Food and Waterborne Illness Surveillance and Investigation
Annual Report, Florida, 2001

Bureau of Environmental Epidemiology
Division of Environmental Health
Department of Health

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Overview

The 2001 year continued to be active for food and waterborne outbreak reporting and investigation. A total of 3,101 foodborne illness complaints were reported to Florida counties in 2001. A total of 303 outbreaks with 2,052 cases were reported, compared to 288 outbreaks and 1,757 cases for 2000, and 286 outbreaks and 1,544 cases for 1999. Investigators were able to laboratory confirm 56 of the outbreaks (including 5 *V. vulnificus*) associated with 650 cases. Norwalk, Staphylococcus, and Salmonella were implicated in the largest percentage of the total reported outbreaks (11.2%, 9.2%, and 5.3%, respectively). Norwalk was identified in the largest percentage of cases in total reported outbreaks (35.8%) followed by *Clostridium perfringens* (7.3%). Restaurants were the source site in 79.2% of the outbreaks reported and in 61.2% of the cases. Multiple items (24.4%) and multiple ingredients (17.5%) accounted for a total of 41.9% of all outbreaks, followed by poultry (12.5%) and beef (10.9%) and shellfish (10.9% - this includes all single Vibrio vulnificus cases). Multiple ingredients (17.6%) and multiple items (25.3%) accounted for 42.9% of all outbreak-associated cases, followed by poultry (8.9%), vegetables (5.4%), water (6.4%) and ice (5.4%). The month with the largest percentage of outbreaks reported was April (12.5%) with the largest percentage of cases reported in March (16.3%). Large (greater than 10 cases) outbreaks accounted for 12.2% (37) of the total reported outbreaks and 59.4% (1219) of the total cases. Selected significant outbreaks are briefly described below. Each outbreak can have up to three factors under the current surveillance system. There are also categories for none reported, other and unknown. Aside from unknown and none reported, the eight most frequent contributing factors are as follows:

Table 1: Eight Most Prevalent Contributing Factors in Foodborne Outbreaks, Florida 2001

Contributing Factor[1]	# Outbreaks	# Cases
Contamination Factor		
Bare hand contact	60	650
Cross contamination from raw ingredient of animal origin	34	157
Proliferation/amplification factor		
Inadequate cold holding	74	302
Slow cooling time	26	173
Survival factor		
Other	11	82
Insufficient time/T during cooling	10	68
Method of preparation factor		
Cook/serve foods	66	280
Multiple items	37	276

[1] Each outbreak can have at least 3 of each of the four types of factor. See Tables 22-37 and Appendix for more detailed information.

Table 2: Summary of Food and Waterborne Illness Outbreaks Reported to Florida, 1989 – 2001[2]

Year	# Outbreaks	# Cases
1989	11	72
1990	7	314
1991	17	331
1992	40	1048
1993	136	890
1994	**258**	**1526**
1995	**296**	**2908**
1996	**305**	**2777**
1997	**439**	**2744**
1998	**315**	**3290**
1999	**286**	**1544**
2000	**288**	**1757**
2001	**303**	**2052**

[2] The current surveillance and investigation program data began in 1994.

Table 3: Confirmed, Suspected and Total Outbreaks Reported to Florida, 1994 - 2001

1994	# Outbreaks	# Cases
Suspected	201	719
Confirmed	57	807
Total	**258**	**1526**

1995	# Outbreaks	# Cases
Suspected	216	783
Confirmed	80	2125
Total	**296**	**2908**

1996	# Outbreaks	# Cases
Suspected	226	759
Confirmed	79	2018
Total	**305**	**2777**

1997	# Outbreaks	# Cases
Suspected	357	1417
Confirmed	82	1327
Total	**439**	**2744**

1998	# Outbreaks	# Cases
Suspected	256	1937
Confirmed	59	1353
Total	**315**	**3290**

1999	# Outbreaks	# Cases
Suspected	234	1012
Confirmed	52	532
Total	**286**	**1544**

2000	# Outbreaks	# Cases
Suspected	238	945
Confirmed	50	812
Total	**288**	**1757**

2001	# Outbreaks	# Cases
Suspected	235	995
Confirmed	68	1057
Total	**303**	**2052**

Figure 1: Number of Suspected and Confirmed Outbreaks by Year, Florida, 1994 - 2001

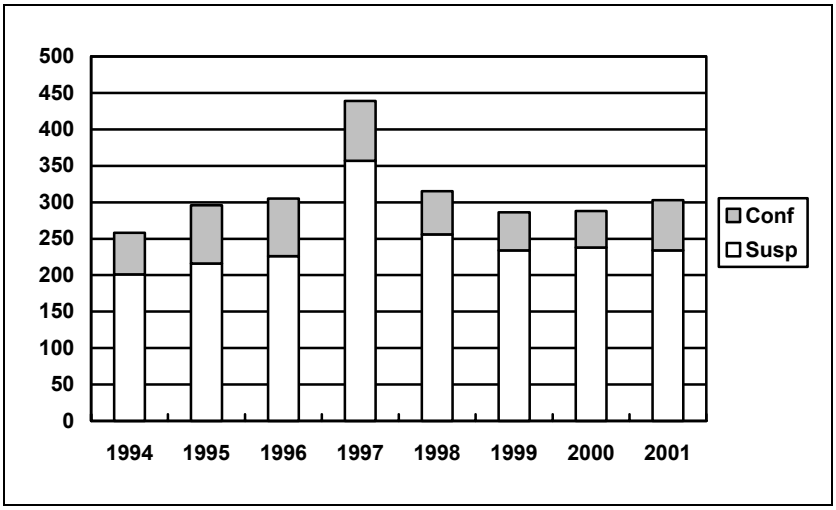
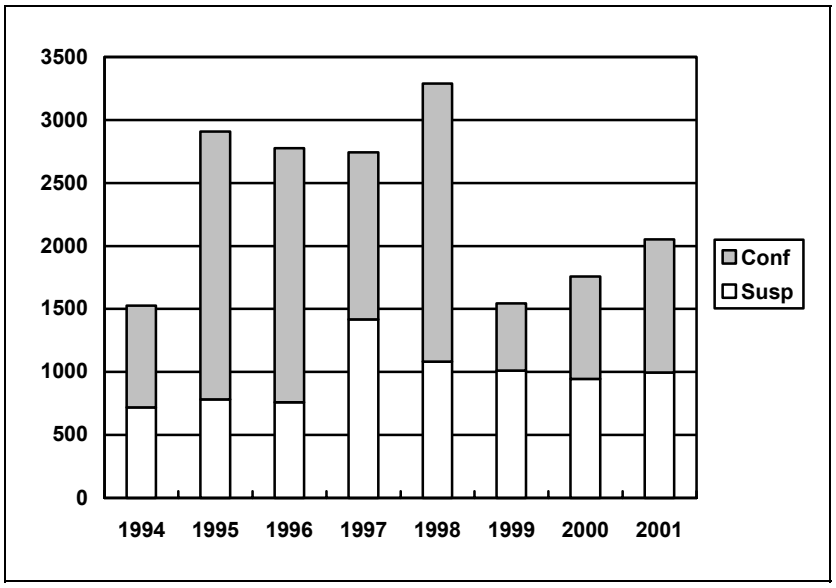


Figure 2: Number of Cases for Suspected and Confirmed Outbreaks by Year, Florida, 1994 - 2001



Training and Continuing Education

In 2001, 32 training sessions were held around the state specifically targeting Department of Health staff and 50 sessions were presented to other audiences. Training presentations of the newly developed Norwalk module, new environmental health employee orientation, refresher courses on food and waterborne disease outbreak investigation and statewide overviews of food and waterborne disease. Other special topics included a presentation on Bovine Spongiform Encephalopathy to county health department directors, Vibrio vulnificus for clinicians to the Florida Medical Association Annual Meeting, questionnaire development for epidemiologists to southeast Florida county health departments, and complaint intake and log maintenance and surveillance to county health departments in the Orlando area. In addition, several table top exercises of simulated foodborne outbreaks were held around the state.

Besides county health department environmental health, nursing and epidemiology staff, audiences included members of the Florida Environmental Health Association, the Florida Association for Food Protection, the Dietary Manager's Association, the Florida School for the Deaf and Blind, CSX Railroad worker safety personnel, Publix employees and the Pasco County Permits Board. In a cooperative effort with other agencies, training was presented to staff of the Department of Education and the Department of Business and Professional Regulation. Trainers also presented a guest lecture at the University of Florida to a Food Safety and Sanitation Class and an inservice to statewide county extension agents.

Bioterrorism Training 2001

Of the 32 training sessions presented to Department of Health staff, 9 covered bioterrorism response issues. Two other bioterrorism presentations were given to outside audiences, the Department of Business and Professional Regulation and to a group of emergency responders.

Interactive and On-line Training 2001

Food and Waterborne Disease Program Staff facilitated the FDA-sponsored satellite training on Communications for Regulators at various sites around the state. The Department of Health Interactive Bookshelf including Basic Environmental Epidemiology, Foodborne Disease, Waterborne Disease and Bio and Chemical Terrorism was revised and updated.

Training modules currently under development:

1) Vibrio parahaemolyticus
2) Update Foodborne Disease Module

Outbreak Definitions

Foodborne illness outbreak: An outbreak is an incident in which two or more persons have the same disease, have similar symptoms, or excrete the same pathogens; and there is a time, place, and/or person association between these persons. A foodborne disease outbreak is one in which a common food has been ingested by such persons. Nevertheless, a single case of suspected botulism, mushroom poisoning, ciguatera or paralytic shellfish poisoning, other rare disease, or a case of a disease that can be definitely related to ingestion of a food, can be considered as an incident of foodborne illness and warrants further investigation.

Confirmed outbreak: A confirmed foodborne outbreak is an outbreak that has been thoroughly investigated and the results include strong epidemiological association of a food item or meal with illness. A thorough investigation is documented by

- diligent case finding,
- interviewing of ill cases and well individuals,
- collecting clinical and food lab samples where appropriate and available,
- confirmation of lab samples where possible,
- field investigation of the establishment(s) concerned, and
- statistical analysis of the information collected during the investigation.

The summary report of all of the information collected in an investigation in a confirmed outbreak will indicate a strong association with a particular food and/or etiologic agent and a group of two or more people, or single incidents as described above.

Suspected outbreak: A suspected foodborne outbreak is one for which the sum of the epidemiological evidence is not strong enough to consider it a confirmed outbreak.

Selected Foodborne Outbreaks

Multi-county Norwalk Outbreak, Pinellas and Pasco Counties, January, 2001

This outbreak of gastrointestinal illness is associated with the consumption of catered luncheon sandwiches from three medical facilities in Pinellas and Pasco Counties on January 30 and 31, 2001. The ill persons had no other epidemiological associations identified and the onset of symptoms were chronologically clustered indicating a common source exposure. A total of 81 cases of gastrointestinal illness were reported among 138 luncheon attendees from three unrelated medical clinics on January 30 and 31, 2001 in Pinellas and Pasco Counties and 6 persons from the community. Analysis of data identified a common caterer and common foods (roll-up sandwiches) among the three illness clusters and community attendees.

On February 1, 2001, the Pinellas County Health Department was informed by a local medical clinic that a cluster of illness had occurred following a catered luncheon at their facility. Thirty of 40 medical staff attending a luncheon at the clinic on January 30 subsequently experienced gastrointestinal illness. Symptoms reported included nausea, diarrhea and vomiting. This was the only common gathering for this group of persons where food and drink was served. A local deli had catered “lavash” wrap sandwiches (cold cut and vegetable) which had been served buffet-style in two shifts during a 4-hour period (lavash is a kind of flatbread). The following day, the Pinellas County Health Department was contacted by two additional medical facilities that had catered luncheons on January 30 and 31 from the same deli as the group that had initially reported illnesses. The identical menu items served at both medical facilities included the same roll-up type sandwiches served at the first outbreak cluster previously reported. In addition to the clinic luncheons, 4 persons who had eaten “lavash” sandwiches at the same deli on January 30 had also become ill with gastrointestinal symptoms. Some of the sandwiches served at one of the medical centers had also been taken home and served to two household members who later became ill.

A luncheon menu was obtained from each of the affected medical facilities, along with detailed preparation and serving procedures. A list of the people who attended the luncheons was also obtained. A medical and food history questionnaire was developed and administered to attendees of two of the three luncheons on January 30 and 31. Resulting data was analyzed using Epi Info statistical analysis software. A case was defined as any person who exhibited at least diarrhea (defined as 3 or more loose stools in a 24 hour period) or vomiting and/or nausea

and attended one of the three luncheons catered by the same deli in Tarpon Springs on January 30 or 31. A control was defined as a person who attended one of the three luncheons and did not become ill. Leftover wrap sandwiches were collected from attendees and from the caterer for laboratory analysis. Stool specimens were collected from seven luncheon attendees and were submitted to the Bureau of Laboratories in Tampa for enteric and viral testing. An onsite investigation by the Pinellas County Health Department in conjunction with an inspection by the Department of Business and Professional Regulation (DBPR) was performed on February 2, 2001.

A total of 37/40 (92.5%) people who attended the earliest reported catered luncheon responded to the questionnaire. Of these 30 (75%) became ill following the suspect luncheon on January 31, 2001. The mean onset of the symptoms was 36.5 hours with a range of 26 - 56 hours. Predominant symptoms reported included diarrhea (100%), loss of appetite (100%), nausea (85.7%) and vomiting (82.1%). Duration of illness ranged from 24 to 90 hours with a mean of 44.2 hours. Table 4 shows attack rates of specific foods served at the luncheon on January 31, 2001.

Table 4: Food Attack Rate Table, Catered Luncheon
January 31, 2001, Pinellas County, Florida

	Number Of Persons Who Ate Specified Food				**Number Of Persons Who Did Not Eat Specified Food**			
Food Items Served	Ill	Not Ill	Total	Percent Ill	Ill	Not Ill	Total	Percent Ill
Turkey/Avocado Sandwiches	16	4	20	80.0	12	5	17	70.5
Pastrami/ Corned Beef Sandwiches	14	2	16	87.5	14	7	21	66.6
Turkey Pastrami Sandwiches	4	3	7	57.1	24	6	30	80.0
Veggie w/ humus Sandwiches	2	2	4	50.0	26	7	33	78.8
Cheese Soup	7	8	15	46.6	15	9	24	62.5

Results of the case–control study did not implicate any specific food items that were served at the catered luncheon on January 31, 2001. However, a very high food-specific attack rate among attendees consuming any of the four catered sandwiches, was observed (75%). No differences in illness rates were observed from attendees attending the luncheon early or late. The food item with the highest attack rate was the pastrami/corned beef sandwich, but this was not statistically significant. The laboratory results of the submitted food products were negative for enteric bacteria and virus. Results of stool tests were also negative.

An environmental investigation was performed at the catering deli facility in Tarpon Springs on February 2, 2001. The preparation process of all menu items served at each luncheon in question was reviewed and the kitchen facility was inspected by DBPR representatives. All food temperatures and refrigeration units checked were satisfactory. The deli staff was observed not properly washing produce items during preparation and improper glove usage was also observed.

The incubation period, symptomatology, duration of the illness and very high attack rates suggest an etiology of Norwalk virus.[3],[4] The high number of cases (81) and a high food specific

[3] Chin, James, ed. Epidemic Viral Gastroenteropathy. In Control of Communicable Diseases Manual, 17th Edition, 2000, pp. 218-220.

attack rate (75.0%) indicate an association with becoming ill and consuming wrap sandwiches from the catering deli. Because no single sandwich type was shown to be statistically significant, a common item used on all of the sandwiches such as lettuce, tomato or yogurt dressing may have been the food vehicle allowing the transmission of the viral agent. Cross-contamination of food items may also have occurred. Other food items including a home made cheese soup and Greek and chicken salads were subsequently ruled out because they were not served at each luncheon. The problem noted with improper glove usage by deli staff and failure to properly pre-wash produce could be causative factors in this outbreak. Negative viral stool specimen results may have been due to collection of the specimens during the later stages of the illness.

It is recommended that educational food safety training be provided for staff involved in all aspects of food preparation. All new kitchen staff should also undergo a similar training program. In addition, closer monitoring of the foodservice staff would insure proper glove usage and proper produce pre-washing.

Scombroid Fish Poisoning - Lee County, April, 2001

On April 16, 2001, the Lee County Health Department received complaints of possible food poisoning from 3 individuals who consumed fresh white tuna at a local restaurant on April 13, 2001 between 6:30 and 7:00 p.m. The 3 individuals developed symptoms immediately to within a ½ hr to an hour after eating. Symptoms included tingling of the tongue, swollen and flushed face, blood-shot eyes, hives, burning sensation and itching over entire body, vomiting, diarrhea, cramps, nausea, chills, fever and headache. None of the individuals were hospitalized. However, two of the individuals sought medical treatment at local emergency rooms and the other had taken Benadryl. The median duration of illness was 48 hours. Based on signs and symptoms, the type of fish consumed and doctor's diagnosis, scombroid fish poisoning was suspected.

The Lee County Health Department conducted an onsite investigation at the restaurant on April 16, 2001. The owner purchased 1 fish (2 fillets or approximately 25 pounds yielding about 38 servings), from a distributor in Miami. The fish consumed by the 3 individuals was actually a fish known as escolar, not white tuna. The escolar fish had been imported from Ecuador. The fish arrived at the restaurant on ice already filleted. Ten servings of the fish were sold on April 13, 2001. Portions of the remaining fish were collected for laboratory analysis and the balance of the fish was returned to the distributor. The distributor's records revealed another delivery of escolar fish (1 fillet or approximately 7 pounds) to one other restaurant. That restaurant sold only 1 serving and no illness was reported. A sample was collected for analysis and the remainder was returned to the distributor. The Food and Drug Administration (FDA) was notified and picked up the 3 samples to test for histamine levels at their laboratory in Atlanta. Additional cases were sought by reviewing restaurant credit card receipts and emergency room records. The Department of Business and Professional Regulation conducted an inspection of the facility on April 24, 2001.

No other cases suggestive of scombroid poisoning were found. All 3 of the cases were females (100%). The age of the cases ranged from 10 - 64 years, median 61 years. For the 2 cases who sought medical treatment, one patient was prescribed Benadryl, Solumedrol, Zantac and Phenergan and the other patient was already on Zyterc and was given Prednisone.

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[4] FDA/CFSAN. The Norwalk Virus Family. Foodborne Pathogenic Microorganism and Natural Toxins Handbook. http://www.cfsan.fda.gov/~mow/chap34.html

The onsite investigation of the restaurant did not reveal any problems with the handling or storage of the fish. Refrigeration units, personnel hygiene and sanitary practices were satisfactory.

The FDA lab results revealed that all 3 samples contained high levels of histamine. According to the FDA guidelines, histamine levels of 50 mg/kg are considered to be poisonous. The two samples from the restaurant reporting illness were 512.00 mg/kg and 651.00 mg/kg. The other sample was 298.00 mg/kg. The laboratory results confirmed the initial diagnosis of scombroid poisoning, which is caused by high histamine levels.

Scombroid fish poisoning is a type of food intoxication caused by the ingestion of certain fish species that have begun to spoil with the growth of certain types of food bacteria. The toxin forms in a food when certain bacteria are present and time and temperature abuse permit their growth. The suspect toxin is an elevated level of histamine generated by bacterial degradation of substances in the muscle protein.[5] Freezing, cooking, smoking, curing or canning, does not destroy the potential toxins. Distribution of the toxin within an individual fish fillet or between cans in a case lot can be uneven, with some sections of a product causing illnesses and others not. Fish that have been implicated in scombroid poisoning include the tunas (e.g., skipjack and yellowfin), mahi mahi, bluefish, sardines, mackerel, amberjack, and abalone. Common sensory examination by the consumer cannot ensure the absence or presence of the toxin. Chemical testing is the only reliable test for evaluation of a product.[6] The onset of intoxication symptoms is rapid, ranging from immediate to 30 minutes. The duration of the illness is usually 3 hours, but may last several days. Diagnosis of the illness is usually based on the patient's symptoms, time of onset, and the effect of treatment with antihistamine medication.[7]

Escolar, *(Lepidocybium flavobrunneum*) is an oily white-meat fish and is a member of the mackerel family, of which tuna is a distant cousin. Albacore (white tuna) is almost identical to escolar, and the two seem to be interchangeable. The fish has a velvety texture with a buttery taste but not a lot of fat. The oil from the fish is mostly wax esters, the same components found in the fat-substitute Olestra, which are thought to be indigestible.[8],[9] The Food and Drug Administration issued a warning that the fish seemed to act like a laxative. This fish is known to have purgative qualities. However, not all persons who eat this fish experience symptoms. The properties of this fish may be affected by season or other variables. Consuming smaller quantities may reduce the risk of illness, however if you have pre-existing medical conditions, you may want to avoid this fish.[10]

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[5] Otwell, Steven. Scombroid Poisoning. Sea Grant Extension Fact Sheet-12, University of Florida and FDA/CFSAN, FDA Prime Connection. http://www.cfsan.fda.gov/~ear/FLSCROM.html

[6] FDA/CFSAN. Scombrotoxin. Foodborne Pathogenic Microorganisms and Natural Toxins Handbook (Bad Bug Book). http://www.cfsan.fda.gov/~mow/chap38.html

[7] FDA/CFSAN. Scombrotoxin. Foodborne Pathogenic Microorganisms and Natural Toxins Handbook (Bad Bug Book). http://www.cfsan.fda.gov/~mow/chap38.html

[8] Department of Human Services, South Australia. Illness Reports Associated With "Rudderfish." Friday, September 17, 1999. http://www.dhs.sa.gov.au/pehs/Alerts-&-Recalls/rudderfish-17dec99.htm

[9] Karetnick, Jen. The Great White Tuna, Unsolved Fish Mysteries, Miami New Times, February 1, 2001. http://miaminewtimes.com/issues/2001-02-01/dish.html/1/index.html

[10] Department of Human Services, South Australia. Illness Reports Associated With "Rudderfish." Friday, September 17, 1999. http://www.dhs.sa.gov.au/pehs/Alerts-&-Recalls/rudderfish-17dec99.htm

This small cluster of scombroid fish poisoning was associated with the consumption of escolar fish, from Ecuador. Since the investigation of the restaurant did not reveal any mishandling of the fish and there were other cases in other areas (2 in Orange County, Florida and 8 in Michigan)[11] of scombroid fish poisoning recently reported from the consumption of escolar from Ecuador, it is believed that the fish may have been mishandled by the supplier or importer. There were different distributors for the Lee County and the Orange County cases. While the fish associated with this outbreak was not recalled due to traceback problems, some escolar from a company in California was recalled in 2000 for high histamine levels.[12] Studies have shown toxic histamine levels can be generated within less than 6 to 12 hours exposure without ice or refrigeration.[13]

To prevent histamine formation it is imperative that the fish be held below 41ºF during all phases of handling, from the time the fish has been caught until preparation for consumption. Immediate freezing or irradiation will also prevent this spoilage. Ensure the fish is from an approved source and check the temperature of the fish upon receiving and look for visible signs of spoilage (if the fish does not appear fresh or if the temperature is not within proper range, do not accept the product).

Salmonella Enteriditis Associated with Mung Bean Sprouts, Orange County, May 2001

In the reporting week of May 7, 2001, two large Orlando, Florida area hospitals reported unusually high numbers of *Salmonella sp.* Group D cases to the Orange County Health Department. Reported cases totaled approximately twice the number seen in background surveillance. Preliminary exposure history indicated that 14 of the first 15 reported cases consumed food from Asian restaurants or markets within three days of illness onset. The 13 restaurant facilities, primarily of Vietnamese or Thai cuisine, were located in a relatively small geographic area of Orlando. There were two markets in the same area as the restaurants. One market is located in Orange County, the second market is in neighboring Seminole County. An preliminary analysis of food products consumed indicated that mung bean sprouts were the single common food item among 14 of the initial 15 (93.3%) reported ill.

A case-control study was conducted to test the initial hypothesis of illness being associated with the consumption of mung bean sprouts. A case was defined as an individual with a laboratory-confirmed *Salmonella* serogroup D infection, or an ill individual who was epidemiologically linked to a confirmed case, who ate a meal(s) at or from an Oriental food service facility located in Orange County or Seminole County during their incubation period, and who had onset of illness during April or May of 2001. Controls were selected from healthy meal partners of the cases. A total of 31 cases and 18 controls were included in the study. Hospital laboratories that had isolated cultures provided *Salmonella* group D subcultures to the Bureau of

[11] Snell, Robert. Spoiled Fish get blame in poisonings. Lansing State Journal, April 18, 2001.
[12] FDA Enforcement Report. Class II – Recalls and Field Corrections. July 19, 2000. http://www.fda.gov/bbs/topics/ENFORCE/ENF00651.html
[13] Otwell, Steven. Scombroid Poisoning. Sea Grant Extension Fact Sheet-12, University of Florida and FDA/CFSAN, FDA Prime Connection. http://www.cfsan.fda.gov/~ear/FLSCROM.html

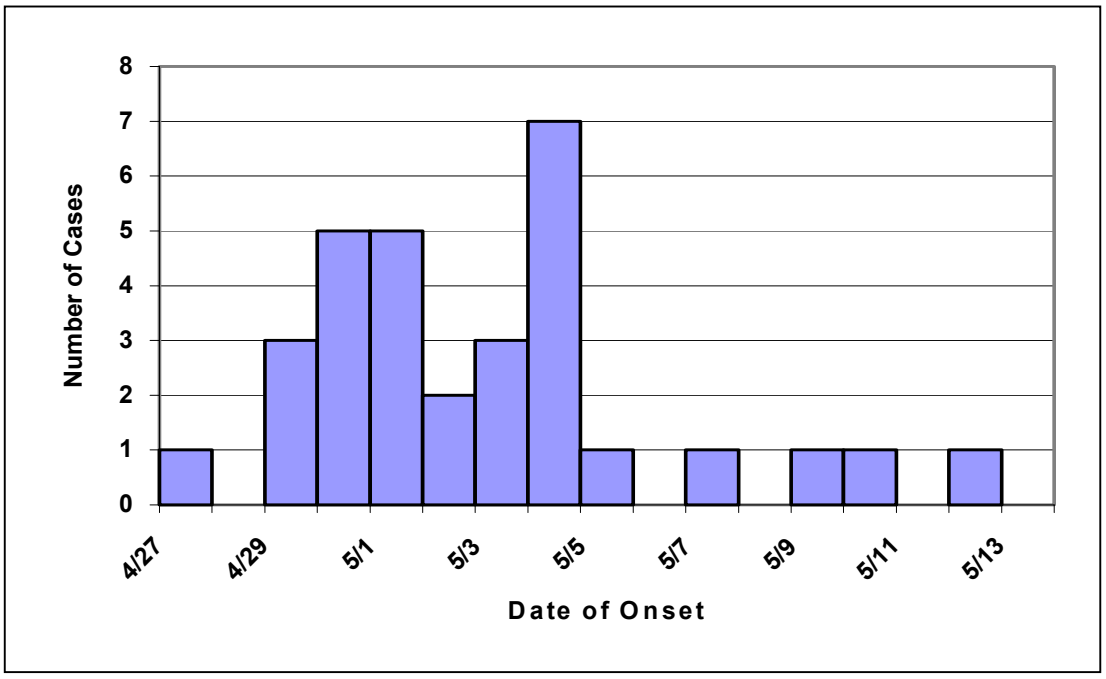
Laboratories in Jacksonville for Pulsed Field Gel Electrophoresis (PFGE) analysis and speciation. A task force comprised of the Florida Department of Business and Professional Regulation, the Florida Department of Agriculture and Consumer Services, the Food and Drug Administration, and the Florida Department of Health conducted traceback activities to determine the source of the implicated mung bean sprouts.

Salmonella Enteriditis was confirmed as the agent for this cluster of gastrointestinal illness. A total of 31 laboratory-confirmed cases associated with this outbreak were reported to the Florida Department of the Health during May and June. Florida cases were from Orange County (25) and Seminole County (4) with two (2) cases reported from Minnesota. There were also five additional epidemiologically-linked cases located in Orange County. Symptomatology included diarrhea (100%), bloody stools (32%), mucous stools (23%), fever (74%), abdominal cramps (71%), chills (48%), vomiting (45%), headache (42%), nausea (32%), and myalgia (32%). Onsets of illness ranged from April 27 to May 13, 2001. A 75 year-old man diagnosed with Salmonella bacteremia with an onset date of June 11, 2001 and identical PFGE analysis results was also reported. His place and time exposure data were also similar to cases associated with this outbreak. The onset dates of cases enrolled in the study are shown in Figure 3. Cases consumed food from Asian restaurants or markets from April 22 though May 9, 2001.

The food product that was significantly associated with illness in the univariate analysis was mung bean sprouts (Crude OR: 6.62, CI=1.40 – 38.31, 95% confidence interval). In addition, shrimp roll, basil, cilantro, and bean sprouts were subjected to stepwise logistic regression. The significant predictor of illness at the 0.05-level was mung bean sprouts (Adjusted odds ratio=9.33, CI=1.58 – 55.03, 95% confidence interval).

PFGE analyses performed on 17 *Salmonella Enteriditis* subcultures from cases in Orange and Seminole Counties matched each other utilizing three enzymes. Comparative analysis of PFGE results to four other clusters or groups in Florida indicate the Orlando and Seminole County cluster was different from other clusters and was perhaps unique from all other Florida samples. PFGE patterns submitted to Pulsnet were compared to a mung bean sprout-related outbreak in Canada during February 2001. Matches with two of three enzyme patterns in Florida suggest a similarity to the Canadian cluster. Since the Canadian group performed phage-typing analysis, subcultures from the Florida cluster were forwarded to the Centers for Disease Control and Prevention in Atlanta, Georgia for similar analysis. Phage-typing results for Florida cases matched Canadian cases with phage-type 913.

Figure 3: Cases of Salmonellosis Enteriditis by Date of Onset, April - May, 2001



The bean sprout trace-back data indicated that the 13 restaurants and 2 markets were supplied through growers and distributors in Orlando and Tampa, Florida. A grower in Orlando supplied 74 stores in the area including many associated with exposure by the confirmed or epi-linked cases. This grower received mung bean seeds from a large warehouse in Kentucky as did many of the other sprout growers. Canada reported their traceback procedures linked mung bean seeds to the same Kentucky warehouse company. Data suggested that the mung bean seeds had originated in China, and were brokered or supplied through a large company in Kentucky to Florida and Canadian sprout growers.

Mung bean sprouts and many other types of sprouts have been implicated in multiple outbreaks, including Salmonella, in the United States and other countries.[14],[15],[16],[17],[18] The restaurants associated with this outbreak, primarily Vietnamese and Thai cuisine, serve entrées that include raw or undercooked mung bean sprouts. Ingestion of raw or undercooked sprouts was likely to have played a role in this outbreak. Several Chinese restaurants that had been

[14] FDA, Interim Advisory on Alfalfa Sprouts, T-98-47, August 31, 1998. http://vm.cfsan.fda.gov/~lrd/tpalfalf.html

[15] Taormina, Peter J. et al., Infections Associated With Eating Seed Sprouts: An International Concern, Emerging Infectious Diseases (5)5: 626-634, September-October, 1999. http://www.cdc.gov/ncidod/eid/vol5no5/pdf/taormina.pdf

[16] van Duynhoven, Yvonne T.H.P., et al., *Salmonella enterica* Serotype Enteritidis Phage Type 4b Outbreak Associated with Bean Sprouts, Emerging Infectious Diseases (8) 4:440-443, April, 2002. http://www.cdc.gov/ncidod/EID/vol8no4/pdf/01-0213.pdf

[17] Mohle-Boetani, J. Outbreak of *Salmonella* serotype Kottbus Infections Associated with Eating Alfalfa Sprouts --- Arizona, California, Colorado, and New Mexico, February--April 2001. MMWR (51)1:7-9, January 11, 2002. http://www.cdc.gov/mmwr/PDF/wk/mm5101.pdf

[18] Como-Sabetti, K. Outbreaks of Escherichia coli O157:H7 Infection Associated with Eating Alfalfa Sprouts -- Michigan and Virginia, June-July 1997. MMWR (46)32:741-744, August 15, 1997. http://www.cdc.gov/mmwr/PDF/wk/mm4632.pdf

supplied with mung bean sprouts in the Orange and Seminole County area of Florida were not named as establishments frequented by those ill. Chinese-style cuisine is more likely to serve cooked sprouts and thus reduce or destroy Salmonella bacteria. Since several growers were suppliers of sprouts, it is likely their seeds were contaminated with the Salmonella bacteria. Sanitation and manufacturing processes at the grower's sites were inadequate to reduce or prevent the growth of bacteria during the growing and harvesting process. Further study of the processes of sprout seed production, growing, harvesting and storage need to be conducted to ensure a safe supply of this food product. Consumer education efforts targeting at-risk populations (the very young, very old, pregnant women and immune compromised) also need to be enhanced.[19],[20]

Memorial Day Party Norwalk Outbreak, Pasco County, May, 2001

On May 31, 2001 the Pasco County Health Department was informed that approximately 20 persons who attended a Memorial Day party at a private residence in Hudson on May 26, 2001 subsequently experienced gastrointestinal illness. There were 31 persons who attended this party. The predominant symptoms reported were diarrhea, abdominal cramps, vomiting and loss of appetite. Food items served at the party included items home prepared and commercially purchased.

An investigation of this outbreak was performed by the Pasco County Health Department and Bureau of Environmental Epidemiology. A listing of food items served at the party was obtained from host, along with detailed preparation and serving procedures. A list of the people who attended the party was obtained from the event organizer. A questionnaire including patient and food history questions was developed and administered to attendees of the Memorial Day party. Resulting data were analyzed using Epi Info 6.04c statistical software. A case was defined as any person who exhibited at least diarrhea (defined as 3 or more loose stools in a 24 hour period) or vomiting and abdominal pains and attended the Memorial Day party in Hudson on May 26, 2001. A control was defined as a person who attended the Memorial Day party and did not become ill. Leftover shrimp salad and frozen shrimp from the party were provided by the host for laboratory analysis. Clinical specimens were not available. A brief onsite visit by the Pasco County Health Department and Bureau of Environmental Epidemiology was performed at the private residence on May 31, 2001. The Florida Department of Agriculture and Consumer Services was notified about the ongoing investigation.

A total of 31 (100%) people who attended the party responded to the questionnaire. Of these, 20 (64.5%) became ill following the suspect meal on May 26, 2001. The mean onset of the symptoms was 27.3 hours with a range of 10 – 49 hours. Predominant symptomatology reported included diarrhea (100%), abdominal cramps (95%), nausea (95%) and vomiting (70%).

Duration of illness ranged from 12 to 72+ hours with a mean of 44.7 hours. Only one of the reported cases sought medical care. Figure 4 depicts the incubation period of the cases grouped by 2-hour periods.

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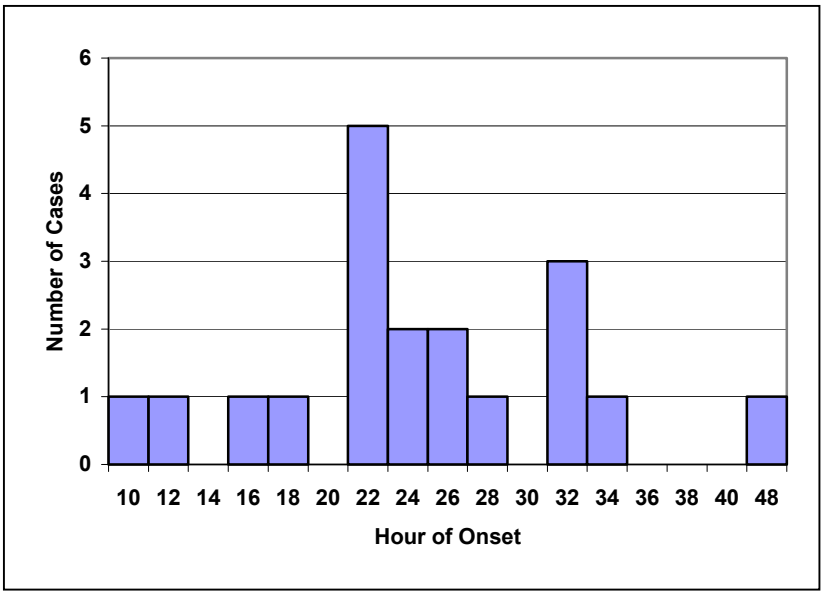
[19] FDA, Consumers Advised of Risks Associated with Raw Sprouts, P-99-13, July 9, 1999. http://vm.cfsan.fda.gov/~lrd/hhssprts.html

[20] Kurtzweil, Paula. Questions Keep Sprouting About Sprouts, FDA Consumer (33)1, January-February, 1999. http://www.fda.gov/fdac/features/1999/199_sprt.html

Figure 4: Onset of Cases, Memorial Day Party, Pasco County, Florida, May 26, 2001



Results of the cohort study indicated that two of the food items served were statistically significant. The most significant food product was the shrimp salad which has a relative risk of 10.45 (CI 1.61 – 67.90) and a Chi-square of 22.14 (p=0.000025). The homemade cheesecake was weakly significant with a relative risk of 1.82 (CI 1.13 – 2.93) and a chi-square of 5.03 (p=0.025). The shrimp salad also had a high food-specific attack rate. The laboratory results of the shrimp salad were negative for Norwalk virus and any specific bacterial agent. However, standard plate count testing on the same shrimp salad indicated high bacterial levels at 320,000 per/gram.

During the epidemiological field visit to the private residence it was revealed that the person who had prepared most of the items for the party had become ill two days before the party. She had experienced similar symptoms as other ill party attendees. A few days before the party, she had also sampled a few shrimp that were used in the shrimp salad. In addition, one person who attended the party had taken home some of the shrimp salad and reported becoming ill a day later. This person did not have any of the shrimp salad at the party on May 26. A discussion of food preparation processes did not identify any problems with hygiene or preparation procedures. The homemade cheesecake had been prepared by another party attendee. Not much information was available about this food item's preparation. However the preparer of the cheesecake had no history of illness before or after the party.

This outbreak of gastrointestinal illness is strongly associated with the consumption of shrimp salad at a private Memorial Day party in Hudson on May 26, 2001. No other epidemiological associations were identified and the onsets of symptoms were chronologically clustered indicating a common source exposure. The incubation period, symptomatology and duration of the illness suggest an etiology of Norwalk virus.[21,22] Epidemiological analysis indicates a statistically significant association between gastrointestinal illness and consumption of shrimp

[21] Chin, James, ed. Epidemic Viral Gastroenteropathy. In Control of Communicable Diseases Manual, 17th Edition, 2000, pp. 218-220.
[22] FDA/CFSAN. The Norwalk Virus Family. Foodborne Pathogenic Microorganism and Natural Toxins Handbook. http://www.cfsan.fda.gov/~mow/chap34.html

salad. The identification of a high bacteria count on the shrimp salad possibly indicates improper handling or storage of the shrimp at any point during the commercial preparation process or after purchase in the home. Standard plate count levels above 100,000 per/gram generally indicate some type of mishandling of the food product. Cross-contamination of food items may also have occurred. It is not clear if contamination of the shrimp salad may have been associated with cross-contamination from the raw shrimp or whether the ill food handler was the source of contamination. In addition, the ill food handler's illness could be associated with consumption of shrimp salad before the party on May 26.

Clostridium perfringens at a Gala Dinner in Duval County, Florida, October, 2001

On Wednesday, October 24, 2001 the Florida Department of Health Regional Food and Waterborne Disease Epidemiologist received a report from the Department of Business and Professional Regulation regarding complaints of gastrointestinal illness from persons who attended an annual business association gala on Friday, October 19, 2001 in Jacksonville, Florida.

The business association provided a list of names and phone numbers of ticket holders for the gala, which was used to contact potential attendees. Of the 881 tickets sold for the gala, it was estimated that approximately 600-700 persons actually attended the event. Case histories were obtained by telephone interview or self-administered questionnaire. Of 235 attendees who responded, 79 reported an illness meeting the case definition. There were 156 well individuals. The incubation periods ranged from 2 to 64.25 hours, with a mean incubation period of 11.87 hours. The duration of illness ranged from 2 to 96 hours, with a mean duration of 29.1 hours. The predominant symptoms were diarrhea and cramps. The number of diarrheal episodes in a 24-hour period ranged from 1 to 20, with a mean of 6 diarrheal episodes in a 24-hour period.

A buffet station had served carved pork, burgundy sauce, chicken breasts in gravy, beef tips in gravy, rice pilaf, bowtie pasta with peas in sauce, vegetable medley, broccoli casserole and dinner rolls. Other food items at the gala included assorted cheeses, fruits, fresh vegetables, sushi, green salad, cold pasta salad, dressings, and hot artichoke, spinach, and crabmeat dips and assorted desserts. All food items were placed out for service between 5:30-9:00 pm. Fresh items were displayed on trays or bowls. Cold items were placed on tables without any cold holding methods. Hot items were held in hot holding equipment or insulated containers prior to service and were then served from hot holding pans using Sterno cans for heat. Interviews with the caterers revealed that the hot holding equipment did not maintain proper temperatures. Sterno cans were used to increase temperature, but did not effectively do so. Some items were removed from the hot holding equipment, reheated and placed in insulated containers without an internal heat source.

The results of the statistical analyses indicate that the highest risk of illness was associated with consumption of the beef tips with gravy (Table 5). The Adjusted OR of 3.63 indicates that a person who consumed the beef tips was over 3 times more likely to become ill than someone who had not eaten that food item. Additionally, the crabmeat dip also showed an association with illness. With an Adjusted OR of 2.28, the data indicate that consumption of both of these food items was associated with illness.

Table 5: Adjusted Odds Ratios for Gastrointestinal Illness (95% CI) for Selected Food Items, Gala Dinner, Duval County, October, 2001 (n=79 Cases and 156 Controls)

Food	Adjusted Odds Ratio*	*Lower Confidence* Limit	*Upper Confidence* Limit	p-value
Crab meat dip	**2.284**	**1.077**	**4.845**	**0.0313**
Beef tips	**3.63**	**1.867**	**7.061**	**0.0001**
Rice pilaf	1.188	0.641	2.204	0.5839
Pasta Pea	1.598	0.869	2.94	0.1315
Buffet pork	1.541	0.816	2.912	0.1825
Broccoli casserole	0.889	0.478	1.653	0.7098
Bananas Foster	0.812	0.433	1.522	0.5152
Chicken	1.331	0.691	2.563	0.3931
Bread/Toast for hot dip	0.976	0.47	2.026	0.9485
Vegetable medley	0.948	0.504	1.784	0.869
Chocolate cheesecake	2.158	0.762	6.114	0.1478
Ice	0.77	0.406	1.462	0.4251
Mixed drinks (cocktail)	1.512	0.792	2.886	0.2098

The etiology of this outbreak is characteristic of *Clostridium perfringens* as the most plausible pathogen. *C. perfringens* intoxication is an intestinal disorder characterized by sudden onset of colic followed by diarrhea. Typically the incubation period for *C. perfringens* ranges from 6 – 24 hours, with an average incubation period of 10 – 12 hours. The illness is generally mild with a short duration of one day or less.[23]

The results of the investigation and statistical analysis implicate the beef tips as well as the crabmeat dip as the sources of the illnesses associated with the gala. It is apparent that both food items were contaminated with the pathogens and then held under conditions, inadequate hot holding and reheating, that allowed enough proliferation of the organisms to cause illness when these items were consumed.

Multi-County Ciguatera Outbreak, Florida October, 2001[24]

On October 28, 2001, the Palm Beach County Health Department was informed by a physician at a local hospital of a ciguatera intoxication occurring on October 27. Three persons from three separate parties consumed black grouper at a local restaurant on October 27. On October 30 and 31, the Martin County Health Department was informed by a local physician of ciguatera intoxication occurring on October 27 and 28. Three more persons had consumed black grouper at a local restaurant on October 27 and 28 in Martin County. On November 1, the Martin County Health Department was notified of two more persons experiencing symptoms consistent with ciguatera intoxication after consuming black grouper at yet another local restaurant on October 27 in Martin County. Also on November 1, the Palm Beach County Health Department was notified of three additional persons experiencing symptoms consistent with ciguatera intoxication after consuming black grouper at the same restaurant as the original three cases on October 27.

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[23] Chin J., *Clostridium perfringens* Food Intoxication. In: Control of Communicable Diseases Manual, 17th Edition, American Public Health Association, 2000:206-207.

[24] Wamnes, Janet and Roberta Hammond, Multi-County Ciguatera Outbreak, Florida. EpiUpdate (Florida Department of Health), Noveber 9, 2001.
http://www.doh.state.fl.us/disease_ctrl/epi/Epi%20Updates/2001.htm

Table 6: Line Summary of Cases, Multi-county Ciguatera Outbreak, October, 2001

County	Date of Exposure	Date Reported	# Cases	Restaurant
Palm Beach	10/27	10/28	3	A
Martin	10/27	10/30	2	B
Martin	10/28	10/31	1	B
Martin	10/27	11/1	2	C
Palm Beach	10/27	11/1	3	A

The first three persons in Palm Beach County developed diarrhea, vomiting, and abdominal cramps within 6 hours after consuming the fish. Later they developed tingling and numbness in the gums, itching, weakness in their legs, reversal of hot-cold sensations, difficulty in breathing, body aches, and joint and muscle pain, with recurring symptoms of itching. The first 3 persons from Martin County developed nausea, diarrhea, and abdominal pain. One of these persons also experienced vomiting within 5 hours after consuming the fish. Later, the 3 Martin County persons developed tingling and numbness in the gums, pin-prickling in hands and feet, body aches, reversal of hot-cold sensations, and itching, with recurring symptoms of itching and weakness. The second group of persons that ate grouper at a different local restaurant in Martin County on October 27 developed diarrhea and abdominal cramps within 4 hours after consuming the fish. Later they developed tingling and numbness in the lips, nose, and tongue, body aches, reversal of hot-cold sensations, and itching. The last group of persons that ate grouper at the Palm Beach County restaurant developed diarrhea, nausea, and abdominal pain within 6 hours after consuming the fish. Later they developed tingling and numbness in the lips, nose, and tongue, body aches, reversal of hot-cold sensations, and itching, with recurring symptoms of itching and weakness.

The Bureau of Environmental Epidemiology, the Palm Beach County Health Department, the Martin County Health Department, the Florida Department of Agriculture and Consumer Services, and the Department of Business and Professional Regulation were immediately notified after each complaint. Investigations by the respective county health departments, the Bureau of Environmental Epidemiology and the Departments of Business and Professional Regulation and Agriculture and Consumer Services were conducted at each implicated restaurant, fish market, and fish supplier. All of the restaurants where the outbreaks occurred had obtained the black grouper from the same distributor located in Broward County. Leftover black grouper was obtained from the initial investigation in Palm Beach County to be tested for ciguatoxin by the Food and Drug Administration.

A total of 11 cases of ciguatera intoxication from the consumption of black grouper bought at restaurants in Martin and Palm Beach Counties from different fish markets but from the same supplier and same source lot in Broward County were identified. Six of the cases consumed the fish at the same restaurant in Palm Beach County on October 27, 3 in one party, 3 in another party. Three of the cases consumed the fish at the same restaurant in Martin County on

October 27 and 28, 2 in one party, and 1 in another party. Two of the cases consumed the fish at a different restaurant in Martin County on October 27.

The fish market in Palm Beach County had purchased over 200 pounds of black grouper and the fish market in Martin County had obtained 1600 pounds of the fish from a licensed supplier in Broward County on October 25. The Florida Department of Agriculture and Consumer Services obtained invoices from the supplier that indicated the black grouper was obtained from a vendor in Freeport, Bahamas. The two fish markets that supplied the fish to the three restaurants in Martin and Palm Beach County as well as the fish supplier in Broward County were issued a stop-sale for the implicated lot of black grouper. Staff of the Martin and Indian River County Health Departments and the Bureau of Environmental Epidemiology called 25 restaurants who had also purchased the fish from the Martin County fish market in Martin, St. Lucie, Indian River, Okeechobee and Palm Beach Counties. The restaurants were asked to discard the fish because of the outbreak. The black grouper obtained for testing was positive for ciguatoxin. Because one of the Palm Beach County cases was a resident of the State of Indiana, an EpiX alert was posted as well as an alert on the Foodborne Outbreak listserve. No other out-of-state cases were identified. No further clusters were identified in this outbreak.

Ciguatera poisoning is a notifiable (reportable) disease in Florida (s. 64D-3.002(1)j, Florida Administrative Code) and should be reported to the local county health department by the attending physician. It is a form of human poisoning caused by the consumption of subtropical and tropical marine finfish which have accumulated naturally occurring toxins through their diet. Marine finfish most commonly implicated in ciguatera fish poisoning include the groupers, barracudas, snappers, jacks, mackerel, and triggerfish. Many other species of warm-water fish harbor ciguatera toxins. The occurrence of toxic fish is sporadic, and not all fish of a given species or from a given locality will be toxic. The ciguatoxins can be recovered from toxic fish through tedious extraction and purification procedures. The mouse bioassay is a generally accepted method of establishing toxicity of suspect fish.[25]

Clinical testing procedures are not presently available for the laboratory diagnosis of ciguatera in humans. Diagnosis is based on symptom history and recent dietary history. Initial signs of poisoning occur within 6 hours after consumption of toxic fish and include perioral numbness and tingling (paresthesia), which may spread to the extremities, nausea, vomiting, and diarrhea. Neurological symptoms include intensified paresthesia, arthralgia, myalgia, headache, temperature sensory reversal and acute sensitivity to temperature extremes, vertigo, and muscular weakness to the point of prostration. Cardiovascular signs include arrhythmia, bradycardia or tachycardia, and reduced blood pressure. Ciguatera poisoning is usually self-limiting, and signs of poisoning often subside within several days from onset. However, in severe cases the neurological symptoms are known to persist from weeks to months.

***Vibrio vulnificus*, Florida, 2001**

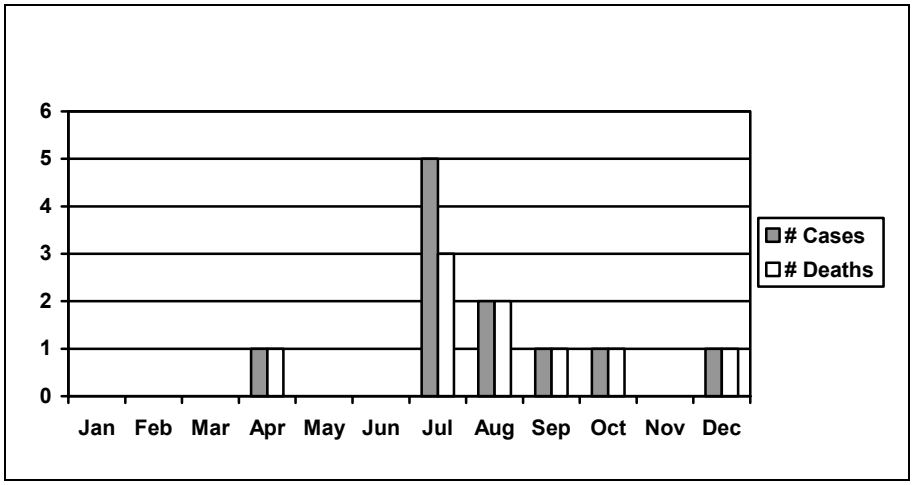
For 2001, there was a total of 20 *Vibrio vulnificus* cases reported in the State of Florida, a significant reduction from the previous year. Of these, 9 were wound-related. The other 11 cases were associated with the consumption of raw oysters. [26] There were 9 oyster-

[25] FDA/CFSAN. Ciguatera. Foodborne Pathogenic Microorganisms and Natural Toxins Handbook (Bad Bug Book), http://www.cfsan.fda.gov/~mow/chap36.html

[26] Vibrio vulnificus cases are also counted as outbreaks because of the virulence of the disease.

consumption-related deaths and 1 wound-related death reported from *Vibrio vulnificus* (see Figure 5). No other deaths from exposure to *Vibrio vulnificus* were reported in 2000. In 2000 there were 8 wound-related cases of *Vibrio vulnificus* (3 deaths), and 5 cases associated with the consumption of raw oysters (2 deaths).

Figure 5: *Vibrio vulnificus* Cases and Deaths Due to Shellfish Consumption by Month, Florida, 2001



The Florida Department of Health is collaborating in a statewide Vibrio vulnficus Education Project with the Florida Department of Agriculture and Consumer Services and with the Interstate Shellfish Sanitation Conference. Targeted audiences include high risk groups, health care practitioners and the general public. In 2001, project elements included a Vibrio vulnficus education seminar and display at the Florida Medical Association Annual Meeting. Physicians attending the seminar were also given a video tape with more in-depth Vibrio vulnficus information as well as general informational brochures.

Appendix: Statewide Data Tables and Figures

Table 7: Number of Reported Outbreaks With Laboratory-Confirmed Etiologic Agents and Number of Cases Associated With These Outbreaks, Florida, 2001

# Outbreaks	Pathogen	# Cases
1	Campylobacter	2
1	Cryptosporidium	5
1	Cyclospora	39
1	Giardia	6
2	C. perfringens	118
2	Hepatitis A	43
2	Other	60
3	Ciguatera	20
4	Chemical	8
4	Scombroid	11
6	Shigella	21
8	Norwalk virus	228
10	Salmonella	78
11	V. vulnificus	11
56	Total	650

Figure 6: Percent Reported Outbreaks With Laboratory-Confirmed Etiologic Agents and Percent Cases Associated With These Outbreaks, Florida, 2001

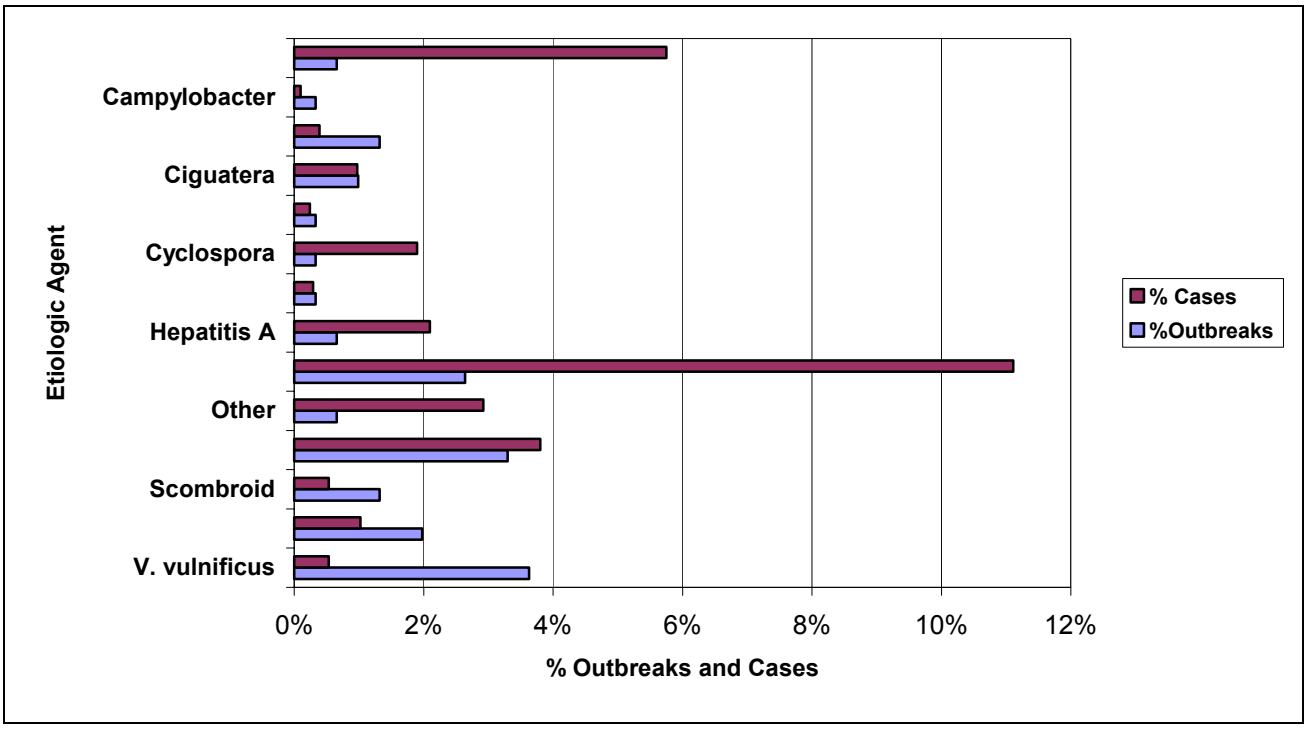
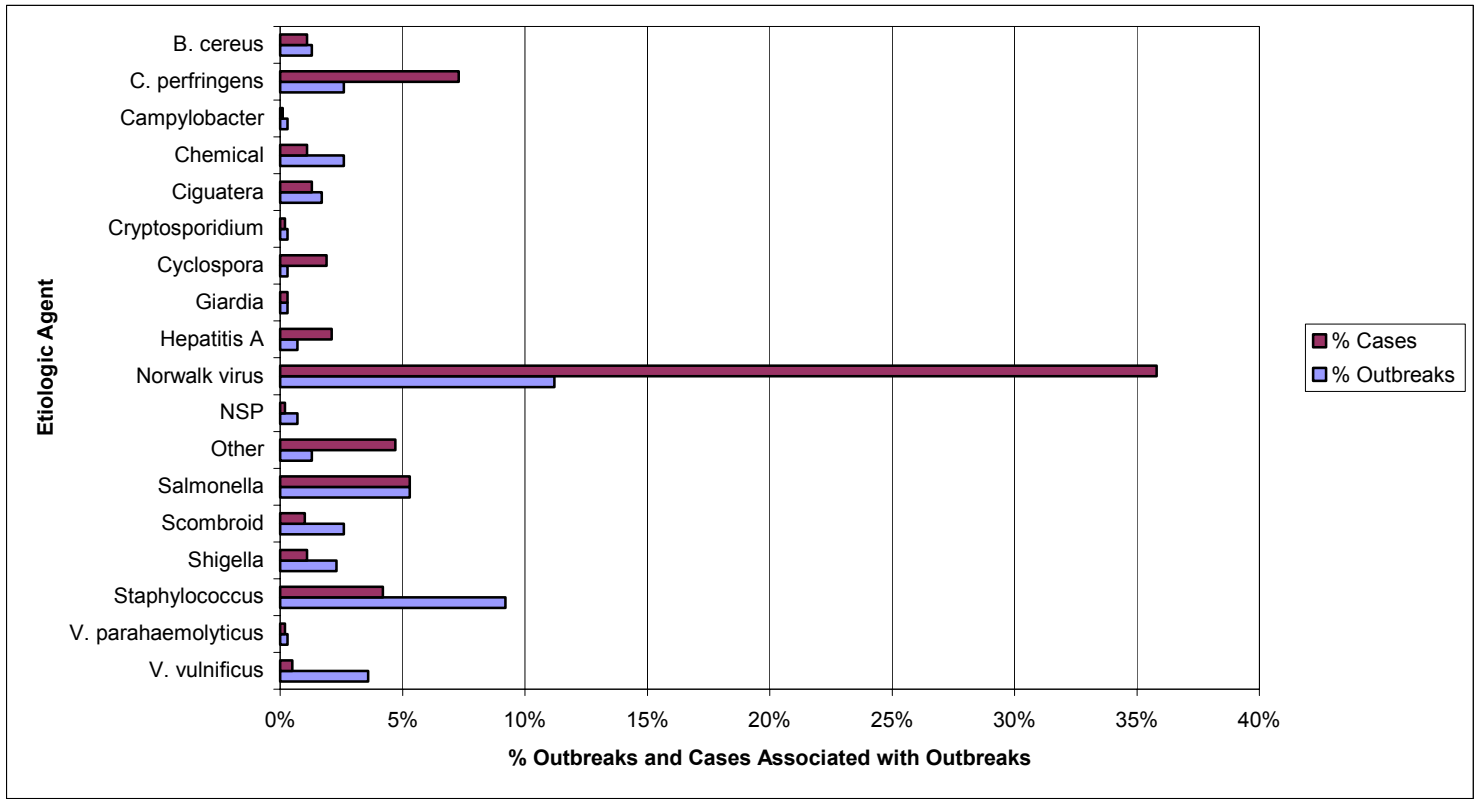
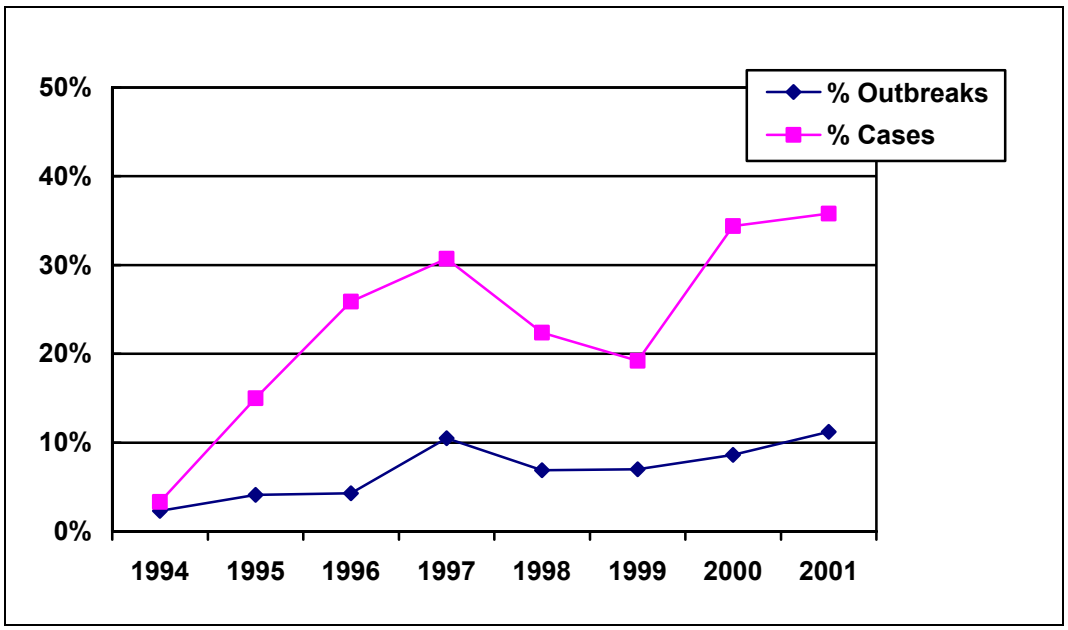


Figure 7: Percent Total Outbreaks and Cases by Etiologic Agent, Florida, 2001*



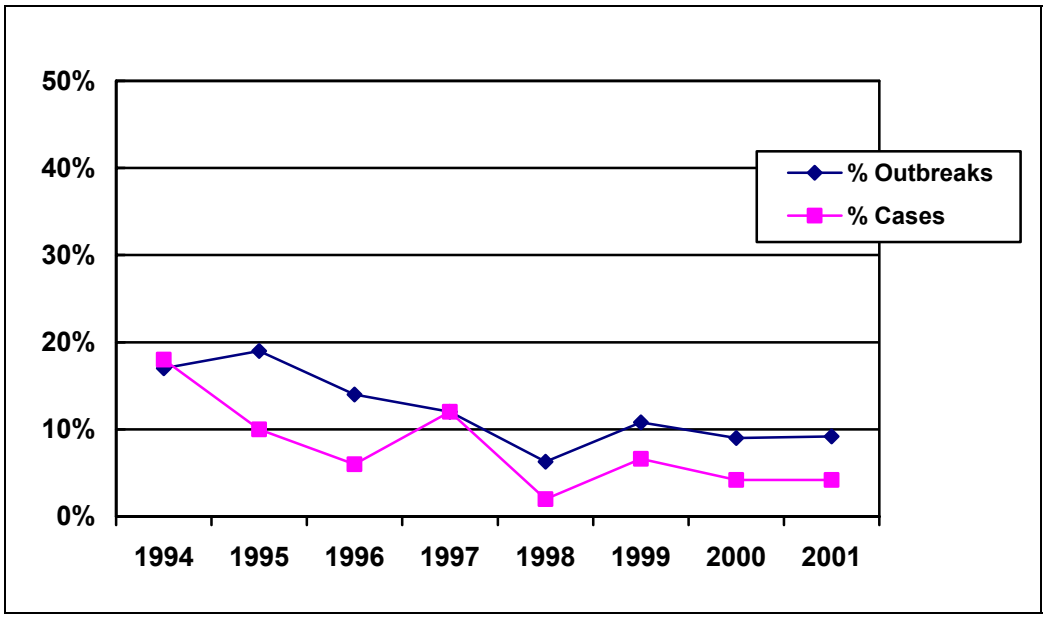
*The etiologic agent was unknown in 53.1% of the outbreaks and 31.6% of the cases.

Figure 8: Trends in Reported Outbreaks and Outbreak Cases of Norwalk, Florida, 1994 - 2001



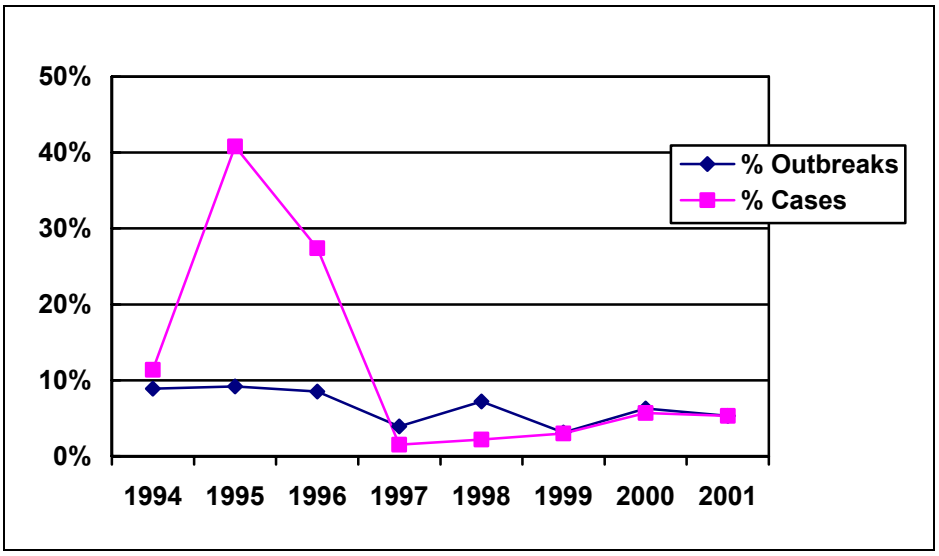
Reported food and waterborne Norwalk outbreaks and cases show an upward trend over time.

Figure 9: Trends in Reported Outbreaks and Outbreak Cases of Staphylococcus, Florida, 1994 - 2001



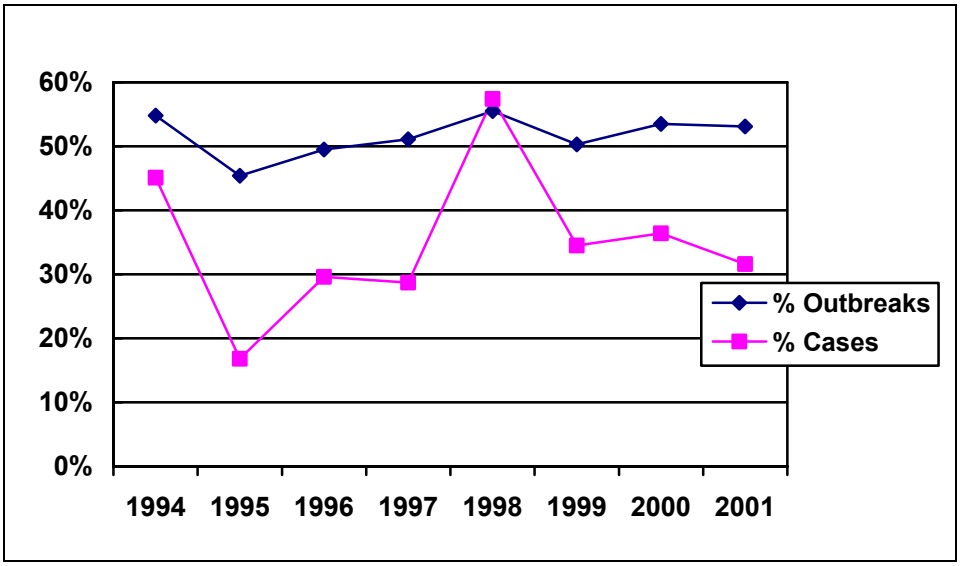
Reported Staphylocccus outbreaks and cases show a downward trend over time.

Figure 10: Trends in Reported Outbreaks and Outbreak Cases of Salmonella, Florida, 1994 - 2001



Reported Salmonella outbreaks and cases show a downward trend over time.

Figure 11: Trends in Reported Outbreaks and Outbreak Cases of Unknown Pathogens, Florida, 1994 - 2001



Food and waterborne outbreaks and cases from unknown causes show a slight upward trend over time.

Figure 12: Percent Total Outbreaks and Cases by Site, Florida, 2001

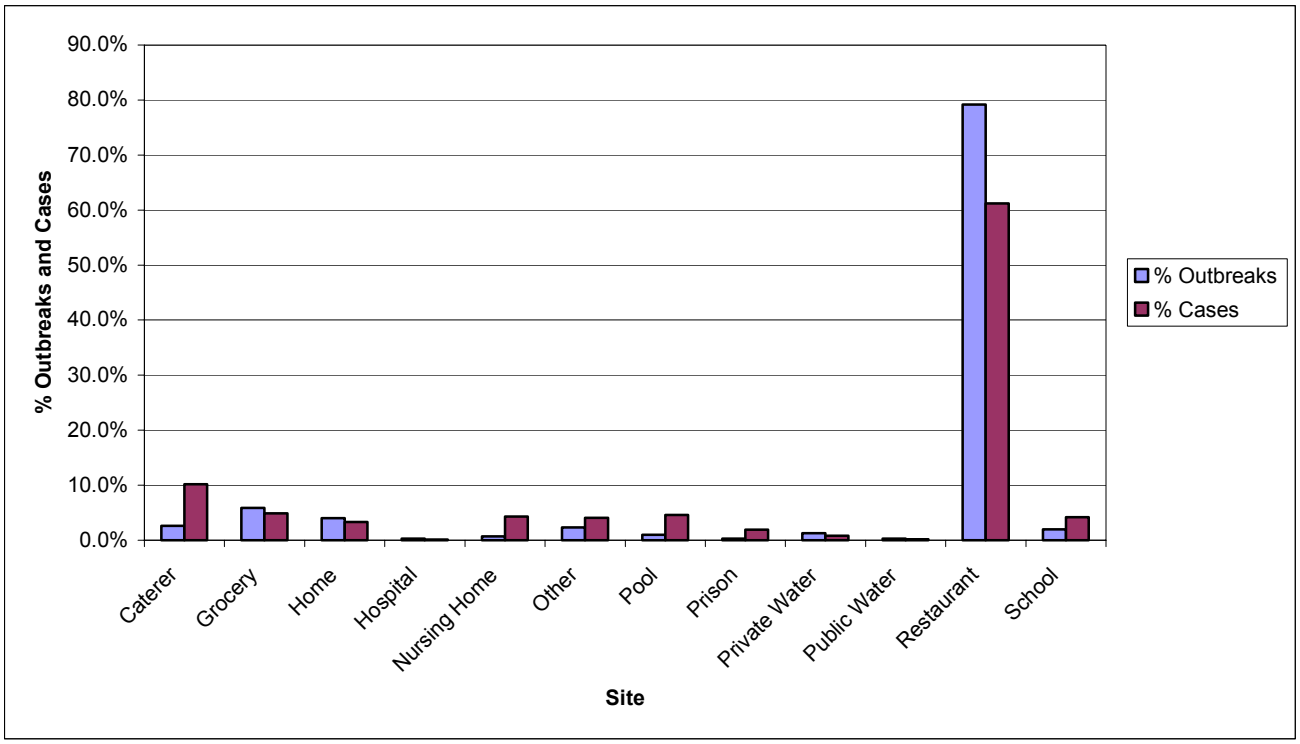


Table 8: Outbreaks by Site, Florida, 2001

Status	Caterer	Grocery	Home	Hospital	Nursing Home	Other	Pool	Prison	Private Water	Public Water	Restaurant	School	Total
Confirmed	4	7	7	0	1	7	3	0	1	1	33	4	68
	5.9%	10.3%	10.3%	0.0%	1.5%	10.3%	4.4%	0.0%	1.5%	1.5%	48.5%	5.9%	22.4%
Suspected	4	11	5	1	1	0	0	1	3	0	207	2	235
	1.7%	4.7%	2.1%	0.4%	0.4%	0.0%	0.0%	0.4%	1.3%	0.0%	88.1%	0.9%	77.6%
Total	**8**	**18**	**12**	**1**	**2**	**7**	**3**	**1**	**4**	**1**	**240**	**6**	**303**
	2.6%	**5.9%**	**4.0%**	**0.3%**	**0.7%**	**2.3%**	**1.0%**	**0.3%**	**1.3%**	**0.3%**	**79.2%**	**2.0%**	**100%**

Table 9: Cases by Site, Florida, 2001

Status	Caterer	Grocery	Home	Hospital	Nursing Home	Other	Pool	Prison	Private Water	Public Water	Restaurant	School	Total
Confirmed	180	65	53	0	48	85	94	0	4	5	441	82	1057
	17.0%	6.1%	5.0%	0.0%	4.5%	8.0%	8.9%	0.0%	0.4%	0.5%	41.7%	7.8%	51.5%
Suspected	29	36	15	3	41	0	0	39	13	0	815	4	995
	2.9%	3.6%	1.5%	0.3%	4.1%	0.0%	0.0%	3.9%	1.3%	0.0%	81.9%	0.4%	48.5%
Total	**209**	**101**	**68**	**3**	**89**	**85**	**94**	**39**	**17**	**5**	**1256**	**86**	**2052**
	10.2%	**4.9%**	**3.3%**	**0.1%**	**4.3%**	**4.1%**	**4.6%**	**1.9%**	**0.8%**	**0.2%**	**61.2%**	**4.2%**	**100%**

Table 10: Food and Waterborne Outbreaks and Cases Reported by Agency of Jurisdiction,[27] Florida, 1996 - 2001

1996

Agency	# Outbreaks	% Outbreaks	# Cases	% Cases
DACS	20	6.6%	105	3.7%
DBPR	258	85.4%	1824	64.2%
DOH	9	3.0%	651	23.0%
OTHER	15	4.9%	261	9.2%
Total	**302**	**100.0%**	**2841**	**100.0%**

1997

Agency	# Outbreaks	% Outbreaks	# Cases	% Cases
DACS	72	16.4%	334	12.2%
DBPR	323	73.7%	1777	64.8%
DOH	24	5.5%	294	10.7%
OTHER	19	4.3%	338	12.3%
Total	**438**	**100.0%**	**2743**	**100.0%**

1998

Agency	# Outbreaks	% Outbreaks	# Cases	% Cases
DACS	20	6.3%	91	2.8%
DBPR	243	77.1%	1911	58%
DOH	35	11%	1149	34.9%
OTHER	17	5.4%	139	4.2%
Total	**315**	**100.0%**	**3290**	**100.0%**

1999

Agency	# Outbreaks	% Outbreaks	# Cases	% Cases
DACS	30	10.5%	228	14.8%
DBPR	226	79.0%	983	63.7%
DOH	18	6.3%	255	16.5%
OTHER	12	4.2%	78	5.1%
Total	**286**	**100.0%**	**1544**	**100.0%**

2000

Agency	# Outbreaks	% Outbreaks	# Cases	% Cases
DACS	35	12.2%	142	8.1%
DBPR	210	72.9%	986	56.1%
DOH	21	7.3%	410	23.3%
OTHER	22	7.6%	219	12.5%
Total	288	100.0%	1757	100.0%

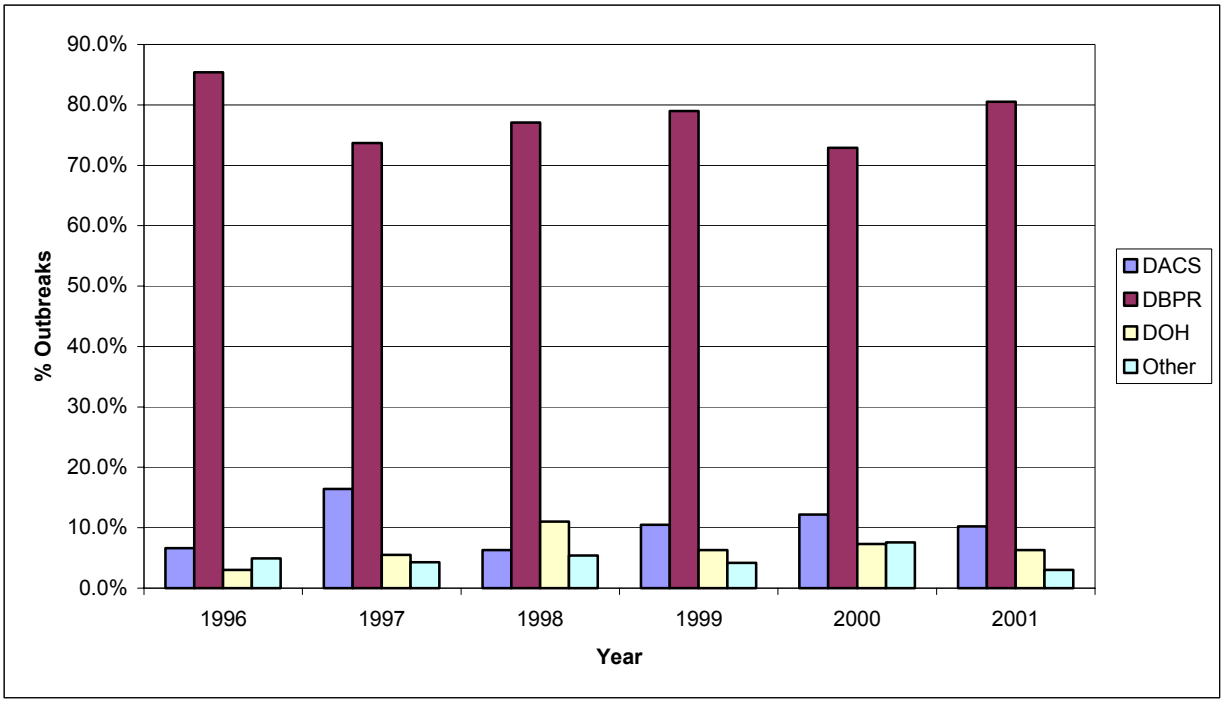
[27] Agency of jurisdiction refers to the agency regulating the primary food source and/or food workers identified as the cause of the outbreak (DACS = Department of Agriculture and Consumer Services, DBPR = Department of Business and Professional Regulation, DOH = Department of Health, OTHER = most often private homes or events, occasionally other state or federal agencies).

Table 12: Food and Waterborne Outbreaks and Cases Reported by Agency of Jurisdiction,[28] Florida, 1996 - 2001 (cont.)

2001

Agency	# Outbreaks	% Outbreaks	# Cases	% Cases
DACS	31	10.2%	173	8.4%
DBPR	244	80.5%	1505	73.3%
DOH	19	3.0%	311	15.2%
OTHER	9	100.0%	63	3.1%
Total	303	10.2%	2052	100.0%

Figure 13: Reported Food and Waterborne Disease Outbreaks by Agency of Jurisdiction, 1996 - 2001



[28] Agency of jurisdiction refers to the agency regulating the primary food source and/or food workers identified as the cause of the outbreak (DACS = Department of Agriculture and Consumer Services, DBPR = Department of Business and Professional Regulation, DOH = Department of Health, OTHER = most often private homes or events, occasionally other state or federal agencies).

Figure 14: Cases Associated With Reported Food and Waterborne Disease Outbreaks by Agency of Jurisdiction, 1996 - 2001

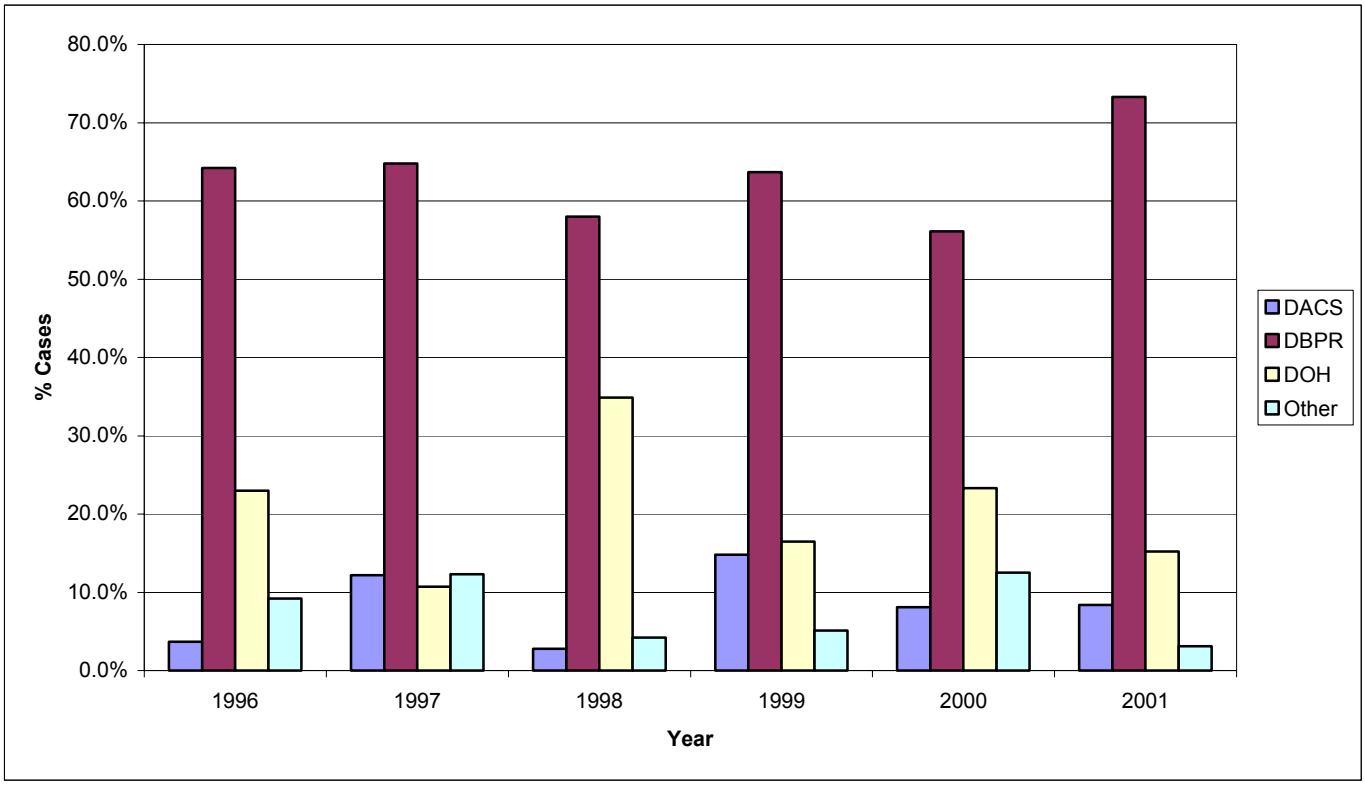


Figure 15: Percent Total Outbreaks and Cases by Vehicle, Florida, 2001

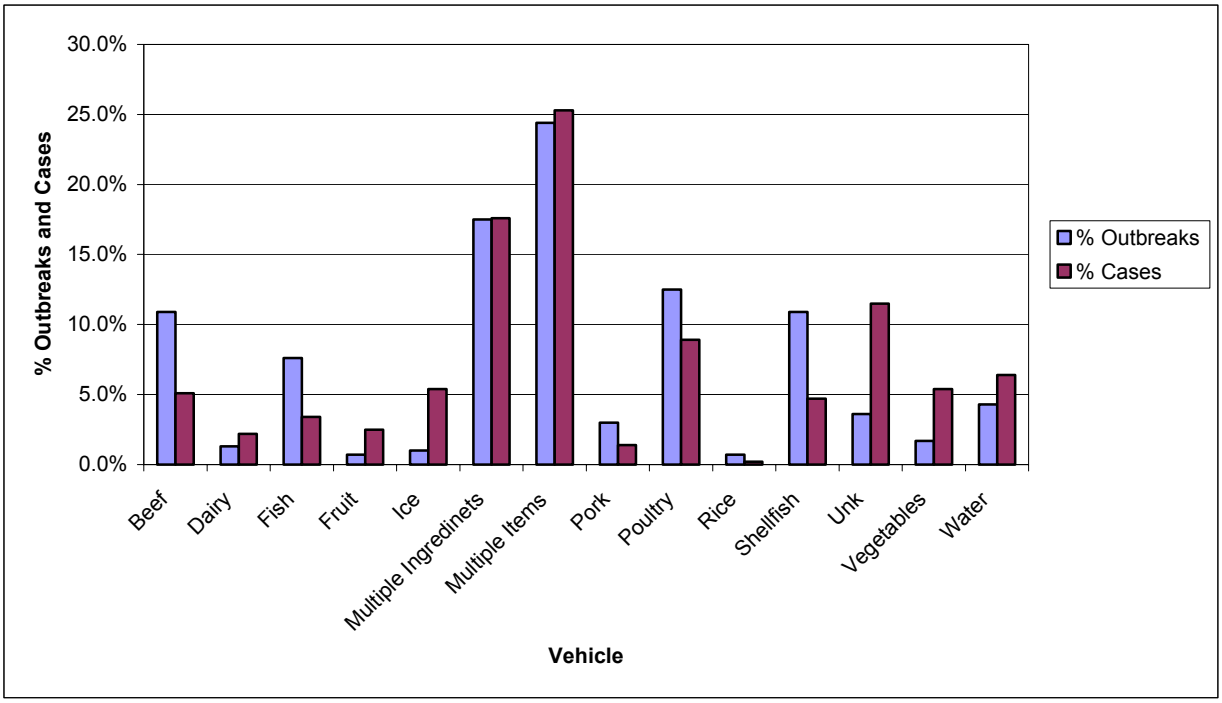


Table 11: Outbreaks by Vehicle, Florida, 2001

Status	Beef	Dairy	Fish	Fruit	Ice	Multiple Ingredinets	Multiple Items	Pork	Poultry	Rice	Shellfish	Unk	Vegetables	Water	Total
Confirmed	2	0	10	1	2	10	10	1	7	0	13	4	1	7	68
	2.9%	0.0%	14.7%	1.5%	2.9%	14.7%	14.7%	1.5%	10.3%	0.0%	19.1%	5.9%	1.5%	10.3%	22.4%
Suspected	31	4	13	1	1	43	64	8	31	2	20	7	4	6	235
	13.2%	1.7%	5.5%	0.4%	0.4%	18.3%	27.2%	3.4%	13.2%	0.9%	8.5%	3.0%	1.7%	2.6%	77.6%
Total	**33**	**4**	**23**	**2**	**3**	**53**	**74**	**9**	**38**	**2**	**33**	**11**	**5**	**13**	**303**
	10.9%	**1.3%**	**7.6%**	**0.7%**	**1.0%**	**17.5%**	**24.4%**	**3.0%**	**12.5%**	**0.7%**	**10.9%**	**3.6%**	**1.7%**	**4.3%**	**100%**

Table 12: Cases by Vehicle, Florida, 2001

Status	Beef	Dairy	Fish	Fruit	Ice	Multiple Ingredinets	Multiple Items	Pork	Poultry	Rice	Shellfish	Unk	Vegetables	Water	Total
Confirmed	23	0	38	48	98	178	256	11	92	0	33	138	34	108	1057
	2.2%	0.0%	3.6%	4.5%	9.3%	16.8%	24.2%	1.0%	8.7%	0.0%	3.1%	13.1%	3.2%	10.2%	99.9%
Suspected	82	45	31	4	12	184	263	18	90	4	64	98	77	23	995
	8.2%	4.5%	3.1%	0.4%	1.2%	18.5%	26.4%	1.8%	9.0%	0.4%	6.4%	9.8%	7.7%	2.3%	99.7%
Total	**105**	**45**	**69**	**52**	**110**	**362**	**519**	**29**	**182**	**4**	**97**	**236**	**111**	**131**	**2052**
	5.1%	**2.2%**	**3.4%**	**2.5%**	**5.4%**	**17.6%**	**25.3%**	**1.4%**	**8.9%**	**0.2%**	**4.7%**	**11.5%**	**5.4%**	**6.4%**	**100%**

Table 13: Total Outbreaks, Florida, 2001: Etiologic Agent by Vehicle

Pathogen	Beef	Dairy	Fish	Fruit	Ice	Multiple Ingredients	Multiple Items	Pork	Poultry	Rice	Shellfish	Unk	Vegetables	Water	Total
B. cereus	0	0	1	0	0	1	0	0	0	2	0	0	0	0	**4**
C. perfringens	1	0	0	0	0	2	2	1	1	0	0	0	1	0	**8**
Campylobacter	0	0	0	0	0	0	1	0	0	0	0	0	0	0	**1**
Chemical	0	0	0	0	0	4	1	0	0	0	0	0	0	3	**8**
Ciguatera	0	0	5	0	0	0	0	0	0	0	0	0	0	0	**5**
Cryptosporidia	0	0	0	0	0	0	0	0	0	0	0	0	0	1	**1**
Cyclospora	0	0	0	0	0	0	0	0	0	0	0	1	0	0	**1**
Giardia	0	0	0	0	0	0	0	0	0	0	0	0	0	1	**1**
Hepatitis A	0	0	0	0	1	0	0	0	0	0	0	1	0	0	**2**
Norwalk Virus	0	1	0	2	1	6	10	2	2	0	4	5	1	0	**34**
NSP	0	0	0	0	0	0	0	0	0	0	2	0	0	0	**2**
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	4	**4**
Salmonella	1	0	1	0	0	5	2	0	6	0	0	0	1	0	**16**
Scombroid	0	0	8	0	0	0	0	0	0	0	0	0	0	0	**8**
Shigella	1	0	0	0	0	2	1	0	1	0	2	0	0	0	**7**
Staphylococcus	6	1	0	0	0	6	8	1	4	0	1	0	1	0	**28**
Unknown	24	2	7	0	1	27	49	5	24	0	13	4	1	4	**161**
V. parahaemolyticus	0	0	1	0	0	0	0	0	0	0	0	0	0	0	**1**
V. vulnificus	0	0	0	0	0	0	0	0	0	0	11	0	0	0	**11**
Total	**33**	**4**	**23**	**2**	**3**	**53**	**74**	**9**	**38**	**2**	**33**	**11**	**5**	**13**	**303**

Table 14: Total Cases in All Outbreaks, Florida, 2001: Etiologic Agent by Vehicle

Pathogen	Beef	Dairy	Fish	Fruit	Ice	Multiple Ingredients	Multiple Items	Pork	Poultry	Rice	Shellfish	Unk		Water	Total
B. cereus	0	0	2	0	0	16	0	0	0	4	0	0	0	0	**22**
C. perfringens	16	0	0	0	0	43	84	2	2	0	0	0	2	0	**149**
Campylobacter	0	0	0	0	0	0	2	0	0	0	0	0	0	0	**2**
Chemical	0	0	0	0	0	13	2	0	0	0	0	0	0	8	**23**
Ciguatera	0	0	27	0	0	0	0	0	0	0	0	0	0	0	**27**
Cryptosporidia	0	0	0	0	0	0	0	0	0	0	0	0	0	5	**5**
Cyclospora	0	0	0	0	0	0	0	0	0	0	0	39	0	0	**39**
Giardia	0	0	0	0	0	0	0	0	0	0	0	0	0	6	**6**
Hepatitis A	0	0	0	0	40	0	0	0	0	0	0	3	0	0	**43**
Norwalk Virus	0	33	0	52	58	110	176	13	35	0	33	154	70	0	**734**
NSP	0	0	0	0	0	0	0	0	0	0	4	0	0	0	**4**
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	96	**96**
Salmonella	3	0	2	0	0	36	4	0	29	0	0	0	34	0	**108**
Scombroid	0	0	20	0	0	0	0	0	0	0	0	0	0	0	**20**
Shigella	3	0	0	0	0	4	8	0	2	0	6	0	0	0	**23**
Staphylococcus	14	3	0	0	0	20	28	2	14	0	3	0	3	0	**87**
Unknown	69	9	14	0	12	120	215	12	100	0	40	40	2	16	**649**
V. parahaemolyticus	0	0	4	0	0	0	0	0	0	0	0	0	0	0	**4**
V. vulnificus	0	0	0	0	0	0	0	0	0	0	11	0	0	0	**11**
Total	**105**	**45**	**69**	**52**	**110**	**362**	**519**	**29**	**182**	**4**	**97**	**236**	**111**	**131**	**2052**

Table 15: Confirmed Outbreaks, Florida, 2001: Etiologic Agent by Vehicle

Pathogen	Beef	Fish	Fruit	Ice	Multiple ingredients	Multiple Items	Pork	Poultry	Shellfish	Unk	Vegetables	Water	Total
B. cereus	0	0	0	0	1	0	0	0	0	0	0	0	**1**
C. perfringens	1	0	0	0	0	1	0	0	0	0	0	0	**2**
Chemical	0	0	0	0	1	0	0	0	0	0	0	2	**3**
Ciguatera	0	4	0	0	0	0	0	0	0	0	0	0	**4**
Cryptosporidia	0	0	0	0	0	0	0	0	0	0	0	1	**1**
Cyclospora	0	0	0	0	0	0	0	0	0	1	0	0	**1**
Hepatitis A	0	0	0	1	0	0	0	0	0	1	0	0	**2**
Norwalk virus	0	0	1	1	2	7	1	2	1	2	0	0	**17**
NSP	0	0	0	0	0	0	0	0	1	0	0	0	**1**
Other	0	0	0	0	0	0	0	0	0	0	0	3	**3**
Salmonella	0	0	0	0	3	0	0	2	0	0	1	0	**6**
Scombroid	0	6	0	0	0	0	0	0	0	0	0	0	**6**
Shigella	0	0	0	0	0	0	0	1	0	0	0	0	**1**
Unknown	1	0	0	0	3	2	0	2	0	0	0	1	**9**
V. vulnificus	0	0	0	0	0	0	0	0	11	0	0	0	**11**
Total	**2**	**10**	**1**	**2**	**10**	**10**	**1**	**7**	**13**	**4**	**1**	**7**	**68**

Table 16: Cases in Confirmed Outbreaks, Florida, 2001: Etiologic Agent by Vehicle

Pathogen	Beef	Fish	Fruit	Ice	Multiple ingredients	Multiple Items	Pork	Poultry	Shellfish	Unk	Vegetables	Water	Total
B. cereus	0	0	0	0	16	0	0	0	0	0	0	0	**16**
C. perfringens	16	0	0	0	0	79	0	0	0	0	0	0	**95**
Chemical	0	0	0	0	1	0	0	0	0	0	0	5	**6**
Ciguatera	0	23	0	0	0	0	0	0	0	0	0	0	**23**
Cryptosporidia	0	0	0	0	0	0	0	0	0	0	0	5	**5**
Cyclospora	0	0	0	0	0	0	0	0	0	39	0	0	**39**
Hepatitis A	0	0	0	40	0	0	0	0	0	3	0	0	**43**
Norwalk virus	0	0	48	58	94	160	11	35	20	96	0	0	**522**
NSP	0	0	0	0	0	0	0	0	2	0	0	0	**2**
Other	0	0	0	0	0	0	0	0	0	0	0	94	**94**
Salmonella	0	0	0	0	32	0	0	21	0	0	34	0	**87**
Scombroid	0	15	0	0	0	0	0	0	0	0	0	0	**15**
Shigella	0	0	0	0	0	0	0	2	0	0	0	0	**2**
Unknown	7	0	0	0	35	17	0	34	0	0	0	4	**97**
V. vulnificus	0	0	0	0	0	0	0	0	11	0	0	0	**11**
Total	**23**	**38**	**48**	**98**	**178**	**256**	**11**	**92**	**33**	**138**	**34**	**108**	**1057**

Table 17: Suspected Outbreaks, Florida, 2001: Etiologic Agent by Vehicle

Pathogen	Beef	Dairy	Fish	Fruit	Ice	Multiple Ingredients	Multiple Items	Pork	Poultry	Rice	Shellfish	Unk	Vegetables	Water	Total
B. cereus	0	0	1	0	0	0	0	0	0	2	0	0	0	0	**3**
C. perfringens	0	0	0	0	0	2	1	1	1	0	0	0	1	0	**6**
Campylobacter	0	0	0	0	0	0	1	0	0	0	0	0	0	0	**1**
Chemical	0	0	0	0	0	3	1	0	0	0	0	0	0	1	**5**
Ciguatera	0	0	1	0	0	0	0	0	0	0	0	0	0	0	**1**
Giardia	0	0	0	0	0	0	0	0	0	0	0	0	0	1	**1**
Norwalk virus	0	1	0	1	0	4	3	1	0	0	3	3	1	0	**17**
Nsp	0	0	0	0	0	0	0	0	0	0	1	0	0	0	**1**
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	1	**1**
Salmonella	1	0	1	0	0	2	2	0	4	0	0	0	0	0	**10**
Scombroid	0	0	2	0	0	0	0	0	0	0	0	0	0	0	**2**
Shigella	1	0	0	0	0	2	1	0	0	0	2	0	0	0	**6**
Staphylococcus	6	1	0	0	0	6	8	1	4	0	1	0	1	0	**28**
Unknown	23	2	7	0	1	24	47	5	22	0	13	4	1	3	**152**
V. parahaemolyticus	0	0	1	0	0	0	0	0	0	0	0	0	0	0	**1**
Total	**31**	**4**	**13**	**1**	**1**	**43**	**64**	**8**	**31**	**2**	**20**	**7**	**4**	**6**	**235**

Table 18: Cases in Suspected Outbreaks, Florida, 2001: Etiologic Agent by Vehicle

Pathogen	Beef	Dairy	Fish	Fruit	Ice	Multiple Ingredients	Multiple Items	Pork	Poultry	Rice	Shellfish	Unk	Vegetables	Water	Total
B. cereus	0	0	2	0	0	0	0	0	0	4	0	0	0	0	6
C. perfringens	0	0	0	0	0	43	5	2	2	0	0	0	2	0	54
Campylobacter	0	0	0	0	0	0	2	0	0	0	0	0	0	0	2
Chemical	0	0	0	0	0	12	2	0	0	0	0	0	0	3	17
Ciguatera	0	0	4	0	0	0	0	0	0	0	0	0	0	0	4
Giardia	0	0	0	0	0	0	0	0	0	0	0	0	0	6	6
Norwalk virus	0	33	0	4	0	16	16	2	0	0	13	58	70	0	212
NSP	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2
Salmonella	3	0	2	0	0	4	4	0	8	0	0	0	0	0	21
Scombroid	0	0	5	0	0	0	0	0	0	0	0	0	0	0	5
Shigella	3	0	0	0	0	4	8	0	0	0	6	0	0	0	21
Staphylococcus	14	3	0	0	0	20	28	2	14	0	3	0	3	0	87
Unknown	62	9	14	0	12	85	198	12	66	0	40	40	2	12	552
V. parahaemolyticus	0	0	4	0	0	0	0	0	0	0	0	0	0	0	4
Total	**82**	**45**	**31**	**4**	**12**	**184**	**263**	**18**	**90**	**4**	**64**	**98**	**77**	**23**	**995**

Figure 16: Percent Total Outbreaks and Cases by Month, Florida, 2001

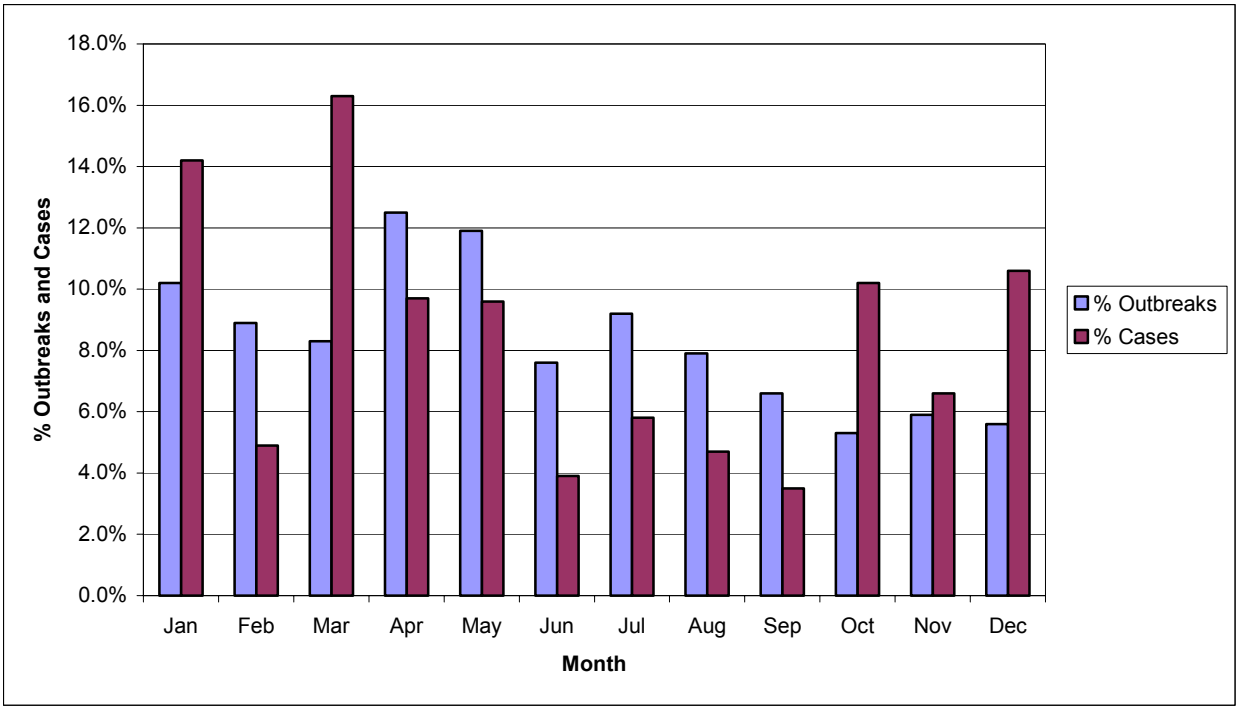


Table 19: Outbreaks by Month, Florida, 2001

Status	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Confirmed	6	2	5	9	5	1	11	4	9	5	7	4	68
	8.8%	2.9%	7.4%	13.2%	7.4%	1.5%	16.2%	5.9%	13.2%	7.4%	10.3%	5.9%	22.4%
Suspected	25	25	20	29	31	22	17	20	11	11	11	13	235
	10.6%	10.6%	8.5%	12.3%	13.2%	9.4%	7.2%	8.5%	4.7%	4.7%	4.7%	5.5%	77.6%
Total	**31**	**27**	**25**	**38**	**36**	**23**	**28**	**24**	**20**	**16**	**18**	**17**	**303**
	10.2%	**8.9%**	**8.3%**	**12.5%**	**11.9%**	**7.6%**	**9.2%**	**7.9%**	**6.6%**	**5.3%**	**5.9%**	**5.6%**	**100%**

Table 20: Outbreak-associated Cases by Month, Florida, 2001

Status	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Confirmed	208	22	184	76	78	5	68	14	44	172	103	83	1057
	19.7%	2.1%	17.4%	7.2%	7.4%	0.5%	6.4%	1.3%	4.2%	16.3%	9.7%	7.9%	51.5%
Suspected	83	78	150	124	120	75	50	82	28	38	32	135	995
	8.3%	7.8%	15.1%	12.5%	12.1%	7.5%	5.0%	8.2%	2.8%	3.8%	3.2%	13.6%	48.5%
Total	**291**	**100**	**334**	**200**	**198**	**80**	**118**	**96**	**72**	**210**	**135**	**218**	**2052**
	14.2%	**4.9%**	**16.3%**	**9.7%**	**9.6%**	**3.9%**	**5.8%**	**4.7%**	**3.5%**	**10.2%**	**6.6%**	**10.6%**	**100%**

Table 21: Outbreaks With Greater Than 10 Cases, Florida, 2001[29]

Status	County	# Cases	Site	Vehicle	Pathogen	Confirmation
Suspected	Charlotte	11	Restaurant	Unknown	Norwalk virus	Suspected
Confirmed	Palm beach	11	Restaurant	Black grouper	Ciguatera	Confirmed
Confirmed	Pinellas	11	Restaurant	Ham sandwiches	Norwalk virus	Suspected
Suspected	Broward	12	Restaurant	Unknown	Unknown	Unknown
Suspected	Pinellas	12	Restaurant	Black & blue salad	Unknown	Unknown
Confirmed	Collier	13	Caterer	Tuna salad	Norwalk virus	Suspected
Confirmed	Duval	14	Restaurant	Ready-to-eat items	Norwalk virus	Confirmed
Confirmed	Dade	16	Restaurant	Imperial rice with chicken	B. cereus	Suspected
Confirmed	Hillsborough	16	Restaurant	Meat empanadas	C. perfringens	Suspected
Suspected	Pinellas	19	Caterer	Multiple food items	Unknown	Unknown
Confirmed	Polk	19	School	Chicken marsala	Salmonella	Suspected
Confirmed	Pasco	20	Home	Shrimp salad	Norwalk virus	Suspected
Confirmed	Pasco	23	Restaurant	Salad bar items	Norwalk virus	Suspected
Confirmed	Dade	25	Home	Black bean soup	Unknown	Unknown
Confirmed	Collier	26	Restaurant	Coconut shrimp	Salmonella	Confirmed
Confirmed	Seminole	27	School	Bbq chicken	Unknown	Unknown
Suspected	Indian river	28	Restaurant	Multiple items	Unknown	Unknown
Confirmed	Hillsborough	29	Restaurant	Grilled chicken sandwich	Norwalk virus	Suspected
Confirmed	Duval	30	Restaurant	Multiple ready to eat items	Norwalk virus	Confirmed
Confirmed	Lee	33	School	Tuna,chicken,macaroni salads	Norwalk virus	Confirmed
Suspected	Palm beach	33	Restaurant	Multiple items	Unknown	Unknown
Suspected	St. Lucie	33	Restaurant	Cheese cubes	Norwalk virus	Suspected
Confirmed	Hillsborough	34	Pool	Pool water	Other	Suspected
Confirmed	Orange	34	Other	Mung bean sprouts	Salmonella	Confirmed
Suspected	Okeechobee	39	Prison	Beef noodle casserole	C. perfringens	Confirmed
Confirmed	Palm beach	39	Other	Unknown	Cyclospora	Confirmed
Confirmed	Orange	40	Restaurant	Ice	Hepatitis A	Confirmed
Suspected	Hillsborough	41	Nursing home	Unknown	Norwalk virus	Confirmed
Confirmed	Lee	46	Grocery	Fruit, chicken salad sand.	Norwalk virus	Suspected
Confirmed	Broward	48	Nursing home	Unknown	Norwalk virus	Confirmed

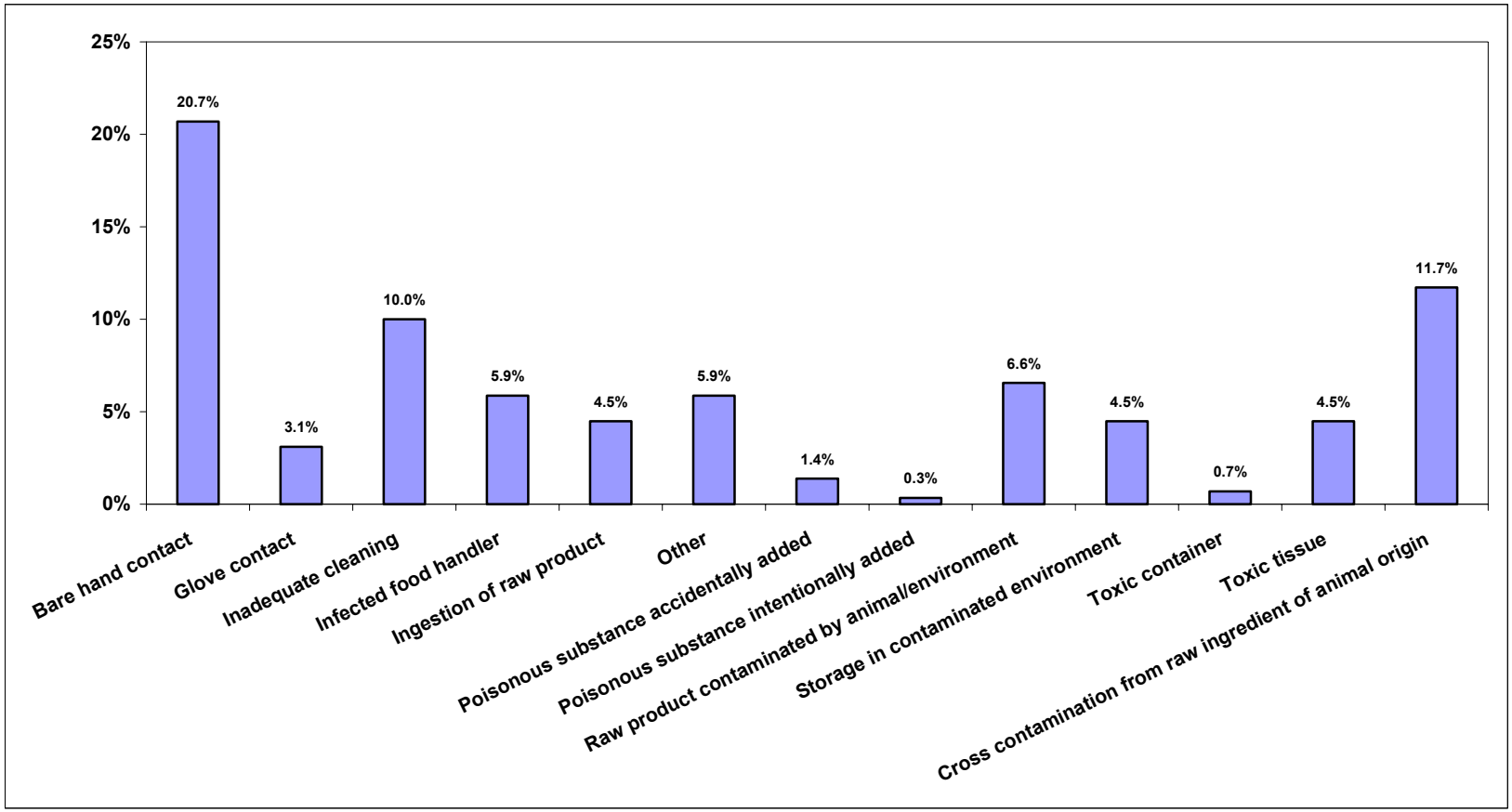
[29] The total number of outbreaks with more than ten cases is: 37 (12.2% of the total). The total number of cases associated with these outbreaks is 1219 (59.4% of the total).

Table 21: Outbreaks With Greater Than 10 Cases, Florida, 2001 (cont.)[30]

Status	County	# Cases	Site	Vehicle	Pathogen	Confirmation
Confirmed	Sarasota	48	Restaurant	Unknown	Norwalk virus	Confirmed
Confirmed	Seminole	48	Restaurant	Fruit salad	Norwalk virus	Suspected
Confirmed	Hillsborough	53	Pool	Spa water	Other	Confirmed
Confirmed	Orange	58	Restaurant	Water and ice	Norwalk virus	Suspected
Suspected	St. Lucie	70	Restaurant	Salad	Norwalk virus	Suspected
Confirmed	Duval	79	Caterer	Beeftips\gravy,crabmeat dip	C. perfringens	Confirmed
Confirmed	Pinellas	81	Caterer	Lavash sandwiches	Norwalk virus	Suspected

[30] The total number of outbreaks with more than ten cases is: 37 (12.2% of the total). The total number of cases associated with these outbreaks is 1219 (59.4% of the total).

Figure 17: Contamination Factor – Percent Total Foodborne Outbreaks (n=290), Florida, 2001[31]



[31] Each outbreak may have up to three contamination factors.

Table 22: Contamination Factor - Number of Outbreaks and Cases Associated With Foodborne Outbreaks, Florida, 2001[32]

Contamination Factor	# Outbreaks	# Cases
Bare hand contact	60	650
Glove contact	9	67
Inadequate cleaning	29	154
Infected food handler	17	404
Ingestion of raw product	13	55
Other	17	228
Poisonous substance accidentally added	4	11
Polluted source	1	2
Raw product contaminated by animal/environment	19	173
Storage in contaminated environment	13	69
Toxic container	2	9
Toxic tissue	13	46
Cross contamination from raw ingredient of animal origin	34	157

Table 23: Contamination Factor: Percent of Total Foodborne Outbreaks (n=290) and Cases Associated With Outbreaks (n=1921), Florida, 2001

Contamination Factor	% Outbreaks	% Cases
Bare hand contact	20.7%	33.8%
Glove contact	3.1%	3.5%
Inadequate cleaning	10.0%	8.0%
Infected food handler	5.9%	21.0%
Ingestion of raw product	4.5%	2.9%
Other	5.9%	11.9%
Poisonous substance accidentally added	1.4%	0.6%
Polluted source	0.3%	0.1%
Raw product contaminated by animal/environment	6.6%	9.0%
Storage in contaminated environment	4.5%	3.6%
Toxic container	0.7%	0.5%
Toxic tissue	4.5%	2.4%
Cross contamination from raw ingredient of animal origin	11.7%	8.2%

[32] Each outbreak may have up to three contamination factors.

Figure 18: Proliferation/Amplification Factor: Percent Total Foodborne Outbreaks, Florida, 2001[33]

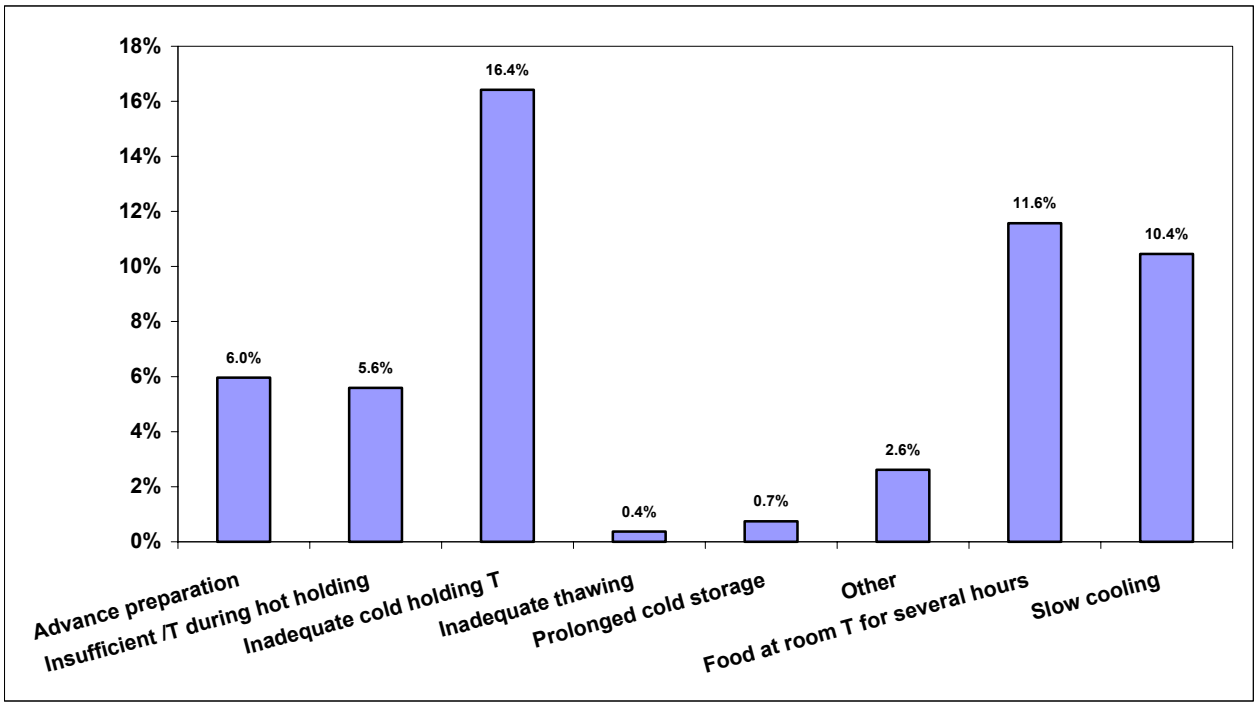


Table 24: Proliferation/Amplification Factor:
Number of Foodborne Outbreaks and Cases Associated With Foodborne Outbreaks, Florida, 2001

Proliferation Factors	# Outbreaks	# Cases
Advance preparation	8	184
Insufficient /T during hot holding	19	180
Inadequate cold holding T	74	302
Inadequate thawing	1	3
Other	9	177
Food at room T for several hours	25	100
Slow cooling	26	173

Table 25: Proliferation/Amplification Factor:
Percent Total Foodborne Outbreaks (n=290) and Cases Associated With Foodborne Outbreaks (n=1921) , Florida, 2001

Proliferation Factors	% Outbreaks	% Cases
Advance preparation	2.8%	9.6%
Insufficient /T during hot holding	6.6%	9.4%
Inadequate cold holding T	25.5%	15.7%
Inadequate thawing	0.3%	0.2%
Other	3.1%	9.2%
Food at room T for several hours	8.6%	5.2%
Slow cooling	9.0%	9.0%

[33] Each outbreak may have up to three proliferation/amplification factors.

Figure 19: Survival Factor: Percent Total Foodborne Outbreaks (n=290), Florida, 2001[34]

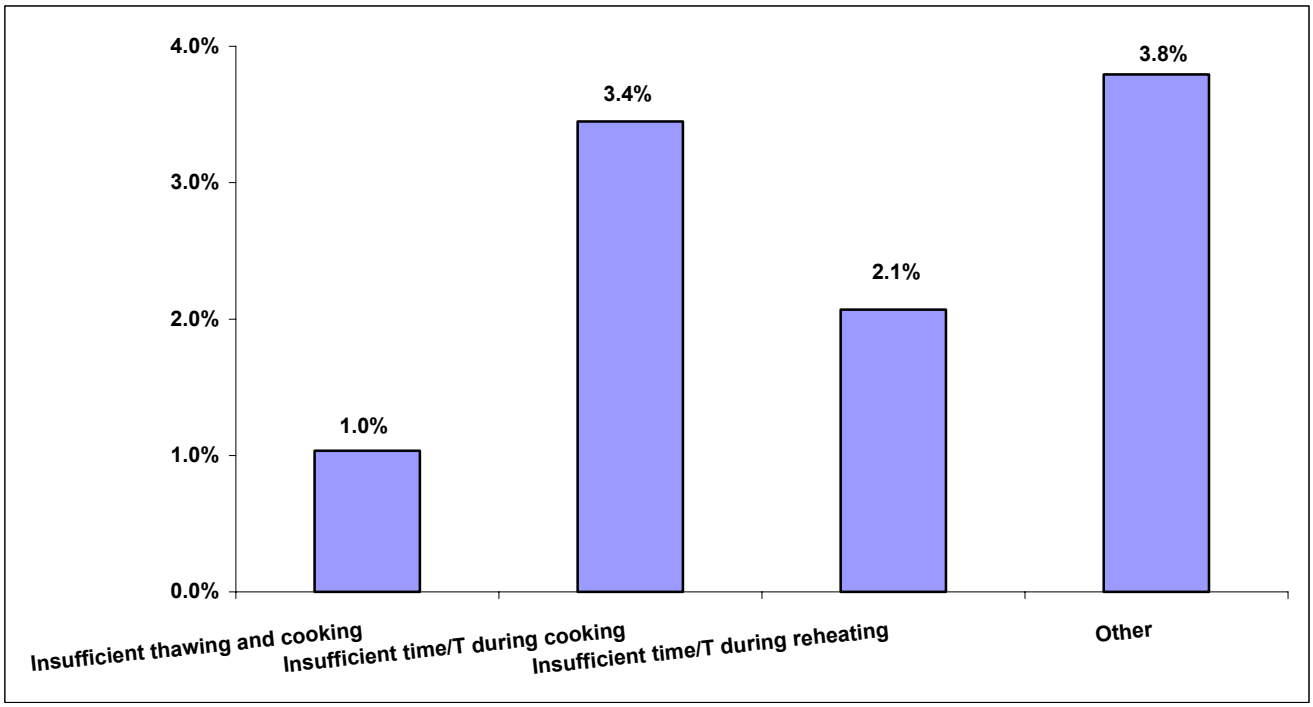


Table 26: Survival Factor:
Number of Foodborne Outbreaks and Cases Associated With Foodborne Outbreaks, Florida, 2001

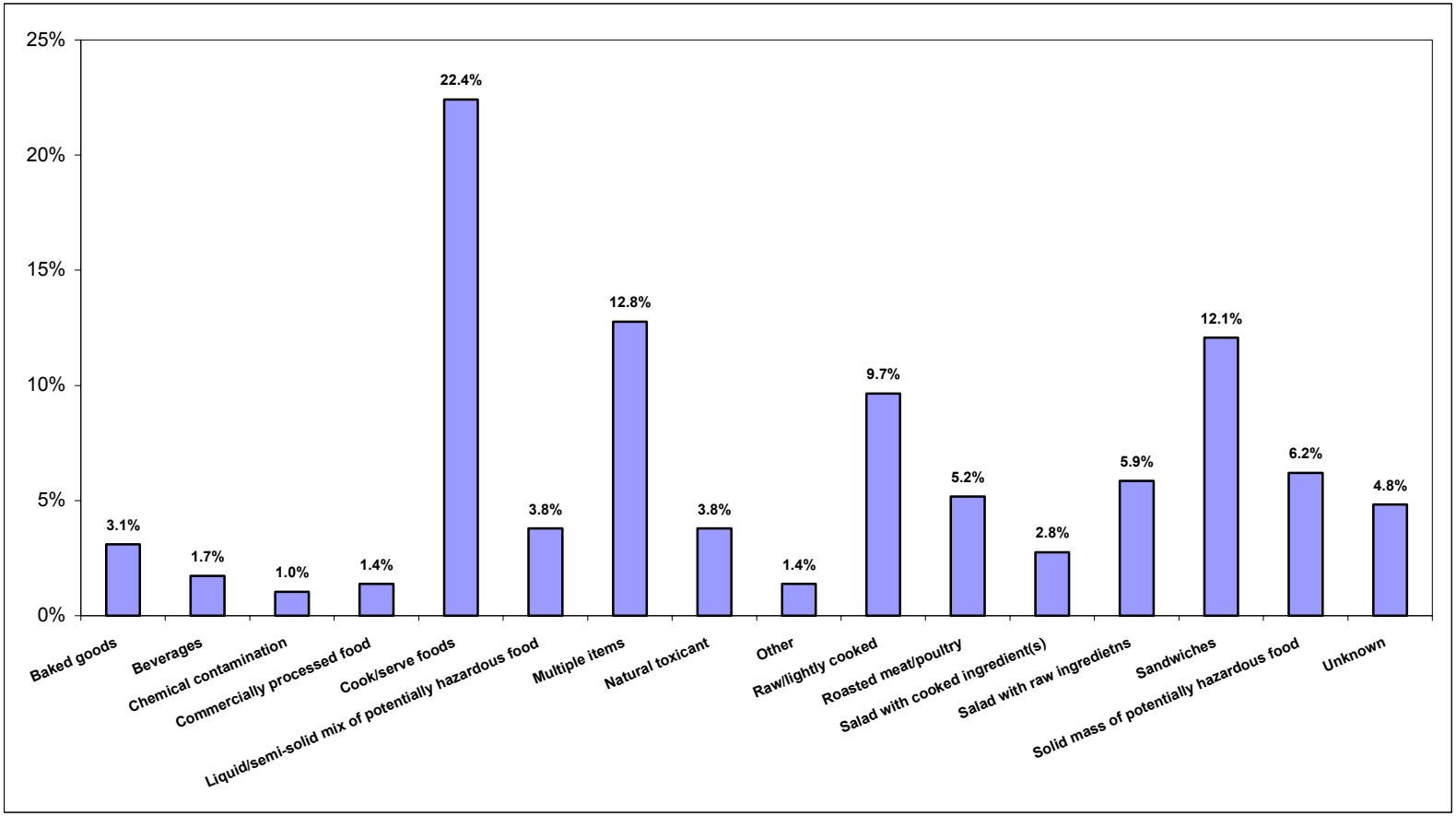
Survival Factors	# Outbreaks	# Cases
Insufficient thawing and cooking	3	7
Insufficient time/T during cooking	10	68
Insufficient time/T during reheating	6	96
Other	11	82
Total	**30**	**253**

Table 27: Survival Factor:
Percent Total Foodborne Outbreaks (n=290) and Cases Associated With Foodborne Outbreaks (n=1921), Florida, 2001

Survival Factors	# Outbreaks	# Cases
Insufficient thawing and cooking	1.0%	0.4%
Insufficient time/T during cooking	3.4%	3.5%
Insufficient time/T during reheating	2.1%	5.0%
Other	3.8%	4.3%
Total	**10.3%**	**13.2%**

[34] Each outbreak may have up to three survival factors.

Figure 20: Method of Preparation Factor: Percent Foodborne Outbreaks (n=290), Florida, 2001[35]



[35] Each outbreak may have up to three method of preparation factors.

Table 28: Method of Preparation Factor:
Number of Foodborne Outbreaks and Cases Associated With Foodborne Outbreaks, Florida, 2001

Method of Preparation Factor	# Outbreaks	# Cases
Baked goods	9	39
Beverages	5	69
Chemical contamination	3	11
Commercially processed food	4	107
Cook/serve foods	65	269
Liquid/semi-solid mix of potentially hazardous food	11	98
Multiple items	37	276
Natural toxicant	11	27
Other	4	51
Raw/lightly cooked	28	123
Roasted meat/poultry	15	133
Salad with cooked ingredient(s)	8	157
Salad with raw ingredietns	17	221
Sandwiches	35	259
Solid mass of potentially hazardous food	18	98
Unknown	14	174

Table 29: Method of Preparation Factor:
Percent Total Foodborne Outbreaks (n=290) and Cases Associated With Foodborne Outbreaks (n=1921) , Florida, 2001[36]

Method of Preparation Factor	% Outbreaks	% Cases
Baked goods	3.1%	2.0%
Beverages	1.7%	3.6%
Chemical contamination	1.0%	0.6%
Commercially processed food	1.4%	5.6%
Cook/serve foods	22.4%	14.0%
Liquid/semi-solid mix of potentially hazardous food	3.8%	5.1%
Multiple items	12.8%	14.4%
Natural toxicant	3.8%	1.4%
Other	1.4%	2.7%
Raw/lightly cooked	9.7%	6.4%
Roasted meat/poultry	5.2%	6.9%
Salad with cooked ingredient(s)	2.8%	8.2%
Salad with raw ingredietns	5.9%	11.5%
Sandwiches	12.1%	13.5%
Solid mass of potentially hazardous food	6.2%	5.1%
Unknown	4.8%	9.1%

[36] Each outbreak may have up to three method of preparation factors.

Table 30: Contamination Factors by Etiologic Agent for Foodborne Outbreaks Reported in Florida (n=290), 2001

Pathogen	Bare Hand Contact	Glove Contact	Inadequate Cleaning	Infected Handler	Ingested Raw Product	Other	Accidental Poison	Intentional Poison	Raw Product	Storage Contamination	Toxic Container	Toxic Tissue	X Contamination Animal Origin	Total
B. cereus	0	0	1	0	0	0	0	0	3	0	0	0	0	**4**
C. perfringens	1	0	3	0	0	3	0	0	1	0	0	0	2	**10**
Campylobacter	1	0	0	0	0	0	0	0	1	0	0	0	0	**2**
Chemical	0	0	0	0	0	0	4	1	0	1	1	0	0	**7**
Ciguatera	0	0	0	0	0	0	0	0	0	0	0	5	0	**5**
Cyclospora	0	0	0	0	0	0	0	0	1	0	0	0	0	**1**
Hepatitis A	1	0	0	1	0	0	0	0	0	0	0	0	0	**2**
Norwalk virus	14	1	0	13	3	1	0	0	3	0	0	1	2	**38**
Nsp	0	0	0	0	0	0	0	0	0	0	0	1	0	**1**
Other	0	0	0	0	0	1	0	0	0	0	0	0	0	**1**
Salmonella	2	2	3	0	1	0	0	0	2	0	0	0	3	**13**
Scombroid	0	0	0	0	0	0	0	0	0	0	0	6	0	**6**
Shigella	3	0	0	1	0	0	0	0	0	0	0	0	2	**6**
Staphylococcus	12	4	2	1	0	0	0	0	0	2	0	0	7	**28**
Unknown	25	2	20	1	2	10	0	0	7	10	1	0	18	**96**
V. parahaemolyticus	1	0	0	0	0	0	0	0	0	0	0	0	0	**1**
V. vulnificus	0	0	0	0	7	2	0	0	1	0	0	0	0	**10**
Total	**60**	**9**	**29**	**17**	**13**	**17**	**4**	**1**	**19**	**13**	**2**	**13**	**34**	**231**

Table 33: Contamination Factors by Etiologic Agent for Cases in Foodborne Outbreaks Reported in Florida (n=1921), 2001

Pathogen	Bare Hand Contact	Glove Contact	Inadequate Cleaning	Infected Handler	Ingested Raw Product	Other	Accidental Poison	Intentional Poison	Raw Product	Storage Contamination	Toxic Container	Toxic Tissue	X Contamination Animal Origin	Total
B. cereus	0	0	2	0	0	0	0	0	6	0	0	0	0	**8**
C. perfringens	2	0	11	0	0	120	0	0	16	0	0	0	4	**153**
Campylobacter	2	0	0	0	0	0	0	0	2	0	0	0	0	**4**
Chemical	0	0	0	0	0	0	11	2	0	2	6	0	0	**21**
Ciguatera	0	0	0	0	0	0	0	0	0	0	0	27	0	**27**
Cyclospora	0	0	0	0	0	0	0	0	39	0	0	0	0	**39**
Hepatitis A	40	0	0	3	0	0	0	0	0	0	0	0	0	**43**
Norwalk virus	468	48	0	388	8	10	0	0	86	0	0	2	34	**1044**
Nsp	0	0	0	0	0	0	0	0	0	0	0	2	0	**2**
Other	0	0	0	0	0	2	0	0	0	0	0	0	0	**2**
Salmonella	4	4	23	0	34	0	0	0	4	0	0	0	6	**75**
Scombroid	0	0	0	0	0	0	0	0	0	0	0	15	0	**15**
Shigella	7	0	0	2	0	0	0	0	0	0	0	0	5	**14**
Staphylococcus	35	10	6	3	0	0	0	0	0	6	0	0	16	**76**
Unknown	88	5	112	8	6	94	0	0	19	61	3	0	92	**488**
V. parahaemolyticus	4	0	0	0	0	0	0	0	0	0	0	0	0	**4**
V. vulnificus	0	0	0	0	7	2	0	0	1	0	0	0	0	**10**
Total	**650**	**67**	**154**	**404**	**55**	**228**	**11**	**2**	**173**	**69**	**9**	**46**	**157**	**2025**

Table 32: Proliferation/Amplification Factors by Etiologic Agent for Foodborne Outbreaks Reported in Florida (n=290), 2001

Pathogen	Advance preparation	Hot insufficient time	Inadequate cold hold	Inadequate thawing	Other	Room temperature	Slow cool	Total
B. cereus	1	2	1	0	0	2	2	**8**
C. perfringens	2	3	3	0	1	1	4	**14**
Campylobacter	0	0	0	0	0	1	1	**2**
Ciguatera	0	0	0	0	1	0	0	**1**
Norwalk virus	1	0	2	0	1	1	1	**6**
Salmonella	0	1	5	0	1	3	1	**11**
Scombroid	0	0	2	0	2	1	0	**5**
Shigella	0	0	3	0	0	0	0	**3**
Staphylococcus	1	4	14	0	0	1	5	**25**
Unknown	3	9	44	1	3	15	12	**87**
Total	**8**	**19**	**74**	**1**	**9**	**25**	**26**	**162**

Table 33: Proliferation/Amplification Factors by Etiologic Agent for Cases in Foodborne Outbreaks Reported in Florida (n=1921), 2001

Pathogen	Advance preparation	Hot insufficient time	Inadequate cold hold	Inadequate thawing	Other	Room temperature	Slow cool	Total
B. cereus	2	18	2	0	0	4	4	**30**
C. perfringens	95	88	9	0	79	2	62	**335**
Campylobacter	0	0	0	0	0	2	2	**4**
Ciguatera	0	0	0	0	2	0	0	**2**
Norwalk virus	48	0	59	0	48	23	23	**201**
Salmonella	0	2	12	0	34	6	2	**56**
Scombroid	0	0	6	0	4	3	0	**13**
Shigella	0	0	7	0	0	0	0	**7**
Staphylococcus	2	10	38	0	0	3	13	**66**
Unknown	37	62	169	3	10	57	67	**405**
Total	**184**	**180**	**302**	**3**	**177**	**100**	**173**	**1119**

Table 34: Survival Factors by Etiologic Agent for Foodborne Outbreaks Reported in Florida (n=290), 2001

Pathogen	Insufficient thaw and cook	Insufficient time/T cooki	Insufficient time/T reheat	Other	Total
B. cereus	0	1	0	1	**2**
C. perfringens	0	1	3	1	**5**
Norwalk virus	0	0	0	1	**1**
Salmonella	2	2	0	1	**5**
Scombroid	0	0	0	2	**2**
Unknown	1	6	3	5	**15**
Total	**3**	**10**	**6**	**11**	**30**

Table 35: Survival Factors by Etiologic Agent for Cases in Foodborne Outbreaks Reported in Florida (n=1921), 2001

Pathogen	Insufficient thaw and cook	Insufficient time/T cook	Insufficient time/T reheat	Other	Total
B. cereus	0	2	0	16	**18**
C. perfringens	0	39	88	2	**129**
Norwalk virus	0	0	0	11	**11**
Salmonella	4	4	0	34	**42**
Scombroid	0	0	0	4	**4**
Unknown	3	23	8	15	**49**
Total	**7**	**68**	**96**	**82**	**253**

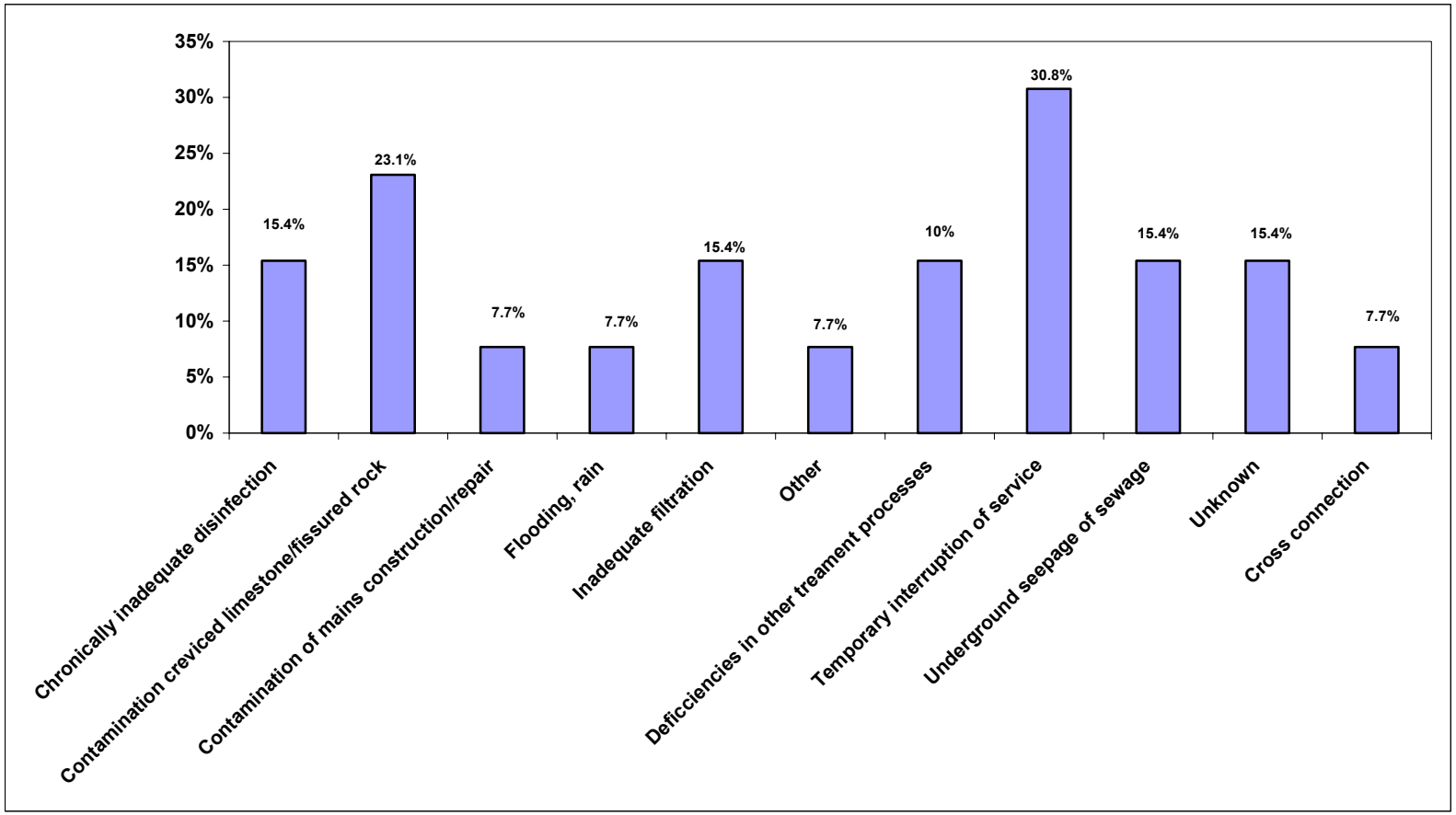
Table 36: Method of Preparation Factors by Etiologic Agent for Foodborne Outbreaks Reported in Florida (n=290), 2001

Pathogen	Baked goods	Beverages	Chemical contamination	Commercial process	Cook/ serve	Liquid/ semi solid	Multiple items	Natural toxicant	Other	Raw/lightly cooked	Roast meat/ poultry	Salad/cooked ingredients	Salad/raw ingredients	Sandwiches	Solid mass	Unk	Total
B. cereus	0	0	0	0	0	0	0	0	0	1	0	0	0	0	3	0	**4**
C. perfringens	0	0	0	0	5	0	1	0	0	0	1	1	0	0	2	0	**10**
Campylobacter	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	**1**
Chemical	1	2	3	0	0	0	0	0	0	0	0	0	1	0	0	0	**7**
Ciguatera	0	0	0	0	2	0	0	3	0	0	0	0	0	0	0	0	**5**
Cyclospora	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	**1**
Hepatitis Aa	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	**2**
Norwalk virus	1	1	0	2	1	1	3	0	1	5	1	4	6	7	0	4	**37**
NSP	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	**2**
Other	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**
Salmonella	0	0	0	2	7	1	3	0	0	1	2	1	0	2	0	0	**19**
Scombroid	0	0	0	0	7	0	0	4	0	0	0	0	0	0	0	0	**11**
Shigella	1	0	0	0	1	0	1	0	0	2	0	0	0	1	1	0	**7**
Staphylococcus	0	0	0	0	9	1	5	0	0	1	2	1	2	5	0	0	**26**
Unknown	6	1	0	0	33	8	23	0	2	8	9	1	8	20	12	8	**139**
V. parahaemolyticus	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	**1**
V. vulnificus	0	0	0	0	0	0	0	2	0	9	0	0	0	0	0	0	**11**
Total	**9**	**5**	**3**	**4**	**65**	**11**	**37**	**11**	**4**	**28**	**15**	**8**	**17**	**35**	**18**	**14**	**284**

Table 37: Method of Preparation Factors by Etiologic Agent for Cases in Foodborne Outbreaks Reported in Florida (n=1921), 2001

Pathogen	Baked goods	Beverages	Chemical contamination	Commercial process	Cook/ serve	Liquid/ semi solid	Multiple items	Natural toxicant	Other	Raw/lightly cooked	Roast meat/ poultry	Salad/cooked ingredients	Salad/raw ingredients	Sandwiches	Solid mass	Unk	Total
B. cereus	0	0	0	0	0	0	0	0	0	2	0	0	0	0	20	0	**22**
C. perfringens	0	0	0	0	29	0	5	0	0	0	79	79	0	0	41	0	**233**
Campylobacter	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	**2**
Chemical	4	4	11	0	0	0	0	0	0	0	0	0	2	0	0	0	**21**
Ciguatera	0	0	0	0	18	0	0	9	0	0	0	0	0	0	0	0	**27**
Cyclospora	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	39	**39**
Hepatitis Aa	0	0	0	0	0	0	0	0	40	0	0	0	0	0	0	3	**43**
Norwalk virus	6	58	0	79	5	48	70	0	4	40	2	72	183	187	0	106	**860**
NSP	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	**4**
Other	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**2**
Salmonella	0	0	0	28	38	2	25	0	0	34	21	2	0	7	0	0	**157**
Scombroid	0	0	0	0	19	0	0	12	0	0	0	0	0	0	0	0	**31**
Shigella	2	0	0	0	2	0	8	0	0	6	0	0	0	2	3	0	**23**
Staphylococcus	0	0	0	0	28	2	16	0	0	3	6	2	4	15	0	0	**76**
Unknown	27	5	0	0	130	46	150	0	7	25	25	2	32	48	34	26	**557**
V. parahaemolyticus	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	**4**
V. vulnificus	0	0	0	0	0	0	0	2	0	9	0	0	0	0	0	0	**11**
Total	**39**	**69**	**11**	**107**	**269**	**98**	**276**	**27**	**51**	**123**	**133**	**157**	**221**	**259**	**98**	**174**	**2112**

Figure 21: Waterborne Disease Factors: Percent Total Waterborne Outbreaks (n=13), Florida, 2001[37]



[37] Each outbreak may have up to three waterborne disease factors.

Table 38: Waterborne Disease Factor:
Number of Waterborne Outbreaks and Cases Associated With Waterborne Outbreaks, Florida, 2001

Waterborne Disease Factors	# Outbreaks	# Cases
Chronically inadequate disinfection	2	58
Contamination creviced limestone/fissured rock	3	11
Contamination of mains construction/repair	1	5
Flooding, rain	1	6
Inadequate filtration	2	87
Other	1	3
Deficiencies in other treatment processes	2	6
Temporary interruption of service	4	49
Underground seepage of sewage	2	9
Unknown	2	7
Cross connection	1	3

Table 39: Waterborne Disease Factors:
Percent Total Waterborne Outbreaks (n=13) and Cases Associated With Waterborne Outbreaks (n=131) , Florida, 2001[38]

Waterborne Disease Factors	% Outbreaks	% Cases
Chronically inadequate disinfection	15.4%	44.3%
Contamination creviced limestone/fissured rock	23.1%	8.4%
Contamination of mains construction/repair	7.7%	3.8%
Flooding, rain	7.7%	4.6%
Inadequate filtration	15.4%	66.4%
Other	7.7%	2.3%
Deficiencies in other treatment processes	15.4%	4.6%
Temporary interruption of service	30.8%	37.4%
Underground seepage of sewage	15.4%	6.9%
Unknown	15.4%	5.3%
Cross connection	7.7%	2.3%

[38] Each outbreak may have up to three waterborne disease factors.

Table 40: Contributing Factors by Etiologic Agent for All Waterborne Outbreaks (n=13), Florida, 2001

Pathogen	Chronically inadequate disinfection	Contamination creviced limestone /fissured rock	Contamination of mains construction/repair	Flooding, rain	Inadequate filtration	Other	Deficiencies in other treatment processes	Temporary interruption of service	Undergroun d seepage of sewage	Unknown	Cross connection	Total
Chemical	0	0	0	0	0	1	0	0	0	1	1	**3**
Cryptosporidium	1	0	1	0	0	0	0	0	0	0	0	**2**
Giardia	0	0	0	1	0	0	0	0	1	0	0	**2**
Other	1	0	0	0	2	0	1	2	0	0	0	**6**
Unkown	0	3	0	0	0	0	1	2	1	1	0	**8**
Total	**2**	**3**	**1**	**1**	**2**	**1**	**2**	**4**	**2**	**2**	**1**	**21**

Table 41: Contributing Factors by Etiologic Agent for Cases Associated With All Waterborne Outbreaks (n=131), Florida, 2001

Pathogen	Chronically inadequate disinfection	Contamination creviced limestone/ fissured rock	Contamination of mains construction/repair	Flooding, rain	Inadequate filtration	Other	Deficiencies in other treatment processes	Temporary interruption of service	Undergroun d seepage of sewage	Unknown	Cross connection	Total
Chemical	0	0	0	0	0	3	0	0	0	2	3	**8**
Cryptosporidium	5	0	5	0	0	0	0	0	0	0	0	**10**
Giardia	0	0	0	6	0	0	0	0	6	0	0	**12**
Other	53	0	0	0	87	0	2	41	0	0	0	**183**
Unkown	0	11	0	0	0	0	4	8	3	5	0	**31**
Total	**58**	**11**	**5**	**6**	**87**	**3**	**6**	**49**	**9**	**7**	**3**	**244**

The following codes are to be used to fill out Part 1 (question 9) and Part 2 (question 15).

Contamination Factors:[1]

C1 - Toxic substance part of tissue (e.g., ciguatera)
C2 - Poisonous substance intentionally added (e.g., cyanide or phenolphthalein added to cause illness)
C3 - Poisonous or physical substance accidentally/incidentally added (e.g., sanitizer or cleaning compound)
C4 - Addition of excessive quantities of ingredients that are toxic under these situations (e.g., niacin poisoning in bread)
C5 - Toxic container or pipelines (e.g., galvanized containers with acid food, copper pipe with carbonated beverages)
C6 - Raw product/ingredient contaminated by pathogens from animal or environment (e.g., *Salmonella enteriditis* in egg, Norwalk in
shellfish, *E. coli* in sprouts)
C7 - Ingestion of contaminated raw products (e.g., raw shellfish, produce, eggs)
C8 - Obtaining foods from polluted sources (e.g., shellfish)
C9 - Cross-contamination from raw ingredient of animal origin (e.g., raw poultry on the cutting board)
C10 - Bare-handed contact by handler/worker/preparer (e.g., with ready-to-eat food)
C11 - Glove-handed contact by handler/worker/preparer (e.g., with ready-to-eat food)
C12 - Handling by an infected person or carrier of pathogen (e.g., *Staphylococcu*s, *Salmonell*a, Norwalk agent)
C13 - Inadequate cleaning of processing/preparation equipment/utensils – leads to contamination of vehicle (e.g., cutting boards)
C14 - Storage in contaminated environment – leads to contamination of vehicle (e.g., store room, refrigerator)
C15 - Other source of contamination *(please describe in Comment*s)

Proliferation/Amplification Factors:[1]

P1 - Allowing foods to remain at room or warm outdoor temperature for several hours (e.g., during preparation or holding for service)
P2 - Slow cooling (e.g., deep containers or large roasts)
P3 - Inadequate cold-holding temperatures (e.g., refrigerator inadequate/not working, iced holding inadequate)
P4 - Preparing foods a half day or more before serving (e.g., banquet preparation a day in advance)
P5 - Prolonged cold storage for several weeks (e.g., permits slow growth of psychrophilic pathogens)
P6 - Insufficient time and/or temperature during hot holding (e.g., malfunctioning equipment, too large a mass of food)
P7 - Insufficient acidification (e.g., home canned foods)
P8 - Insufficiently low water activity (e.g., smoked/salted fish)
P9 - Inadequate thawing of frozen products (e.g., room thawing)
P10 - Anaerobic packaging/Modified atmosphere (e.g., vacuum packed fish, salad in gas flushed bag)
P11 - Inadequate fermentation (e.g., processed meat, cheese)
P12 - Other situations that promote or allow microbial growth or toxic production *(please describe in Comment*s)

Survival Factors:[1]

S1 - Insufficient time and/or temperature during cooking/heat processing (e.g., roasted meats/poultry, canned foods, pasteurization)
S2 - Insufficient time and/or temperature during reheating (e.g., sauces, roasts)
S3 - Inadequate acidification (e.g., mayonnaise, tomatoes canned)
S4 - Insufficient thawing, followed by insufficient cooking (e.g., frozen turkey)
S5 - Other process failures that permit the agent to survive *(please describe in Comment*s)

Method of Preparation:[2]

M1 - Foods eaten raw or lightly cooked (e.g., hard shell clams, sunny side up eggs)
M2 - Solid masses of potentially hazardous foods (e.g., casseroles, lasagna, stuffing)
M3 - Multiple foods (e.g., smorgasbord, buffet)
M4 - Cook/serve foods (e.g., steak, fish fillet)
M5 - Natural toxicant (e.g., poisonous mushrooms, paralytic shellfish poisoning)
M6 - Roasted meat/poultry (e.g., roast beef, roast turkey)
M7 - Salads prepared with one or more cooked ingredients (e.g., macaroni, potato, tuna)
M8 - Liquid or semi-solid mixtures of potentially hazardous foods (e.g., gravy, chili, sauce)
M9 - Chemical contamination (e.g., heavy metal, pesticide)
M10 - Baked goods (e.g., pies, eclairs)
M11 - Commercially processed foods (e.g., canned fruits and vegetables, ice cream)
M12 - Sandwiches (e.g., hot dog, hamburger, Monte Cristo)
M13 - Beverages (e.g., carbonated and non-carbonated, milk)
M14 - Salads with raw ingredients (e.g., green salad, fruit salad)
M15 - Other, does not fit into above categories *(please describe in Comments)*
M16 - Unknown, vehicle was not identified

[1] Frank L. Bryan, John J. Guzewich, and Ewen C. D. Todd. Surveillance of Foodborne Disease III. Summary and Presentation of Data
on Vehicles and Contributory Factors; Their Value and Limitations. Journal of Food Protection, 60; 6:701-714, 1997.

[2] Weingold, S. E., Guzewich JJ, and Fudala JK. Use of foodborne disease data for HACCP risk assessment. Journal of Food Protection, 57; 9:820-830, 1994.

Factors Contributing to Water Contamination[39]

At Source:

- Overflow of sewage
- Flooding, heavy rains
- Underground seepage of sewage
- Use of a back-up source of water by a water utility
- Improper construction or location of well or spring
- Contamination through creviced limestone or fissured rock

At Treatment Plant

- No disinfection
- Temporary interruption of disinfection
- Chronically inadequate disinfection
- No filtration
- Inadequate filtration
- Deficiencies in other treatment processes

In Distribution System

- Cross connection
- Back siphonage
- Contamination of mains during construction or repair
- Contamination of storage facility

Other

[39] Waterborne Diseases Outbreak Report, CDC 52.12 (rev. 12/96).