Surveillance for Foodborne Disease Outbreaks United States, 2013: Annual Report

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

Acknowledgements

The findings in this study are based, in part, on contributions by state, local, tribal, and territorial health departments.

Suggested Citation

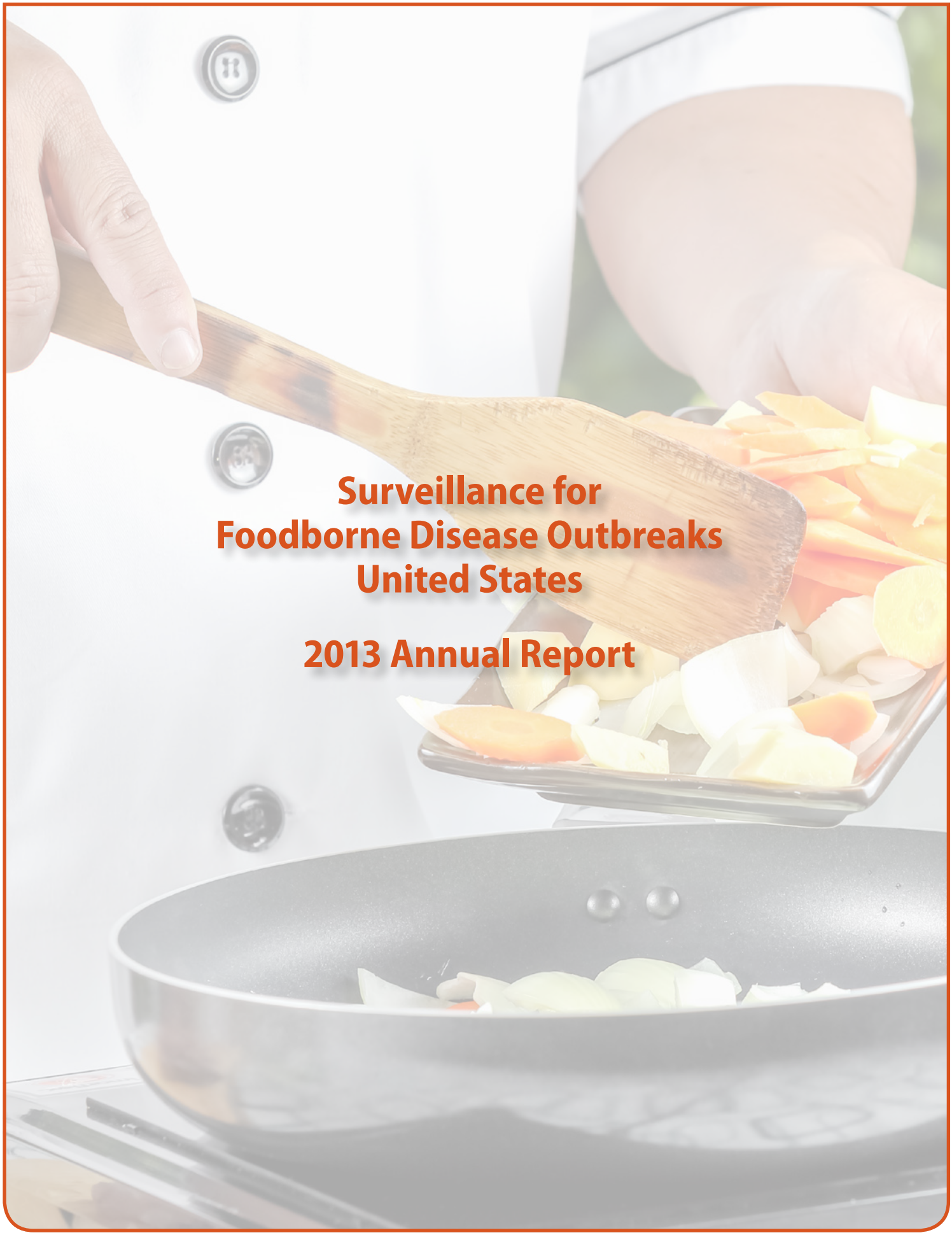
Centers for Disease Control and Prevention (CDC).
Surveillance for Foodborne Disease Outbreaks, United States, 2013, Annual Report.
Atlanta, Georgia: US Department of Health and Human Services, CDC, 2015.

Report compiled by

Daniel Dewey-Mattia, Sarah D. Bennett,
Elisabeth Mungai, and L. Hannah Gould

Centers for Disease Control and Prevention

Division of Foodborne, Waterborne, and Environmental Diseases
1600 Clifton Road, Mail Stop C-09, Atlanta, GA 30329-4027
Telephone: 404.639.2206
E-mail: NORS-Foodborne@cdc.gov
Web: http://www.cdc.gov/foodsafety/fdoss/



Surveillance for Foodborne Disease Outbreaks United States

2013 Annual Report

Contents

Main Findings

- In 2013, 818 foodborne disease outbreaks were reported, resulting in 13,360 illnesses, 1,062 hospitalizations, 16 deaths, and 14 food recalls.
- Outbreaks caused by *Salmonella* increased 39% from 2012 (113) to 2013 (157). Outbreak-associated hospitalizations caused by *Salmonella* increased 38% from 2012 (454) to 2013 (628).
- Fish (50 outbreaks), mollusks (23), chicken (21), and dairy (21, with 17 due to unpasteurized products) were the most common single food categories implicated in outbreaks.
- As reported in previous years, restaurants (433 outbreaks, 60% of outbreaks reporting a single location of preparation), specifically restaurants with sit-down dining 351, 49%), were the most commonly reported locations of food preparation.

Background

Foodborne diseases cause about 48 million illnesses each year in the United States, of which about 9.4 million are caused by known pathogens.[1-2] Although relatively few of these illnesses occur in the setting of a recognized outbreak, data collected during outbreak investigations can provide valuable 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://c.ymcdn.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, U.S. territories, and Freely Associated States voluntarily submit reports of outbreaks inves¬tigated 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 mode of transmission.

Investigating and reporting agencies use a standard outbreak reporting form (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). Outbreaks that are excluded from the Foodborne Disease Outbreak Surveillance System include those that occurred on cruise ships that have 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.

This report includes foodborne disease outbreaks reported to the Foodborne Disease Outbreak Surveillance System by March 26, 2015 in which the first illness occurred in 2013. Etiologic agents were reported as confirmed if a predefined criteria were met;[3] 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 2013 state populations (http://www.census.gov/popest). Multistate outbreaks were included in 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.[4] 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: Foodborne Disease Outbreaks, United States, 2013

States and Rates

During 2013, 818 foodborne disease outbreaks were reported, resulting in 13,360 illnesses, 1,062 hospitalizations, and 16 deaths (Table 1). Outbreaks were reported by public health officials from all 50 states and Puerto Rico (Figure). The median rate was 3.3 foodborne disease 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.

Etiologic Agents

A single confirmed or suspected etiologic agent was identified in 605 outbreaks (74%, with 439 confirmed and 166 suspected) (Table 1). Among the 439 outbreaks with a single confirmed etiologic agent, bacteria caused the most outbreaks (239 outbreaks, 54%), followed by viruses (160, 36%), chemicals (33, 8%), and parasites (7, 2%). Norovirus was the most common cause of confirmed, single-etiology outbreaks, accounting for 154 (35%) outbreaks and 3,758 (40%) illnesses. *Salmonella* was next, accounting for 149 (34%) outbreaks and 3,553 (38%) illnesses. Among the 147 confirmed *Salmonella* outbreaks with a serotype reported, Enteritidis was the most common (34 outbreaks, 23%), followed by Typhimurium (24, 16%), Heidelberg (12, 8%), Newport (9, 6%), Javiana (8, 5%), and I 4,[5],12:i:- (6, 4%). Shiga toxin-producing *Escherichia coli* (STEC) caused 29 confirmed, single-etiology outbreaks, of which 26 (90%) were caused by serogroup O157, 2 (7%) by O26, and 1 (3%) by O111.

Illnesses, Hospitalizations, and Deaths

Of the 9,359 outbreak-associated illnesses caused by a single confirmed etiologic agent, 965 (10%) resulted in hospitalization (Table 1). Among confirmed, single-etiology outbreaks, *Salmonella* caused the most outbreak-associated hospitalizations (623 hospitalizations, 65%), followed by STEC (137, 14%) and hepatitis A virus (73, 8%). Outbreaks caused by *Listeria monocytogenes* resulted in the highest proportion of ill persons hospitalized (88%). Among the 16 deaths reported, 13 (81%) were attributed to bacterial etiologies (*Listeria monocytogenes* [6], *Salmonella* [4], STEC O157 [2], and *Vibrio cholerae* [1]); 1 death was attributed to norovirus, 1 to multiple etiologies, and 1 to an unknown etiology.

Food Categories Implicated

A food was reported for 377 (46%) outbreaks. In 210 (56%) of these outbreaks, the food could be classified into 1 of the 24 categories (Table 2a); the categories most commonly implicated were fish (50 outbreaks, 24%), mollusks (23, 11%), chicken (21, 10%), and dairy (21, 10%). Pasteurization information was reported for 20 of the dairy outbreaks and 17 (85%) involved unpasteurized products. The most outbreak-associated illnesses were from chicken (901 illnesses, 23%), pork (529, 14%), and fruit (422, 11%).

Etiologic Agents and Food Category Pairs

The pathogen-food category pairs responsible for most outbreaks were scombroid toxin (histamine fish poisoning) in fish (25 outbreaks), ciguatoxin in fish (15), and *Vibrio parahaemolyticus* in mollusks (13) (Table 2b). The pathogen-food category pairs responsible for the most outbreak-associated illnesses were *Salmonella* in chicken (700 illnesses), *Salmonella* in pork (436), and *Salmonella* in seeded vegetables (268). The pathogen-food category pairs responsible for the most hospitalizations were *Salmonella* in chicken (213 hospitalizations), hepatitis A virus in fruits (71), and *Salmonella* in pork (65). Deaths were reported for the following pathogen-food category pairs: *Listeria* in dairy (3 deaths),

STEC in vegetable row crops (1), norovirus in fruits (1), *Salmonella* in fruits (1), *Salmonella* in nuts and seeds (1), and *Vibrio cholerae* in mollusks (1).

Location of Food Preparation

Among the 720 outbreaks and 11,058 illnesses with a reported single location where food was prepared, 433 outbreaks (60%) and 5,585 associated illnesses (51%) 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 (351 outbreaks, 81%).

Recalls

Fourteen outbreaks resulted in product recalls. The foods recalled were Latin-style soft cheese (2 outbreaks); chicken (2); oysters (2); French-style semi-soft cheese, infused rice products, landjaeger sausage, oysters and clams, pistachios, raw cashew cheese, romaine lettuce, and tahini (1 each).

Multistate Outbreaks

Twenty-six multistate outbreaks (3% of all outbreaks) were reported (Table 4), resulting in 1,530 illnesses (11% of illnesses), 403 hospitalizations (38% of hospitalizations), and 7 deaths (44% of deaths). Outbreaks involved a median of five states (range: 2-30). Eleven outbreaks were caused by *Salmonella*; the serotypes were Saintpaul (2 outbreaks); Adelaide, Heidelberg, Javiana, Newport, Senftenberg, Stanley, Thompson, Virchow, and multiple serotypes (1 each). The remaining 15 outbreaks were caused by *Vibrio parahaemolyticus* (4), STEC (4 outbreaks; serogroups O157 [3] and O26 [1]), *Listeria* (4), hepatitis A virus (1), *Cyclospora cayetanensis* (1), and niacin (1). A food was implicated in all 11 multistate outbreaks caused by *Salmonella*; the foods were cherry and grape tomatoes, chicken, cucumber, ground beef, papaya, pistachios, pork, raw cashew cheese, sugarcane, tahini, and tilapia fish (1 each). Four multistate outbreaks were caused by STEC, which was transmitted in prepackaged leafy greens (serogroup O157), romaine lettuce (O157), salmon (O157), and an unspecified lettuce (O26) (1 outbreak each).

Four multistate outbreaks were caused by *Listeria* in pasteurized Latin-style soft cheese (2 outbreaks), pasteurized French-style semi-soft cheese (1), and an unidentified food in an outbreak identified through whole genome sequencing (1). Raw oysters and raw clams (2 outbreaks), raw oysters (1), and raw oysters, raw clams, and steamed clams (1) were implicated in the four *Vibrio parahaemolyticus* outbreaks. Infused rice products were implicated in the outbreak caused by niacin, bagged salad mix was implicated in the outbreak caused by *Cyclospora cayetanensis*, and pomegranate seeds were implicated in the outbreak caused by hepatitis A virus.

Limitations

The findings in this report have at least three limitations. First, only a small proportion of foodborne illnesses reported each year are identified as being associated with outbreaks. The extent to which the distribution of food vehicles and locations of preparation implicated in foodborne disease 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 or suspected etiology or food vehicle might not apply to outbreaks with an unknown etiology or food vehicle. 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 published earlier or from future reports.

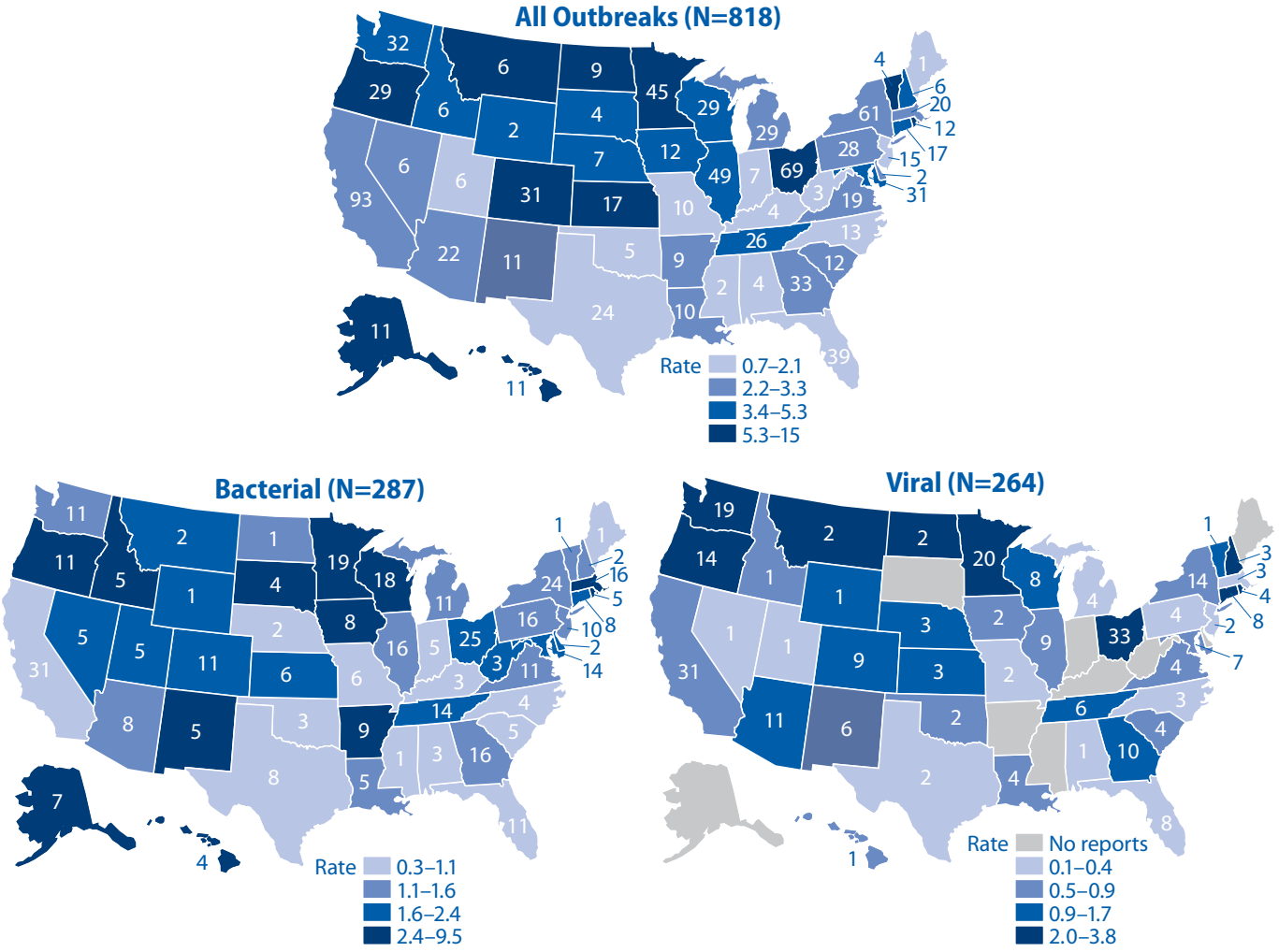
Additional Information

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. Scallan E, Griffin PM, Angulo FJ, Tauxe RV, Hoekstra RM. Foodborne illness acquired in the United States-unspecified agents. Emerging Infectious Diseases 2011; 17(1): 16-22.
3. CDC. Guide to confirming a diagnosis in foodborne disease. Available at: http://www.cdc.gov/foodsafety/outbreaks/investigating-outbreaks/confirming_diagnosis.html. Accessed January 23, 2014.
4. Interagency Food Safety Analytics Collaboration (IFSAC). The Interagency Food Safety Analytics Collaboration (IFSAC): Completed Projects. Available at: http://www.cdc.gov/foodsafety/ifsac/projects/completed.html. Accessed May 30, 2014.

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, 2013.



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

† Reported outbreaks in each state. Puerto Rico reported 19 outbreaks (not shown).

‡ Includes 26 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: 2–30).

§ Includes outbreaks caused by both confirmed and suspected etiologies.

Table 1: Reported foodborne disease outbreaks, outbreak-associated illnesses, and hospitalizations, by etiology (confirmed or suspected)*—Foodborne Disease Outbreak Surveillance System, United States, 2013.

	No. Outbreaks				No. Illnesses				No. Hospitalizations			
Etiology	CE	SE	Total	%	CE	SE	Total	%	CE	SE	Total	%
Bacterial												
Salmonella†	149	8	157	26	3553	40	3593	32	623	5	628	62
Escherichia coli, Shiga toxin-producing (STEC)§	29	2	31	5	409	23	432	4	137	7	144	14
Clostridium perfringens	12	15	27	4	361	240	601	5	2	1	3	0
Campylobacter‡	20	7	27	4	266	21	287	3	17	5	22	2
Vibrio parahaemolyticus	9	4	13	2	57	23	80	1	4	1	5	0
Staphylococcus aureus enterotoxin	6	4	10	2	221	42	263	2	25	2	27	3
Listeria monocytogenes	6	0	6	1	34	0	34	0	30	0	30	3
Bacillus cereus	2	3	5	1	9	16	25	0	0	1	1	0
Shigella¶	3	1	4	1	27	4	31	0	4	0	4	0
Vibrio cholerae	1	1	2	0	3	2	5	0	3	1	4	0
Staphylococcus spp	1	1	2	0	33	5	38	0	0	0	0	0
Clostridium botulinum	0	1	1	0	0	4	4	0	0	4	4	0
Escherichia coli, Enteroaggregative	1	0	1	0	34	0	34	0	0	0	0	0
Other	0	1	1	0	0	3	3	0	0	0	0	0
Subtotal	239	48	287	47	5007	423	5430	49	845	27	872	86
Chemical and toxin												
Scombroid toxin/Histamine	22	3	25	4	58	10	68	1	0	1	1	0
Ciguatoxin	7	9	16	3	25	27	52	0	2	4	6	1
Amnesic shellfish poison	1	0	1	0	2	0	2	0	2	0	2	0
Puffer fish tetrodotoxin	1	0	1	0	2	0	2	0	2	0	2	0
Paralytic shellfish poison	1	0	1	0	2	0	2	0	0	0	0	0
Other	1	2	3	0	2	60	62	1	0	3	3	0
Subtotal	33	14	47	8	91	97	188	2	6	8	14	1
Parasitic												
Cryptosporidium	3	0	3	0	29	0	29	0	4	0	4	0
Trichinella	2	0	2	0	12	0	12	0	3	0	3	0
Cyclospora	2	0	2	0	199	0	199	2	10	0	10	1
Subtotal	7	0	7	1	240	0	240	2	17	0	17	2
Viral												
Norovirus	154	103	257	42	3758	1241	4999	45	24	9	33	3
Hepatitis A	4	0	4	1	172	0	172	2	73	0	73	7
Sapovirus	1	0	1	0	33	0	33	0	0	0	0	0
Rotavirus	1	0	1	0	58	0	58	1	0	0	0	0
Other	0	1	1	0	0	16	16	0	0	0	0	0
Subtotal	160	104	264	44	4021	1257	5278	47	97	9	106	11
Single etiology**	439	166	605	74	9359	1777	11136	83	965	44	1009	95
Multiple etiologies	9	7	16	2	128	47	175	1	9	1	10	1
Unknown etiology	0	197	197	24	2049	2049	2049	15	0	43	43	4
Total	**448**	**370**	**818**	**100**	**9487**	**3873**	**13360**	**100**	**974**	**88**	**1062**	**100**

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.

† *Salmonella* serotypes causing more than five outbreaks were Enteritidis (36 outbreaks), Typhimurium (24), Heidelberg (12), Newport (9), Javiana (9), and I 4,[5],12:i:- (6).

‡ *Campylobacter jejuni* (15 outbreaks), *Campylobacter* unknown species (9), *Campylobacter coli* (2), and *Campylobacter* multiple species (1).

§ STEC serogroups O157 (28 outbreaks), O26 (2), and O111 (1).

¶ *Shigella sonnei* (2 outbreaks), *Shigella flexneri* (1), and *Shigella* unknown species (1).

** The denominator for the etiology percentages is the single etiology total. The denominatory 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.

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

Table 2a: Reported foodborne disease outbreaks and outbreak-associated illnesses, by food category*—Foodborne Disease Outbreak Surveillance System, United States, 2013.

	No. Outbreaks		No. Illnesses	
Food Category*	Total	%	Total	%
Aquatic animals				
Crustaceans	2	1	11	0
Mollusks†	23	11	138	4
Fish	50	24	217	6
Other aquatic animals	1	0	2	0
Subtotal	76	36	368	10
Land animals				
Dairy‡	21	10	222	6
Eggs	3	1	79	2
Beef	11	5	296	8
Pork	13	6	529	14
Other meat (sheep, goat, etc.)	4	2	34	1
Chicken	21	10	901	23
Turkey	6	3	194	5
Other poultry	2	1	59	2
Game	2	1	12	0
Subtotal	83	40	2326	60
Plants				
Oils and sugars	1	0	7	0
Sprouts	1	0	3	0
Root and other underground vegetables§	2	1	69	2
Seeded vegetables¶	8	4	305	8
Herbs	1	0	38	1
Vegetable row crops**	9	4	207	5
Fruits††	15	7	422	11
Grains and beans‡‡	8	4	61	2
Nuts and seeds§§	2	1	25	1
Subtotal	47	22	1137	29
Other	1	0	2	0
Food reported, attributed to a single food category¶¶	210	26	3858	29
Food reported, not attributed to a single food category	167	20	3203	24
No food reported	441	54	6299	47
Total¶¶	**818**	**100**	**13360**	**100**

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

† Bivalve mollusks (22 outbreaks) and non-bivalve mollusks (1).

‡ Unpasteurized dairy products (17 outbreaks), pasteurized dairy products (3), and pasteurization unknown (1).

§ Tubers (2 outbreaks).

¶ Solanaceous seeded vegetables (4 outbreaks), vine-grown seeded vegetables (3), and legumes (1).

** Leafy vegetables (9 outbreaks).

†† Fruits not further classified (6 outbreaks), melons (3), pome fruits (3), small fruits (1), sub-tropical fruits (1), and tropical fruits (1).

‡‡ Grains (4 outbreaks), beans (2), and grains and beans not further classified (2).

§§ Nuts (1 outbreak) 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: Common pathogen-food category pairs resulting in outbreaks, outbreak-associated illnesses, hospitalizations, and deaths—Foodborne Disease Outbreak Surveillance System, United States, 2013.

Top 5 pathogen-food category pairs resulting in outbreaks

Etiology	Food Category*	No. Outbreaks	No. Illnesses	No. Hospitalizations	No. Deaths
Scombroid toxin/Histamine	Fish	25	68	1	0
Ciguatoxin	Fish	15	50	6	0
Vibrio parahaemolyticus	Mollusks	13	80	5	0
Salmonella	Chicken	9	700	213	0
Campylobacter	Dairy	9	114	5	0

Top 5 pathogen-food category pairs resulting in outbreak-associated illnesses

Etiology	Food Category*	No. Outbreaks	No. Illnesses	No. Hospitalizations	No. Deaths
Salmonella	Chicken	9	700	213	0
Salmonella	Pork	8	436	65	0
Salmonella	Seeded vegetables	5	268	44	0
Salmonella	Beef	5	210	19	0
Norovirus	Fruits	6	196	0	1

Top 5 pathogen-food category pairs resulting in outbreak-associated hospitalizations

Etiology	Food Category*	No. Outbreaks	No. Illnesses	No. Hospitalizations	No. Deaths
Salmonella	Chicken	9	700	213	0
Hepatitis A	Fruits	2	159	71	0
Salmonella	Pork	8	436	65	0
Escherichia coli, Shiga toxin-producing	Vegetable row crops	7	188	63	1
Salmonella	Seeded vegetables	5	268	44	0

Pathogen-food category pairs resulting in outbreak-associated deaths

Etiology	Food Category*	No. Outbreaks	No. Illnesses	No. Hospitalizations	No. Deaths
Listeria monocytogenes	Dairy	3	23	21	3
Escherichia coli, Shiga toxin-producing	Vegetable row crops	7	188	63	1
Norovirus	Fruits	6	196	0	1
Salmonella	Fruits	5	49	18	1
Salmonella	Nuts and seeds	2	25	2	1
Vibrio cholerae	Mollusks	2	5	4	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, 2013.

	No. Outbreaks		No. Illnesses	
Location of food preparation	Total	%	Total	%
Restaurant	433	60	5585	51
Sit-down dining	351	49	4494	41
Fast-food	52	7	611	6
Other or unknown type	27	4	460	4
Multiple types	3	0	20	0
Catering or banquet facility	102	14	2435	22
Private home	86	12	1078	10
Institutional location	27	4	859	8
School	10	1	362	3
Prison or jail	8	1	311	3
Workplace cafeteria	3	0	116	1
Camp	1	0	6	0
Day care	2	0	19	0
Workplace, not cafeteria	1	0	12	0
Other	2	0	33	0
Other location	5	1	35	0
Other commercial location	40	6	442	4
Grocery store	15	2	86	1
Fair, festival, or temporary mobile service	9	1	171	2
Farm or dairy	14	2	178	2
Other	2	0	7	0
Hospital or nursing home	12	2	256	2
Nursing home	11	2	223	2
Hospital	1	0	33	0
Other private location	16	2	374	3
Place of worship	13	2	361	3
Picnic	2	0	9	0
Other	1	0	4	0
Single location*	720	88	11058	83
Multiple locations	43	5	903	7
Unknown location	55	7	1399	10
Total*	**818**	**100**	**13360**	**100**

* 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: Reported foodborne disease outbreaks and outbreak-associated illnesses, by etiology (confirmed or suspected)* and location of food preparation†—Foodborne Disease Outbreak Surveillance System, United States, 2013.

	Catering or banquet facility		Restaurant		Other commercial location		Hospital or nursing home		institutional location		Private home		Other private location		Other location	
Etiology	NO	NI	NO	NI	NO	NI	NO	NI	NO	NI	NO	NI	NO	NI	NO	NI
Bacterial																
Salmonella	9	142	60	1118	12	193	2	7	10	310	28	475	6	179	2	11
Escherichia coli, Shiga toxin-producing	2	53	14	286	4	23	–‡	–	2	14	6	33	–	–	2	11
Clostridium perfringens	8	339	11	127	–	–	–	–	3	57	3	15	1	11	–	–
Campylobacter	1	8	14	135	6	107	–	–	–	–	1	2	–	–	–	–
Vibrio parahaemolyticus	–	–	8	25	–	–	–	–	–	–	1	5	–	–	–	–
Staphylococcus aureus enterotoxin	1	9	4	49	1	4	–	–	2	162	1	14	1	25	–	–
Listeria monocytogenes	–	–	1	4	–	–	–	–	–	–	2	17	–	–	–	–
Bacillus cereus	–	–	3	12	1	5	–	–	–	–	–	–	–	–	–	–
Shigella	–	–	2	22	–	–	–	–	–	–	1	4	–	–	–	–
Vibrio cholerae	–	–	1	2	–	–	–	–	–	–	–	–	–	–	–	–
Staphylococcus spp	–	–	1	5	–	–	–	–	–	–	1	33	–	–	–	–
Clostridium botulinum	–	–	–	–	–	–	–	–	–	–	1	4	–	–	–	–
Escherichia coli, Enteroaggregative	1	34	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Other	–	–	1	3	–	–	–	–	–	–	–	–	–	–	–	–
Subtotal	22	585	120	1788	24	332	2	7	17	543	45	602	8	215	4	22
Chemical and toxin																
Scombroid toxin/Histamine	–	–	15	42	3	7	–	–	1	4	4	8	–	–	–	–
Ciguatoxin	–	–	3	8	–	–	–	–	–	–	10	33	1	4	–	–
Amnesic shellfish poison	–	–	1	2	–	–	–	–	–	–	–	–	–	–	–	–
Puffer fish tetrodotoxin	–	–	–	–	–	–	–	–	–	–	1	2	–	–	–	–
Paralytic shellfish poison	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Other	–	–	–	–	1	2	–	–	–	–	1	3	–	–	–	–
Subtotal	–	–	19	52	4	9	–	–	1	4	16	46	1	4	0	–
Parasitic																
Cryptosporidium	–	–	–	–	1	8	–	–	–	–	2	21	–	–	–	–
Trichinella	–	–	–	–	–	–	–	–	–	–	2	12	–	–	–	–
Cyclospora	–	–	1	161	–	–	–	–	–	–	–	–	–	–	–	–
Subtotal	–	–	1	161	1	8	–	–	–	–	4	33	–	–	0	–
Viral																
Norovirus	48	1259	160	2411	4	40	8	228	5	244	11	176	3	113	1	13
Hepatitis A	–	–	1	9	1	4	–	–	–	–	2	159	–	–	–	–
Sapovirus	–	–	1	33	–	–	–	–	–	–	–	–	–	–	–	–
Rotavirus	1	58	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Other	1	16	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Subtotal	50	1333	162	2453	5	44	8	228	5	244	13	335	3	113	1	13
Single etiology	72	1918	302	4454	34	393	10	235	23	791	78	1016	12	332	5	35
Multiple etiologies	–	–	7	59	2	16	1	9	2	51	1	7	1	13	0	–
Unknown etiology§	30	517	124	1072	4	33	1	12	2	17	7	55	3	29	0	–
Total	**102**	**2435**	**433**	**5585**	**40**	**442**	**12**	**256**	**27**	**859**	**86**	**1078**	**16**	**374**	**5**	**35**

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, 2013.

Month of first illness onset	Etiology	No. illnesses	No. hospitalizations	No. deaths	No. states involved	Implicated food	Food recall
January	*Salmonella* Saintpaul	84	17	0	18	Cucumber	No
January	*Salmonella* Senftenberg	8	1	0	6	Pistachio	Yes
February	*Salmonella* Mbandaka and Montevideo	17	1	1	10	Tahini	Yes
March	*Salmonella* Saintpaul	131	23	0	23	Cherry tomato; grape tomato	No
March	*Salmonella* Heidelberg	634	200	0	30	Chicken	No
March	Hepatitis A	157	70	0	10	Pomegranate seeds	No
April	Shiga toxin-producing *E. coli* O26	26	5	0	13	Lettuce	No
April	*Salmonella* Newport	39	9	0	8	Ground beef	No
April	Shiga toxin-producing *E. coli* O157:H7	14	9	1	9	Prepackaged leafy greens	No
May	Shiga toxin-producing *E. coli* O157:H7	7	0	0	3	Salmon	No
May	*Listeria monocytogenes*	6	6	1	5	French-style soft chesse	Yes
May	*Vibrio parahaemolyticus*	4	0	0	3	Raw oysters	No
June	*Salmonella* Thompson	13	6	1	4	Papaya	No
June	*Cyclospora cayetanensis*	161	10	0	2	Bagged salad mix	No
June	*Salmonella* Virchow	7	1	0	3	Sugarcane	No
June	*Vibrio parahaemolyticus*	15	0	0	6	Raw oysters; raw clams	Yes
June	*Vibrio parahaemolyticus*	10	1	0	3	Raw oysters; raw clams; steamed clams	No
July	*Listeria monocytogenes*	5	5	1	3	No food reported	No
July	*Vibrio parahaemolyticus*	20	3	0	5	Raw oysters; raw clams	Yes
August	*Listeria monocytogenes*	8	7	1	2	Latin-style soft cheese	Yes
August	*Salmonella* Adelaide	14	2	0	5	Pork	No
September	*Listeria monocytogenes*	9	8	1	6	Latin-style soft cheese	Yes
October	Shiga toxin-producing *E. coli* O157:H7	33	9	0	4	Romaine lettuce	Yes
October	Niacin	57	0	0	3	Infused rice products	Yes
November	*Salmonella* Stanley	18	4	0	3	Raw cashew cheese	Yes
November	*Salmonella* Javiana	33	6	0	6	Tilapia fish	No

Appendix: Reported foodborne disease outbreaks by etiology (confirmed or suspected)* and contributing factors—Foodborne Disease Outbreak Surveillance System, United States, 2013.

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		
Bacterial																		
Salmonella	[1]	–§	–	–	–	18	11	2	20	6	3	7	1	3	8	54	57	157
Escherichia coli, Shiga toxin-producing	–	–	–	–	–	3	5	–	4	2	–	2	–	–	2	13	14	31
Clostridium perfringens	1	–	1	–	–	7	–	–	1	–	–	–	–	1	2	12	20	27
Campylobacter	–	–	–	–	–	5	9	1	2	–	–	–	–	–	–	16	18	27
Vibrio parahaemolyticus	–	–	–	–	–	2	7	1	–	–	–	–	–	–	–	9	9	13
Staphylococcus aureus enterotoxin	–	–	–	–	–	–	–	–	2	2	2	1	–	–	2	7	9	10
Listeria monocytogenes	–	–	–	–	–	–	–	–	1	–	–	–	–	–	1	2	2	6
Bacillus cereus	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	1	3	5
Shigella	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	1	1	4
Vibrio cholerae	1	–	–	–	–	–	2	–	–	–	–	–	–	–	–	2	2	2
Staphylococcus spp	–	–	–	–	–	–	–	–	1	1	1	–	–	–	–	2	2	2
Clostridium botulinum	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	1
Escherichia coli, Enteroaggregative	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
Other	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	1
Subtotal	3	–	1	–	–	35	35	4	31	11	6	10	1	5	15	119	139	287
Chemical and toxin																		
Scombroid toxin/Histamine	18	–	–	–	–	–	1	–	–	–	–	–	–	–	1	20	23	25
Ciguatoxin	15	–	–	–	–	–	–	–	–	–	–	–	–	–	–	15	15	16
Amnesic shellfish poison	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	1	1
Puffer fish tetrodotoxin	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	1	1
Paralytic shellfish poison	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	1	1
Other	1	–	–	1	–	–	–	–	–	–	–	–	–	–	–	2	2	3
Subtotal	37	–	–	1	–	–	1	–	–	–	–	–	–	–	1	40	43	47
Parasitic																		
Cryptosporidium	–	–	–	–	–	–	1	–	1	–	–	–	–	–	–	2	2	3
Trichinella	–	–	–	–	–	2	–	–	–	–	–	–	–	–	–	2	2	2
Cyclospora	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2
Subtotal	–	–	–	–	–	2	1	–	1	–	–	–	–	–	–	4	4	7
Viral																		
Norovirus	–	–	–	–	–	–	5	1	6	54	39	42	6	3	9	116	119	257
Hepatitis A	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	1	1	4
Sapovirus	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	1	1	1
Rotavirus	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
Other	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	1	1	1
Subtotal	–	–	–	–	–	–	5	1	6	57	39	42	6	3	9	119	122	264
Single etiology	40	–	1	1	–	37	42	5	38	68	45	52	7	8	25	282	308	605
Multiple etiologies	–	–	–	–	–	–	2	1	–	1	2	1	–	1	1	5	9	16
Unknown etiology	–	–	1	–	–	–	5	1	6	8	6	7	2	4	6	31	53	197
Total	**40**	**–**	**2**	**1**	**–**	**37**	**49**	**7**	**44**	**77**	**53**	**60**	**9**	**13**	**32**	**318**	**370**	**818**

Appendices' footnotes are on page 15.

Appendix: Reported foodborne disease outbreaks by etiology (confirmed or suspected)* and contributing factors—Foodborne Disease Outbreak Surveillance System, United States, 2013.

Etiology	Proliferation / Amplification Factors‡													No. outbreaks with reported contributing factors	Total No. outbreaks
	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	≥1 factor reported		
Bacterial															
Salmonella	25	13	3	5	9	2	12	5	–§	1	1	4	35	57	157
Escherichia coli, Shiga toxin-producing	4	–	–	1	–	–	–	1	–	–	1	–	7	14	31
Clostridium perfringens	5	3	–	1	4	–	6	6	–	–	–	–	19	20	27
Campylobacter	3	–	–	1	1	–	1	2	–	–	2	1	7	18	27
Vibrio parahaemolyticus	–	–	–	–	–	–	–	–	–	–	–	1	1	9	13
Staphylococcus aureus enterotoxin	4	5	–	2	2	–	3	3	–	–	–	1	9	9	10
Listeria monocytogenes	–	–	–	–	–	–	–	–	–	–	–	–	–	2	6
Bacillus cereus	2	1	1	–	–	–	–	2	–	–	–	–	3	3	5
Shigella	–	–	–	–	–	–	–	–	–	–	–	–	–	1	4
Vibrio cholerae	–	–	–	–	–	–	–	–	–	–	–	–	–	2	2
Staphylococcus spp	–	–	–	1	–	–	1	1	–	–	–	–	2	2	2
Clostridium botulinum	–	–	–	–	–	–	–	–	–	–	1	–	1	1	1
Escherichia coli, Enteroaggregative	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
Other	–	–	–	–	–	–	–	1	–	–	–	–	1	1	1
Subtotal	43	22	4	11	16	2	23	21	–	1	5	7	85	139	287
Chemical and toxin															
Scombroid toxin/Histamine	1	1	–	3	3	–	1	1	–	–	–	3	12	23	25
Ciguatoxin	–	–	–	–	–	–	–	–	–	–	–	–	–	15	16
Amnesic shellfish poison	–	–	–	–	–	–	–	–	–	–	–	–	–	1	1
Puffer fish tetrodotoxin	–	–	–	–	–	–	–	–	–	–	–	–	–	1	1
Paralytic shellfish poison	–	–	–	–	–	–	–	–	–	–	–	–	–	1	1
Other	–	–	–	–	–	–	–	–	–	–	–	–	–	2	3
Subtotal	1	1	–	3	3	–	1	1	–	–	–	3	12	43	47
Parasitic															
Cryptosporidium	–	–	–	–	–	–	–	–	–	–	–	–	–	2	3
Trichinella	–	–	–	–	–	–	–	–	–	–	–	–	–	2	2
Cyclospora	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2
Subtotal	–	–	–	–	–	–	–	–	–	–	–	–	–	4	7
Viral															
Norovirus	3	2	2	–	2	–	1	2	–	–	–	2	10	119	257
Hepatitis A	–	–	–	–	–	–	–	–	–	–	–	–	–	1	4
Sapovirus	–	–	–	–	–	–	–	–	–	–	–	1	1	1	1
Rotavirus	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
Other	1	–	–	–	–	–	–	–	–	–	–	1	1	1	1
Subtotal	4	2	2	–	2	–	1	2	–	–	–	4	12	122	264
Single etiology	48	25	6	14	21	2	25	24	–	1	5	14	109	308	605
Multiple etiologies	3	2	–	1	1	–	2	5	–	–	–	1	8	9	16
Unknown etiology	11	10	–	6	9	3	12	5	–	–	–	3	32	53	197
Total	**62**	**37**	**6**	**21**	**31**	**5**	**39**	**34**	**–**	**1**	**5**	**18**	**149**	**370**	**818**

Appendices' footnotes are on page 15.

Appendix: Reported foodborne disease outbreaks by etiology (confirmed or suspected)* and contributing factors—Foodborne Disease Outbreak Surveillance System, United States, 2013.

Etiology	Survival Factors‡						No. outbreaks with reported contributing factors	Total No. outbreaks
	S1	S2	S3	S4	S5	≥1 factor reported		
Bacterial								
Salmonella	14	11	–§	2	6	26	57	157
Escherichia coli, Shiga toxin-producing	1	–	–	1	3	5	14	31
Clostridium perfringens	6	7	–	–	2	14	20	27
Campylobacter	9	–	–	1	1	11	18	27
Vibrio parahaemolyticus	–	–	–	–	–	–	9	13
Staphylococcus aureus enterotoxin	–	1	–	–	1	2	9	10
Listeria monocytogenes	–	–	–	–	1	1	2	6
Bacillus cereus	1	–	–	–	1	2	3	5
Shigella	–	–	–	–	–	–	1	4
Vibrio cholerae	–	–	–	–	–	–	2	2
Staphylococcus spp	–	–	–	–	–	–	2	2
Clostridium botulinum	–	–	–	–	–	–	1	1
Escherichia coli, Enteroaggregative	–	–	–	–	–	–	–	1
Other	–	–	–	–	–	–	1	1
Subtotal	31	19	–	4	15	61	139	287
Chemical and toxin								
Scombroid toxin/Histamine	–	–	–	–	1	1	23	25
Ciguatoxin	–	–	–	–	–	–	15	16
Amnesic shellfish poison	–	–	–	–	–	–	1	1
Puffer fish tetrodotoxin	–	–	–	–	–	–	1	1
Paralytic shellfish poison	–	–	–	–	–	–	1	1
Other	–	–	–	–	–	–	2	3
Subtotal	–	–	–	–	1	1	43	47
Parasitic								
Cryptosporidium	–	–	–	–	1	1	2	3
Trichinella	2	–	–	–	–	2	2	2
Cyclospora	–	–	–	–	–	–	–	2
Subtotal	2	–	–	–	1	3	4	7
Viral								
Norovirus	1	–	–	2	1	4	119	257
Hepatitis A	–	–	–	–	–	–	1	4
Sapovirus	–	–	–	–	–	–	1	1
Rotavirus	–	–	–	–	–	–	–	1
Other	–	–	–	–	1	1	1	1
Subtotal	1	–	–	2	2	5	122	264
Single etiology	34	19	–	6	19	70	308	605
Multiple etiologies	1	2	–	–	2	5	9	16
Unknown etiology	5	8	–	2	8	21	53	197
Total	**40**	**29**	**–**	**8**	**29**	**96**	**370**	**818**

Appendices' footnotes are on page 15.

Appendix Footnotes:

* 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 / under-processed
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
Centers for Disease Control and Prevention
1600 Clifton Road NE, Atlanta, GA 30333
Telephone: 1-800-CDC-INFO (232-4636) / TTY: 1-888-232-6348
E-mail: cdcinfo@cdc.gov
Web: http://www.cdc.gov

CS 259962-A