

TABLE 20.—SUMMARY OF FIVE FOODBORNE OUTBREAKS—Continued

Pathogen	Location and year	Vehicle	Confirmed or reported cases	Estimated number of cases	Total illness cost
Outbreaks resulting from deliberate contamination					
<i>Salmonella Typhimurium</i>	Dalles, Oregon 1984	Salad bars	751 cases; 45 hospitalizations	Not available	\$10,687,000 to \$18,875,000
<i>Shigella dysenteriae</i> type 2	Texas, 1996	Muffins and doughnuts	12 cases; 4 hospitalizations	All cases identified	\$83,000
Outbreaks resulting from imported foods					
<i>Cyclospora cayatanensis</i>	United States and Canada, 1996	Raspberries (probably imported from Guatemala)	1465 cases identified, less than 20 hospitalization	Not available	\$3,941,000

Salmonella enteritidis in ice cream

In 1994, approximately 224,000 people were sickened by ice cream contaminated with *Salmonella enteritidis*. The source of the contamination appeared to be pasteurized pre-mix that had been contaminated during transport in tanker trailers that previously had carried non-pasteurized eggs. There were 150 confirmed cases of salmonellosis associated with the outbreak in Minnesota. However, ice cream produced during the contamination period was distributed to 48 states. To calculate the total number of illnesses associated with the outbreak, researchers calculated an attack rate of 6.6 percent. This attack rate was extrapolated to the population that consumed the ice cream, giving a total number sickened of 224,000 (Ref. 11).

Salmonellosis most commonly causes gastrointestinal symptoms. Almost 91 percent of cases are mild and cause one to three days of illness with symptoms including diarrhea, abdominal cramps, and fever. Moderate cases, defined as requiring a trip to a physician, account for 8 percent of the cases. These cases typically have duration of two to 12 days. Severe cases require hospitalization and last 11 to 21 days. In addition to causing gastroenteritis, salmonellosis also can cause reactive arthritis in a small percentage of cases. Reactive arthritis may be short or long term and is characterized by joint pain. Just over one percent of cases develop short-term reactive arthritis and two percent of cases develop chronic, reactive arthritis.

In table 21, FDA estimated the costs associated with salmonellosis, including medical treatment costs and pain and

suffering. Pain and suffering is measured by lost quality adjusted life days (QALDs). QALDs measure the loss of utility associated with an illness. A QALD is measured between zero and one, with one being a day in perfect health. The total loss of a Quality Adjusted Life Year (QALY), or the loss of a year of life is valued at \$100,000, based on economic studies of how consumers value risks to life (Ref. 12). Thus, an entire lost QALD would be valued at \$274 and fractions of QALDs are a fraction of the day's value. FDA presents two estimates of values of pain and suffering associated with arthritis, one based on physician estimates (Ref. 13) and another based on a regression analysis approach (Ref. 14). This gives a range of costs for the average case of salmonellosis between \$14,231 and \$25,133.

TABLE 21.—THE COST OF AN AVERAGE CASE OF SALMONELLOSIS

Severity	Case Breakdown	Total QALDs Lost per Illness	Health Loss per Case (Discounted)	Medical Costs per Case (Discounted)	Weighted Dollar Loss per Case
Illness					
Mild	90.7%	1.05	\$660	\$0	\$599
Moderate	8.1%	3.68	\$2,310	\$283	\$209
Severe	1.2%	9.99	\$6,266	\$9,250	\$188
Arthritis Regression Approach					
Short-Term	1.26%	5.41	\$3,391	\$100	\$44
Long-Term	2.40%	2,613.12	\$452,554	\$7,322	\$11,048
Direct Survey Approach					
Short-Term	1.26%	10.81	\$6,778	\$100 \$87	\$21,906 \$2,143
Long-Term	2.40%	5,223.15	\$904,573	\$7,322	
Death	0.04%		\$5,000,000		
Total Expected Loss per Case				Regression Approach Direct Survey Approach	\$14,231 \$25,133