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Salmonellosis, Orange County 2006–2015

Salmonellosis is an infection caused by Salmonella bacteria. Illness usually develops 12 to 72 hours after infection, and symptoms most commonly include diarrhea, fever and abdominal cramps. Most people recover in four to seven days without treatment, and antibiotics are only recommended for more severe cases. There are over 2000 different strains of Salmonella bacteria that can infect humans. The most common sources of infection are eating or preparing contaminated food and contact with animals. Salmonella bacteria also can be spread person-to-person and, rarely, through contaminated water. Since animals may carry Salmonella, foods of animal origin must be handled properly to avoid contamination of surfaces in the kitchen and cooked thoroughly to kill the bacteria. Animals kept as pets can also be a source of Salmonella. Outbreaks have resulted from reptiles including small turtles, (the sale of which was banned in California in 1972 and in the U.S. in 1975) iguanas and young birds.

Since 2006, the incidence of Salmonellosis in Orange County has fluctuated between 8.5 and 15.6 per 100,000 persons, with 2015 having the highest rates due to a number of local, state and nationwide outbreaks that year. See Table 1.

Table 1. Salmonellosis Rates per 100,000 population, Orange County, 2015

|	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Orange County	11.6	9.5	8.5	11.0	12.2	10.4	14.6	12.9	13.3	15.6
California[1]	13.3	12.1	13.2	12.7	13.0	10.9	12.3	13.2	13.9	14.3
United States[2]	15.5	16.0	16.9	16.2	17.7	16.8	17.3	15.5	16.1	-

Rates are calculated per 100,000 population

[1] Yearly Summaries of Selected General Communicable Diseases in California, 2011-2015

[2] MMWR Summary of Notifiable Infectious Diseases and Conditions — United States, 2014

Table 2. Salmonellosis Case Counts and Rate per 100,000 with Gender, Race/Ethnicity and Age Group Detail, Orange County, 2006–2015

Orange County	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Total Cases	356	286	279	367	386	318	448	398	417	489
Gender										
Male	164	142	136	161	196	153	214	189	199	257
Female	192	144	143	205	190	165	229	209	217	232
Unknown	0	0	0	1	0	0	5	0	1	0
Race/ Ethnicity										
White	157	138	126	184	181	130	161	146	196	225
Black	4	1	1	6	2	6	5	6	1	5
Hispanic	129	95	86	90	102	94	138	141	139	159
Asian	37	35	31	54	55	43	47	33	47	39
Pacific Islander	0	0	0	2	2	2	0	2	0	0
AI/AN*	0	1	0	0	0	1	0	0	0	1
Multiracial	0	0	0	0	0	3	4	24	6	18
Other/Unknown	29	16	35	31	44	39	93	46	28	34
Unknown	0	0	0	0	0	0	0	0	1	0
Age Group										
0-4 years	87	84	79	68	71	67	67	62	81	73
5-14 years	73	37	43	79	68	56	56	72	75	68
15-24 years	41	25	24	33	50	28	28	50	40	57
25-44 years	70	50	57	76	73	65	65	81	90	105
45-64 years	54	54	48	67	63	52	52	81	62	103
65 years & over	31	36	28	44	61	50	50	52	68	83
Unknown	0	0	0	0	0	0	0	0	1	0

Figure 1. Salmonella Rates by City, Orange County, 2015
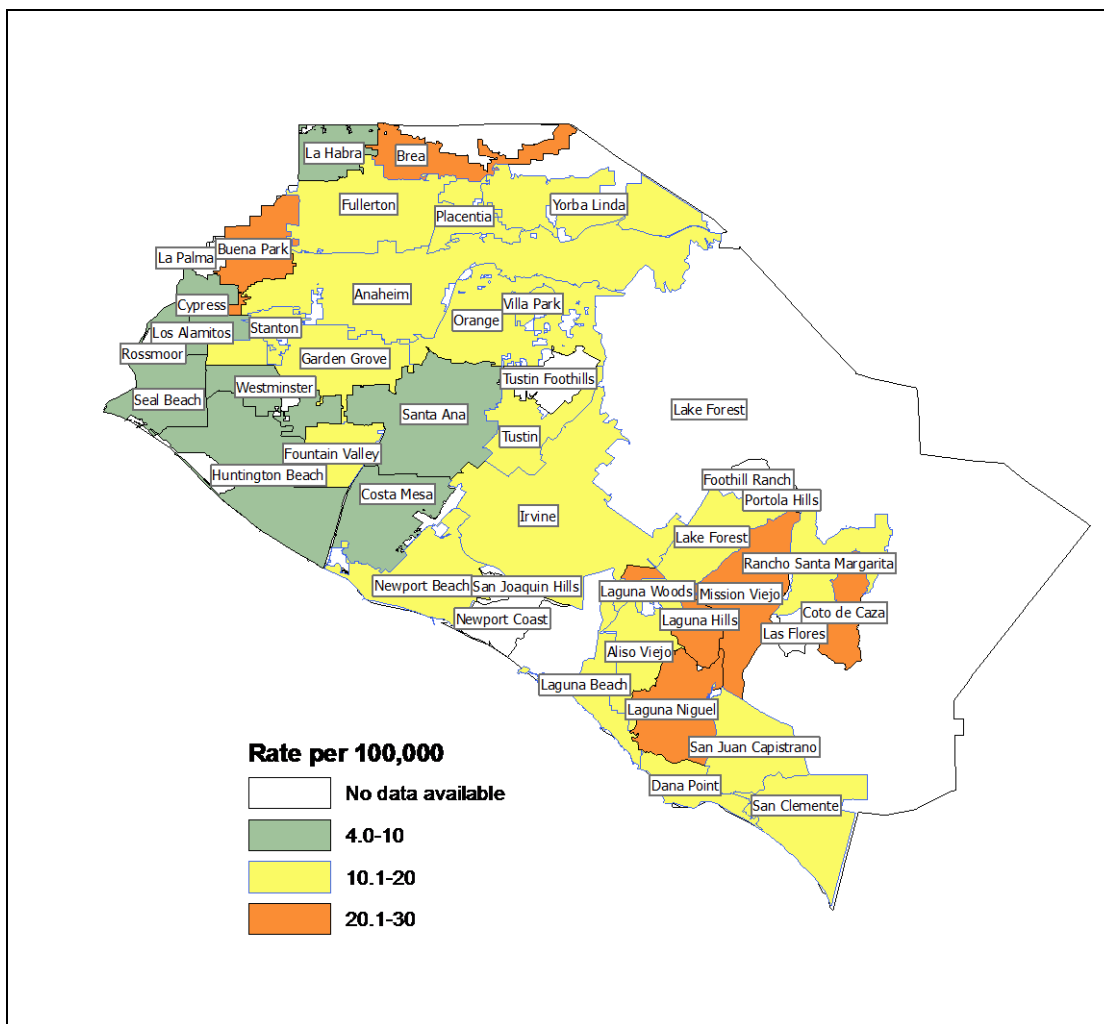
Salmonella Outbreaks in Orange County in 2015

OCHCA Epidemiology and Assessment investigated 40 local, state or national clusters in 2015. Those clusters with more than 5 cases are listed in Table 3 below.

Orange County had multiple outbreaks of Salmonella in 2015 with a source identified. One outbreak was related to small palm sized turtles when turtle water tested positive for Salmonella Poona. A national outbreak of Salmonella Paratyphi B was linked to raw fresh tuna used in sushi. Two Orange County baby showers in the fall of 2015 involved two different serotypes: Salmonella Manhattan, where food items were the source and Salmonella Pomona, where a food preparer was implicated. A multistate cucumber outbreak also involved the Salmonella Poona serotype.

However, the top five cluster serotypes in Orange County during 2015 are Enteritidis (27.5% of clusters), Newport (17.5%), Heidelberg (10%), I 4,5,12, Incomplete Typhimurium (7.5%) and Typhimurium (5%). These were also the top five Salmonella serotypes seen nationally in 2015.

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Table 3. Salmonella Clusters, Orange County, 2015

	SOURCE	SEROTYPE	# CASES	MEDIAN AGE/RANGE	# HOSPITALIZED	DURATION/ ONSET DATES
NATIONAL						
1	Turtles	S. poona	5	2Y/ 2M-18Y		7/31-10/6/2015
2	Cucumbers	S. poona	6	13Y/ 2M-57y	2	8/8-10/31/2015
4	Raw tuna	S. paratyphi B	6	27Y/ 9Y-83Y	1	3/6-4/12/2015
5		S. typhimurium	6	42Y/ 30Y-59Y		12/29-2/16/2015
STATE						
1	Travel to Mexico	S. enteritidis	9	38Y/10Y-68Y		7/10-9/3/2015
3		S. newport	6	34Y/ 7M-85Y		4/9-7/28/2015
LOCAL						
1		S. enteritidis	14	25.5Y/7Y-76Y	1	7/11-9/14/2015
11	Private meal/baby shower	S. pomona	9	28Y/ 18Y-47Y	2	9/5-9/8/2015
16	Private meal/baby shower	S. manhattan	40	8.5Y/ 2Y-35Y	13	10/3/2015

Clusters with less than five cases are not listed in Table 3, but were still investigated due to similarities in PFGE or serotype. Eight of the forty clusters had sources identified. Four were due to food, including tuna used in sushi, cucumbers and private meals. Two were associated with travel to Mexico. Two were due to animal exposure of livestock and small palm sized turtles. For additional information on national outbreaks, see the CDC website on Salmonella outbreaks: http://www.cdc.gov/salmonella/outbreaks.html.

PulseNet

In 1996, the Center for Disease Control & Prevention (CDC) established PulseNet, a molecular subtyping network for foodborne disease surveillance, established by the Centers for Disease Control & Prevention (CDC) in 1996. It consists of state health departments, certain local health departments, and federal agencies that upload testing data to the CDC network. PulseNet maintains a database of all pulsed-field gel electrophoresis (PFGE) dendrograms, sometimes called "DNA fingerprints". PulseNet looks for matching PFGE patterns of Salmonella isolates to detect potential clusters and outbreaks. For example, in 2015 a large outbreak of Salmonella serotype Poona was identified through this system and traced to small, palm sized turtles.

Pulse Field Gel Electrophoresis

Each case of salmonellosis is investigated to assess potential sources and prevent transmission. In addition, all isolates of Salmonella bacteria are sent to the Orange County Public Health Laboratory (OCPHL) to determine the strain type. The OCPHL participates in a nationwide system of public health laboratories, called PulseNet, where "DNA fingerprints", by pulse field gel electrophoresis (PFGE), of Salmonella strains are compared to look for matches that could indicate an outbreak. PFGE is a laboratory technique used by scientists to produce a DNA fingerprint for a bacterial isolate. See Figure 2

Figure 2. Pulse Gel Electrophoreses
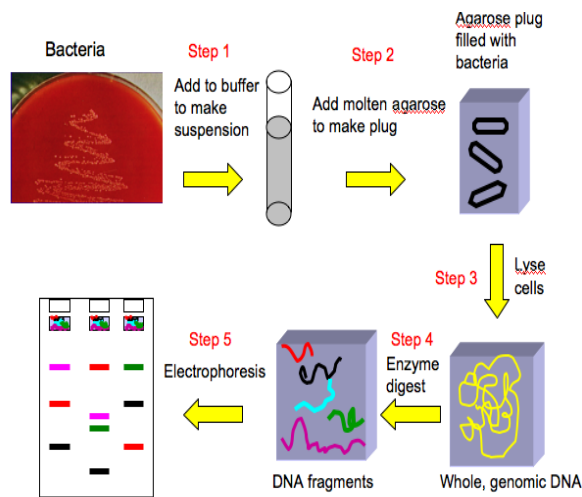
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