a military population.

Figure 2. STEC Serogroups, San Diego County, 2013-2017



Current as of 6/14/2018. Excludes cases in the large 2017 military outbreak of O157. Other/Undetermined includes 4 O121, 1 O45, 1 O145, and 71 where a serogroup could not be determined via available testing.

Figure 3. Common STEC Serogroups by Shiga Toxin (Stx) Type, San Diego County, 2013-2017 (N=146)



Current as of 6/14/2018. Includes only the most commonly detected serogroups in San Diego County and only those with complete Stx information. Excludes cases in the large 2017 military outbreak of O157.

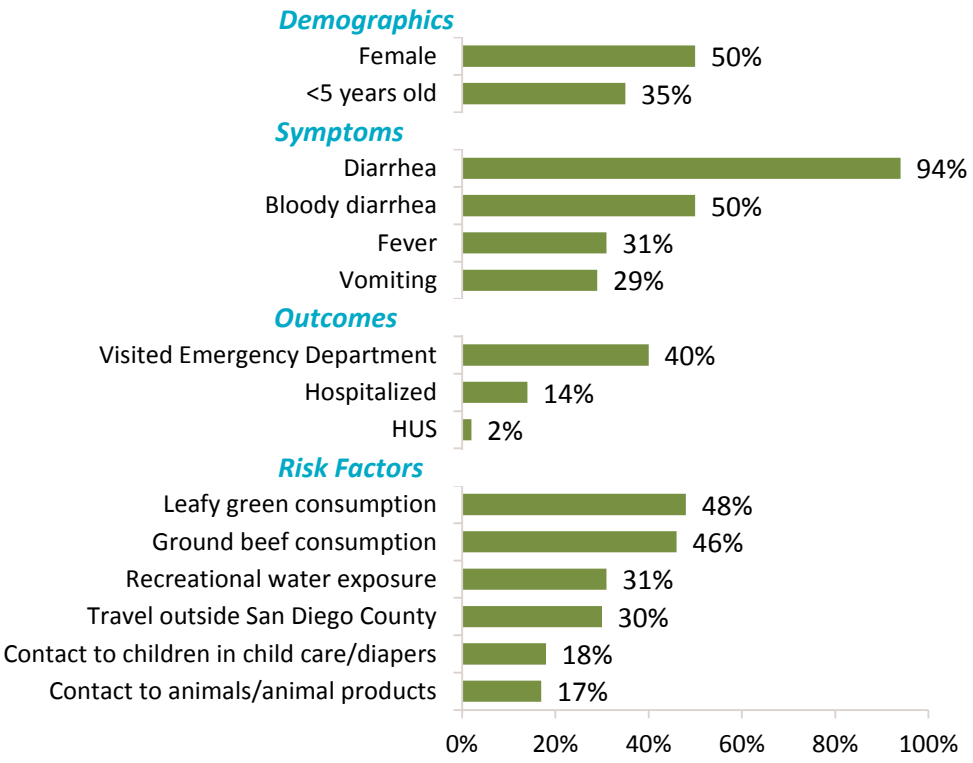
The Monthly Communicable Disease Surveillance Report is a publication of the County of San Diego Public Health Services Epidemiology and Immunization Services Branch (EISB). EISB works to identify, investigate, register, and evaluate communicable, reportable, and emerging diseases and conditions to protect the health of the community. The purpose of this report is to present trends in communicable disease in San Diego County. To subscribe to this report, send an email to EpiDiv.HHSA@sdcounty.ca.gov.

SHIGA TOXIN-PRODUCING *E. COLI* (STEC), continued

In addition to diarrhea, symptoms of STEC infection, which usually begin 3-4 days after exposure, may include severe stomach cramps, vomiting, and low-grade fever. Diarrhea is often bloody. Most people recover within a week. However, infection can be severe. An estimated 5-10% develop a life-threatening complication known as hemolytic uremic syndrome (HUS), characterized by decreased urination, fatigue, and anemia. In San Diego County from 2013-2017, there were five non-outbreak cases of post-STEC HUS (2%) reported, four post-O157 and one post-O121. Young children and the elderly are at increased risk of severe infection, including HUS. Antibiotic treatment of STEC cases is usually not recommended due to potentially increased risk of HUS.

Although non-O157 STEC can also cause HUS, in general, non-O157 STEC infections are less severe. In addition, strains of STEC producing Stx2 tend to cause more serious illness. O157 bacteria usually produce Stx2 alone or Stx1 and Stx2, whereas other common serogroups, such as O103, almost exclusively produce Stx1 and usually cause milder illness. In San Diego County, 84% of O157 cases between 2013-2017 had bloody diarrhea compared to 39% of non-O157 cases. Also, 31% of O157 cases were hospitalized compared to 9% of non-O157 cases.

Figure 4. Select Characteristics of STEC Cases, San Diego County, 2013-2017 (N=225)



Current as of 6/14/18. Excludes cases in the large 2017 military outbreak of O157. Risk factors are potential exposures mentioned by case-patients, not confirmed sources of infection. Denominators for characteristics are cases with available information (ranging from 175-225).

Resources

- Centers for Disease Control and Prevention (CDC) E. coli website
- United States Department of Agriculture Food Safety and Inspection Service E. coli website
- CDC E. coli Outbreak Investigations website
- California Department of Public Health Shiga Toxin-Producing E. coli website

E. coli O157 was first recognized as a human pathogen, in 1982, during an outbreak of bloody diarrhea traced to beef consumption. During 1992-1993, the San Diego County health department played a role in the investigation of a large four-state outbreak of *E. coli* O157 caused by contaminated hamburgers from a fast food restaurant. Over 700 cases and four deaths were associated with this outbreak, prompting food safety reviews and additional beef processing controls. A 2017 San Diego County outbreak of O157 among recruits, at the Marine Corps Recruit Depot, was also potentially associated with undercooked beef. Of the 242 ill recruits reported, 14 developed HUS.

A variety of other products, including cheese, flour, cookie dough, and nuts, have caused outbreaks. Contaminated raw produce has also been a frequent source of outbreaks. Sprouts, as in the 2011 outbreak of O104 in Europe, and leafy greens, as in the 2018 romaine lettuce-associated outbreak of O157 in the United States, are of particular concern. San Diego County had one case associated with the recent romaine outbreak.

Table 1. Select Reportable Diseases		2018			Prior Years		
Disease and Case Inclusion Criteria (C,P,S)		Current Month	Prior Month	Year-to-Date (YTD)	2017 YTD	Avg YTD, Prior 3 Years	2017 Total
Amebiasis	C	1	1	5	3	6.0	10
Botulism (Foodborne, Infant, Wound, Other)	C,P	0	4	8	3	2.0	8
Brucellosis	C,P	0	1	1	3	1.7	5
Campylobacteriosis	C,P	71	42	253	365	290.3	883
Chickenpox, Hospitalization or Death	C,P	0	0	0	1	1.0	3
Chikungunya	C,P	1	0	1	1	0.7	2
Coccidioidomycosis	C	14	20	122	74	63.7	313
Cryptosporidiosis	C,P	7	3	22	14	9.3	54
Dengue Virus Infection	C,P	0	0	2	7	5.3	12
Encephalitis, All	C	2	5	21	23	29.7	43
Giardiasis	C,P	14	18	105	148	124.0	317
Hepatitis A, Acute	C	2	2	21	171	62.0	576
Hepatitis B, Acute	C	0	1	5	7	4.3	13
Hepatitis B, Chronic	C,P	72	70	359	387	361.3	868
Hepatitis C, Acute	C,P	0	0	1	1	0.7	4
Hepatitis C, Chronic	C,P	267	368	1,606	1,004	1,134.0	3,098
Legionellosis	C	5	2	21	33	24.3	66
Listeriosis	C	1	0	3	4	5.0	15
Lyme Disease	C,P	3	2	6	5	2.0	21
Malaria	C	1	2	4	2	3.0	8
Measles (Rubeola)	C	0	0	0	2	3.3	2
Meningitis, Aseptic/Viral	C,P,S	9	10	38	51	51.0	188
Meningitis, Bacterial	C,P,S	2	6	24	13	16.0	39
Meningitis, Other/Unknown	C	4	1	8	16	15.0	34
Meningococcal Disease	C,P	0	0	3	0	0.7	1
Mumps	C,P	0	0	3	6	6.3	15
Pertussis	C,P,S	45	72	353	472	391.3	1,161
Rabies, Animal	C	0	2	4	8	4.7	16
Rocky Mountain Spotted Fever	C,P	0	0	0	1	0.7	3
Salmonellosis (Non-Typhoid/Non-Paratyphoid)	C,P	41	40	206	161	162.0	576
Shiga toxin-Producing *E. coli* (including O157)	C,P	7	8	30	11	14.0	288
Shigellosis	C,P	23	16	96	89	64.3	334
Typhoid Fever	C,P	0	0	0	2	2.0	2
Vibriosis	C,P	2	2	6	14	11.7	50
West Nile Virus Infection	C,P	0	0	0	0	0.0	2
Yersiniosis	C,P	3	2	11	23	11.7	54
Zika Virus	C,P	2	0	3	7	7.0	21

Case counts are provisional and subject to change as additional information becomes available. Cases are grouped into calendar months and calendar years on the basis of the earliest of the following dates: onset, lab specimen collection, diagnosis, death, and report received. Counts may differ from previously or subsequently reported counts due to differences in inclusion or grouping criteria, late reporting, or updated case information. Inclusion criteria (C,P,S = Confirmed, Probable, Suspect) based on Council of State and Territorial Epidemiologists/Centers for Disease Control and Prevention (CSTE/CDC) surveillance case criteria.

Figure 5. Select Enteric Infections by Month
June 2017 – May 2018

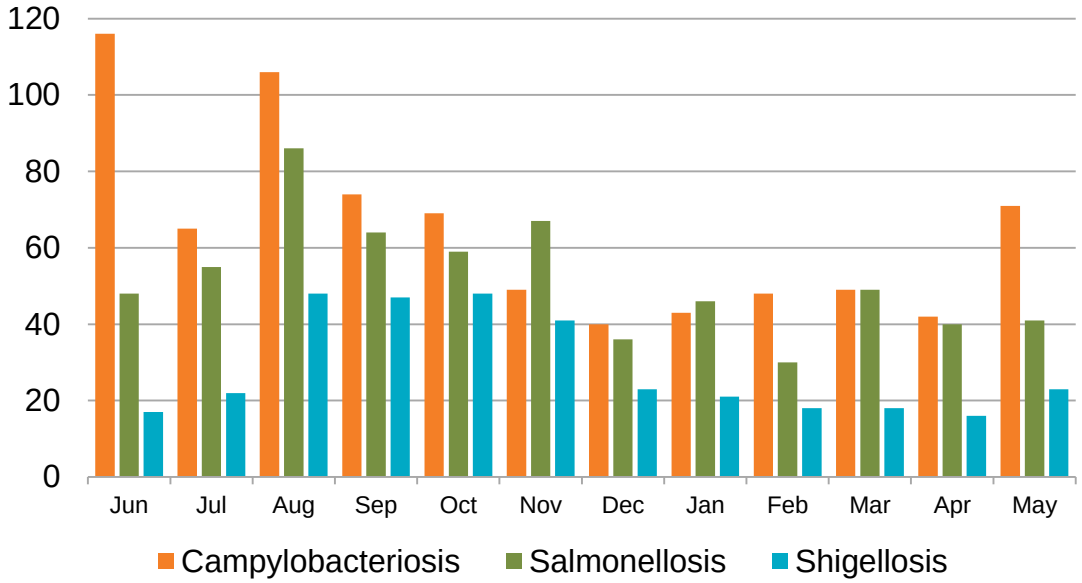


Figure 6. Select Vaccine-Preventable Infections by Month
June 2017 – May 2018

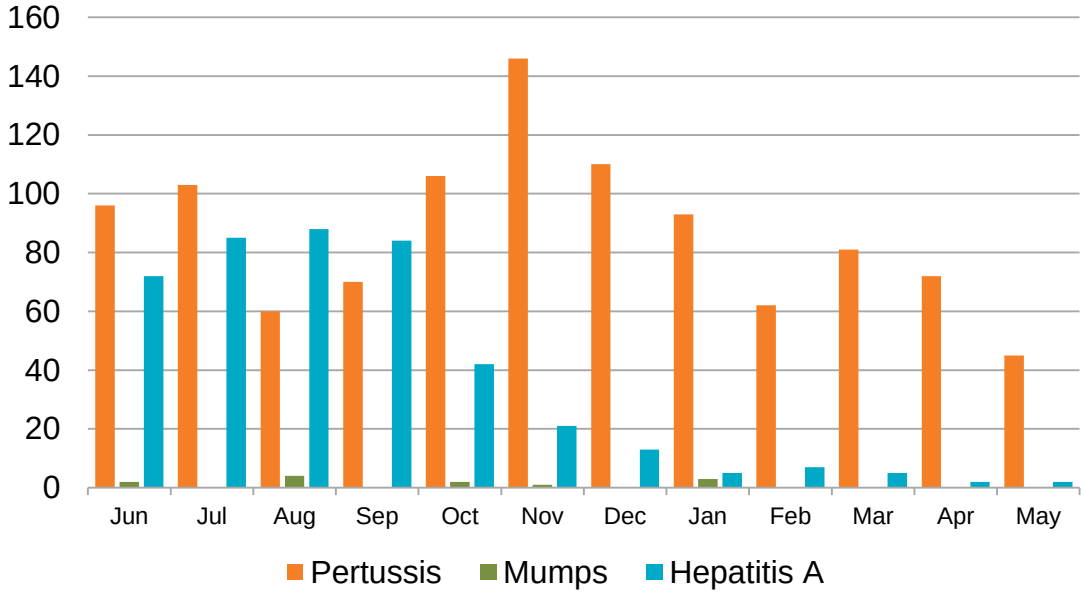


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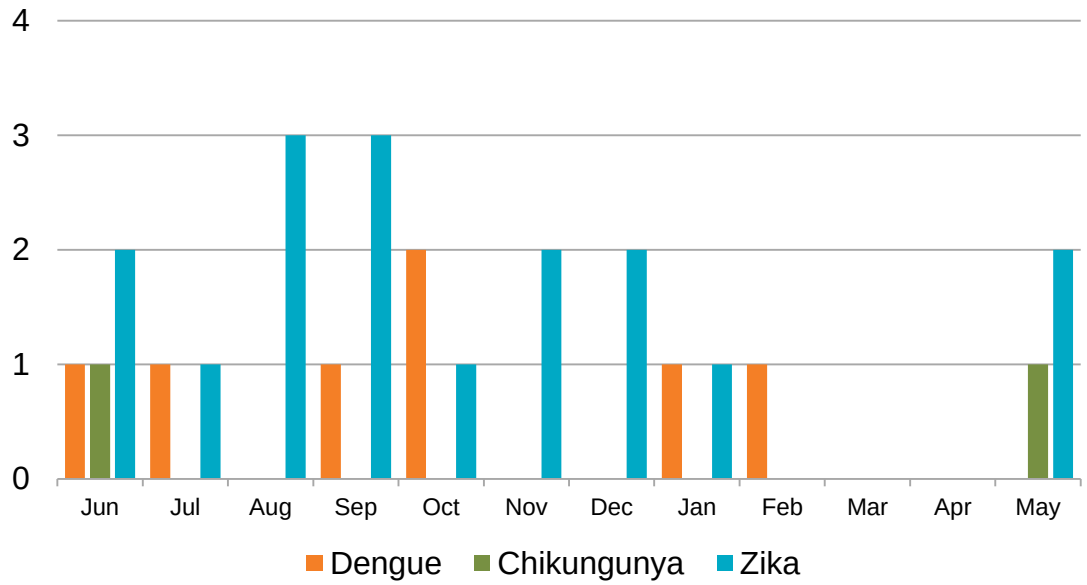
Figure 7. Select Vector-Borne Infections by Month
June 2017 – May 2018



All of these dengue, chikungunya, and Zika virus cases are travel-associated. For additional information on Zika cases, see the HHSA Zika Virus webpage. ***Case counts are provisional and subject to change as additional information becomes available.*** Cases are grouped into calendar months and calendar years on the basis of the earliest of the following dates: onset, lab specimen collection, diagnosis, death, and report received. Counts may differ from previously or subsequently reported counts due to differences in inclusion or grouping criteria, late reporting, or updated case information. Inclusion criteria (C,P,S = Confirmed, Probable, Suspect) based on Council of State and Territorial Epidemiologists/Centers for Disease Control and Prevention (CSTE/CDC) surveillance case criteria.

Disease Reporting in San Diego County

San Diego County communicable disease surveillance is a collaborative effort among Public Health Services, hospitals, medical providers, laboratories, and the San Diego Health Connect Health Information Exchange (HIE). The data presented in this report are the result of those efforts.

Reporting is crucial for disease surveillance and detection of disease outbreaks. Under the California Code of Regulations, Title 17 (Sections 2500, 2505, and 2508), public health professionals, medical providers, laboratories, schools, and others are mandated to report more than 80 diseases or conditions to San Diego County Health and Human Services Agency.

To report a communicable disease, contact the Epidemiology Program by phone at (619) 692-8499 or download and print a Confidential Morbidity Report form and fax it to (858) 715-6458. For urgent matters on evenings, weekends or holidays, dial (858) 565-5255 and ask for the Epidemiology Program duty officer. For more information, including a complete list of reportable diseases and conditions in California, visit the Epidemiology Program website, www.sdepi.org.

Tuberculosis, sexually transmitted infections, and HIV disease are covered by other programs within Public Health Services. For information about reporting and data related to these conditions, search for the relevant program on the Public Health Services website, http://www.sandiegocounty.gov/content/sdc/hhsa/programs/phs.html.