

## *E. coli* O157:H7

*E. coli* O157:H7 is a Class B Disease and must be reported to the state within one business day.

### Epidemiology

Enterohemorrhagic *Escherichia coli* (EHEC) or *E. coli* O57:H7 are bacteria that produce toxins (shiga-toxins) that cause illness. *E. coli* O157:H7 has a bovine reservoir and can be transmitted by undercooked ground beef and unpasteurized milk. These bacteria can also be spread from person-to-person by fecal-oral transmission, with person-to-person transmission most commonly being seen in families, child care centers and custodial institutions. Outbreaks from contaminated food and water have also occurred.

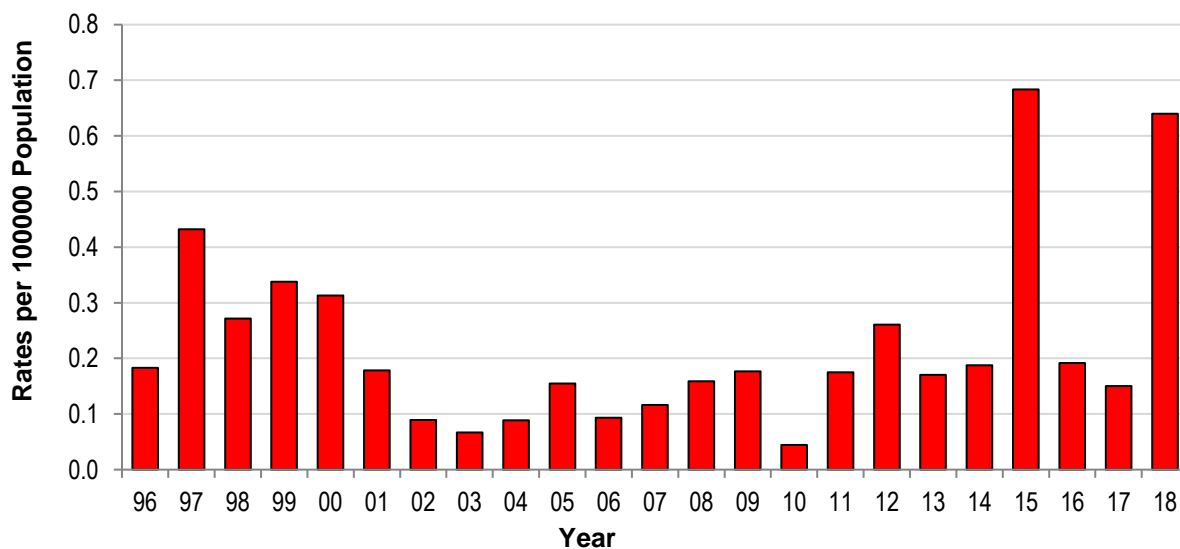
*E. coli* O157:H7 exists, at least intermittently, in both dairy and beef herds in the majority of cattle farms across the United States. Typically, O157 is detectable in the feces of fewer than 5% of cattle in the U.S. at any point in time. Despite this low detection rate, 60% of retail ground beef contains Shiga-Toxin producing *E. coli* (STEC). This is due in part to the way hamburger meat is produced. Hamburger meat is processed in bulk from a large number of animals. Up to a hundred cows may contribute to a single pack of hamburgers.

Symptoms of *E. coli* infection include diarrhea that ranges from mild and non-bloody to stools that are virtually all blood but contain no fecal leukocytes. Fever is not usually present.

### Incidence

*E. coli* O157:H7 became reportable in Louisiana in 1996. The number of cases ranged from eight to almost 20 per year in the late 90s then decreased in recent years to less than 12, except for during outbreaks in 2015 and 2018 (Figure 1).

Figure 1: *E. coli* O157:H7 incidence rates - Louisiana, 1996-2018



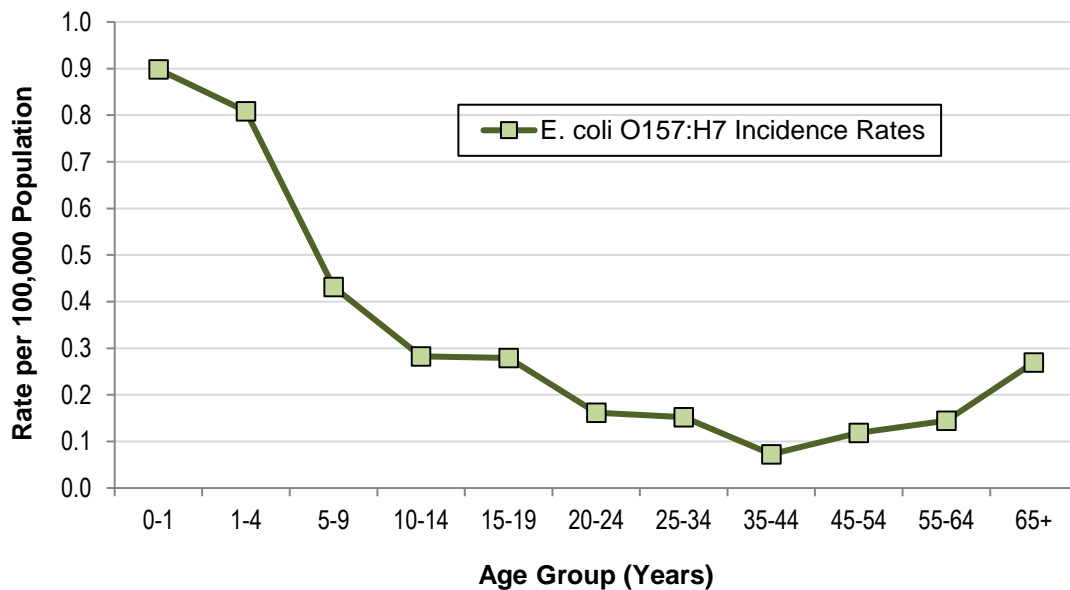
The most recent data (2018) from FoodNet\* states shows a national incidence rate of all STEC infections to be 5.88 per 100,000 population. The incidence rate of *E.coli* O157:H7 infections for Louisiana in 2018 was 0.64 per 100,000 population.

\* *FoodNet* is a collaborative project of the CDC, 10 EIP sites, the U.S. Department of Agriculture (USDA), and the Food and Drug Administration (FDA).

## Age Group Distribution

The age group distribution shows a very high rate among infants and young children (Figure 2). There is no difference in incidence rates between males and females.

Figure 2: *E.coli* O157:H7 average annual incidence rates by age - Louisiana, 1996-2018



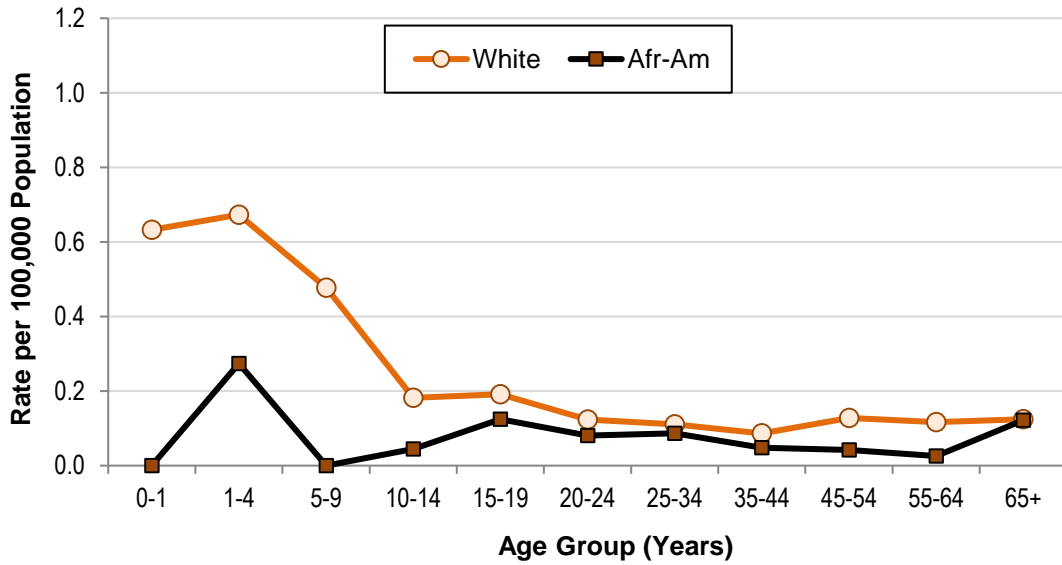
The highest rates are observed among infants who are not exposed to undercooked meat. These cases result from fecal-oral cross contamination when infants are fed. Detection is higher among infants than among older children and adults because infants with diarrhea are more likely to be brought to medical care and have stool cultured.

Those 65 years old and older are at a higher risk for complications as a result of an *E. coli* infection.

## Race Distribution

The race distribution shows a large discrepancy by race, with White infants and children having higher rates compared to African-Americans. These rates of *E. coli* O157:H7 are more reflective of diagnosis of diarrhea and access to medical care rather than true incidence (Figure 3).

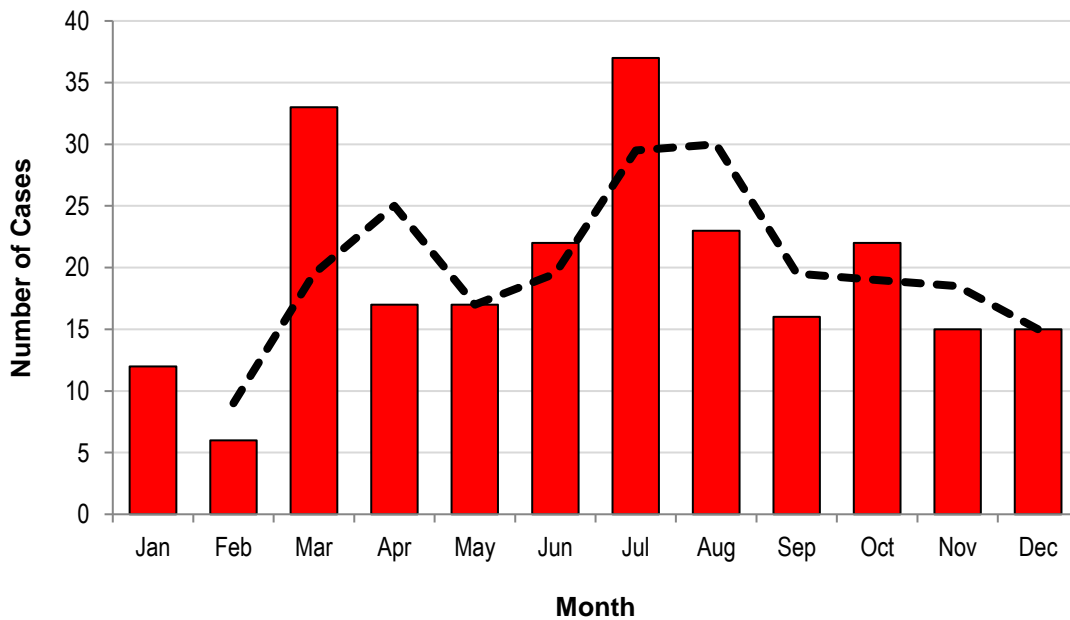
Figure 3: *E. coli* O157:H7 average incidence rates by race and age - Louisiana, 1996-2018



### Seasonal Distribution

Typically the seasonal distribution of *E. coli* infections shows a higher number of cases during the summer months. Data from 1996 to 2018 shows an increase in cases from March to December in Louisiana (Figure 4), the peaks in March and July are due to outbreaks.

Figure 4: *E. coli* O157:H7 total cases by month - Louisiana, 1996-2018



## Geographical Distribution

The geographic distribution of *E. coli* O157:H7 cases is a reflection of reporting patterns from medical providers (Table).

**Table:** Average incidence rate of *E. coli* O157:H7 infections per 100,000 population by parish Louisiana, 1996-2018

| Parish           | Inc. Rate<br>1996-2018 | Parish           | Inc. Rate<br>1996-2018 |
|------------------|------------------------|------------------|------------------------|
| Acadia           | 0.07                   | Madison          | 0.00                   |
| Allen            | 0.00                   | Morehouse        | 0.14                   |
| Ascension        | 0.19                   | Natchitoches     | 0.22                   |
| Assumption       | 0.73                   | Orleans          | 0.15                   |
| Avoyelles        | 0.31                   | Ouachita         | 0.34                   |
| Beauregard       | 0.00                   | Plaquemines      | 0.18                   |
| Bienville        | 0.00                   | Point Coupee     | 0.18                   |
| Bossier          | 0.16                   | Rapides          | 0.53                   |
| Caddo            | 0.12                   | Red River        | 0.00                   |
| Calcasieu        | 0.30                   | Richland         | 0.82                   |
| Caldwell         | 0.00                   | Sabine           | 0.18                   |
| Cameron          | 0.54                   | St. Bernard      | 0.28                   |
| Catahoula        | 0.00                   | St. Charles      | 0.50                   |
| Claiborne        | 0.00                   | St. Helena       | 0.40                   |
| Concordia        | 0.00                   | St. James        | 0.39                   |
| Desoto           | 0.00                   | St. John         | 0.00                   |
| East Baton Rouge | 0.28                   | St. Landry       | 0.10                   |
| East Carroll     | 0.00                   | St. Martin       | 0.09                   |
| East Feliciana   | 1.86                   | St. Mary         | 0.31                   |
| Evangeline       | 0.00                   | St. Tammany      | 0.38                   |
| Franklin         | 0.00                   | Tangipahoa       | 0.16                   |
| Grant            | 0.00                   | Tensas           | 0.00                   |
| Iberia           | 0.00                   | Terrebonne       | 0.16                   |
| Iberville        | 0.00                   | Union            | 0.38                   |
| Jackson          | 0.27                   | Vermilion        | 0.08                   |
| Jefferson        | 0.13                   | Vernon           | 0.08                   |
| Jeff. Davis      | 0.13                   | Washington       | 0.37                   |
| La Salle         | 0.19                   | Webster          | 0.00                   |
| Lafayette        | 0.49                   | West Baton Rouge | 0.57                   |
| Lafourche        | 0.18                   | West Carroll     | 0.00                   |
| Lincoln          | 0.00                   | West Feliciana   | 0.56                   |
| Livingston       | 0.24                   | Winn             | 0.26                   |

## 2015 Outbreak

In March of 2015, the Louisiana Department of Health's (LDH) Office of Public Health's (OPH) Infectious Disease Epidemiology Section (IDEpi) was notified about a possible gastrointestinal illness outbreak amongst students at a school in Louisiana. Fifteen students sought medical care and reported diarrhea and abdominal pain, 12 of whom were hospitalized. Based on onset times, ten were identified as primary cases and five were possible secondary cases. Eleven stool samples tested positive for *E.coli* O157 at the State Public Health Laboratory. Cases were interviewed and a case control study was conducted. Case histories were compared and multiple environmental samples were taken, including school food, water, and sporting event exposures; no common and unique exposure could be identified. It is likely that this outbreak was caused by a one-time exposure to a limited group of individuals over a short period of time.

## 2018 Outbreak

In July of 2018, the Louisiana Department of Health's (LDH) Office of Public Health's (OPH) Infectious Disease Epidemiology Section (IDEpi) outbreak of *E. coli* O157 at a nursing home. Three residents were hospitalized with *E. coli* O157 and subsequently 4 additional stool samples were submitted to the State Public Health Laboratory and tested positive for *E. coli* O157. Based on onset times 13 were identified as primary cases and 2 were possible secondary cases. The facility was inspected and they were given food safety recommendations and cleaning guidelines.

## Other *E.coli*

Most strains of *E.coli* are normal, harmless inhabitants of the intestinal tract.

There are a few Enterohemorrhagic *E.coli* (EHEC) strains beyond O157:H7, e.g., *E.coli* O26:H11. All of these strains produce cytotoxins resembling those found in *Shigella dysenteriae*, type 1. These toxins are referred to as shiga-like toxins or verotoxins.

Enteroinvasive *E.coli* (EIEC) strains include these specific serotypes of *E.coli*: O28, O112, O115, O124, O136, O143, O144, O147, O152, O164 and O167. The EIEC strains resemble *Shigella* biochemically, and can invade intestinal epithelial cells.

Enteropathogenic *E.coli* (EPEC) strains traditionally have been defined as members of specific *E.coli* serotypes that have been epidemiologically incriminated as causes of infantile diarrhea. They include the following somatic serogroups: O44, O55, O86, O111, O114, O119, O125, O126, O127, O128, O142 and O158.

More recently, EPEC has been defined according to specific virulence properties. EPEC strains adhere to intestinal mucosa and produce a characteristic lesion in the gastrointestinal tract, termed an attaching and effacing lesion. EPEC do not produce enterotoxins and are not invasive.

Enterotoxigenic *E.coli* (ETEC) strains colonize the small intestine without invading it and produce either, or both, heat-labile and/or heat-stable enterotoxins. Examples of these strains include O6:H16 and O8:H9.

In 2001, national surveillance began for shiga-toxin producing *E. coli* under the name of EHEC. The case definition changed from EHEC to STEC (shiga-toxin producing *E. coli*) in 2006 and serotype specific reporting was implemented. From 2004 to 2018, STEC cases in Louisiana have become evenly divided between shiga-toxin producing *E. coli* O157:H7 and *E. coli* non-O157:H7 (37.62% and 38.12% respectively). The remaining cases were not grouped (24.26%) (Figures 5 and 6).

Figure 5: Reported STEC cases by serotype - Louisiana, 2004-2018

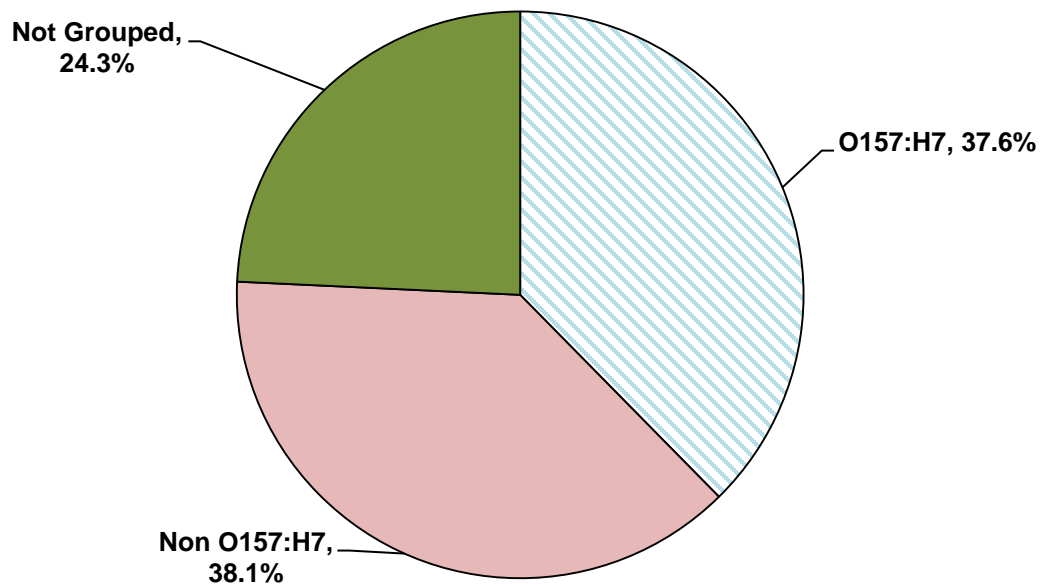


Figure 6: Incidence of STEC cases per 100,000 Population - Louisiana, 2004-2018

