

# Outbreaks of Foodborne Diseases Associated with Tomatoes<sup>1</sup>

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Fresh-market tomatoes are a popular commodity in homes and food service around the world. Because fresh-market tomatoes are intended to be consumed raw, there is no “kill-step” to eliminate pathogens in the event that tomatoes become contaminated (Maitland et al. 2011). Public health officials often meet numerous challenges when conducting traceback investigations of produce outbreaks. Fresh produce items have often reached the end of their shelf life by the time they have been linked to an outbreak; obtaining samples from these items is difficult because these items have typically been consumed or discarded (Lynch et al. 2009). It can be difficult for public health officials to determine where the implicated food was produced and prepared. As a consequence, the challenges of recognizing unusual food vehicles, such as specific lots of fresh produce, can delay the foodborne outbreak investigation (Lynch et al. 2009). The number of sporadic (i.e., isolated) illnesses linked to the consumption of contaminated fresh fruits and vegetables is unknown (Heaton and Jones 2008).

This document is intended to serve as a reference for everyone interested in the safety of fresh-market tomatoes by providing a comprehensive list of tomato-related outbreaks in the United States. Three tables are presented

below, which include foodborne outbreaks where tomatoes were i) confirmed as the food vehicle (Table 1), ii) part of a complex food vehicle (Table 2), and iii) suspected, but not confirmed, as the food vehicle (Table 3). Of 38 outbreaks linked to fresh tomatoes in the United States since 1990, 4,028 illnesses and four deaths are reported (Table 1). *Salmonella* sp. was confirmed as the causative agent in 30 of 38 outbreaks linked to fresh tomatoes (Table 1).



Figure 1. Tomatoes.  
Credits: USDA Photo by Scott Bauer

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Table 1. Outbreaks of foodborne disease associated with tomatoes in the United States, 1990–2017.

Year	Month of Onset	Location	Pathogen <sup>b</sup>	Location of Consumption	Cases (Deaths)	Food Vehicle	Reference <sup>c</sup>
1990	NR <sup>a</sup>	US (multistate)	S. Javiana	Various	176 (0)	Round tomato	Hedberg et al. 1999
1993	NR	US (multistate)	S. Montevideo	Various	100 (0)	Round tomato	Hedberg et al. 1999
1994	NR	Arkansas	Hepatitis A	Restaurant	92 (0)	Diced tomato	FDA 2009
1998	December	US (multistate)	S. Baildon	Restaurant; Nursing home	86 (3)	Tomato	Cummings et al. 2001, CDC 2018
2000	November	US (multistate)	S. Thompson	Private home	43 (NR)	Tomato	CDC 2018
2000	December	Ohio	Norovirus	Restaurant	31 (0)	Tomato	CDC 2018
2001	May	New York	Shigella flexneri	Restaurant	886 (NR)	Tomato	CDC 2018
2002	February	Connecticut	S. Newport	Private home	8 (0)	Grape tomato	CDC 2018
2002	June	Massachusetts	S. Javiana	Restaurant	3 (0)	Tomato	CDC 2018
2002	June	Florida	S. Javiana	Restaurant	159 (0)	Tomato	CDC 2018
2002	July	US (multistate)	S. Newport	Hospital; Restaurant; School	510 (0)	Tomato	CDC 2018
2003	March	California	S. Virchow	NR	11 (0)	Tomato	CDC 2018
2004	May	Ohio	Campylobacter	Restaurant	13 (0)	Tomato	CDC 2018
2004	June	US (multistate)	S. Braenderup	Private home; Restaurant	137 (0)	Roma tomato	CDC 2018
2004	July	US (multistate)	S. Anatum; Javiana; Muenchen; Thompson; Typhimurium	Restaurant	429 (0)	Roma tomato	CDC 2018
2004	November	Connecticut	Norovirus	Camp	92 (0)	Tomato	CDC 2018
2005	March	Tennessee	Hepatitis A	Restaurant	23 (0)	Tomato	CDC 2018
2005	July	US (multistate)	S. Newport	Restaurant	72 (0)	Beefsteak tomato	CDC 2018
2005	September	Colorado	Norovirus	Unknown (caterer)	17 (0)	Tomato	CDC 2018
2005	November	US (multistate)	S. Braenderup	Restaurant	84 (0)	Roma tomato	CDC 2018
2006	January	Pennsylvania	S. Berta	Hospital; Nursing home; Restaurant	16 (0)	Tomato	CDC 2018
2006	June	US (multistate)	S. Newport	Restaurant	115 (0)	Tomato	CDC 2018
2006	September	Maine	S. Typhimurium	NR	8 (0)	Tomato	CDC 2018
2006	September	US (multistate)	S. Typhimurium	Private home; Restaurant	192 (0)	Tomato	CDC 2018
2007	June	US (multistate)	S. Newport	Restaurant	65 (0)	Beefsteak tomato	CDC 2018
2007	July	Colorado	Norovirus	Restaurant	33 (0)	Tomato	CDC 2018
2007	July	New York	S. Newport	NR	10 (1)	Tomato	CDC 2018
2007	October	Minnesota	S. Typhimurium	Restaurant	23 (0)	Tomato	CDC 2018

Year	Month of Onset	Location	Pathogen <sup>b</sup>	Location of Consumption	Cases (Deaths)	Food Vehicle	Reference <sup>c</sup>
2009	May	Michigan	S. Saintpaul	Restaurant	21 (0)	Tomato	CDC 2018
2010	May	US (multistate)	S. Newport	Private home; Restaurant	64 (NR)	Tomato	CDC 2018
2010	July	US (multistate)	S. Javiana	Private home; Restaurant	30 (NR)	Tomato	CDC 2018
2010	July	US (multistate)	S. Newport	NR	24 (NR)	Tomato	CDC 2018
2011	April	US (multistate)	S. Newport	Restaurant	166 (0)	Tomato	CDC 2018
2011	July	New York	S. Newport	NR	10 (0)	Tomato	CDC 2018
2012	June	Pennsylvania	S. Newport	Restaurant	102 (0)	Tomato	CDC 2018
2013	March	US (multistate)	S. Saintpaul	NR	131 (0)	Cherry tomato, grape tomato	CDC 2018
2013	May	California	S. Enteritidis	School/University	27 (0)	Tomato	CDC 2018
2015	May	US (multistate)	S. Hartford	Restaurant	19 (0)	Tomato	CDC 2018

<sup>a</sup> NR—Not reported.  
<sup>b</sup> Pathogens abbreviated and associated with outbreaks include *S.*—*Salmonella*.  
<sup>c</sup> References for each outbreak appear in the following reference list.

Table 2. Outbreaks of foodborne disease associated with multiple or complex foods including tomatoes in the United States, 1979–2017.

Year	Month	Location	Pathogen <sup>b</sup>	Location of Consumption	Cases (Deaths)	Food Vehicle	Reference <sup>c</sup>
1979	NR <sup>a</sup>	Massachusetts	<i>L. monocytogenes</i>	Hospital	20 (5)	Tomato, lettuce, and celery	FDA 2009
1989	NR	US (multistate)	<i>G. lamblia</i>	NR	21 (0)	Lettuce, onion, tomato	FDA 2009
1998	September	California	<i>Shigella sonnei</i>	Restaurant	318 (0)	Salsa	CDC 2018
1999	March	Georgia	Norovirus	NR	54 (0)	Bread, hot dog, tomato sauce	CDC 2018
1999	May	Wisconsin	<i>C. perfringens</i>	School	35 (0)	Tomato sauce	CDC 2018
1999	September	Washington	Norovirus	NR	115 (NR)	Leaf lettuce, tomato	CDC 2018
2000	January	California	<i>C. botulinum</i>	Private home	2 (NR)	Squash, tomato	CDC 2018
2000	October	Minnesota	Norovirus	Restaurant	34 (0)	Cherry tomato, dips, vegetable dips	CDC 2018
2000	October	California	<i>Shigella sonnei</i>	Restaurant	221 (1)	Salsa	CDC 2018
2002	January	Tennessee	Norovirus	Restaurant	11 (0)	Cheese, lettuce, tomato	CDC 2018
2002	March	Texas	<i>S. Enteritidis</i>	Restaurant	700 (0)	Salsa	CDC 2018
2002	June	Tennessee	<i>S. Anatum</i>	Restaurant	16 (0)	Salsa	CDC 2018
2002	July	North Carolina	Norovirus	Unknown (caterer)	11 (0)	Cake, tomato	CDC 2018
2002	August	California	Norovirus	Unknown (caterer)	50 (NR)	Lettuce, tomato	CDC 2018
2003	June	California	<i>S. Saintpaul</i>	Restaurant	17 (0)	Mango, tomato	CDC 2018
2003	June	Washington, DC	Norovirus	Unknown (caterer)	47 (NR)	Pastry, tomato, basil, and mozzarella salad	CDC 2018
2003	November	US (multistate)	<i>S. Saintpaul</i>	Restaurant	33 (NR)	Chicken, iceberg lettuce, tomato	CDC 2018
2004	April	Oregon	Norovirus	Restaurant	19 (0)	Iceberg lettuce, tomato	CDC 2018
2004	May	Ohio	Norovirus	Restaurant	9 (0)	Salsa	CDC 2018
2004	June	Illinois	<i>S. Infantis</i>	Private home	60 (0)	Salsa	CDC 2018
2004	August	Washington	<i>E. coli</i> O157:H7	Restaurant	6 (0)	Salsa	CDC 2018
2005	April	Virginia	Norovirus	Restaurant	38 (NR)	Burrito, enchilada, lettuce, tomato	CDC 2018
2005	April	Virginia	Norovirus	Restaurant	14 (0)	Chicken salad, coleslaw, potato salad, tomato	CDC 2018
2005	May	Washington	<i>E. coli</i> O157:H7	Restaurant	3 (0)	Salsa	CDC 2018
2005	June	California	<i>S. Enteritidis</i>	Restaurant	85 (0)	Salsa	CDC 2018
2005	June	Wyoming	<i>S. Enteritidis</i>	Restaurant	20 (0)	Eggs, tomato	CDC 2018
2005	July	New York	<i>S. Newport</i>	Private home; Restaurant	27 (0)	Onion, tomato	CDC 2018
2005	August	California	<i>S. Enteritidis</i>	Restaurant	30 (0)	Salsa	CDC 2018

Year	Month	Location	Pathogen <sup>b</sup>	Location of Consumption	Cases (Deaths)	Food Vehicle	Reference <sup>c</sup>
2006	June	Maryland	<i>S. Typhimurium</i>	Private home, Restaurant	18 (0)	Lettuce, tomato	CDC 2018
2006	June	Oregon	Norovirus	Restaurant	17 (0)	Salsa	CDC 2018
2006	September	Pennsylvania	Norovirus	Private home	17 (0)	Tea, tomato	CDC 2018
2007	May	Washington	<i>S. IV 50:z4,z23:-</i>	Restaurant	2 (0)	Salsa	CDC 2018
2007	May	Florida	<i>S. Baildon</i>	Restaurant	2 (0)	Salsa	CDC 2018
2007	June	Washington, DC	<i>S. Newport</i>	Private home; Restaurant	46 (NR)	Avocado, cilantro, guacamole, tomato	CDC 2018
2007	June	Maryland	<i>S. Javiana</i>	Private home; Restaurant	5 (0)	Cheese, chicken, tomato, unspecified fruit	CDC 2018
2007	August	Minnesota	<i>S. Enteritidis</i>	Restaurant	18 (0)	Salsa	CDC 2018
2008	January	New York	Norovirus	Restaurant	10 (0)	Salsa	CDC 2018
2008	April	US (multistate)	<i>S. Saintpaul</i>	Private home; Restaurant	1500 (2)	Jalapeño and serrano peppers; tomato, plum, roma, round <sup>d</sup>	CDC 2018
2008	April	Iowa	<i>S. Braenderup</i>	Restaurant	12 (0)	Green salad, tomato	CDC 2018
2008	May	Pennsylvania	<i>B. cereus, C. perfringens</i>	Restaurant	8 (0)	Chicken fajita, fried rice, refried beans, tomato, tortilla	CDC 2018
2008	July	California	<i>S. Blockley</i>	Private home	9 (0)	Mole; pasta with tomato sauce	CDC 2018
2008	July	US (multistate)	<i>S. Hartford</i>	NR	22 (0)	Salsa	CDC 2018
2008	October	Illinois	Norovirus	Restaurant	64 (0)	Lettuce-based salads, tomato relish	CDC 2018
2009	August	Kansas	Pesticides	Restaurant	39 (0)	Salsa	CDC 2018
2009	December	California	Norovirus	Workplace (not cafeteria)	14 (0)	Salsa	CDC 2018
2010	February	Illinois	<i>Shigella sonnei</i>	Restaurant	314 (1)	Bread, tomato	CDC 2018
2010	June	Connecticut	Norovirus	Restaurant	20 (0)	Ground beef, tomato	CDC 2018
2010	August	Florida	<i>Shigella sonnei</i>	Restaurant	15 (0)	Salsa	CDC 2018
2011	March	Georgia	<i>S. Saintpaul</i>	Private home; Restaurant	14 (0)	Cucumber, tomato	CDC 2018
2012	September	Illinois	Norovirus	Unknown (caterer)	22 (0)	Onions, tomato	CDC 2018
2013	May	Virginia	Norovirus	Restaurant	35 (0)	Tomato mozzarella sandwich, feta salad	CDC 2018
2013	July	Michigan	<i>S. Enteritidis</i>	Restaurant	15 (0)	Salsa	CDC 2018
2014	March	Wisconsin	Norovirus GI_3B	Unknown (caterer)	10 (0)	Lettuce, tomato, tortilla	CDC 2018

Year	Month	Location	Pathogen <sup>b</sup>	Location of Consumption	Cases (Deaths)	Food Vehicle	Reference <sup>c</sup>
2014	April	Pennsylvania	<i>B. cereus</i>	NR	31 (0)	Grape tomato, blueberries, pancakes, chicken, carrots, whipped potato, lamb, peppers, coconut rice pudding	CDC 2018
2014	April	Tennessee	Norovirus	Restaurant	7 (0)	Lettuce, tomato	CDC 2018
2014	June	Arkansas	<i>Shigella sonnei</i>	Workplace	269 (0)	Salsa	CDC 2018
2014	November	Minnesota	<i>E. coli</i> O111	Restaurant	3 (0)	Salsa	CDC 2018
2015	February	Oregon	Norovirus	Restaurant	10 (0)	Salsa	CDC 2018
2015	May	Kansas	<i>S. Typhimurium</i>	Restaurant	10 (0)	Tomato, ground beef	CDC 2018
2015	June	Michigan	Norovirus GII_4 Sydney	Restaurant	11 (0)	Salsa	CDC 2018
2015	August	US (multistate)	<i>S. Newport</i>	Restaurant	119 (0)	Salsa	CDC 2018
2015	November	California	<i>Shigella sonnei</i>	Restaurant	19 (0)	Salsa	CDC 2018
2015	December	Wisconsin	Norovirus	Private home	16 (0)	Salsa	CDC 2018
2016	May	Colorado	<i>E. coli</i> O157:H7	Restaurant	9 (0)	Tomato, cucumber, lettuce	CDC 2018
2017	July	Pennsylvania	<i>S. Javiana</i>	Unknown	24 (0)	Salsa	CDC 2018
2017	October	New York	<i>Shigella sonnei</i>	Restaurant	2 (0)	Tomato, lettuce	CDC 2018

<sup>a</sup> NR—Not reported.

<sup>b</sup> Pathogens abbreviated and associated with outbreaks include *S.*—*Salmonella*; *E.*—*Escherichia*; *L.*—*Listeria*; *B.*—*Bacillus*; *G.*—*Giardia*; and *C.*—*Clostridium*.

<sup>c</sup> References for each outbreak appear in the following reference list.

<sup>d</sup> Traceback investigations eventually confirmed the presence of the outbreak strain in jalapeño and serrano peppers but not tomatoes.

Table 3. Outbreaks of foodborne disease associated with tomatoes or multiple foods including tomatoes without a confirmed pathogen, 1998–2017.

Year	Month	Location	Suspected Pathogen <sup>a</sup>	Location of Consumption	Cases (Deaths)	Food Vehicle	Reference <sup>b</sup>
1998	January	Florida	Unknown	Restaurant	5 (0)	Tomato sauce	CDC 2018
1998	July	Michigan	Unknown	Restaurant	9 (NR)	Salsa	CDC 2018
1999	May	Colorado	Norovirus	Restaurant	20 (NR)	Lettuce, tomato	CDC 2018
1999	July	New York	Unknown	Restaurant	4 (NR)	Salsa	CDC 2018
1999	July	Maryland	Unknown	Restaurant	2 (NR)	Omelet, cheese, tomato	CDC 2018
1999	July	California	<i>B. cereus</i> , <i>Staphylococcus aureus</i>	NR	13 (0)	Salsa	CDC 2018
1999	August	Pennsylvania	Norovirus	School	14 (NR)	Green pea salad, roast beef, tomato	CDC 2018
1999	November	California	Norovirus	Restaurant	28 (0)	Lettuce, tomato	CDC 2018
2000	January	Washington	Unknown	Restaurant	3 (0)	Lettuce, tomato	CDC 2018
2000	March	Florida	Norovirus	Restaurant	6 (0)	Salsa	CDC 2018
2000	July	California	Unknown	Restaurant	16 (0)	Salsa	CDC 2018
2000	December	Washington	Norovirus	Restaurant	2 (NR)	Salsa, tostada	CDC 2018
2001	June	Massachusetts	Norovirus	Unknown (caterer)	20 (0)	Goat cheese, pastry, tomato	CDC 2018
2001	June	Florida	Norovirus	Restaurant	3 (NR)	Sandwich, bacon, lettuce, tomato	CDC 2018
2001	September	Florida	Unknown	Restaurant	4 (NR)	White fish, stuffed tomato	CDC 2018
2002	January	Florida	Norovirus	Restaurant	3 (NR)	Cherry tomato, iceberg lettuce	CDC 2018
2002	January	Indiana	Norovirus	Restaurant	22 (0)	Salsa	CDC 2018
2002	February	California	Norovirus	Restaurant	39 (0)	Lettuce, tomato	CDC 2018
2002	February	Michigan	Unknown	Restaurant	2 (NR)	Sandwich, bacon, lettuce, tomato	CDC 2018
2002	July	Florida	Unknown	NR	2 (NR)	Grape tomato, guacamole	CDC 2018
2002	August	Florida	Chemical/toxin	Restaurant	3 (0)	Salsa	CDC 2018
2002	September	California	<i>Campylobacter</i> , <i>Salmonella</i>	Restaurant	6 (0)	Salsa	CDC 2018
2002	September	California	<i>B. cereus</i>	Restaurant	8 (NR)	Salsa	CDC 2018
2003	September	California	<i>B. cereus</i> , <i>C. perfringens</i>	Restaurant	5 (0)	Salsa	CDC 2018
2003	December	California	Norovirus	Restaurant	15 (0)	Salsa	CDC 2018
2003	December	California	<i>B. cereus</i> , <i>C. perfringens</i>	Restaurant	3 (0)	Salsa	CDC 2018
2004	March	Michigan	Unknown	Restaurant	6 (0)	Salsa	CDC 2018



Year	Month	Location	Suspected Pathogen <sup>a</sup>	Location of Consumption	Cases (Deaths)	Food Vehicle	Reference <sup>b</sup>
2004	April	Colorado	<i>C. perfringens</i>	Restaurant	3 (0)	Salsa	CDC 2018
2004	August	California	Norovirus	Restaurant	12 (0)	Sandwich, bacon, lettuce, tomato	CDC 2018
2004	September	Pennsylvania	Norovirus	Restaurant	8 (0)	Romaine lettuce, tomato, vidalia onion	CDC 2018
2004	October	Texas	Unknown	Restaurant	11 (NR)	Tomato	CDC 2018
2005	May	Utah	Unknown	Restaurant	29 (0)	Salsa	CDC 2018
2005	July	New York	Unknown	Unknown (caterer)	31 (0)	Green salad, tomato salad, tuna salad	CDC 2018
2005	September	Florida	Unknown	Restaurant	4 (NR)	Salsa	CDC 2018
2005	October	Florida	Unknown	Restaurant	2 (NR)	Iceberg lettuce, tomato	CDC 2018
2005	October	Pennsylvania	Norovirus	Restaurant	19 (0)	Tomato	CDC 2018
2006	February	California	Unknown	Restaurant	11 (0)	Salsa	CDC 2018
2006	December	California	Norovirus	NR	125 (0)	Salsa	CDC 2018
2007	December	New York	Unknown	Restaurant	20 (0)	Tomato, basil and mozzarella salad	CDC 2018
2008	June	Deleware	Unknown	Restaurant	17 (0)	Green salad, tomato	CDC 2018
2008	September	California	Unknown	Restaurant	9 (0)	Tomato salad	CDC 2018
2008	October	Colorado	Norovirus	Restaurant	5 (0)	Salsa	CDC 2018
2009	January	Massachusetts	Unknown	Banquet facility	32 (0)	Salads, tomato, vegetables	CDC 2018
2009	March	California	Norovirus	Restaurant	9 (0)	Salads, tomato	CDC 2018
2009	May	New York	Unknown	Restaurant	18 (0)	Bruschetta, roasted red peppers, prosciutto with melon, tomatoes with mozzarella, fried zucchini, marinated zucchini	CDC 2018
2009	September	Washington	Norovirus	Restaurant	4 (0)	Tomato	CDC 2018
2010	January	Pennsylvania	Unknown	Restaurant	15 (0)	Lettuce, tomato	CDC 2018
2011	August	New Jersey	Unknown	NR	8 (0)	Lettuce, onions, tomato	CDC 2018
2011	October	Michigan	Unknown	Banquet facility	33 (0)	Tomato	CDC 2018
2012	March	Pennsylvania	Unknown	Unknown (caterer)	55 (0)	Tomato	CDC 2018
2012	November	California	Norovirus	Restaurant	9 (0)	Salsa	CDC 2018
2013	June	Michigan	Unknown	Restaurant	7 (0)	Lettuce, tomato	CDC 2018
2013	October	California	Norovirus	Restaurant	4 (0)	Salsa	CDC 2018
2014	February	California	Unknown	Restaurant	13 (0)	Cherry tomato	CDC 2018

Year	Month	Location	Suspected Pathogen <sup>a</sup>	Location of Consumption	Cases (Deaths)	Food Vehicle	Reference <sup>b</sup>
2015	April	Florida	Unknown	Restaurant	2 (0)	Tomato, basil and mozzarella salad	CDC 2018
2015	May	Washington	Unknown	Restaurant	8 (0)	Lettuce, tomato, tortilla	CDC 2018
2017	July	Colorado	Unknown	Restaurant	5 (0)	Salsa	CDC 2018

<sup>a</sup> Pathogens abbreviated and associated with outbreaks include *S.*—*Salmonella*, *B.*—*Bacillus*, and *C.*—*Clostridium*.  
<sup>b</sup> References for each outbreak appear in the following reference list.