

# Surveillance for Foodborne Disease Outbreaks United States, 2014: Annual Report



National Center for Emerging and Zoonotic Infectious Diseases  
Division of Foodborne, Waterborne, and Environmental Diseases



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**Surveillance for  
Foodborne Disease Outbreaks  
United States**

**2014 Annual Report**

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## Main Findings

- In 2014, 864 foodborne disease outbreaks were reported, resulting in 13,246 illnesses, 712 hospitalizations, 21 deaths, and 21 food recalls.
- Ground beef was the contaminated food or ingredient in five of the 25 multistate outbreaks. Four were caused by Shiga toxin-producing *E. coli* and 1 by *Salmonella*.
- Fish (43 outbreaks), chicken (23), and dairy (19, of which 15 were due to unpasteurized products) were the most common single food categories implicated. The most outbreak-associated illnesses were from seeded vegetables (e.g. cucumbers or tomatoes, 428 illnesses), chicken (354), and dairy (267).
- As reported in previous years, restaurants (485 outbreaks, 65% of outbreaks reporting a single location of preparation), specifically restaurants with sit-down dining (394, 53%), were the most commonly reported locations of food preparation.

## Background

Foodborne diseases due to known pathogens are estimated to cause about 9.4 million illnesses each year in the United States.<sup>1</sup> Although relatively few of these illnesses occur in the setting of a recognized outbreak, data collected during outbreak investigations provide insights into the pathogens and foods that cause illness. Public health officials, regulatory agencies, and the food industry can use these data to create control strategies along the farm-to-table continuum that target specific pathogens and foods.

An outbreak of foodborne disease is defined as the occurrence of two or more cases of a similar illness resulting from ingestion of a common food. Foodborne disease outbreaks are a nationally notifiable condition (<http://cymcdn.com/sites/www.cste.org/resource/resmgr/CSTENotifiableConditionListA.pdf>). CDC conducts surveillance of foodborne disease outbreaks in the United States through the Foodborne Disease Outbreak Surveillance System. Public health agencies

in all 50 states, the District of Columbia, and U.S. territories voluntarily submit reports of outbreaks investigated by their agencies using a Web-based reporting platform, the National Outbreak Reporting System (NORS) (<http://www.cdc.gov/nors/>). NORS also collects reports of enteric disease outbreaks caused by other transmission modes, including water, animal contact, person-to-person contact, environmental contamination, and unknown modes of transmission.

Agencies use a standard form ([http://www.cdc.gov/nors/pdf/NORS\\_CDC\\_5213.pdf](http://www.cdc.gov/nors/pdf/NORS_CDC_5213.pdf)) to report foodborne disease outbreaks. Data requested for each outbreak include the reporting state; date of first illness onset; number of illnesses, hospitalizations, and deaths; etiology; implicated food and ingredients; locations of food preparation; and factors contributing to food contamination (see appendix). The reporting form also requests the reason(s) a particular food is suspected as the source; five choices are provided. ([http://www.cdc.gov/nors/pdf/NORS\\_Guidance\\_5213-508c.pdf](http://www.cdc.gov/nors/pdf/NORS_Guidance_5213-508c.pdf)). Foods reported in multistate outbreaks are further classified as confirmed or suspected sources. Reports of outbreaks on cruise ships that dock in both U.S. and international ports and those in which the food was eaten outside the United States, even if the illness occurred in the United States, are excluded from the Foodborne Disease Outbreak Surveillance System.

This report includes foodborne disease outbreaks reported by February 17, 2016, in which the first illness occurred in 2014. Etiologic agents were reported as confirmed if predefined criteria were met;<sup>2</sup> otherwise, they were reported as suspected. For outbreaks caused by a single confirmed or suspected etiology, etiologies were grouped as bacterial, chemical and toxin, parasitic, or viral. Multistate outbreaks were defined as outbreaks in which exposure to the implicated food occurred in more than one state or territory. Population-based outbreak reporting rates were calculated for each state using U.S. Census estimates of the 2014 state populations (<http://www.census.gov/popest>). Multistate outbreaks were included in

state population-based outbreak reporting rates by assigning one outbreak to each state that reported a case in the outbreak. Implicated foods were classified into 1 of 24 single-food categories if a single contaminated ingredient was identified or if all ingredients belonged to that category.<sup>3</sup> Outbreaks attributed to foods that could not be assigned to one of these categories, or for which the report contained insufficient information for category assignment, were not attributed to any category.

## Findings

### States and Rates

During 2014, 864 foodborne disease outbreaks were reported (Table 1), resulting in 13,246 illnesses, 712 hospitalizations, and 21 deaths. Outbreaks were reported by public health officials from 49 states and Puerto Rico (Figure). The median rate was 3.6 outbreaks per 1 million population; rates ranged from 0.7 outbreaks per 1 million population in Mississippi to 15.0 outbreaks per 1 million population in Alaska. No outbreaks were reported in South Dakota.

### Etiologic Agents

A single etiologic agent was confirmed in 462 (53%) outbreaks (Table 1) which resulted in 8,810 (67%) illnesses. Bacteria caused the most outbreaks (247 outbreaks, 53%), followed by viruses (161, 35%), chemicals (46, 10%), and parasites (7, 2%). Norovirus was the most common cause of confirmed, single-etiology outbreaks, accounting for 157 (34%) outbreaks and 3,835 (43%) illnesses. *Salmonella* was next, accounting for 140 (30%) outbreaks and 2,395 (27%) illnesses. Among the 131 confirmed *Salmonella* outbreaks with a serotype reported, Enteritidis was the most common (40 outbreaks, 31%), followed by Typhimurium (15, 11%), I 4,[5],12:i:- (6, 5%), Javiana (6, 5%), and Newport (6, 5%). Shiga toxin-producing *Escherichia coli* (STEC) caused 23 confirmed, single-etiology outbreaks, of which 12 (52%) were caused by serogroup O157, 3 (13%) by O111, 3 (13%) by O26, 2 (9%) by O121, 1 (4%) by O103, 1 (4%) by O145, and 1 (4%) by O186.

## Illnesses, Hospitalizations, and Deaths

Of the 8,810 outbreak-associated illnesses caused by a single confirmed etiologic agent, 665 (8%) resulted in hospitalization (Table 1). Among confirmed, single-etiology outbreaks, *Salmonella* caused the most outbreak-associated hospitalizations (395 hospitalizations, 59%), followed by STEC (62, 9%) and *Listeria monocytogenes* (51, 8%). Outbreaks caused by *Listeria monocytogenes* resulted in the highest proportion of ill persons hospitalized (93%). Among the 21 deaths reported, 17 (81%) were attributed to bacterial etiologies (*Listeria monocytogenes* [13], STEC O157 [1], *Campylobacter* [1], *Clostridium botulinum* [1], and *Salmonella* [1]). Four deaths were attributed to norovirus.

### Food Categories Implicated

A food was reported for 369 (43%) outbreaks. In 205 (56%) of these outbreaks, the food could be classified into 1 of the 24 categories (Table 2a); the categories most commonly implicated were fish (43 outbreaks, 21%), chicken (23, 11%), and dairy (19, 9%). Pasteurization information was reported for 18 of the dairy outbreaks and 15 (83%) involved unpasteurized products. The most outbreak-associated illnesses were from seeded vegetables (e. g. cucumbers or tomatoes; 428 illnesses, 16%), chicken (354, 13%), and dairy (267, 10%).

### Etiologic Agents and Food Category Pairs

The pathogen-food category pairs responsible for most outbreaks with a single confirmed etiologic agent were ciguatoxin in fish (19), scombroid toxin (histamine) in fish (16 outbreaks), and *Salmonella* in chicken (11) (Table 2b). The pathogen-food category pairs responsible for the most illnesses in outbreaks with a single confirmed etiologic agent were *Salmonella* in seeded vegetables (357 illnesses), *Salmonella* in chicken (227), and *Staphylococcus aureus* enterotoxin in turkey (184). The pathogen-food category pairs responsible for the most hospitalizations in outbreaks with a single confirmed etiologic agent were *Salmonella*

in seeded vegetables (68 hospitalizations), *Listeria monocytogenes* in fruits (36), and *Salmonella* in chicken (23). Deaths were reported for the following pathogen-food category pairs: *Listeria monocytogenes* in fruits (8 deaths), *Listeria monocytogenes* in sprouts (2), Norovirus in chicken (2); *Campylobacter* in dairy, *Clostridium botulinum* toxin in fish, *Listeria monocytogenes* in dairy, and STEC in beef (1 each).

## Location of Food Preparation

Among the 742 outbreaks and 10,895 illnesses with a reported single location where food was prepared, 485 outbreaks (65%) and 4,780 associated illnesses (44%) were attributed to foods prepared in a restaurant (Table 3a). Among these outbreaks, sit-down dining-style was the type of restaurant most commonly reported as the location where food was prepared (394 outbreaks, 53%).

## Recalls

Twenty-one outbreaks resulted in product recalls. The foods recalled were raw oysters (4 outbreaks); tuna (3); ground beef (2); almond and peanut butter, apple, chia seed powder, chicken, Latin-style soft cheese, milkshakes, mung bean sprouts, romaine lettuce, pasteurized milk, peaches, pesto, and sprouts (1 each).

## Multistate Outbreaks

Twenty-five multistate outbreaks (3% of all outbreaks) were reported (Table 4), resulting in 778 illnesses (6% of illnesses), 194 (28% of hospitalizations), and 11 deaths (52% of deaths). Outbreaks involved a median of 5 states (range: 2–29). Eleven outbreaks were caused by *Salmonella*; the serotypes were Baildon, Braenderup, Enteritidis, Javiana, Minnesota, Newport, Paratyphi B variant L(+) tartrate(+), Saintpaul, Stanley, Typhimurium, and multiple serotypes (1 outbreak each). Ten multistate outbreaks were caused by STEC (serogroups O157 [6 outbreaks], O103 [1], O111 [1], O121 [1], and O145 [1]). Three were caused by *Listeria* and one by norovirus. The foods implicated in *Salmonella* outbreaks were almond and peanut butter, cantaloupe (suspected), cashews (suspected), chia seed powder, cucumber, grapes (suspected), ground beef (suspected), mango (suspected), mini cucumbers (suspected), mini peppers (suspected),

and mung bean sprouts (1 each). For STEC, implicated foods included ground beef in 4 outbreaks (1 confirmed, 3 suspected) (serogroups O157 [3 outbreaks] and O145 [1]); cabbage (serogroup O111), clover sprouts (O121), leaf lettuce (O157), pre-packaged salad (O157), spinach (suspected) (O157), and an undetermined food from a Mexican-style chain restaurant (O103). Foods implicated in the *Listeria* multistate outbreaks were apples, stone fruit, and mung bean sprouts (1 outbreak each). Raw oysters were implicated in the norovirus outbreak.

## Multistate Outbreaks Spanning Multiple Years

Five multistate outbreaks investigated in 2014 are not included in the 2014 tally because the first outbreak-associated illness occurred before 2014. Two were caused by *Listeria*; the implicated foods were ice cream (first illness in 2010) and Latin-style soft cheese (first illness in 2013). Two were caused by *Salmonella*; the implicated foods were chicken (first illness in 2013) and tilapia (first illness in 2013). One outbreak was caused by niacin in infused-rice products (first illness in 2013).

## Limitations

The findings in this report have at least three limitations. First, only a small proportion of foodborne illnesses that occur each year are identified as being associated with outbreaks. The extent to which the distribution of food vehicles and locations of preparation implicated in outbreaks reflect the same vehicles and locations as sporadic foodborne illnesses is unknown. Similarly, not all outbreaks are identified, investigated, or reported. Second, many outbreaks had an unknown etiology, an unknown food vehicle, or both, and conclusions drawn from outbreaks with a confirmed etiology or food vehicle might not apply to other outbreaks. Finally, CDC's outbreak surveillance system is dynamic. Agencies can submit new reports and change or delete reports as information becomes available. Therefore, the results of this analysis might differ from those in other reports.

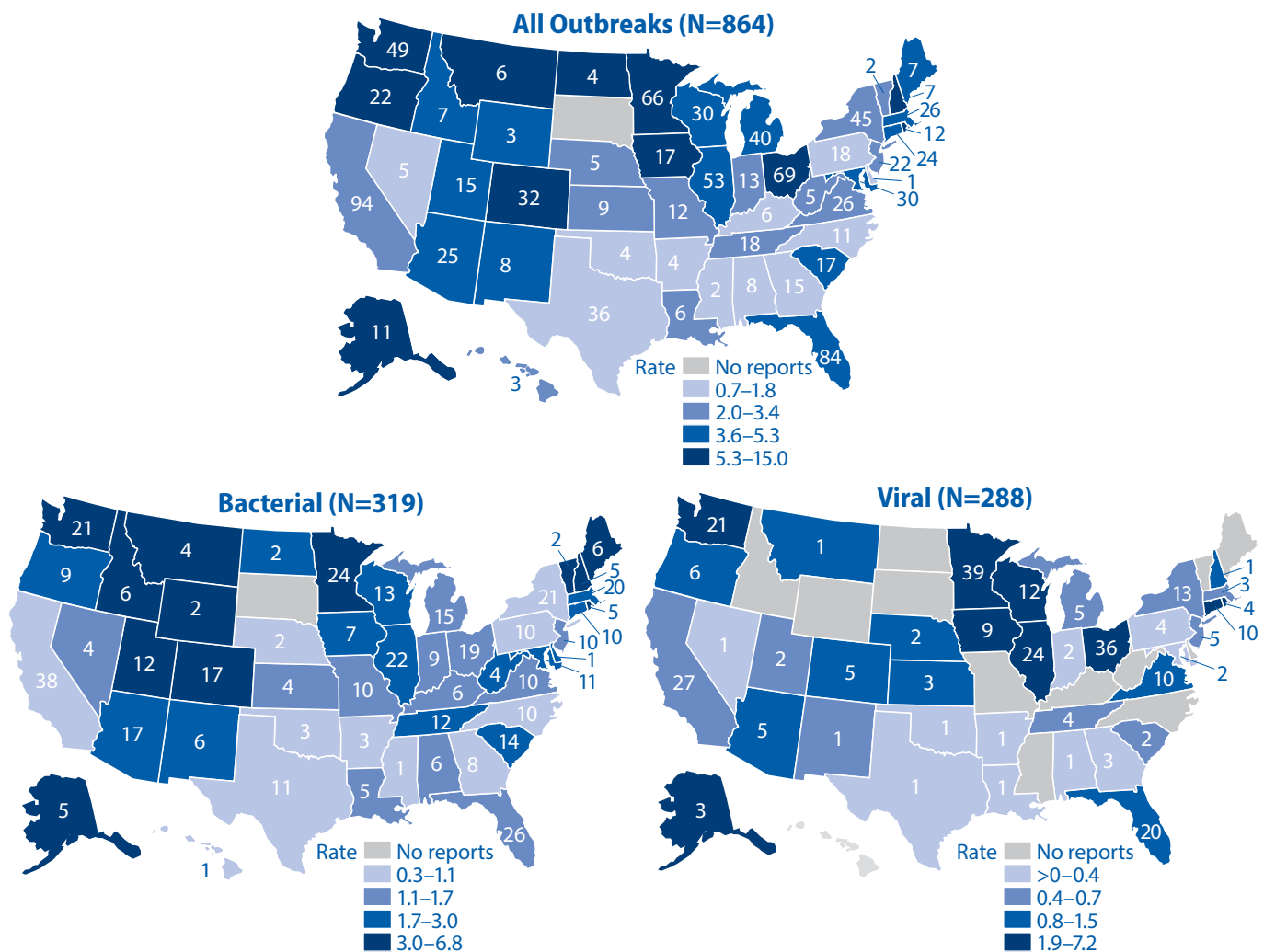
## Additional Information

Public health, regulatory, and food industry professionals can use this information to target prevention efforts against pathogens and foods that cause the most foodborne disease outbreaks. Learn more about how outbreaks are reported and tracked at <http://www.cdc.gov/foodsafety/fdoss/>.

## References

1. Scallan E, Hoekstra RM, Angulo FJ, et al. Foodborne illness acquired in the United States—major pathogens. *Emerging Infectious Diseases* 2011; 17(1): 7–15.
2. CDC. Guide to confirming a diagnosis in foodborne disease. Available at: <http://www.cdc.gov/foodsafety/outbreaks/investigating-outbreaks/confirming-diagnosis.html>. Accessed October 15, 2015.
3. Interagency Food Safety Analytics Collaboration (IFSAC): Completed Projects. Available at: <http://www.cdc.gov/foodsafety/ifsac/projects/completed.html>. Accessed October 15, 2015.

**Figure:** Rate of reported foodborne disease outbreaks per 1 million population\* and number of outbreaks,† by state‡ and etiology§— Foodborne Disease Outbreak Surveillance System, United States, 2014.



\* Cutpoints for outbreak rate categories determined using quartiles. Legend differs for each map.

† Reported outbreaks in each state. Puerto Rico reported 4 outbreaks (not shown).

‡ Includes 25 multistate outbreaks (i.e., outbreaks in which exposure occurred in more than one state) assigned as an outbreak to each state involved. Multistate outbreaks involved a median of five states (range: 2–29).

§ Includes outbreaks caused by both confirmed and suspected etiologies.



**Table 1:** Foodborne disease outbreaks, outbreak-associated illnesses, and hospitalizations, by etiology (confirmed or suspected)\* —Foodborne Disease Outbreak Surveillance System, United States, 2014.

Etiology	No. Outbreaks				No. Illnesses				No. Hospitalizations			
	CE	SE	Total	%	CE	SE	Total	%	CE	SE	Total	%
<b>Bacterial</b>												
<i>Salmonella</i> <sup>†</sup>	140	9	149	22	2395	168	2563	22	395	5	400	58
<i>Campylobacter</i> <sup>‡</sup>	24	7	31	5	324	29	353	3	29	1	30	4
<i>Clostridium perfringens</i>	13	17	30	5	678	552	1230	11	1	0	1	0
<i>Escherichia coli</i> , Shiga toxin-producing (STEC) <sup>§</sup>	23	1	24	4	220	2	222	2	62	0	62	9
<i>Staphylococcus aureus</i> enterotoxin	9	8	17	3	504	62	566	5	9	1	10	1
<i>Shigella</i> <sup>¶</sup>	11	5	16	2	366	23	389	3	26	1	27	4
<i>Bacillus cereus</i>	4	11	15	2	102	103	205	2	0	1	1	0
<i>Listeria monocytogenes</i>	9	0	9	1	55	0	55	0	51	0	51	7
<i>Vibrio parahaemolyticus</i>	8	0	8	1	28	0	28	0	3	0	3	0
<i>Clostridium botulinum</i>	4	0	4	1	10	0	10	0	9	0	9	1
<i>Streptococcus</i> , Group A	1	0	1	0	54	0	54	0	0	0	0	0
<i>Escherichia coli</i> , Enteroaggregative	1	0	1	0	4	0	4	0	0	0	0	0
Other	0	12	12	2	0	179	179	2	0	0	0	0
<b>Subtotal</b>	<b>247</b>	<b>70</b>	<b>317</b>	<b>48</b>	<b>4740</b>	<b>1118</b>	<b>5858</b>	<b>51</b>	<b>585</b>	<b>9</b>	<b>594</b>	<b>85</b>
<b>Chemical and toxin</b>												
Ciguatoxin	18	1	19	3	69	3	72	1	11	0	11	2
Scombroid toxin/Histamine	17	0	17	3	40	0	40	0	0	0	0	0
Mycotoxins	4	0	4	1	9	0	9	0	4	0	4	1
Puffer fish tetrodotoxin	1	0	1	0	2	0	2	0	0	0	0	0
Other	6	5	11	2	25	23	48	0	11	0	11	2
<b>Subtotal</b>	<b>46</b>	<b>6</b>	<b>52</b>	<b>8</b>	<b>145</b>	<b>26</b>	<b>171</b>	<b>1</b>	<b>26</b>	<b>0</b>	<b>26</b>	<b>4</b>
<b>Parasitic</b>												
<i>Cryptosporidium</i>	3	1	4	1	18	6	24	0	1	1	2	0
<i>Trichinella</i>	2	0	2	0	6	0	6	0	1	0	1	0
<i>Cyclospora</i>	2	0	2	0	16	0	16	0	1	0	1	0
<b>Subtotal</b>	<b>7</b>	<b>1</b>	<b>8</b>	<b>1</b>	<b>40</b>	<b>6</b>	<b>46</b>	<b>0</b>	<b>3</b>	<b>1</b>	<b>4</b>	<b>1</b>
<b>Viral</b>												
Norovirus	157	127	284	43	3835	1505	5340	47	44	20	64	9
Hepatitis A	2	0	2	0	15	0	15	0	7	0	7	1
Sapovirus	2	0	2	0	35	0	35	0	0	0	0	0
<b>Subtotal</b>	<b>161</b>	<b>127</b>	<b>288</b>	<b>43</b>	<b>3885</b>	<b>1505</b>	<b>5390</b>	<b>47</b>	<b>51</b>	<b>20</b>	<b>71</b>	<b>10</b>
<b>Single etiology**</b>	<b>461</b>	<b>204</b>	<b>665</b>	<b>77</b>	<b>8810</b>	<b>2655</b>	<b>11465</b>	<b>87</b>	<b>665</b>	<b>30</b>	<b>695</b>	<b>98</b>
<b>Multiple etiologies</b>	<b>5</b>	<b>7</b>	<b>12</b>	<b>1</b>	<b>268</b>	<b>211</b>	<b>479</b>	<b>4</b>	<b>11</b>	<b>0</b>	<b>11</b>	<b>2</b>
<b>Unknown etiology<sup>††</sup></b>	<b>0</b>	<b>187</b>	<b>187</b>	<b>22</b>	<b>1302</b>	<b>1302</b>	<b>1302</b>	<b>10</b>	<b>0</b>	<b>6</b>	<b>6</b>	<b>1</b>
<b>Total</b>	<b>466</b>	<b>398</b>	<b>864</b>	<b>100</b>	<b>9078</b>	<b>4168</b>	<b>13246</b>	<b>100</b>	<b>676</b>	<b>36</b>	<b>712</b>	<b>100</b>

**Abbreviations:** CE = confirmed etiology; SE = suspected etiology.

\* If at least one etiology was laboratory-confirmed, the outbreak was considered to have a confirmed etiology. If no etiology was laboratory-confirmed, but an etiology was reported based on clinical or epidemiologic features, the outbreak was considered to have a suspected etiology.

<sup>†</sup> *Salmonella* causing more than five outbreaks were Enteritidis (40 outbreaks), Typhimurium (15), Javiana (6), 1,4,[5],12:i:- (6), and Newport (6).

<sup>‡</sup> *Campylobacter jejuni* (19 outbreaks), *Campylobacter* unknown species (10), and *Campylobacter coli* (1), and *Campylobacter* multiple species (1).

<sup>§</sup> STEC serogroups O157 (12 outbreaks), O26 (3), O111 (3), O121 (2), O186 (1), O103 (1), O145 (1), and unknown serogroup (1).

<sup>¶</sup> *Shigella sonnei* (12 outbreaks), *Shigella flexneri* (2), and *Shigella* unknown species (2).

\*\* The denominator for the etiology percentages is the single etiology total. The denominator for the single etiology, multiple etiologies, and unknown etiology is the total. Because of rounding, numbers might not add up to the single etiology total or the total.

<sup>††</sup> An etiologic agent was not confirmed or suspected based on clinical, laboratory, or epidemiologic information.

**Table 2a:** Foodborne disease outbreaks and outbreak-associated illnesses, by food category\*—Foodborne Disease Outbreak Surveillance System, United States, 2014.

Food Category*	No. Outbreaks		No. Illnesses	
	Total	%	Total	%
<b>Aquatic animals</b>				
Crustaceans	4	2	29	1
Mollusks†	16	8	103	4
Fish	43	21	203	7
Other aquatic animals	1	0	3	0
<b>Subtotal</b>	<b>64</b>	<b>31</b>	<b>338</b>	<b>12</b>
<b>Land animals</b>				
Dairy‡	19	9	267	10
Eggs	4	2	28	1
Beef	15	7	152	6
Pork	9	4	134	5
Other meat (sheep, goat, etc.)	1	0	3	0
Chicken	23	11	354	13
Turkey	6	3	235	9
Other poultry	1	0	3	0
Game	2	1	6	0
<b>Subtotal</b>	<b>80</b>	<b>39</b>	<b>1182</b>	<b>43</b>
<b>Plants</b>				
Oils and sugars	1	0	2	0
Fungi	5	2	11	0
Sprouts	4	2	141	5
Root and other underground vegetables§	2	1	31	1
Seeded vegetables¶	7	3	428	16
Herbs	1	0	7	0
Vegetable row crops**	13	6	174	6
Fruits††	10	5	139	5
Grains and beans††	9	4	104	4
Nuts and seeds§§	3	1	55	2
<b>Subtotal</b>	<b>55</b>	<b>27</b>	<b>1092</b>	<b>40</b>
<b>Other</b>	<b>6</b>	<b>3</b>	<b>115</b>	<b>4</b>
<b>Food reported, attributed to a single food category¶¶</b>	<b>205</b>	<b>24</b>	<b>2727</b>	<b>21</b>
<b>Food reported, not attributed to a single food category</b>	<b>164</b>	<b>19</b>	<b>3517</b>	<b>27</b>
<b>No food reported</b>	<b>495</b>	<b>57</b>	<b>7002</b>	<b>53</b>
<b>Total¶¶</b>	<b>864</b>	<b>100</b>	<b>13246</b>	<b>100</b>

\* Interagency Food Safety Analytics Collaboration (IFSAC) food categorization scheme: <http://www.cdc.gov/foodsafety/ifsac/projects/completed.html>.

† All were bivalve mollusks.

‡ Unpasteurized dairy products (15 outbreaks), pasteurized dairy products (3), and unknown if product pasteurized (1).

§ Bulbs (1 outbreak) and tubers (1).

¶ Vine-grown seeded vegetables (4 outbreaks), solanaceous seeded vegetables (2), and legumes (1).

\*\* Leafy vegetables (12 outbreaks), stem vegetables (1).

†† Fruits not further classified (2 outbreaks), pome fruits (2), small fruits (2), melons (1), stone fruits (1), sub-tropical fruits (1), and tropical fruits (1).

‡‡ Grains (5 outbreaks), beans (3), and grains and beans not further classified (1).

§§ Nuts (2 outbreaks) and seeds (1).

¶¶ The denominator for the food category percentages is the “food reported, attributed to a single food category” total. The denominator for the “food reported attributed to a single food category,” “food reported, not attributed to a single food category,” and “No food reported” is the total. Because of rounding, numbers might not add up to the “food reported, attributed to a single food category” total or the total.

**Table 2b:** Most common confirmed pathogen-food category pairs resulting in outbreaks, outbreak-associated illnesses, hospitalizations, and deaths—Foodborne Disease Outbreak Surveillance System, United States, 2014.

Top 5 pathogen-food category pairs resulting in outbreaks					
Etiology	Food Category*	No. Outbreaks	No. Illnesses	No. Hospitalizations	No. Deaths
<i>Ciguatoxin</i>	Fish	19	72	11	0
<i>Scombroid toxin/Histamine</i>	Fish	16	38	0	0
<i>Salmonella</i>	Chicken	11	227	23	0
<i>Campylobacter</i>	Dairy	8	144	12	1
<i>Vibrio parahaemolyticus</i>	Mollusks	8	28	3	0

Top 5 pathogen-food category pairs resulting in outbreak-associated illnesses					
Etiology	Food Category*	No. Outbreaks	No. Illnesses	No. Hospitalizations	No. Deaths
<i>Salmonella</i>	Seeded vegetables	5	357	68	1
<i>Salmonella</i>	Chicken	11	227	23	0
<i>Staphylococcus aureus enterotoxin</i>	Turkey	2	184	8	0
<i>Campylobacter</i>	Dairy	8	144	12	1
<i>Salmonella</i>	Sprouts	1	115	19	0

Top 5 pathogen-food category pairs resulting in outbreak-associated hospitalizations					
Etiology	Food Category*	No. Outbreaks	No. Illnesses	No. Hospitalizations	No. Deaths
<i>Salmonella</i>	Seeded vegetables	5	357	68	1
<i>Listeria monocytogenes</i>	Fruits	2	37	36	8
<i>Salmonella</i>	Chicken	11	227	23	0
<i>Salmonella</i>	Sprouts	1	115	19	0
<i>Escherichia coli, Shiga toxin-producing</i>	Vegetable row crops	6	105	18	0

Pathogen-food category pairs resulting in outbreak-associated deaths					
Etiology	Food Category*	No. Outbreaks	No. Illnesses	No. Hospitalizations	No. Deaths
<i>Listeria monocytogenes</i>	Fruits	2	37	36	8
Norovirus	Chicken	2	34	0	2
<i>Listeria monocytogenes</i>	Sprouts	2	7	5	2
<i>Campylobacter</i>	Dairy	8	144	12	1
<i>Salmonella</i>	Seeded vegetables	5	357	68	1
<i>Escherichia coli, Shiga toxin-producing</i>	Beef	5	40	16	1
<i>Listeria monocytogenes</i>	Dairy	1	3	2	1
<i>Clostridium botulinum</i>	Fish	1	3	2	1

\* Interagency Food Safety Analytics Collaboration (IFSAC) food categorization scheme: <http://www.cdc.gov/foodsafety/ifsac/projects/completed.html>.

**Table 3a:** Reported foodborne disease outbreaks and outbreak-associated illnesses, by location of food preparation—Foodborne Disease Outbreak Surveillance System, United States, 2014.

Location of food preparation	No. Outbreaks		No. Illnesses	
	Total	%	Total	%
<b>Restaurant</b>	485	65	4780	44
Sit-down dining	394	53	3916	36
Fast-food	59	8	521	5
Other or unknown type	25	3	258	2
Multiple types	7	1	85	1
<b>Catering or banquet facility</b>	92	12	3192	29
<b>Private home</b>	86	12	778	7
<b>Institutional location</b>	26	4	1404	13
School	9	1	359	3
Prison or jail	9	1	650	6
Camp	4	1	86	1
Day Care	1	0	23	0
Indoor workplace	1	0	269	2
Other	2	0	17	0
<b>Other location</b>	8	1	114	1
<b>Other commercial location</b>	29	4	402	4
Grocery store	13	2	146	1
Fair, festival, or temporary mobile service	3	0	35	0
Farm or dairy	10	1	187	2
Other	3	0	34	0
<b>Hospital or nursing home</b>	11	1	168	2
Nursing home	9	1	151	1
Hospital	2	0	17	0
<b>Other private location</b>	16	2	374	3
Place of worship	3	0	40	0
Other	2	0	17	0
<b>Single location*</b>	742	86	10895	82
<b>Multiple locations</b>	58	7	1543	12
<b>Unknown location</b>	64	7	808	6
<b>Total</b>	<b>864</b>	<b>100</b>	<b>13246</b>	<b>100</b>

\*The denominator for the location percentages is the single location total. The denominator for the single location, multiple locations, and unknown location is the total. Because of rounding, numbers might not add up to the single location total or the total.

**Table 3b:** Foodborne disease outbreaks and outbreak-associated illnesses, by confirmed etiology\* and location of food preparation—Foodborne Disease Outbreak Surveillance System, United States, 2014.

Etiology	Catering or banquet facility		Restaurant		Other commercial location		Hospital or nursing home		Institutional location		Private home		Other private location		Other location	
	NO	NI	NO	NI	NO	NI	NO	NI	NO	NI	NO	NI	NO	NI	NO	NI
<b>Bacterial</b>																
<i>Salmonella</i>	8	339	52	649	5	61	1	15	6	109	27	270	2	36	2	15
<i>Campylobacter</i>	3	87	9	56	5	134	1	19	– <sup>†</sup>	–	5	24	–	–	1	4
<i>Clostridium perfringens</i>	5	249	3	50	–	–	–	–	1	167	1	40	–	–	–	–
<i>Escherichia coli</i> , Shiga toxin-producing	1	57	10	96	–	–	–	–	–	–	7	30	1	4	–	–
<i>Staphylococcus aureus</i> enterotoxin	1	141	3	17	–	–	–	–	2	252	–	–	–	–	1	43
<i>Shigella</i>	–	–	7	55	–	–	–	–	2	292	1	11	–	–	–	–
<i>Bacillus cereus</i>	1	4	2	67	–	–	–	–	–	–	–	–	–	–	–	–
<i>Listeria monocytogenes</i>	–	–	2	7	1	2	2	4	–	–	1	2	–	–	1	35
<i>Vibrio parahaemolyticus</i>	–	–	5	18	–	–	–	–	–	–	–	–	–	–	–	–
<i>Clostridium botulinum</i>	–	–	–	–	–	–	–	–	–	–	2	5	1	3	–	–
<i>Streptococcus</i> , Group A	–	–	–	–	–	–	–	–	1	54	–	–	–	–	–	–
<i>Escherichia coli</i> , Enteroaggregative	–	–	–	–	–	–	–	–	1	4	–	–	–	–	–	–
Other	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
<b>Subtotal</b>	<b>19</b>	<b>877</b>	<b>93</b>	<b>1015</b>	<b>11</b>	<b>197</b>	<b>4</b>	<b>38</b>	<b>13</b>	<b>878</b>	<b>44</b>	<b>382</b>	<b>4</b>	<b>43</b>	<b>5</b>	<b>97</b>
<b>Chemical and toxin</b>																
Ciguatoxin	–	–	4	12	–	–	–	–	–	–	12	49	–	–	–	–
Scombroid toxin/Histamine	–	–	13	28	1	2	–	–	–	–	1	2	–	–	–	–
Mycotoxins	–	–	–	–	–	–	–	–	–	–	2	5	–	–	–	–
Puffer fish tetrodotoxin	–	–	–	–	–	–	–	–	–	–	1	2	–	–	–	–
Other	–	–	3	9	–	–	–	–	–	–	–	–	–	–	1	10
<b>Subtotal</b>	<b>–</b>	<b>–</b>	<b>20</b>	<b>49</b>	<b>1</b>	<b>2</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>16</b>	<b>58</b>	<b>–</b>	<b>–</b>	<b>1</b>	<b>10</b>
<b>Parasitic</b>																
<i>Cryptosporidium</i>	–	–	–	–	2	10	–	–	–	–	1	8	–	–	–	–
<i>Trichinella</i>	–	–	–	–	–	–	–	–	1	4	1	2	–	–	–	–
<i>Cyclospora</i>	–	–	1	2	–	–	–	–	–	–	–	–	–	–	–	–
<b>Subtotal</b>	<b>–</b>	<b>–</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>10</b>	<b>–</b>	<b>–</b>	<b>1</b>	<b>4</b>	<b>2</b>	<b>10</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>
<b>Viral</b>																
Norovirus	27	885	90	1938	4	88	3	92	5	251	8	136	–	–	1	3
Hepatitis A	–	–	2	15	–	–	–	–	–	–	–	–	–	–	–	–
Sapovirus	1	14	–	–	–	–	–	–	–	–	–	–	–	–	–	–
<b>Subtotal</b>	<b>28</b>	<b>899</b>	<b>92</b>	<b>1953</b>	<b>4</b>	<b>88</b>	<b>3</b>	<b>92</b>	<b>5</b>	<b>251</b>	<b>8</b>	<b>136</b>	<b>–</b>	<b>–</b>	<b>1</b>	<b>3</b>
<b>Single etiology</b>	<b>47</b>	<b>1776</b>	<b>206</b>	<b>3019</b>	<b>19</b>	<b>302</b>	<b>7</b>	<b>130</b>	<b>19</b>	<b>1133</b>	<b>70</b>	<b>586</b>	<b>4</b>	<b>43</b>	<b>7</b>	<b>110</b>
<b>Multiple etiologies</b>	<b>1</b>	<b>216</b>	<b>2</b>	<b>9</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>1</b>	<b>38</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>
<b>Total</b>	<b>48</b>	<b>1992</b>	<b>208</b>	<b>3028</b>	<b>19</b>	<b>302</b>	<b>7</b>	<b>130</b>	<b>19</b>	<b>1133</b>	<b>71</b>	<b>624</b>	<b>4</b>	<b>43</b>	<b>7</b>	<b>110</b>

**Abbreviations:** NO = number of outbreaks; NI = number of illnesses.

\* If at least one etiology was laboratory-confirmed, the outbreak was considered to have a confirmed etiology. If no etiology was laboratory-confirmed, but an etiology was reported based on clinical or epidemiologic features; the outbreak was considered to have a suspected etiology.

† Reported locations were grouped as follows: catering or banquet facility, restaurant, other commercial location, hospital or nursing home, other institutional location, private home, other private location, and other location (see Table 3a).

‡ No outbreaks in the data reported fall into this category.

§ An etiologic agent was not confirmed or suspected based on clinical, laboratory, or epidemiologic information.

**Table 3c:** Foodborne disease outbreaks and outbreak-associated illnesses, by suspected etiology\* and location of food preparation—Foodborne Disease Outbreak Surveillance System, United States, 2014.

Etiology	Catering or banquet facility		Restaurant		Other commercial location		Hospital or nursing home		Institutional location		Private home		Other private location		Other location	
	NO	NI	NO	NI	NO	NI	NO	NI	NO	NI	NO	NI	NO	NI	NO	NI
<b>Bacterial</b>																
<i>Salmonella</i>	–†	–	7	57	–	–	–	–	2	111	–	–	–	–	–	–
<i>Campylobacter</i>	–	–	2	8	1	2	–	–	–	–	3	11	–	–	–	–
<i>Clostridium perfringens</i>	4	460	11	55	1	25	–	–	–	–	1	12	–	–	–	–
<i>Escherichia coli</i> , Shiga toxin-producing	–	–	–	–	1	2	–	–	–	–	–	–	–	–	–	–
<i>Staphylococcus aureus</i> enterotoxin	1	20	6	34	–	–	–	–	–	–	–	–	–	–	–	–
<i>Shigella</i>	2	4	2	17	–	–	–	–	1	2	–	–	–	–	–	–
<i>Bacillus cereus</i>	2	34	6	33	–	–	–	–	–	–	–	–	–	–	–	–
<i>Listeria monocytogenes</i>	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
<i>Vibrio parahaemolyticus</i>	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
<i>Clostridium botulinum</i>	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
<i>Streptococcus</i> , Group A	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
<i>Escherichia coli</i> , Enteroaggregative	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Other	1	12	8	118	1	32	2	17	–	–	–	–	–	–	–	–
<b>Subtotal</b>	<b>10</b>	<b>530</b>	<b>42</b>	<b>322</b>	<b>4</b>	<b>61</b>	<b>2</b>	<b>17</b>	<b>3</b>	<b>113</b>	<b>4</b>	<b>23</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>
<b>Chemical and toxin</b>																
Ciguatoxin	–	–	–	–	–	–	–	–	–	–	1	3	–	–	–	–
Scombroid toxin/Histamine	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Mycotoxins	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Puffer fish tetrodotoxin	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Other	1	3	3	12	1	8	–	–	–	–	–	–	–	–	–	–
<b>Subtotal</b>	<b>1</b>	<b>3</b>	<b>3</b>	<b>12</b>	<b>1</b>	<b>8</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>1</b>	<b>3</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>
<b>Parasitic</b>																
<i>Cryptosporidium</i>	–	–	–	–	–	–	–	–	–	–	1	6	–	–	–	–
<i>Trichinella</i>	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
<i>Cyclospora</i>	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
<b>Subtotal</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>1</b>	<b>6</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>
<b>Viral</b>																
Norovirus	24	550	85	607	1	5	–	–	3	153	3	29	1	14	–	–
Hepatitis A	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Sapovirus	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
<b>Subtotal</b>	<b>24</b>	<b>550</b>	<b>85</b>	<b>607</b>	<b>1</b>	<b>5</b>	<b>–</b>	<b>–</b>	<b>3</b>	<b>153</b>	<b>3</b>	<b>29</b>	<b>1</b>	<b>14</b>	<b>–</b>	<b>–</b>
<b>Single etiology</b>	<b>35</b>	<b>1083</b>	<b>133</b>	<b>953</b>	<b>6</b>	<b>74</b>	<b>2</b>	<b>17</b>	<b>6</b>	<b>266</b>	<b>9</b>	<b>61</b>	<b>1</b>	<b>14</b>	<b>–</b>	<b>–</b>
<b>Multiple etiologies</b>	<b>–</b>	<b>–</b>	<b>2</b>	<b>9</b>	<b>–</b>	<b>–</b>	<b>1</b>	<b>6</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>
<b>Unknown etiology<sup>§</sup></b>	<b>9</b>	<b>117</b>	<b>142</b>	<b>790</b>	<b>4</b>	<b>26</b>	<b>1</b>	<b>15</b>	<b>1</b>	<b>5</b>	<b>6</b>	<b>93</b>	<b>–</b>	<b>–</b>	<b>1</b>	<b>4</b>
<b>Total</b>	<b>44</b>	<b>1200</b>	<b>277</b>	<b>1752</b>	<b>10</b>	<b>100</b>	<b>4</b>	<b>38</b>	<b>7</b>	<b>271</b>	<b>15</b>	<b>154</b>	<b>1</b>	<b>14</b>	<b>1</b>	<b>4</b>

**Abbreviations:** NO = number of outbreaks; NI = number of illnesses.

\* If at least one etiology was laboratory-confirmed, the outbreak was considered to have a confirmed etiology. If no etiology was laboratory-confirmed, but an etiology was reported based on clinical or epidemiologic features; the outbreak was considered to have a suspected etiology.

† Reported locations were grouped as follows: catering or banquet facility, restaurant, other commercial location, hospital or nursing home, other institutional location, private home, other private location, and other location (see Table 3a).

‡ No outbreaks in the data reported fall into this category.

§ An etiologic agent was not confirmed or suspected based on clinical, laboratory, or epidemiologic information.

**Table 4:** Multistate foodborne disease outbreaks, United States, 2014.

Month of first illness onset	Etiology	No. illnesses	No. hospitalizations	No. deaths	No. states involved	Implicated food*		
						Name	Confirmed	Recall
January	<i>Salmonella</i> Braenderup	6	1	0	5	Almond and peanut butter	Yes	Yes
January	Shiga toxin-producing <i>E. coli</i> O157:H7	4	0	0	2	Ground beef	No	No
January	<i>Salmonella</i> serotypes Hartford, Oranienburg, and Newport	31	5	0	16	Chia seed powder	Yes	Yes
April	<i>Salmonella</i> serotype Baildon	20	6	0	15	Cantaloupe	No	No
April	Shiga toxin-producing <i>E. coli</i> O157:H7	4	1	0	2	Spinach	No	No
April	Shiga toxin-producing <i>E. coli</i> O157:H7	12	7	0	4	Ground beef	Yes	Yes
May	Shiga toxin-producing <i>E. coli</i> O121	19	5	0	6	Clover sprouts	Yes	No
May	<i>Salmonella</i> serotype Newport	275	48	1	29	Cucumber	Yes	No
May	Shiga toxin-producing <i>E. coli</i> O145	8	3	0	5	Ground beef	No	No
May	Shiga toxin-producing <i>E. coli</i> O157:H7	12	4	0	5	Ground beef	No	No
May	<i>Salmonella</i> serotype Minnesota	4	1	0	4	Mango	No	No
June	Shiga toxin-producing <i>E. coli</i> O157:H7	16	13	0	6	Pre-packaged salad	Yes	No
June	Shiga toxin-producing <i>E. coli</i> O111	16	2	0	2	Cabbage	Yes	No
June	<i>Listeria monocytogenes</i>	2	2	1	2	Stone fruit	Yes	Yes
June	<i>Listeria monocytogenes</i>	5	3	2	2	Mung bean sprouts	Yes	Yes
June	<i>Salmonella</i> serotype Paratyphi B	21	5	0	10	Mini peppers	No	No
July	<i>Salmonella</i> serotype Typhimurium	47	11	0	19	Ground beef	No	No
August	<i>Salmonella</i> serotype Saintpaul	27	10	0	7	Grapes	No	No
September	<i>Salmonella</i> serotype Enteritidis	115	19	0	12	Mung bean sprouts	Yes	No
October	<i>Salmonella</i> serotype Javiana	36	8	0	17	Mini cucumbers	No	No
October	Shiga toxin-producing <i>E. coli</i> O103:H2	12	0	0	5	No food reported	–	No
October	<i>Listeria monocytogenes</i>	35	34	7	12	Apple	Yes	Yes
November	Norovirus genogroup II, genotype 2	22	0	0	2	Raw oysters	Yes	Yes
November	Shiga toxin-producing <i>E. coli</i> O157:H7	11	2	0	2	Leaf lettuce	Yes	Yes
December	<i>Salmonella</i> serotype Stanley	18	4	0	6	Cashews	No	No

\*Implicated foods in multistate outbreaks were further classified as confirmed or suspected based on epidemiologic, traceback, and laboratory evidence. A food was considered confirmed if the investigation yielded all three types of evidence or if strong evidence was available from two types of evidence. If fewer than two types of evidence were available or the evidence from two types was not sufficiently strong then the implicated food was considered suspected.

**Appendix:** Foodborne disease outbreaks by confirmed etiology\* and contributing factors—Foodborne Disease Outbreak Surveillance System, United States, 2014.

Etiology	Contamination Factors																No. outbreaks with reported contributing factors	Total No. outbreaks
	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	≥1 factor reported		
<b>Bacterial</b>																		
<i>Salmonella</i>	– <sup>+</sup>	–	–	–	–	14	9	–	20	4	2	2	3	5	8	46	52	140
<i>Campylobacter</i>	–	–	–	–	–	8	4	–	3	–	–	–	–	–	1	15	15	24
<i>Clostridium perfringens</i>	–	–	–	–	–	1	–	–	–	–	–	1	1	1	1	4	9	13
<i>Escherichia coli</i> , Shiga toxin-producing	–	–	–	–	–	2	3	–	–	–	–	–	–	–	–	5	5	23
<i>Staphylococcus aureus</i> enterotoxin	–	–	–	–	–	–	–	–	1	2	2	–	1	2	–	6	6	9
<i>Shigella</i>	–	–	–	–	–	–	–	–	3	2	2	–	–	–	–	5	5	11
<i>Bacillus cereus</i>	–	–	–	–	–	–	–	–	1	1	–	–	–	–	–	2	4	4
<i>Listeria monocytogenes</i>	–	–	–	–	–	–	3	3	–	–	–	–	–	2	–	6	6	9
<i>Vibrio parahaemolyticus</i>	–	–	–	–	–	–	8	1	–	–	–	–	–	–	–	8	8	8
<i>Clostridium botulinum</i>	2	–	–	–	–	–	1	–	–	–	–	–	–	1	1	4	4	4
<i>Streptococcus</i> , Group A	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	1	1	1
<i>Escherichia coli</i> , Enteroaggregative	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	1	1	1
Other	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Subtotal	2	–	–	–	–	25	29	4	24	9	7	7	4	10	13	103	116	247
<b>Chemical and toxin</b>																		
Ciguatoxin	17	–	–	–	–	–	–	–	–	–	–	–	–	–	–	17	17	18
Scombroid toxin/Histamine	12	–	–	–	–	–	–	–	–	–	–	–	–	–	–	12	13	17
Mycotoxins	4	–	–	–	–	–	–	–	–	–	–	–	–	–	–	4	4	4
Puffer fish tetrodotoxin	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	1	1
Other	1	–	2	2	–	–	–	–	–	–	–	–	–	–	–	4	4	6
Subtotal	35	–	2	2	–	–	–	–	–	–	–	–	–	–	–	38	39	46
<b>Parasitic</b>																		
<i>Cryptosporidium</i>	–	–	–	–	–	–	2	–	–	–	–	–	–	–	–	2	2	3
<i>Trichinella</i>	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2	2	2
<i>Cyclospora</i>	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	1	1	2
Subtotal	2	–	–	–	–	–	3	–	–	–	–	–	–	–	–	5	5	7
<b>Viral</b>																		
Norovirus	–	–	–	–	–	1	6	1	3	45	22	25	7	2	4	86	86	157
Hepatitis A	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	1	1	2
Sapovirus	–	–	–	–	–	–	–	–	–	2	–	–	–	–	–	2	2	2
Subtotal	–	–	–	–	–	1	6	1	3	46	24	25	7	2	4	89	89	161
Single etiology	39	–	2	2	–	26	38	5	27	55	31	32	11	12	17	235	249	461
Multiple etiologies	–	–	–	–	–	1	1	–	–	–	–	–	–	–	–	2	3	5
<b>Total</b>	<b>39</b>	<b>–</b>	<b>2</b>	<b>2</b>	<b>–</b>	<b>27</b>	<b>39</b>	<b>5</b>	<b>27</b>	<b>55</b>	<b>31</b>	<b>32</b>	<b>11</b>	<b>12</b>	<b>17</b>	<b>237</b>	<b>252</b>	<b>466</b>

Appendices' footnotes are on page 18.



**Appendix:** Foodborne disease outbreaks by confirmed etiology\* and contributing factors—Foodborne Disease Outbreak Surveillance System, United States, 2014.

Etiology	Proliferation/Amplification Factors <sup>†</sup>													No. outbreaks with reported contributing factors	Total No. outbreaks
	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	≥1 factor reported		
<b>Bacterial</b>															
<i>Salmonella</i>	18	13	1	3	12	1	10	7	– <sup>§</sup>	–	1	5	35	52	140
<i>Campylobacter</i>	1	1	–	–	–	–	–	–	–	–	1	1	4	15	24
<i>Clostridium perfringens</i>	4	4	–	1	3	1	3	3	–	–	–	2	9	9	13
<i>Escherichia coli</i> , Shiga toxin-producing	1	–	–	–	–	–	–	–	–	–	–	1	2	5	23
<i>Staphylococcus aureus</i> enterotoxin	2	2	–	–	2	–	1	2	–	–	–	1	6	6	9
<i>Shigella</i>	–	–	–	1	1	–	–	–	–	–	–	1	3	5	11
<i>Bacillus cereus</i>	2	1	–	–	–	–	1	–	–	–	–	1	4	4	4
<i>Listeria monocytogenes</i>	–	–	–	–	–	–	–	–	–	–	–	2	2	6	9
<i>Vibrio parahaemolyticus</i>	–	–	–	–	–	–	–	–	–	–	–	–	–	8	8
<i>Clostridium botulinum</i>	2	1	–	–	–	–	–	–	–	–	1	–	4	4	4
<i>Streptococcus</i> , Group A	–	–	–	–	–	–	–	–	–	–	–	–	–	1	1
<i>Escherichia coli</i> , Enteroaggregative	–	–	–	–	–	–	–	–	–	–	–	–	–	1	1
Other	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0
<b>Subtotal</b>	<b>30</b>	<b>22</b>	<b>1</b>	<b>5</b>	<b>18</b>	<b>2</b>	<b>15</b>	<b>12</b>	<b>–</b>	<b>–</b>	<b>3</b>	<b>14</b>	<b>69</b>	<b>116</b>	<b>247</b>
<b>Chemical and toxin</b>															
Ciguatoxin	–	–	–	–	–	–	–	–	–	–	–	–	–	17	18
Scombroid toxin/Histamine	–	–	–	3	2	–	–	–	–	–	–	1	6	13	17
Mycotoxins	–	–	–	–	–	–	–	–	–	–	–	–	–	4	4
Puffer fish tetrodotoxin	–	–	–	–	–	–	–	–	–	–	–	–	–	1	1
Other	–	–	–	–	–	–	–	–	–	–	–	–	–	4	6
<b>Subtotal</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>3</b>	<b>2</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>1</b>	<b>6</b>	<b>39</b>	<b>46</b>
<b>Parasitic</b>															
<i>Cryptosporidium</i>	–	–	–	–	–	–	–	–	–	–	–	1	1	2	3
<i>Trichinella</i>	–	–	–	–	–	–	–	–	–	–	–	–	–	2	2
<i>Cyclospora</i>	–	–	–	–	–	–	–	–	–	–	–	–	–	1	2
<b>Subtotal</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>1</b>	<b>1</b>	<b>5</b>	<b>7</b>
<b>Viral</b>															
Norovirus	4	1	–	1	–	–	–	–	–	–	–	1	5	86	157
Hepatitis A	–	–	–	–	–	–	–	–	–	–	–	–	–	1	2
Sapovirus	–	–	–	–	–	–	–	–	–	–	–	–	–	2	2
<b>Subtotal</b>	<b>4</b>	<b>1</b>	<b>–</b>	<b>1</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>1</b>	<b>5</b>	<b>89</b>	<b>161</b>
<b>Single etiology</b>	<b>34</b>	<b>23</b>	<b>1</b>	<b>9</b>	<b>20</b>	<b>2</b>	<b>15</b>	<b>12</b>	<b>–</b>	<b>–</b>	<b>3</b>	<b>17</b>	<b>81</b>	<b>249</b>	<b>461</b>
<b>Multiple etiologies</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>1</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>1</b>	<b>3</b>	<b>5</b>
<b>Total</b>	<b>34</b>	<b>23</b>	<b>1</b>	<b>9</b>	<b>20</b>	<b>2</b>	<b>16</b>	<b>12</b>	<b>–</b>	<b>–</b>	<b>3</b>	<b>17</b>	<b>82</b>	<b>252</b>	<b>466</b>

Appendices' footnotes are on page 18.

**Appendix:** Foodborne disease outbreaks by confirmed etiology\* and contributing factors—Foodborne Disease Outbreak Surveillance System, United States, 2014.

Etiology	Survival Factors <sup>†</sup>						No. outbreaks with reported contributing factors	Total No. outbreaks
	S1	S2	S3	S4	S5	≥1 factor reported		
<b>Bacterial</b>								
<i>Salmonella</i>	18	7	1	2	6	26	52	140
<i>Campylobacter</i>	6	– <sup>§</sup>	–	–	1	7	15	24
<i>Clostridium perfringens</i>	2	2	–	–	1	4	9	13
<i>Escherichia coli</i> , Shiga toxin-producing	2	–	–	–	1	3	5	23
<i>Staphylococcus aureus</i> enterotoxin	1	1	–	–	1	2	6	9
<i>Shigella</i>	–	–	–	–	–	–	5	11
<i>Bacillus cereus</i>	2	1	–	–	1	3	4	4
<i>Listeria monocytogenes</i>	–	–	–	1	2	2	6	9
<i>Vibrio parahaemolyticus</i>	–	–	–	–	–	–	8	8
<i>Clostridium botulinum</i>	–	–	–	–	3	3	4	4
<i>Streptococcus</i> , Group A	–	–	–	–	–	–	1	1
<i>Escherichia coli</i> , Enteroaggregative	–	–	–	–	–	–	1	1
Other	–	–	–	–	–	–	–	–
<b>Subtotal</b>	<b>31</b>	<b>11</b>	<b>1</b>	<b>3</b>	<b>16</b>	<b>50</b>	<b>116</b>	<b>247</b>
<b>Chemical and toxin</b>								
Ciguatoxin	–	–	–	–	–	–	17	18
Scombroid toxin/Histamine	–	–	–	–	–	–	13	17
Mycotoxins	–	–	–	–	–	–	4	4
Puffer fish tetrodotoxin	–	–	–	–	–	–	1	1
Other	–	–	–	–	–	–	4	6
<b>Subtotal</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>39</b>	<b>46</b>
<b>Parasitic</b>								
<i>Cryptosporidium</i>	–	–	–	–	–	–	2	3
<i>Trichinella</i>	2	–	–	–	–	2	2	2
<i>Cyclospora</i>	–	–	–	–	–	–	1	2
<b>Subtotal</b>	<b>2</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>2</b>	<b>5</b>	<b>7</b>
<b>Viral</b>								
Norovirus	2	–	1	–	4	7	86	157
Hepatitis A	–	–	–	–	–	–	1	2
Sapovirus	–	–	–	–	–	–	2	2
<b>Subtotal</b>	<b>2</b>	<b>–</b>	<b>1</b>	<b>–</b>	<b>4</b>	<b>7</b>	<b>89</b>	<b>161</b>
<b>Single etiology</b>	<b>35</b>	<b>11</b>	<b>2</b>	<b>3</b>	<b>20</b>	<b>59</b>	<b>249</b>	<b>461</b>
<b>Multiple etiologies</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>3</b>	<b>5</b>
<b>Total</b>	<b>35</b>	<b>11</b>	<b>2</b>	<b>3</b>	<b>20</b>	<b>59</b>	<b>252</b>	<b>466</b>

Appendices' footnotes are on page 18.

**Appendix:** Foodborne disease outbreaks by suspected etiology\* and contributing factors—Foodborne Disease Outbreak Surveillance System, United States, 2014.

Etiology	Contamination Factors															No. outbreaks with reported contributing factors	Total No. outbreaks	
	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15			≥1 factor reported
<b>Bacterial</b>																		
<i>Salmonella</i>	– <sup>6</sup>	–	–	–	–	–	–	–	2	–	–	2	–	–	1	4	4	9
<i>Campylobacter</i>	–	–	–	–	–	1	2	–	2	–	–	–	–	1	1	5	5	7
<i>Clostridium perfringens</i>	2	–	–	–	–	2	–	–	–	–	–	–	–	–	–	4	12	17
<i>Escherichia coli</i> , Shiga toxin-producing	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	1	1	1
<i>Staphylococcus aureus</i> enterotoxin	–	–	–	–	–	–	–	–	–	1	–	–	–	–	1	2	5	8
<i>Shigella</i>	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	1	3	5
<i>Bacillus cereus</i>	–	–	–	–	–	–	–	–	–	1	–	–	–	1	1	2	7	11
<i>Listeria monocytogenes</i>	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
<i>Vibrio parahaemolyticus</i>	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
<i>Clostridium botulinum</i>	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
<i>Streptococcus</i> , Group A	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
<i>Escherichia coli</i> , Enteroaggregative	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Other	–	–	–	–	–	–	1	–	2	–	–	–	–	–	–	5	6	9
Subtotal	2	–	–	–	–	3	3	–	7	2	–	2	–	2	10	25	46	70
<b>Chemical and toxin</b>																		
Ciguatoxin	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	1	1
Scombroid toxin/Histamine	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Mycotoxins	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Puffer fish tetrodotoxin	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Other	–	–	2	–	–	–	–	–	–	–	–	–	–	–	–	2	3	5
Subtotal	1	–	2	–	–	–	–	–	–	–	–	–	–	–	–	3	4	6
<b>Parasitic</b>																		
<i>Cryptosporidium</i>	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
<i>Trichinella</i>	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
<i>Cyclospora</i>	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Subtotal	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
<b>Viral</b>																		
Norovirus	–	–	–	–	–	–	3	–	1	21	15	10	5	3	11	45	46	127
Hepatitis A	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Sapovirus	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Subtotal	–	–	–	–	–	–	3	–	1	21	15	10	5	3	11	45	46	127
Single etiology	3	–	2	–	–	3	6	–	8	23	15	12	5	5	21	73	96	204
Multiple etiologies	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	1	1	7
Unknown etiology	3	–	–	1	–	2	1	–	11	5	6	6	2	7	12	38	59	187
<b>Total</b>	<b>6</b>	<b>–</b>	<b>2</b>	<b>1</b>	<b>–</b>	<b>6</b>	<b>7</b>	<b>–</b>	<b>19</b>	<b>28</b>	<b>21</b>	<b>18</b>	<b>7</b>	<b>12</b>	<b>33</b>	<b>112</b>	<b>156</b>	<b>398</b>

Appendices' footnotes are on page 18.

**Appendix:** Foodborne disease outbreaks by suspected etiology\* and contributing factors—Foodborne Disease Outbreak Surveillance System, United States, 2014.

Etiology	Proliferation/Amplification Factors <sup>†</sup>													No. outbreaks with reported contributing factors	Total No. outbreaks
	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	≥1 factor reported		
<b>Bacterial</b>															
<i>Salmonella</i>	1	– <sup>§</sup>	1	–	1	–	–	–	–	–	–	1	1	4	9
<i>Campylobacter</i>	3	1	–	–	1	–	1	–	–	–	–	–	3	5	7
<i>Clostridium perfringens</i>	2	1	–	–	5	1	5	6	–	–	–	2	12	12	17
<i>Escherichia coli</i> , Shiga toxin-producing	–	1	–	1	–	–	–	–	–	–	–	–	1	1	1
<i>Staphylococcus aureus</i> enterotoxin	3	–	–	3	–	–	–	2	–	–	–	–	5	5	8
<i>Shigella</i>	1	–	–	3	1	–	1	1	–	–	–	–	3	3	5
<i>Bacillus cereus</i>	2	4	1	1	2	1	1	2	–	–	–	–	7	7	11
<i>Listeria monocytogenes</i>	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
<i>Vibrio parahaemolyticus</i>	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
<i>Clostridium botulinum</i>	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
<i>Streptococcus</i> , Group A	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
<i>Escherichia coli</i> , Enteroaggregative	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Other	2	2	–	–	5	–	3	3	–	–	–	1	8	9	12
Subtotal	14	9	2	8	15	2	11	14	–	–	–	4	40	46	70
<b>Chemical and toxin</b>															
Ciguatoxin	–	–	–	–	–	–	–	–	–	–	–	–	–	1	1
Scombroid toxin/Histamine	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Mycotoxins	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Puffer fish tetrodotoxin	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Other	1	–	–	–	1	–	–	–	–	–	–	1	2	3	5
Subtotal	1	–	–	–	1	–	–	–	–	–	–	1	2	4	6
<b>Parasitic</b>															
<i>Cryptosporidium</i>	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
<i>Trichinella</i>	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
<i>Cyclospora</i>	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Subtotal	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
<b>Viral</b>															
Norovirus	–	1	–	–	–	–	1	–	–	–	–	–	2	46	127
Hepatitis A	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Sapovirus	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Subtotal	–	1	–	–	–	–	1	–	–	–	–	–	2	46	127
Single etiology	15	10	2	8	16	2	12	14	–	–	–	5	44	96	204
Multiple etiologies	1	–	–	–	–	–	–	1	–	–	–	1	1	1	7
Unknown etiology	7	7	3	10	15	1	15	10	2	–	–	1	42	59	187
<b>Total</b>	<b>23</b>	<b>17</b>	<b>5</b>	<b>18</b>	<b>31</b>	<b>3</b>	<b>27</b>	<b>25</b>	<b>2</b>	<b>–</b>	<b>–</b>	<b>7</b>	<b>87</b>	<b>156</b>	<b>398</b>

Appendices' footnotes are on page 18.

**Appendix:** Foodborne disease outbreaks by suspected etiology\* and contributing factors—Foodborne Disease Outbreak Surveillance System, United States, 2014.

Etiology	Survival Factors <sup>†</sup>						No. outbreaks with reported contributing factors	Total No. outbreaks
	S1	S2	S3	S4	S5	≥1 factor reported		
<b>Bacterial</b>								
<i>Salmonella</i>	– <sup>§</sup>	–	–	–	–	–	4	9
<i>Campylobacter</i>	1	–	–	–	–	1	5	7
<i>Clostridium perfringens</i>	2	5	–	–	1	7	12	17
<i>Escherichia coli</i> , Shiga toxin-producing	–	–	–	–	–	–	1	1
<i>Staphylococcus aureus</i> enterotoxin	1	–	–	–	–	1	5	8
<i>Shigella</i>	–	–	–	1	–	1	3	5
<i>Bacillus cereus</i>	–	–	–	–	–	–	7	11
<i>Listeria monocytogenes</i>	–	–	–	–	–	–	–	–
<i>Vibrio parahaemolyticus</i>	–	–	–	–	–	–	–	–
<i>Clostridium botulinum</i>	–	–	–	–	–	–	–	–
<i>Streptococcus</i> , Group A	–	–	–	–	–	–	–	–
<i>Escherichia coli</i> , Enteroaggregative	–	–	–	–	–	–	–	–
Other	–	–	–	–	4	4	9	12
Subtotal	4	5	–	1	5	14	46	70
<b>Chemical and toxin</b>								
Ciguatoxin	–	–	–	–	–	–	1	1
Scombroid toxin/Histamine	–	–	–	–	–	–	–	–
Mycotoxins	–	–	–	–	–	–	–	–
Puffer fish tetrodotoxin	–	–	–	–	–	–	–	–
Other	–	–	–	–	–	–	3	5
Subtotal	–	–	–	–	–	–	4	6
<b>Parasitic</b>								
<i>Cryptosporidium</i>	–	–	–	–	–	–	–	1
<i>Trichinella</i>	–	–	–	–	–	–	–	–
<i>Cyclospora</i>	–	–	–	–	–	–	–	–
Subtotal	–	–	–	–	–	–	–	1
<b>Viral</b>								
Norovirus	–	–	–	–	1	1	46	127
Hepatitis A	–	–	–	–	–	–	–	–
Sapovirus	–	–	–	–	–	–	–	–
Subtotal	–	–	–	–	1	1	46	127
Single etiology	4	5	–	1	6	15	96	204
Multiple etiologies	–	–	–	–	–	–	1	7
Unknown etiology	8	5	5	4	3	19	59	187
<b>Total</b>	<b>12</b>	<b>10</b>	<b>5</b>	<b>5</b>	<b>9</b>	<b>34</b>	<b>156</b>	<b>398</b>

Appendices' footnotes are on page 18.

## Appendix: Reported foodborne disease outbreaks, by confirmed etiology\* and suspected etiology\* and contributing factors†—Foodborne Disease Outbreak Surveillance System, United States, 2014

\* If at least one etiology was laboratory-confirmed, the outbreak was considered to have a confirmed etiology. If no etiology was laboratory-confirmed but an etiology was reported based on clinical or epidemiologic features, the outbreak was considered to have a suspected etiology.

† Contributing factors are defined as risk factors that either enable an outbreak to occur or amplify an outbreak caused by other means. Contributing factors are classified into three categories: contamination factors (factors that introduce or otherwise permit contamination), proliferation/amplification factors (factors that allow proliferation or growth of the etiologic agent), and survival factors (factors that allow survival or fail to inactivate a contaminant) (Bryan FL, Guzewich JJ, Todd EC. Surveillance of Foodborne Diseases III. Summary and Presentation of Data on Vehicles and Contributory Factors: Their value and limitations. J Food Prot 1997;60(6):701–14). More than one contributing factor might be reported per outbreak.

‡ Contributing factors:

C1: toxic substance part of the tissue

C2: poisonous substance intentionally/deliberately added

C3: poisonous substance accidentally/inadvertently added

C4: addition of excessive quantities of ingredients that are toxic in large amounts

C5: toxic container

C6: contaminated raw product—food that was intended to be consumed after a kill step

C7: contaminated raw product—food was intended to be consumed raw or undercooked/underprocessed

C8: foods originating from sources shown to be contaminated or polluted (such as a growing field or harvest area)

C9: cross-contamination of ingredients (cross-contamination does not include ill food workers)

C10: bare-handed contact by a food handler/worker/preparer who is suspected to be infectious

C11: glove-handed contact by a food handler/worker/preparer who is suspected to be infectious

C12: other mode of contamination (excluding cross-contamination) by a food handler/worker/preparer who is suspected to be infectious

C13: foods contaminated by non-food handler/worker/preparer who is suspected to be infectious

C14: storage in a contaminated environment

C15: other source of contamination

P1: food preparation practices that support proliferation of pathogens (during food preparation)

P2: no attempt was made to control the temperature of implicated food or the length of time food was out of temperature control (during food service or display of food)

P3: improper adherence of approved plan to use Time as a Public Health Control

P4: improper cold holding due to malfunctioning refrigeration equipment

P5: improper cold holding due to an improper procedure or protocol

P6: improper hot holding due to malfunctioning equipment

P7: improper hot holding due to improper procedure or protocol

P8: improper/slow cooling

P9: prolonged cold storage

P10: inadequate modified atmospheric packaging

P11: inadequate processing (acidification, water activity, fermentation)

P12: other situations that promoted or allowed microbial growth or toxin production

S1: insufficient time and/or temperature control during initial cooking/heat processing

S2: insufficient time and/or temperature during reheating

S3: insufficient time and/or temperature control during freezing

S4: insufficient or improper use of chemical processes designed for pathogen destruction

S5: other process failures that permit pathogen survival

§ No outbreaks in the data reported fall in this category.

\* An etiologic agent was not confirmed or suspected based on clinical, laboratory, or epidemiologic information.





**For more information, please contact:**

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