WEST VIRGINIA 2015 ENTERIC DISEASE SURVEILLANCE REPORT

WEST VIRGINIA Department of Health & Human Resources
BUREAU FOR PUBLIC HEALTH

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Introduction

Eleven (11) enteric pathogens are reportable in West Virginia as per the West Virginia Reportable Disease Rule, 64 CSR 7. Cases of these reportable conditions are investigated by local health department (LHD) staff and reported to the West Virginia Department of Health and Human Resources, Bureau for Public Health, Division of Infectious Disease Epidemiology (DIDE) and subsequently the Centers for Disease Control and Prevention (CDC) via the West Virginia Electronic Disease Surveillance System (WVEDSS).

For this report the top four most commonly reported enteric pathogens (Campylobacteriosis, Giardiasis, Salmonellosis and Shiga toxin-producing *E. coli*) were selected for analysis and presented in alphabetical order.

Methods

Cases were ascertained according to the CDC National Notifiable Disease Surveillance System (NNDSS) case definitions in effect for 2015 as proposed by the Council of State and Territorial Epidemiologists (CSTE). Current case definitions can be found at: www.cdc.gov/nndss/conditions/search/.

Data were extracted from WVEDSS, then analyzed and summarized using Microsoft Excel. Data included case information for all cases of the four selected pathogens reported from 2011 through 2015 in West Virginia. The date the case investigation was started is used to determine year of report.

Age-specific population data was taken from 2010 census information found at: (www.census.gov/popest/data/state/asrh/2013/files/SC-EST2013-AGESEX-CIV.csv).

National enteric disease rates and incidences for 2015 were taken from: The Summary of Notifiable Infectious Diseases and Conditions — United States, 2015. MMWR Morb Mortal Wkly Rep 2017;64:1–143. DOI: dx.doi.org/10.15585/mmwr.mm6453a1.

Campylobacteriosis

Campylobacteriosis is one of the most common enteric bacterial infections in the United States and has recently become the most common enteric infection reported in West Virginia. It is caused by the bacterium *Campylobacter*. The illness is characterized by acute onset of diarrhea, vomiting, abdominal pain, fever, and malaise. Symptoms generally occur within two to five days of infection; although, some infected individuals may be asymptomatic and go undetected, but still transmit the bacteria. Campylobacteriosis is of worldwide epidemiologic importance due to the fecal-oral route of infection and the extensive reservoir of the organism in both wild and domestic animals. Many cases are thought to result from eating raw or undercooked poultry meat or through cross-contamination of uncooked or ready-to-eat foods.

Campylobacteriosis was not made a nationally notifiable condition until 2015, but has been reportable for many years in West Virginia. In 2015, West Virginia had a total 328 reported Campylobacteriosis cases: 135 confirmed and 193 probable cases (Figure 1, Table 1). The number of cases has nearly tripled between 2011 and 2015 (Figure 1). This steady increase in reporting of Campylobacteriosis coincides with increased use of culture-independent diagnostic tests (CIDT) for enteric bacteria among clinical laboratories. Due to evolving laboratory testing practices, the Campylobacteriosis case definition has changed several times over the past five years. The current 2015 case definition classifies cases as either confirmed or probable. A case is considered confirmed if *Campylobacteria* is cultured from a clinical specimen. Cases are considered probable if the pathogen is detected by a CIDT method. The suspect classification (clinically compatible cases with an epidemiological link to a confirmed case) was considered for case classification from 2012–2014. However, this category was incorporated into the probable classification in 2015.

In 2015, West Virginia's rate of 17.2 cases per 100,000 population was less than the national rate of 17.7 (Figure 3). Children under one year of age had the highest incidence of Campylobacteriosis (Figure 3, Figure 4). Infections occurred year-round, with peak incidences occurring in the summer and late fall months (Figure 2). The most frequently reported risk factors among West Virginia cases in 2015 were: consumption of untreated water (16.5%) and live poultry and/or reptile contact (13.7%) (Table 2). Twenty-six (26) cases reported being in a high-risk occupation/setting. High risk job occupations and settings are those that increase the risk of disease transmission or outbreak. These occupations and settings include: individuals who work or are associated with daycares/schools, group living centers and healthcare facilities, as well as food handlers.

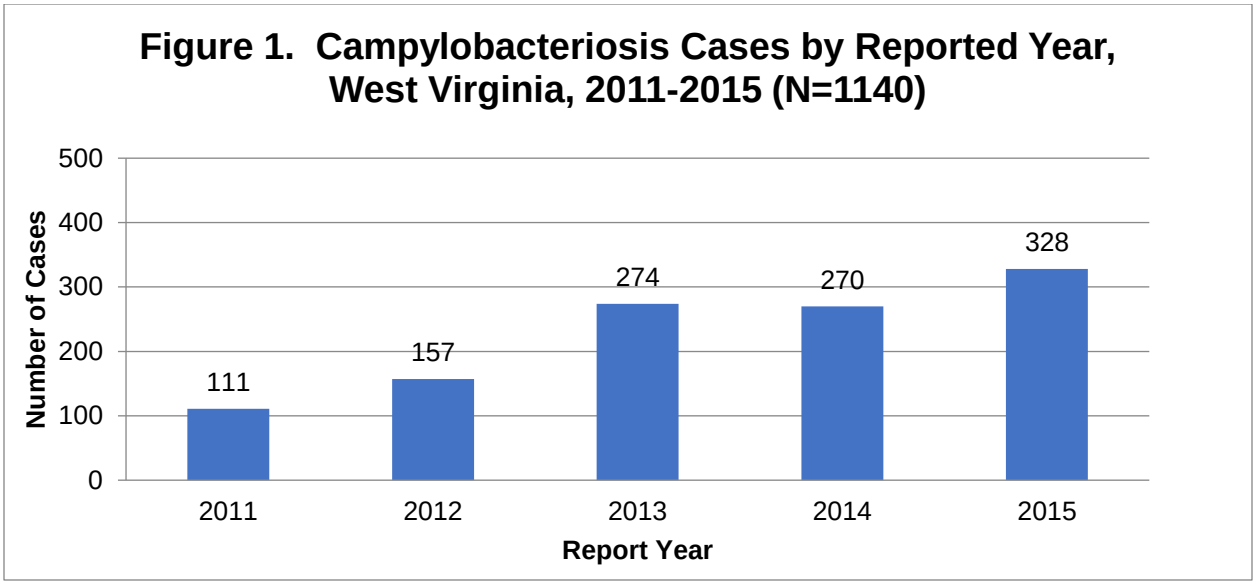


Table 1. Campylobacteriosis Cases by Reported Year and Case Status, West Virginia, 2011-2015 (N=1140)*

Case Status	2011	2012	2013	2014	2015
Confirmed	110	147	143	140	135
Probable	1	10	1	5	193
Suspect	--	0	130	125	--
Total	**111**	**157**	**274**	**270**	**328**

*Case definition changed in 2012 and 2015.

Figure 2. Campylobacteriosis Cases by Month of Onset, West Virginia, 2015 (N=328)

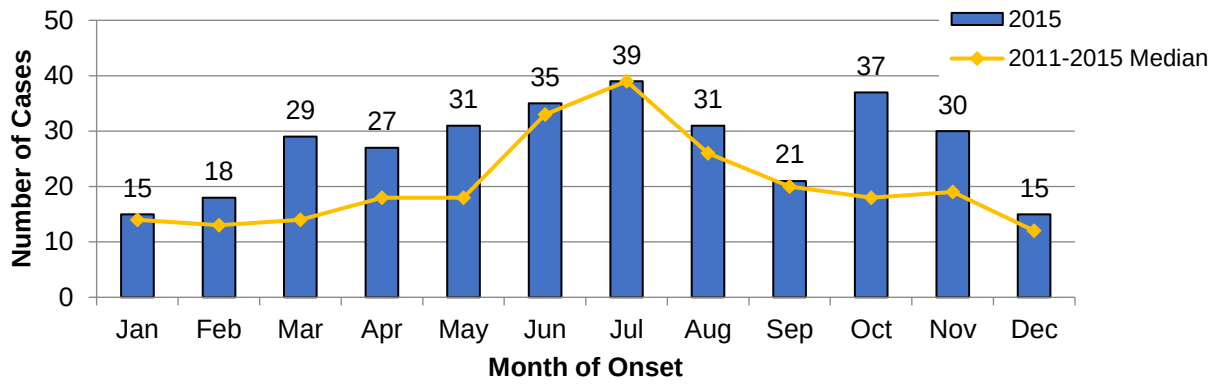
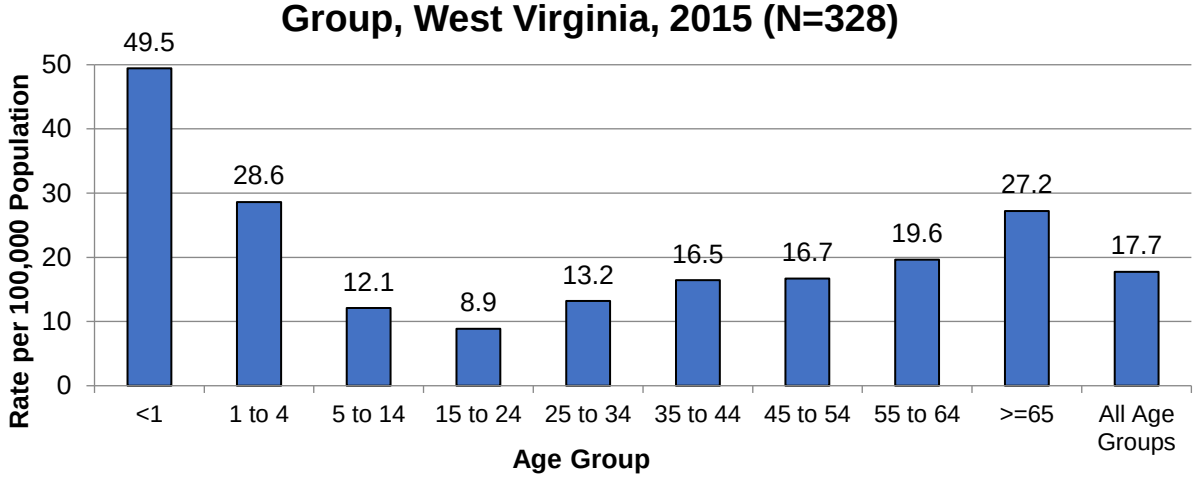


Figure 3. Incidence of Campylobacteriosis by Age Group, West Virginia, 2015 (N=328)



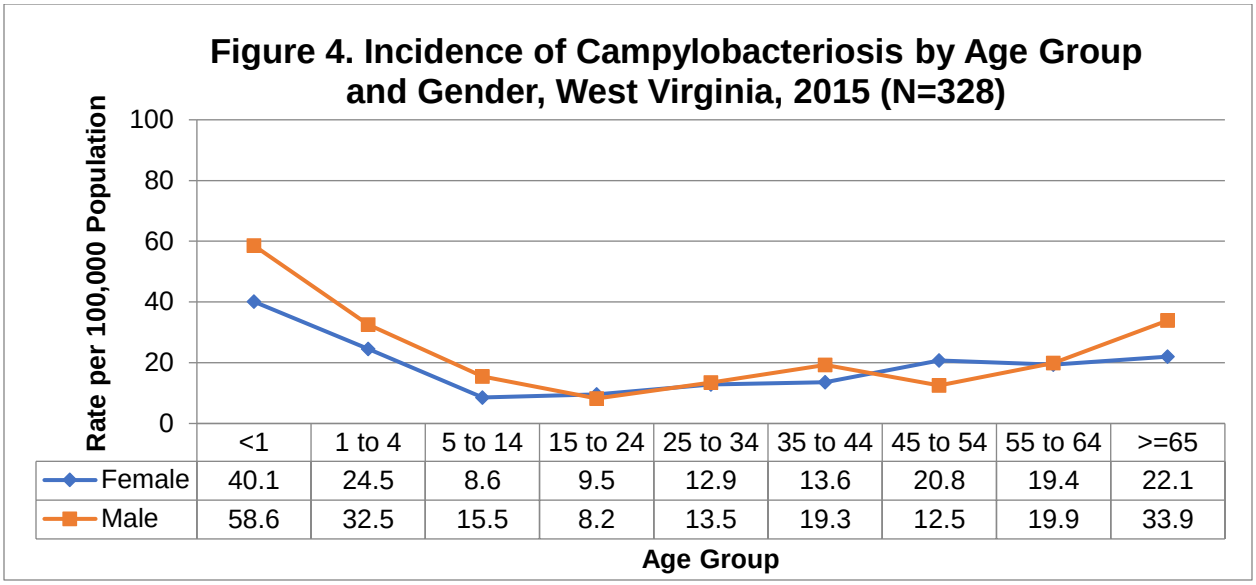


Table 2. Most Common Risk Factors Reported by Campylobacteriosis Cases, West Virginia, 2015 (N=238)

Exposure/Risk Factor	Number of Cases*	Percent of Cases
Consumed untreated water	54	16.5
Live poultry/reptile contact	45	13.7
Recreational water contact	35	10.7
Consumed undercooked poultry	8	2.4

*Multiple exposures/risk factors could be reported per case. Risk factor information was not obtained for all cases, including cases lost to follow-up.

Giardiasis

Giardia intestinalis, the flagellated protozoan also known as G. *lamblia*, or *G. duodenalis*, is the most commonly identified parasitic pathogen in the United States. Humans are the primary reservoir for the giardiasis but the pathogen can infect both wild and domesticated animals. Human infections occur primarily through person-to-person contact or through ingestion of fecally contaminated food or water. As little as ten or fewer *Giardia* cysts can cause infection. Cysts can be excreted in stool intermittently for weeks or months, resulting in a prolonged period of communicability. Children in child care settings, their close contacts, and men who have sex with men are at greatest risk of infection and are commonly involved in giardiasis outbreaks. Because many human cases follow person-to-person transmission, rapid detection and treatment of disease, as well as good contact management practices, are necessary to prevent further spread of disease.

Symptomatic giardiasis patients report chronic diarrhea, abdominal cramps, bloating, frequent loose pale greasy stools, fatigue, and weight loss. However, asymptomatic cases are common. A confirmed case is identified through the detection of the protozoan by direct microscopic observation or by CIDT in a clinical specimen. Cases are considered probable when no laboratory testing has been completed, but a patient is symptomatic and has an epidemiological link to a confirmed case.

In 2015, the reported incidence of giardiasis in West Virginia was 3.6 cases per 100,000 population (Figure 5). This is below the United States rate of 5.7 cases per 100,000 population for the same year. The number of confirmed cases in West Virginia remained at 66 and has fluctuated very little over the past five years (Table 3). West Virginians age 25-34 had the highest incidence of giardiasis at 5.0 cases per 100,000 population (Figure 7). When considering gender and age, male children age one to four years have the highest incidence, with 7.0 cases per 100,000 population (Figure 8). Eight (8) giardiasis cases reported being in a high-risk job occupation/group setting.

Pet exposure was the most commonly reported risk factor for the disease at 62.1% (Table 4). In 2015, as was expected, rates of infection were higher in the summer months. Increase transmission of *Giardia* is usually linked to an outdoor activity in or near recreational and untreated water sources. In April, there was an increase in the number of cases above the expected baseline (five-year median of the reported number of cases) for the month (Figure 6). Further investigation into the increase did not determine a cause.

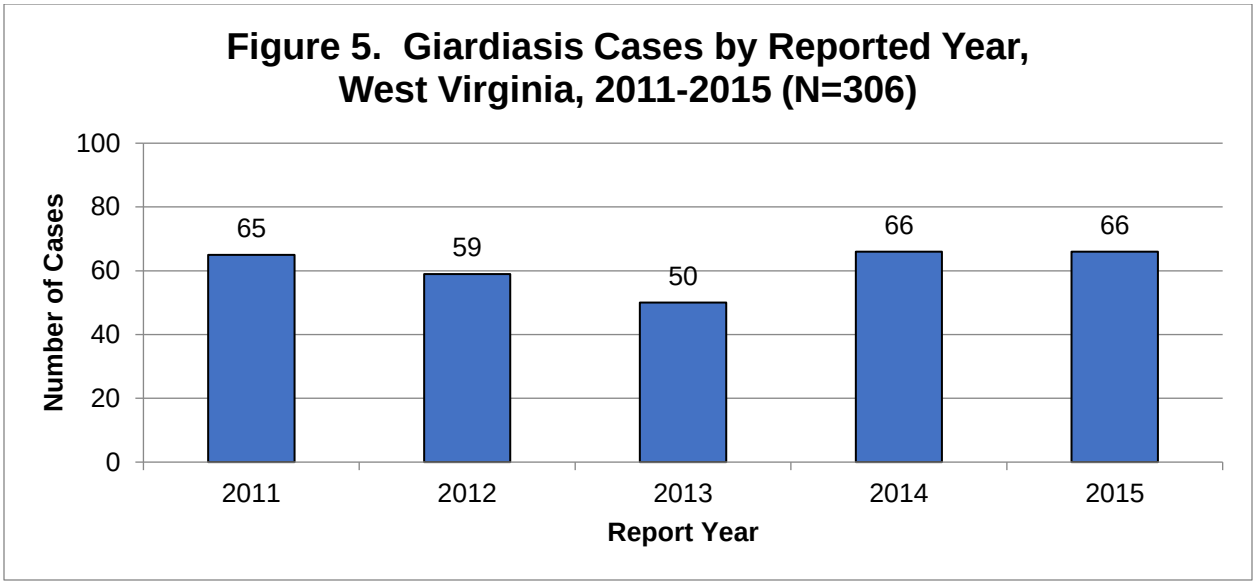
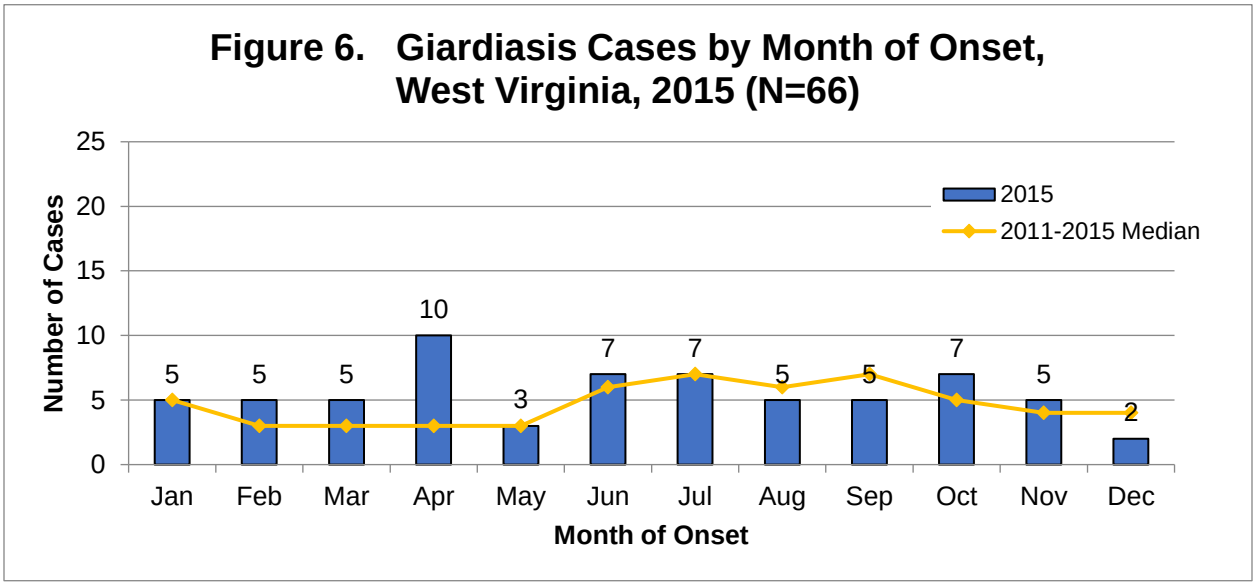
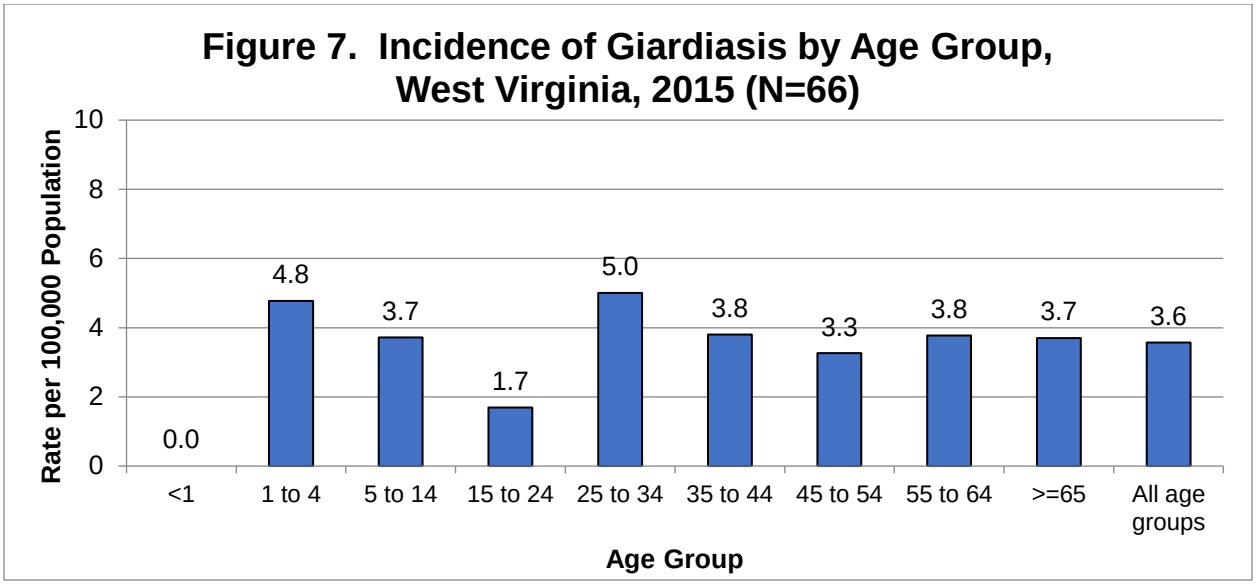
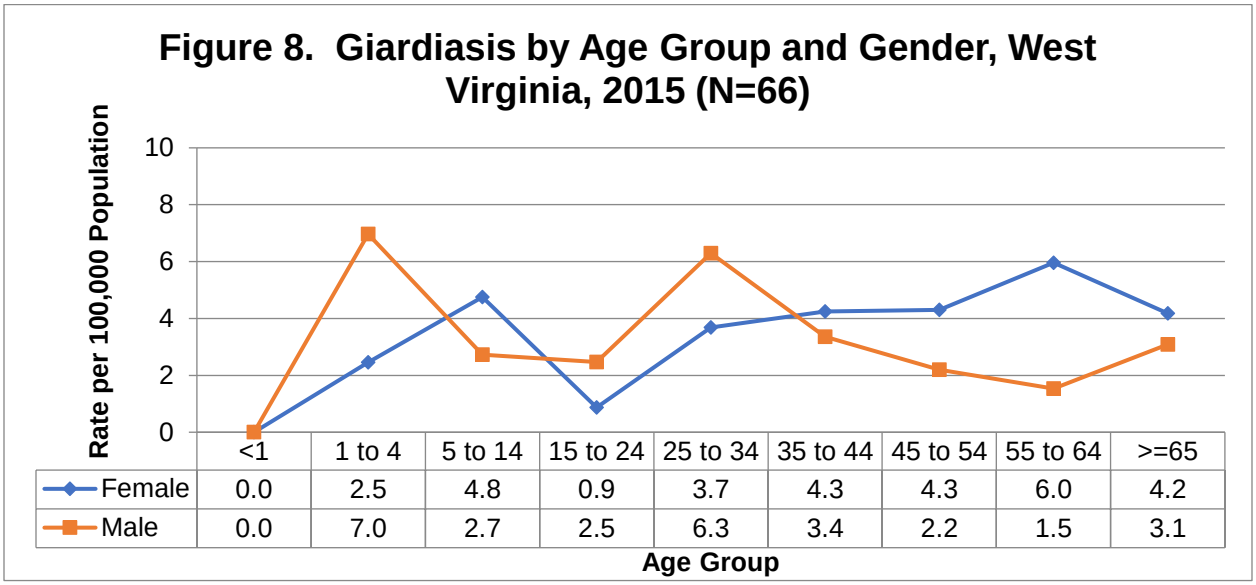


Table 3. Number of Giardiasis Cases by Year of Report and Case Status, West Virginia, 2011-2015 (N=306)

Case Status	2011	2012	2013	2014	2015
Confirmed	61	57	50	66	66
Probable	4	2	0	0	0
Total	65	59	50	66	66







	<1	1 to 4	5 to 14	15 to 24	25 to 34	35 to 44	45 to 54	55 to 64	>=65
Female	0.0	2.5	4.8	0.9	3.7	4.3	4.3	6.0	4.2
Male	0.0	7.0	2.7	2.5	6.3	3.4	2.2	1.5	3.1

Table 4. Most Common Factors Reported by Giardiasis Cases, West Virginia, 2015 (N=328)

Exposure/Risk Factor	Number of Cases*	Percent of Cases
Pet exposure	41	62.1
Recreational water use	16	24.2
Consuming untreated water	12	18.2
Out-of-state travel	12	18.2

*Multiple exposures/risk factors could be reported per case. Risk factor information was not obtained for all cases, including cases lost to follow-up.

Salmonellosis

Salmonellosis is caused by bacterium *Salmonella entererica*. The illness is characterized by acute abdominal pain, diarrhea, and often fever, which usually begins 12 to 36 hours after exposure. Excretion of *Salmonella* may persist for several days or even months beyond the acute phase of the illness. Some infected individuals can become asymptomatic carriers and shed the bacteria for prolonged periods in their stool. There are more than 2,500 serotypes (serovars) of Salmonella. Serotypes may be associated more with certain types of animals, foods, or geographic locations, while other serotypes can be associated with varying degrees of virulence. The serotype *Salmonella* Typhi may cause typhoid fever—a potentially life-threating illness that develops seven to 14 days after the initial onset of Salmonellosis. Symptoms can include bacteremia, fever, headaches, rash, and altered mental status.

A wide range of domestic and wild animals are carriers of *Salmonella*. These include poultry, swine, cattle, rodents, reptiles, dogs and cats. Ingestion of contaminated food (mostly of animal origin) is the predominant mode of transmission. Raw or undercooked food items – such as eggs, milk, meat and poultry – have been implicated as common sources in salmonellosis outbreaks, along with produce and other processed food items. In recent years, numerous large outbreaks have also been linked to contact with high-risk animals including live poultry in backyard flocks, reptiles (especially small turtles) and amphibians.

West Virginia had 202 reported cases of salmonellosis in 2015 (Figure 11). Except for the year 2013, the number of cases has increased over the past five years. Most cases (96.5%) were reported as confirmed cases (Table 5). Confirmed cases are identified through culture-dependent laboratory methods. Probable cases are those identified by using CIDT methods.

The 2015 salmonellosis incidence in West Virginia was 10.9 per 100,000 population and is lower than the national incidence of 17.5 per 100,000 population for that year. Incidence of infection was highest among female children <1 year of age (70.2 cases per 1000,000 population) (Figure 13, Figure 14). Infection rates were highest during summer and early fall, with yearly peak incidence occurring in June (Figure 12). The most commonly (47.0%) reported risk factor for West Virginia was “consumption of fresh produce” (Table 6). Twenty-one (21) cases reported being involved in a high-risk job occupation/group settings.

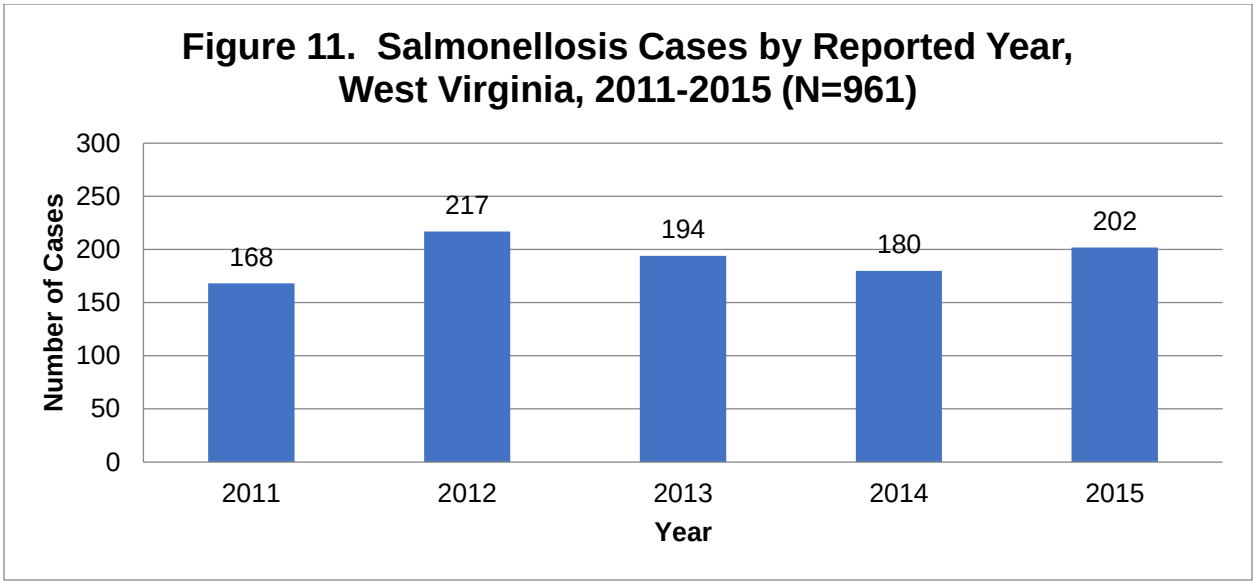


Table 5. Number of Salmonellosis Cases by Year of Report and Case Status, West Virginia, 2011-2015 (N=961)

Case Status	2011	2012	2013	2014	2015
Confirmed	164	213	188	172	195
Probable	4	4	6	8	7
Total	168	217	194	180	202

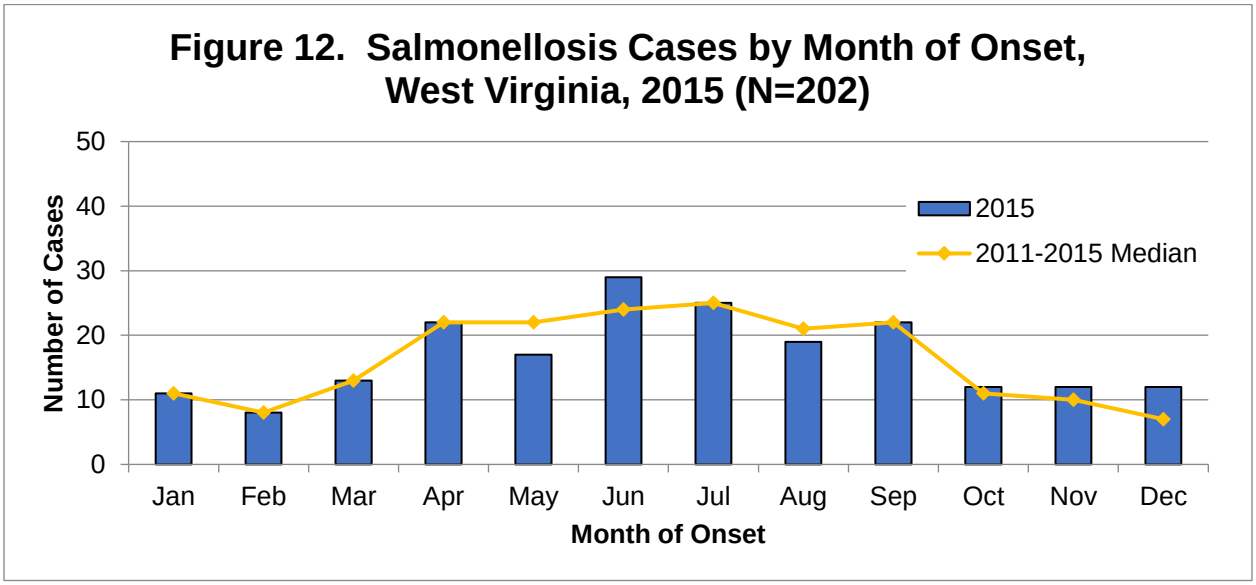


Figure 13. Incidence of Salmonellosis by Age Group, West Virginia, 2015 (N=202)

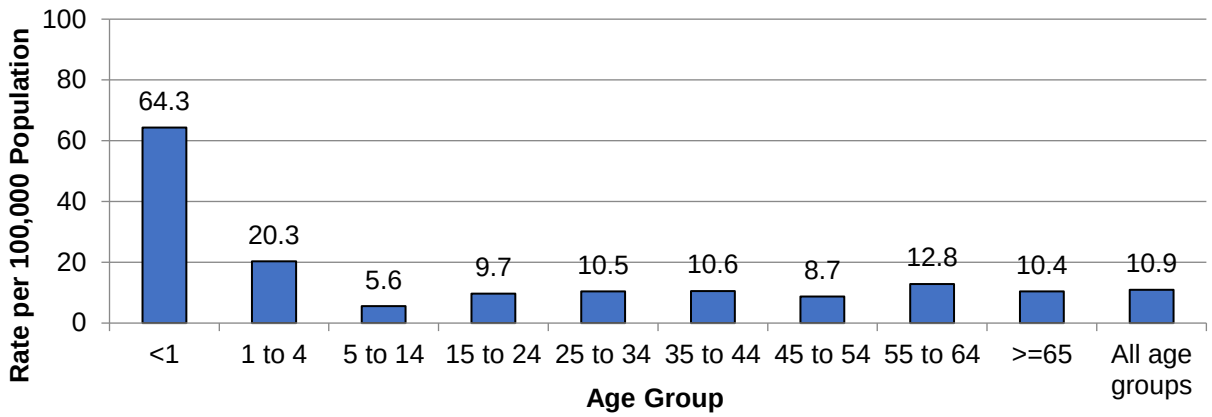
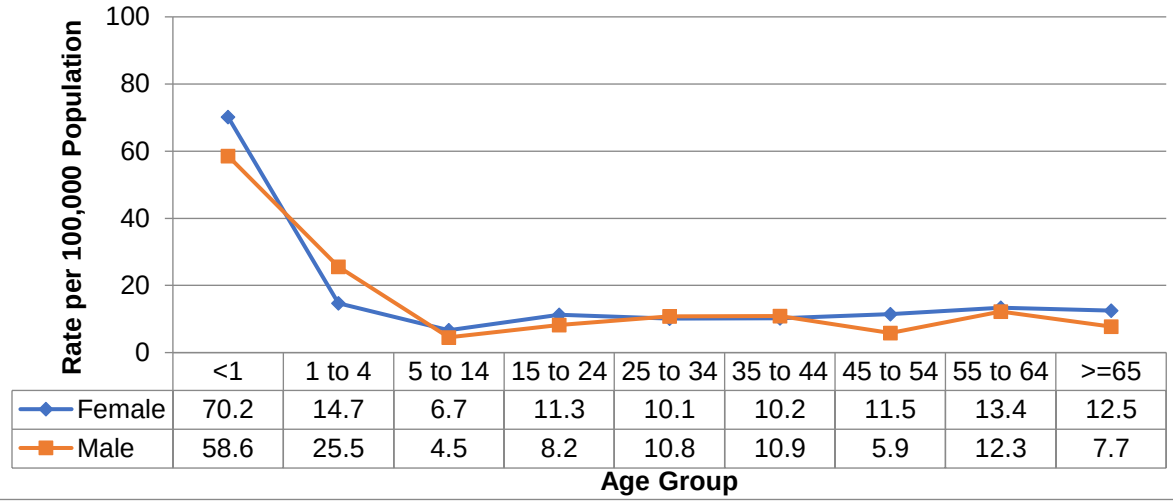


Figure 14. Incidnce Salmonellosis by Age Group and Gender, West Virginia, 2015 (N=202)



	<1	1 to 4	5 to 14	15 to 24	25 to 34	35 to 44	45 to 54	55 to 64	>=65
Female	70.2	14.7	6.7	11.3	10.1	10.2	11.5	13.4	12.5
Male	58.6	25.5	4.5	8.2	10.8	10.9	5.9	12.3	7.7

Table 6. Most Common Risk Factors Reported by Salmonellosis Cases, West Virginia, 2015 (N=202) *

Exposure/Risk Factor	Number of Cases	Percent of Cases
Consumed fresh produce	95	47.0
Out-of-state travel	45	22.3
Contact with farm animals	41	20.3
Consumed fresh shelled eggs	39	19.3

*Multiple exposures/risk factors could be reported per case. Risk factor information was not obtained for all cases, including cases lost to follow-up.

Shiga toxin-producing *Escherichia coli* (STEC) infections including *E.coli* O157

Shiga toxin-producing *E. coli*, the most notorious being *E. coli* O157, are one of the most dreaded causes of infectious gastroenteritis. Bloody diarrhea is a hallmark of this pathogen, but the real danger is post-diarrheal hemolytic uremic syndrome (HUS). Spread by the fecal-oral route, STEC has many animal reservoirs, the most important of which are ruminants: cattle, goats, sheep, deer, etc. Transmission often occurs from consumption of contaminated food or water, as well as direct person-to-person spread and environmental exposures. Mid-to-late summer is the peak season for STEC infections.

Public health actions to monitor, prevent, and control STEC infections are based on serogroup characterization. HUS is mostly associated with O157. Non-O157 STEC, a diverse group that varies in virulence, comprises approximately 50 other serogroups. Increased use of CIDT diagnostic tests in recent years has led to increased detection and reporting STEC infection. STEC produces Shiga toxins (*Stx*) (*Stx*1, *Stx*2, or both). In general, strains that produce certain types of *Stx*2 are the most virulent.

Confirmed cases are determined by bacterial culture of *E. coli* and detection of Shiga toxin production or *Stx* genes. Probable cases are classified by one of the following criteria: (1) STEC or *Stx* genes detected by CIDT in a clinical specimen; (2) isolation of O157 without the detection of *Stx*; (3) individuals who are symptomatic but have no laboratory evidence and have an epidemiological link to a confirmed or probable case of STEC. Suspect cases are those having the laboratory criteria of a case but lack clinical symptoms, or individuals having a diagnosis or HUS.

The number of STEC cases reported statewide more than doubled from 2011 to 2015 (Figure 15). In 2015, there were 46 reported STEC cases in West Virginia: 18 confirmed, five probable, 23 suspect (Table 7). The incidence of STEC cases was 2.5 per 100,000 population and was higher than the national incidence of 2.2 per 100,000 population in 2015 (Figure 17). Male children less than five years had the highest incidence of STEC (Figure 17, Figure 18). More cases were reported in summer and early fall with peak occurrence in July (Figure 16). The most commonly reported risk factor for West Virginia was “consumption of fresh fruits and vegetables” (Table 8).

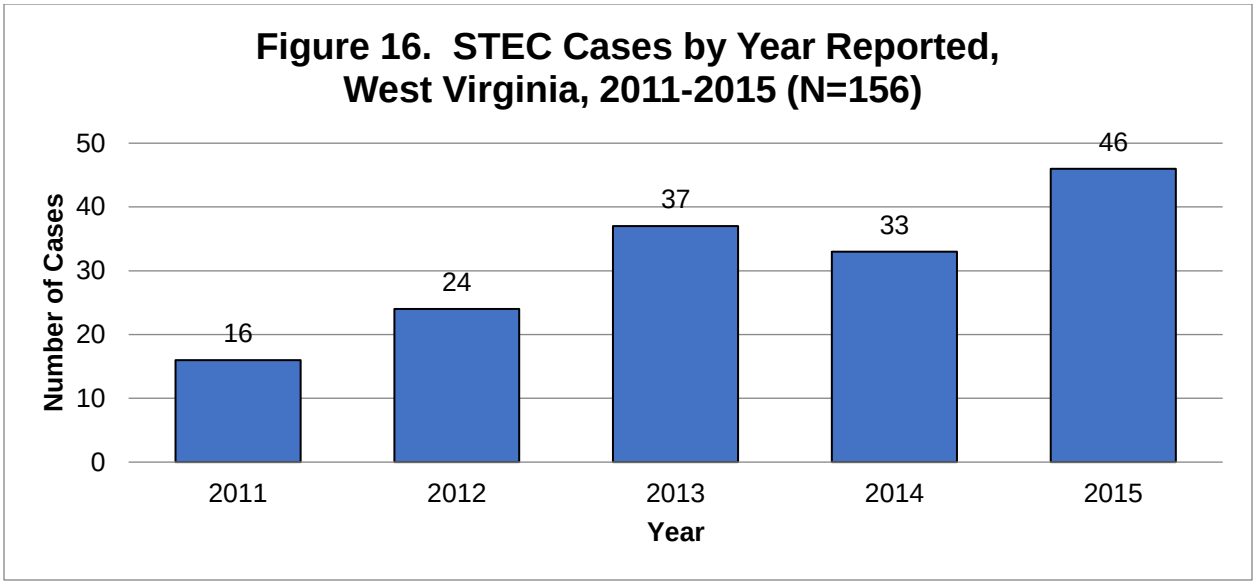


Table 7. Number of STEC Cases by Year of Report and Case Status, West Virginia, 2011-2015 (N=156)

Case Status	2011	2012	2013	2014	2015
Confirmed	8	17	31	19	18
Probable	3	1	4	1	5
Suspect	5	6	2	13	23
Total	**16**	**24**	**37**	**33**	**46**

Figure 17. STEC Cases by Month of Onset, West Virginia, 2015 (N=46)

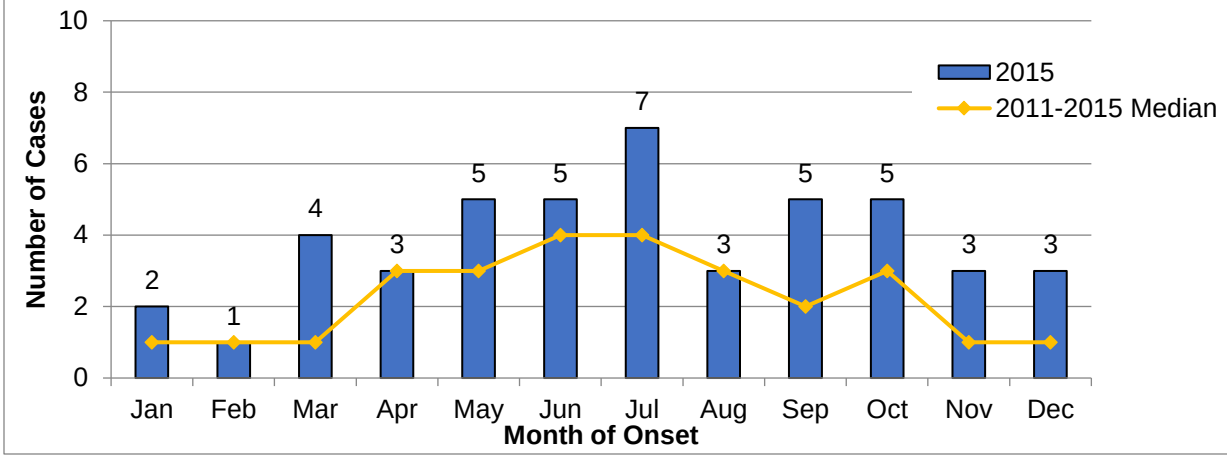
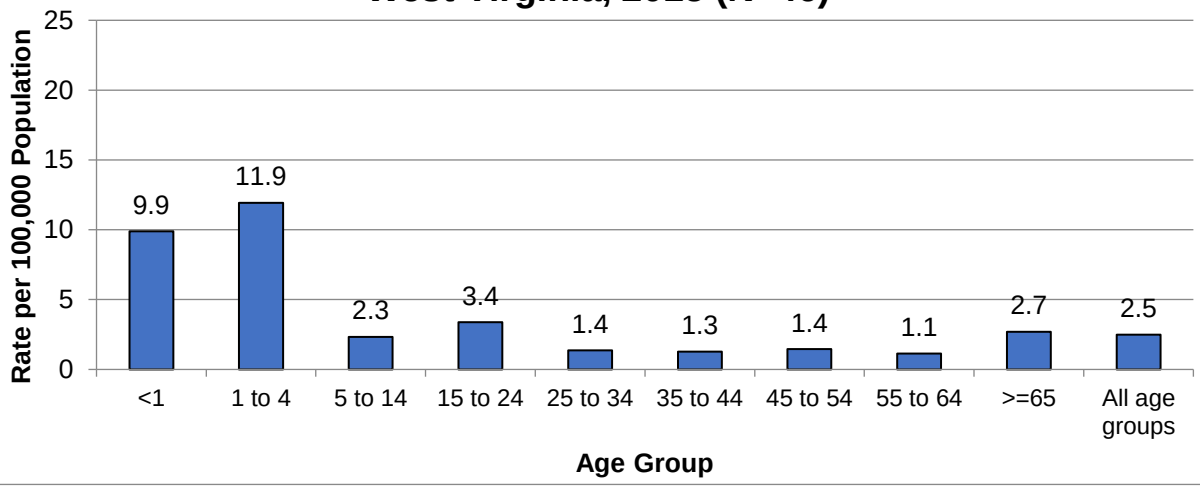


Figure 18. Incidence of STEC by Age Group, West Virginia, 2015 (N=46)



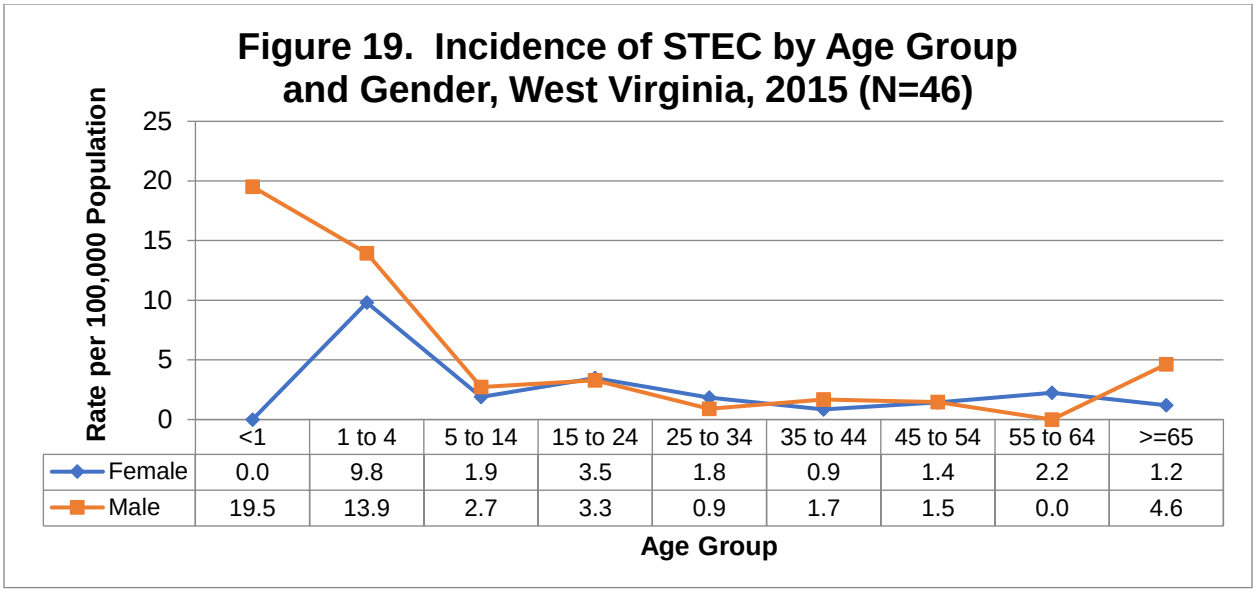


Table 8. Most Common Risk Factors Reported by STEC Cases, West Virginia, 2015 (N=328)

Exposure/Risk Factor	Number of Cases	Percent of Cases
Consumed fresh fruits or vegetables	25	51.0
Recreational water contact	10	20.4
Animal manure contact	7	14.3
Consumed raw red meat	4	8.2

*Multiple exposures/risk factors could be reported per case. Risk factor information was not obtained for all cases, including cases lost to follow-up.