Food and Waterborne Illness Surveillance and Investigation
Annual Report, Florida, 2005

Bureau of Community Environmental Health
Division of Environmental Health
Department of Health

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Overview

2005 continued to be active for food and waterborne outbreak reporting and investigation: a total of 1,960 food and waterborne illness complaints were reported in Florida. Of these complaints, 1,579 were linked to Department of Business and Professional Regulation establishments; 208 to Department of Agriculture and Consumer Services establishments; 61 to Department of Health establishments; and 112 to other types of facilities (e.g. homes, private parties, picnics). Foodborne outbreaks numbered 128 with 1,944 cases. Three waterborne outbreaks were reported in 2005, with a total of 73 cases. A total of 131 food and waterborne outbreaks with 2,017 cases were reported in 2005, compared with 175 outbreaks with 1,954 cases in 2004, and 188 outbreaks and 1,648 cases for 2003. Investigators were able to laboratory confirm 28 of the outbreaks (including 5 *Vibrio vulnificus* cases) associated with 901 cases. The largest outbreak reported in 2005 was the statewide Cyclospora outbreak with a total case count of 592, accounting for 29.5% of all outbreak-related cases reported in 2005. Norovirus, *Staphylococcus*, and *Salmonella* were implicated in the largest percentage of the total reported outbreaks (9%, 9%, and 6%, respectively). After the Cyclospora outbreak, *Clostridium perfringens* was identified in the largest percentage of cases in total reported outbreaks (9%) followed by *Norovirus* (6%) and *Salmonella* (4 %). Restaurants were the source site in 77% of the outbreaks reported and in 76% of the cases. Multiple items (28%) and multiple ingredients (21%) accounted for a total of 49% of all outbreaks, followed by poultry (11%), molluscan shellfish (9% - this includes all single *Vibrio vulnificus* cases)[1], and fish (8%). Poultry accounted for 35% of all outbreak-related cases, followed by vegetables (29%) and multiple ingredients (11%) and multiple items (10%). The month with the largest percentage of outbreaks reported was January (15%) with the largest percentage of cases in April (33%). Large (greater than 10 cases) outbreaks accounted for 15% (19) of the total reported outbreaks and 80% (1,619) 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 (n=128), Florida, 2005

Contributing Factor[2]	# Outbreaks	# Cases
Contamination Factor		
Inadequate cleaning	24	155
Bare hand contact	31	126
Proliferation/amplification factor		
Inadequate cold holding	47	326
Insufficient time/T° during cooking/reheating	16	159
Survival factor		
Insufficient time/T° during reheating	18	333
Other process failures	1	36
Method of preparation factor		
Cook/serve foods	34	703

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

[2] Each outbreak can have at least three of each of the four types of factor, thus the outbreaks and outbreak-related cases will not add up to the actual number. See Tables 27-47 and last two pages of Appendix for more detailed information.

Multiple foods	17	86

The contributing factors listed in Table 1 are areas where food worker educators and public health professionals may want to concentrate their education efforts. Table 2 summarizes the total number of food and waterborne disease outbreaks for years for which records are available.

Table 2: Summary of Food and Waterborne Illness Outbreaks Reported to Florida DOH, 1989–2005[3]

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**
2002	**243**	**1469**
2003	**188**	**1648**
2004	**175**	**1954**
2005	**131**	**2017**

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

Table 3: Confirmed Suspected, and Total Food and Waterborne Outbreaks and Outbreak-related Cases Reported to Florida DOH, 1995-2005

1995	# Outbreaks	# Cases
Confirmed	79	2127
Suspected	215	779
Total	294	2906

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

1996	# Outbreaks	# Cases
Confirmed	81	2097
Suspected	226	759
Total	307	2856

2001	# Outbreaks	# Cases
Confirmed	68	1057
Suspected	232	988
Total	300	2045

1997	# Outbreaks	# Cases
Confirmed	80	1345
Suspected	353	1400
Total	433	2745

2002	# Outbreaks	# Cases
Confirmed	47	641
Suspected	199	835
Total	246	1476

1998	# Outbreaks	# Cases
Confirmed	59	1937
Suspected	257	1356
Total	316	3293

2003	# Outbreaks	# Cases
Confirmed	58	795
Suspected	130	853
Total	188	1648

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

2004	# Outbreaks	# Cases
Confirmed	58	1498
Suspected	117	456
Total	175	1954

2005	# Outbreaks	# Cases
Confirmed	33	1617
Suspected	98	400
Total	131	2017

Figure 1: Number of Confirmed and Suspected Food and Waterborne Outbreaks by Year, Florida, 1995-2005

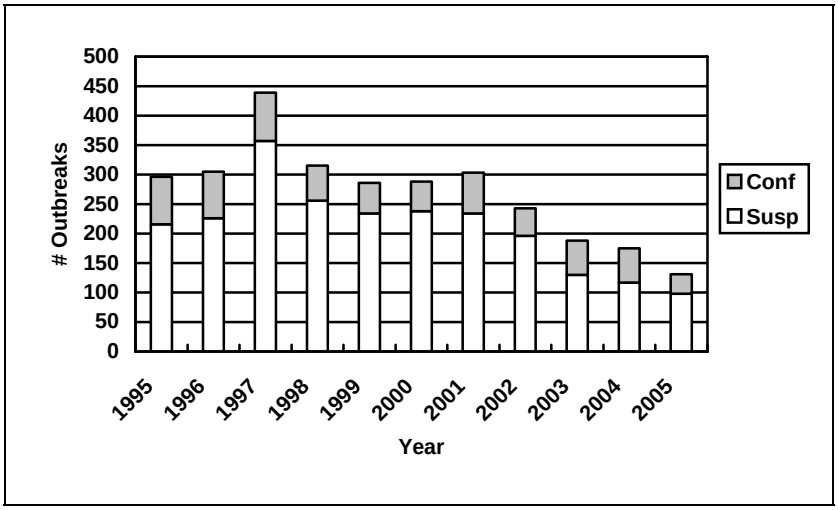
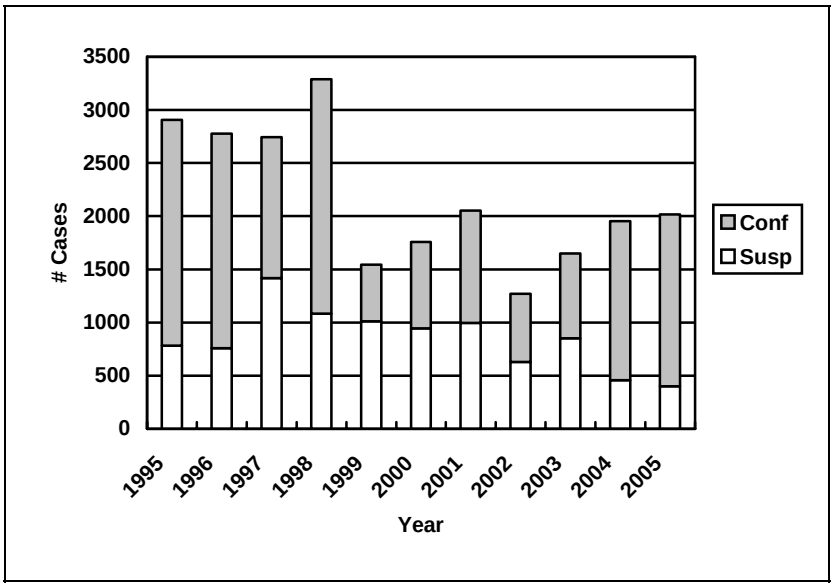


Figure 2: Number of Confirmed and Suspected Food and Waterborne Outbreak-related Cases by Year, Florida, 1995-2005



Training and Continuing Education

In 2005, 17 training sessions were held around the state specifically targeting Department of Health staff and 27 sessions were presented to other audiences. Training presentations included new environmental health employee orientation, and statewide overviews on food and waterborne disease outbreak disease data. Other special topics included Pathogenic E. coli, *Vibrio vulnificus*, recreational waterborne diseases, a general overview of all waterborne diseases, ciguatera and how to investigate foodborne illness complaints.

Besides county health department environmental health, nursing and epidemiology staff, audiences included members of the Florida Environmental Health Association and the National Environmental Health Association. In a cooperative effort with other agencies, training was presented to staff of the Department of Business and Professional Regulation, to Department of Corrections infection control staff and to members of the Food Safety and Security Advisory Council. Trainers also presented three guest lectures at the University of Florida, Institute for Food and Agricultural Sciences inservice to statewide county extension agents;, a guest lecture to Florida Agricultural and Mechanical University's General Epidemiology class and a guest lecture to the Tallahasseee Community College Community Health class.

Preparedness Training 2005

The Food and Waterborne Disease Preparedness Program provided training to several Regional Domestic Security Task Forces (RDSTFs) in 2005. On July 12, an intentional food contamination tabletop training was offered to members of the RDSTF 3. The training included detailed instructions on how to respond to a foodborne outbreak, perform the investigation and which agency and other entity partners will work together along with their responsibilities during an outbreak of intentional contamination. On July 15, the same training was offered to members of RSDTF 4. There was a very positive response to both trainings. The program also provided speakers for several conferences around the state on foodborne illness issues. Presentations were given at the Council for State and Territorial Epidemiologists, and National Environmental Health Association and Florida Environmental Health Association annual meetings.[4]

Training modules currently under development:

1) Agroterrorism Issues and Responsibilities
2) Florida Food and Waterborne Diseases: Ten Years of Data

Outbreak Definitions

Foodborne illness outbreak: An outbreak is an incident in which two or more people have the same disease, have similar symptoms, or excrete the same pathogens; and there is a time, place, and/or person association between these people. 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, is considered as an incident of foodborne illness and warrants further investigation.

[4] Kit lists can be found in the Environmental Health Program Manual, Chapter G, Appendix A.

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

Neurotoxic Shellfish Poisoning, Charlotte County, July 2005

On July 22, 2005, the Charlotte County Health Department (CHCHD) was informed by the Pinellas County Heath Department of 3 Charlotte County residents diagnosed with acute paralytic shellfish poisoning after ingestion of oysters presumed to be contaminated with red tide. Initial reports indicated two of the cases, (brothers - ages 6 and 9) were shipped to All Children's Hospital (ACH) in St. Petersburg, FL. The third case, (mother – age 31), was admitted to Fawcett Memorial Hospital in Port Charlotte, FL on July 14, 2005. On July 25, 2005, Fawcett Memorial Hospital faxed the state's reportable disease list and the patient's histories to CHCHD. The reportable disease list listed another case, a 35 year old woman who is the friend of the third case of the initially reported cases.

On July 14, 2004, the group of 4 went to a local beach in Boca Grande and dug up clams from a low tidal area of Boca Grand Pass in Lee County (recreationally harvested). The clams were then boiled and eaten by the 2 children and 2 adults around 5:00 pm. Shortly thereafter their symptoms began and included: muscle spasm/cramps (100%), tingling (extremities/face/mouth) (75%), abdominal cramps (75%), vomiting (50%), headache (50%), and dizziness (25%).

According to the Florida Department of Agriculture and Consumer Services, Division of Aquaculture, the Boca Grande Pass area has been closed for shellfish harvesting since June 30, 2005 due to the presence of red tide (caused by *Gymnodium breve*, renamed *Karenia brevis* dinoflagellates). Cell counts in the water exceeded 5,000 cells per liter. The waters for red tide organisms are monitored during these closures. The past couple of sampling excursions prior to July 21, 2005 indicated that there were no red tide cells in the waters of these areas.

When red tide cells are no longer found in the waters, the shellfish tissue sampling can begin to determine if the toxin has cleared out of the shellfish (Florida Fish and Wildlife Research Institute conducts the mouse bioassays to determine if toxin remains in the shellfish and if the shellfish are safe to consume or not). Generally, shellfish take about 2 to 3 weeks to cleanse themselves of red tide toxins. Since red tides initiate offshore and do not bloom in estuaries, the highest cell counts and highest levels of toxins in shellfish tissues are found near the passes/inlets.

Recreational and commercial harvest areas must be closed when there are >5,000 cells per liter in the waters, and the area remains closed until both: 1) the cell counts drop below 5,000 cells per liter in the water and 2) the shellfish test negative for toxin.

Red tide is a harmful algal bloom (HAB), resulting from the multiplication of single-celled algae called *Karenia brevis*. Red tide is a natural phenomenon and is not caused by man-made pollution. Red tide refers to a bloom of toxic or harmful marine microorganisms that may color the water or be invisible; toxins may also be released. Shellfish accumulate large amounts of brevetoxin and can then cause NSP after consumption. Commercial shellfish harvesting areas are closed by the Department of Agriculture and Consumer Services Molluscan Shellfish Program when red tide occurs.

Neurotoxic Shellfish Poisoning (NSP) is a notifiable disease in Florida (s. 64D-3.002 (1) qq, Florida Administrative Code). NSP is an illness caused by eating shellfish that have accumulated brevetoxin and its derivatives. The main symptoms include tingling and/or numbness of the lips, tongue, throat, hands and feet. Symptoms tend to be mild and resolve quickly and completely. Onset of this disease occurs within a few minutes to a few hours; duration is fairly short, from a few hours to several days. Recovery is complete with few sequellae; no fatalities have been reported. Other shellfish poisonings include: Paralytic Shellfish Poisoning (PSP), Diarrheic Shellfish Poisoning (DSP) and Amnesic Shellfish Poisoning (ASP). Summary of the different shellfish poisonings is listed in the following table.[5]

Table 4: Summary of Shellfish Poisoning Types

Type of illness	Area of Occurrence	Incubation period	Symptoms	Toxin
Neurotoxic shellfish poisoning	In USA: mostly in Florida, Texas, and North Carolina. Also in Mexico	Few minutes to several hours	Tingling and numbness of lips, mouth, fingers, toes; diarrhea, sensory cold-hot reversal, dizziness, pupil dilation.	Brevetoxins
Paralytic shellfish poisoning	In USA: mostly in California, Oregon, Washington, Alaska, Maine, Massachusetts	30 minutes	Numbness in lips, mouth and face, tingling in fingers and toes; headache, dizziness, muscle weakness, nausea, vomiting, motor incoordination, paralysis, death	Saxitoxins, gonyautoxins, others.

[5] Florida Department of Health Epi Updates, September 11, 1996 and December 7, 2001. http://www.doh.state.fl.us/disease_ctrl/epi/Epi_Updates/index.html

Type of illness	Area of Occurrence	Incubation period	Symptoms	Toxin
Diarrheic shellfish poisoning	Mostly Europe, Japan, South America. Okadaic acid has also been found in Gulf of Mexico shellfish and causative species occur Gulf-wide	30 minutes to a few hours	Vomiting, diarrhea, nausea, abdominal pain.	Okadaic acid, dinophysistoxins, other.
Amnesic shellfish poisoning	In USA: California, Oregon, Washington. Also, Canada. Domoic acid has been found in Gulf of Mexico shellfish and the causative species occur Gulf-wide.	A few hours to 24 hours.	Vomiting, muscle cramps, disorientation, short-term memory loss.	Domoic acid.

Note: Cases of NSP in Florida are often misdiagnosed as Paralytic Shellfish Poisoning (PSP) which can cause a much more serious illness that can result in death. According to the Florida Marine Research Institute, no algal species that cause PSP have been verified in the Gulf of Mexico. PSP cases have been reported from the following states: Alaska, California, Maine, Massachusetts, Oregon, Tennessee (seafood from elsewhere), and Washington. Also, in 2002, 2003 and 2004 several cases of saxitoxin poisoning from the consumption of the Southern pufferfish harvested in the Indian River Lagoon (Florida's Atlantic coast were reported. Saxitoxin is the same toxin that causes PSP, but to date has not been found in the waters off the Gulf Coast of Florida.[6]

Information on the status of red tides in Florida can be obtained from the Florida Fish and Wildlife Research Institute website at: http://www.floridamarine.org/features/category_sub.asp?id=4434. Information on the harvesting status of commercial shellfish beds in Florida can be obtained at http://www.floridaaquaculture.com/. Click on Shellfish Harvesting, then click on the drop down menu arrow and choose Shellfish Harvesting Daily Area Status.

Acknowledgement: Thanks to David Heil, Ph.D., M.P.H., Florida Department of Agriculture, Bureau of Aquaculture Environmental Services for his assistance.

Outbreak of Norovirus Gastrointestinal Illness Associated with Events at a Hotel in Orange County, Florida, July 2005.

On July 25, 2005 Florida Department of Health was notified by a health care facility of several acute cases of gastrointestinal illness that appeared to be linked to a company's event at a hotel in Orlando from July 22 through 24. Attendees were from ten geographical locations throughout Florida. Initial reports indicated that 32 of 84 people who attended were ill with onsets on July 24 and 25.

[6] Ibid

An outbreak investigation was initiated by the Orange County Health Department and regional environmental epidemiologists to determine the extent of this outbreak of diarrheal illness. Stool specimens were submitted by four of the ill persons for analysis. Stool containers were also supplied to food handlers at the implicated facility, however no specimens were provided. All of the stool specimens were shipped to the Department of Health Bureau of Laboratories for testing.

A retrospective cohort study was performed using a questionnaire developed from the menus for the weekend event. This questionnaire was distributed to the county health departments where regional company offices were located and administered to the study subjects. Following the preliminary data analysis, detailed information on implicated food items and ill food handlers was obtained through interviews of food service management staff.

A case was defined as a person who attended the company conference at hotel A and who had vomiting and/or diarrhea or any three of the following symptoms: nausea, cramps, headache, fever, dizziness, or body aches. EpiInfo Version 3.3.2, February 9, 2005 was used for database management and analysis. An onsite investigation of the implicated resort's food service facility was performed by staff from the Orange County Health Department Environmental Health program and the Department of Business and Professional Regulation (DBPR). Food samples were not available for laboratory analysis.

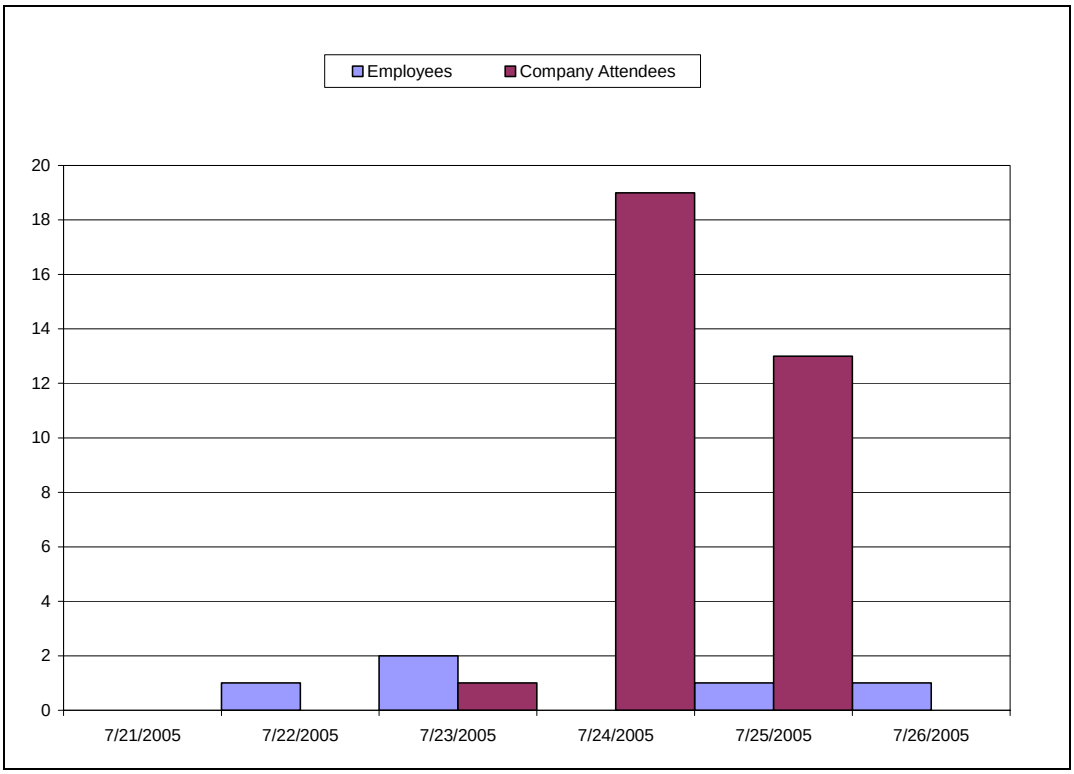
A total of 33 (60%) of 55 attendees who responded to the questionnaire reported gastrointestinal illness matching the case definition. The age of ill persons ranged from 23 to 60 years old, with a mean age of 39 years. Of those who reported illness, 75.8% were females. All respondents attended part or all of the events provided by the company from July 22 through 24, 2005.

Signs and symptoms reported are depicted in Table 5. Three (9.1%) cases sought medical care. The duration of symptoms ranged from 24 to 120 hours, with a mean of 53.6 hours. Onset dates of ill persons from the company group ranged from July 23 to 25, 2005. There were five (41.7%) food workers out of a total of 12 at the implicated hotel who were described as being ill with gastrointestinal symptoms prior to and during this time period. Onsets of illness were July 22 (1), July 23 (2), July 25 (1) and July 26 (1). There was also an initial report of another ill cook with diarrheal illness commencing July 24, but this was deemed to be inaccurate or inconsistent with information obtained during follow-up interviews with management as the investigation progressed. Note that direct, detailed interviews of these workers were not able to be conducted. The frequency distributions of the date and time of onsets for the cohort and the food workers are displayed in Figure 3. A total of 28 (84.8%) of the cases had reported onsets between 12:00 pm, July 24 and 12:00 am, July 25. Table 6 shows an exposure specific attack rate table for two statistically significant food products.

Table 5: Frequency of Symptoms, Norovirus Illness Outbreak, Orange County, July 2005

Symptoms	Number	%
Nausea	28/33	84.8
Abdominal Cramps	28/33	84.8
Diarrhea (9.6 episodes/24 hrs Mean)	26/33	78.8
Fatigue	25/33	75.8
Chills	24/33	72.7
Weakness	24/32	75.0
Headache	23/32	71.9
Vomiting	20/33	60.6
Appetite Loss	19/28	67.9
Body Aches	17/26	65.4
Sweating	16/32	50.0
Fever (Mean=101.5º F.)	16/33	48.5
Dizziness	12/32	37.5
Bloating	12/26	46.2
Weight Loss	8/24	33.3
Numbness	4/32	12.9

Figure 3: Onsets of Illness by Dates, Attendees and Food Workers, Norovirus Outbreak, Orange County July 2005



There were four people from the company group who submitted stools for laboratory analysis. Three were analyzed for the presence of Norovirus. Two of the three (2/3) were positive for Norovirus G1. The remaining sample was negative for parasites, *Shigella, Salmonella, Campylobacter* and *E. coli O157:H7.*

There were three other groups who were at Hotel A during the same weekend as the company event. These included a wedding party from North Carolina, a group from Germany and a group from the United Kingdom. There were no reports of similar illness among these groups to the State of Florida through routine active surveillance methods. These case finding activities in other states and countries were coordinated by the Florida Department of Health and the Centers for Disease Control and Prevention.

Table 6: Food Specific Attack Rate Table for Statistically Significant Exposures, Norovirus Illness Outbreak, July, 2005, Orange County, Florida

Food	Number of persons who ate the food				Number of persons who did not eat the food						
	Ill	Well	Total	% Ill	Ill	Well	Total	% Ill	RR	CI	p-value
Quiche Reception July 23	19	8	27	70.4	2	7	9	22.2	3.17	0.91-11.01	0.0158427665
Tiramisu Lunch July 24	19	4	23	79.2	13	18	31	41.9	1.97	1.25-3.10	0.0026317397

The quiche served at the reception on July 23 was shipped to the hotel as individually frozen bite size servings. They were stored frozen until cooked in an oven and then placed on a

serving tray and placed on the buffet table. The tiramisu served at the lunch on July 24 was shipped frozen as a large piece. It was thawed and then served on the buffet as a whole food product. Persons who wanted a serving cut a piece themselves using provided utensils. The sanitary conditions observed in the kitchen included a lack of soap and drying devices at hand sinks, improper rapid cooling procedures for potentially hazardous foods, insufficient sanitizing temperatures for food contact surfaces, and dirty food contact surfaces in ice machine.

Food products served on a buffet are either consumed or discarded. There is also no sharing of food products between concurrent events although sharing of employees for the preparation of foods at concurrent events did occur. Employees ate pre-packaged meals. Two servers for a small event on July 22 were reported to have experienced gastrointestinal illness with onsets on July 23. This initial July 22 event was attended by 12 people. Food products for the July 23 reception were prepared by four food workers on the day of the event. One reported illness onset on July 25 and one other had an onset of July 26. The foods for the July 24 lunch were prepared by two people; neither of whom was reported to have experienced gastrointestinal illness during this time period. The head chef was reported to have experienced diarrheal illness with an onset of July 22.

The calculated incubation period based on exposure occurring at the July 23 reception ranges from 8-37 hours with a median of 26 hours. One ill person had an onset 6.5 hours prior to this meal. The calculated incubation period based on exposure at the July 24 lunch ranges from 6 to 21 hours with a median of 10 hours. Two persons in the company cohort would have had illness onsets 8 hours and 22.5 hours prior to this meal.

One case in the company group reported onset of illness at 1:30 pm on July 23. This case arrived on the same day and consumed food at the July 23 reception but ate no quiche. The case attended and ate at the luncheon on July 24, including tiramisu. The next reported onset of illness in the company group was at 4:00 am on July 24. One case in the group arrived and left on July 24 and reported illness onset on July 24 at 7 pm. This case ate food at the luncheon on July 24 but did not eat tiramisu. This case also consumed food at the breakfast on the July 24.

This cluster of gastrointestinal illnesses appears to be related to events that occurred at Hotel A during July 22-24, 2005. The reported onset dates and times of illnesses are clustered indicating a point source exposure, such as from food or water. The high percentage of illnesses with onsets in a 24 hour period also strongly suggests a common single source for most of the illnesses. Described clinical symptoms and possible incubation periods indicate a viral agent. The presence of Norovirus G1 in two stool samples from patients who met the case definition confirms Norovirus as the agent causing these illnesses.

The univariate analysis of the available data strongly indicates that exposures to the tiramisu and quiche are likely predictors of illness. Contamination of either or both of the implicated food products could have occurred by handling (most likely) by an asymptomatic or subclinical food worker at the hotel after the cooking or thawing process. There were three ill employees who were reported to have symptom onsets prior to the company group and who had contact with food and fomites to which the group members were exposed. There were two other food workers who were reported ill with gastrointestinal symptoms at the same time as those in the company cohort.

There is a very likely scenario of multiple vehicles of transmission and fomites involved in transmitting Norovirus to this group with one or two food products as the primary vehicle of

transmission that accounts for the majority of the illnesses. The source for the majority of the illnesses most likely was the food service workers at this hotel, and perhaps more than one or two. The food service workers most likely acquired the illness through person-to-person contact internally at the hotel or from external sources. The lack of clinical samples from the food workers precludes further analysis. The observed environmental conditions of the food preparation facility indicate an environment providing opportunities for the transmission of viral agents.

There was also one member of the company group who reported illness onset 14 hours prior to the others. This person may have been the source for a very small number of the total number of illnesses. This person may also have had an early illness onset due to dose or host factors or misreported the onset of illness. Note that person-to-person contact generally tends to have more temporally protracted onset times and fewer total numbers of illnesses in convention environments. One would have to touch every quiche or shake every hand to account for the reported number of illnesses in the short period of time observed. The person who came on July 24 and reported illness in the evening might have had the misfortune of shaking hands with an ill or infectious person who did not wash their hands. This person may have also had a very short incubation period, forgot eating tiramisu, or consumed a food product that was intermittently contaminated and not statistically significant.

There were several limitations to this study. One of the company office groups did not respond to the questionnaire. It is possible that their answers could somewhat alter the data. The inability to obtain clinical samples from the food workers at the implicated hotel limits accurate confirmation of the source of Norovirus G1.

Bacillus cereus Illness at a Company-Sponsored Dinner, Alachua County, October 2005

On Friday, October 21, 2005, the Alachua County Health Department received two reports of gastrointestinal illness from employees who had attended a dinner the previous evening. The dinner was held at an upscale restaurant, sponsored by a pharmaceutical company, and featured two speakers.

A total of 19 health care workers attended the dinner. The food choices were limited to three appetizers, salad, three entrees and three desserts. One attendee kept the menu which was helpful in obtaining food histories. Also, because it was a company funded dinner, a sign-in sheet was available. All but one person was contacted, and a complete line list was created from the responses of eighteen individuals. Only one person had taken food home and not yet eaten it. She provided her slice of cheesecake to us for testing.

Five people reported illness within 12 hours of the dinner. Symptoms included abdominal pain/cramping, diarrhea, nausea, and generalized malaise. After follow-up with cases on Monday, October 24, all reported that their symptoms had resolved during the weekend. No secondary cases were reported and the restaurant involved did not report any other complaints of illness or any employees with gastrointestinal symptoms.

Upon analysis of the line list, cheesecake (attack rate=75%, RR=4.9), potatoes (attack rate=66.7%, RR=3.1), or green beans/carrots (attack rate=66.7%, RR=3.1) were the most likely culprits. Unfortunately, the sample size and number ill were too small to reach significance for any of the food items with a chi-squared test at α=0.05. The p-value for cheesecake was p=0.0525.

Analysis of the cheesecake by the state laboratory revealed *Bacillus cereus* at 32 cfu/gr. Symptoms caused by the diarrheal toxin of *B. cereus* are consistent with those present in our cases, namely cramping, abdominal pain and watery diarrhea beginning 8-16 hours after eating with resolution within 12-24 hours. Since *B. cereus* can be found in the stool of up to 14% of people in the general population, stool samples were not determined to be useful in this investigation.

The cases in our investigation most likely became ill after eating cheesecake held at an improper temperature (between 40ºF and 140ºF) for too long either before or after cooking, allowing the *B. cereus* spores to multiply and produce a sufficient amount of toxin to cause symptoms. The restaurant has been notified of the causative agent and measures necessary to prevent a similar incident in the future. The restaurant received several unsatisfactory marks during the Department of Business and Professional Regulation inspection, but none were critical violations. At the time of inspection, the refrigerator holding the cheesecake was at 40ºF and all aspects relating to cheesecake preparation and storage were appropriate.

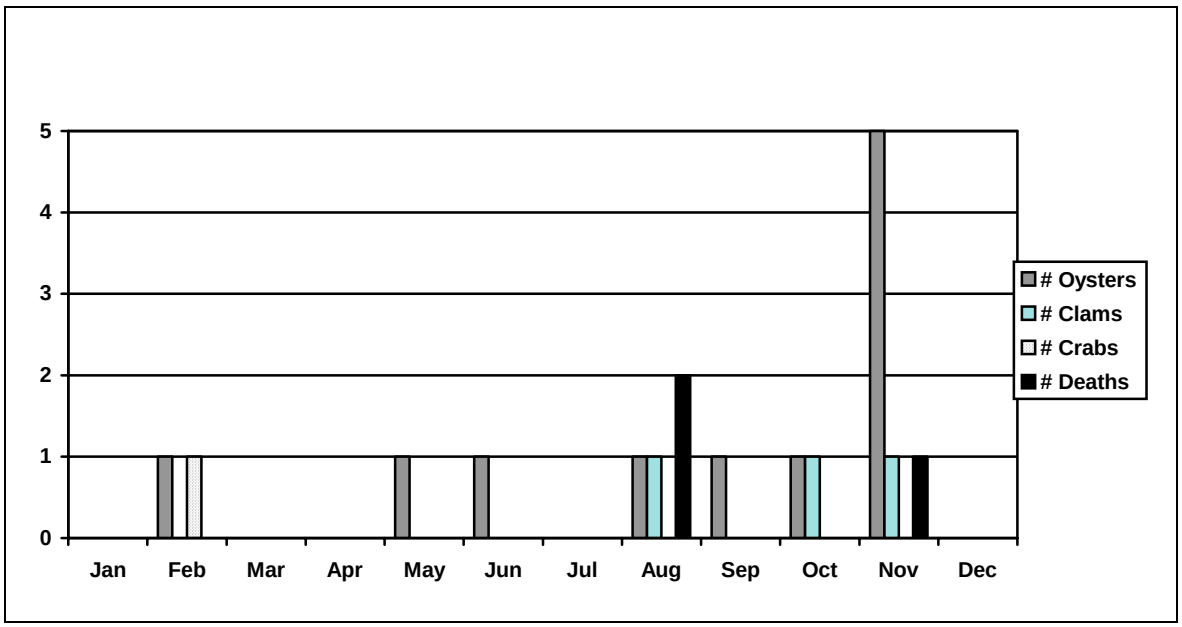
An Overview of Foodborne *Vibrio vulnificus*, Florida, 2005

For 2005, there was a total of 38 *Vibrio vulnificus* cases reported in the State of Florida, less than the previous year. Of these, the largest number included 30 wound-related cases and 2 from an unknown exposure. The other 6 cases were associated with the consumption of raw oysters (5) and clams (1).[7] There were 2 oyster-consumption-related deaths, 1 death from clams, 2 deaths from unknown exposures and 1 wound-related death reported from *Vibrio vulnificus* (see Table x and Figure 7). In 2004 there were 12 wound-related cases of *Vibrio vulnificus* (2 death), 15 from unknown exposures (7 deaths) and 10 cases associated with the consumption of raw oysters (4 deaths).

Table 7: Reported Cases of *Vibrio vulnificus*, Florida 2005

Exposure	# Cases
Wound	30 (1 death)
Oysters	5 (2 deaths)
Unknown	2 (2 deaths)
Clam	1 (1 death)
Total	**38 (6 deaths)**

Figure 4: Reported Cases and Deaths of *Vibrio vulnificus* by Month from Shellfish Consumption, Florida, 2005

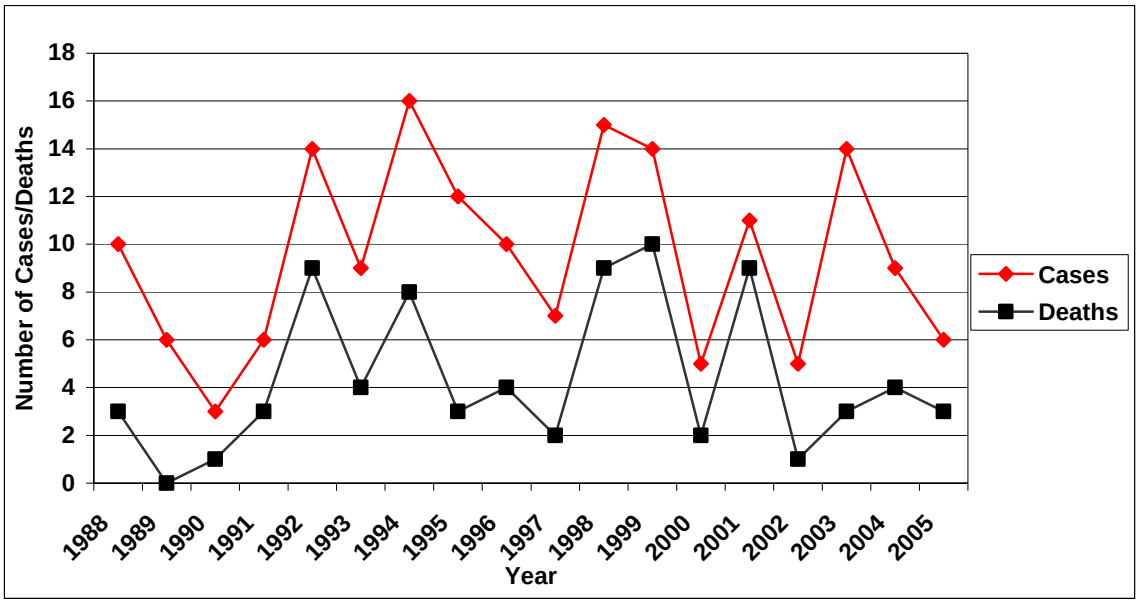


The Florida Department of Health is collaborating in a statewide *Vibrio vulnificus* Education Project with the Florida Department of Agriculture and Consumer Services and with the Interstate Shellfish Sanitation Conference. Targeted audiences include high risk groups, health care practitioners and the general public. Project elements included poster displays in the

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

public areas of several county health deparments and presentations to county health departments, professional associations and community groups on request along with sections on *Vibrio vulnificus* during university lectures on foodborne disease. In addition, liver disease support groups all over Florida were contacted and mailed educational brochures when they requested them. Press releases emphasizing the risk of raw oyster consumption by high risk groups were distributed in May and in November. *Vibrio vulnficus* displays and educational brochures were present at the annual meeting of the Florida Dietetic Association and the Florida Student Nurse Association. Figure 5 shows related*Vibrio vulnificus* cases and deaths in Florida, from 1988-2005.

Figure 5: *Vibrio vulnificus* Cases and Deaths Associated With Molluscan Shellfish Consumption, Florida, 1988-2005



An Overview of Foodborne Hepatitis A in Florida, 1995-2004

Nationwide estimates are that hepatitis A accounts for 0.8% of total foodborne outbreaks and for less than 0.8% of total foodborne outbreak-related cases .[8] Florida estimates that hepatitis A accounts for 0.6% of total foodborne outbreaks (1994-2003 trend: flat - no increase or decrease) and for .95% of total foodborne outbreak-related cases (1994-2003 trend: upward a little less than 1%).[9,10]

Table 8: Comparison of National and Florida Percentages of Foodborne Hepatitis A

	% Total foodborne outbreaks	% Total outbreak-related cases
Nationwide (1993-1998)	0.8%	0.8%
Florida (1996- 2005)	0.5%	.85%

[8] Sonja Olsen, et al. Surveillance for Foodborne-Disease Outbreaks – United States, 1993-1997, Morbidity and Mortality Weekly Report, CDC Surveillance Summaries (49)SS-1, March 17, 2000.
[9] Source: Bureau of Community Environmental Health, Food and Waterborne Disease Program
[10] Source: Bureau of Community Environmental Health, Food and Waterborne Disease Program

Figure 6: Foodborne Hepatitis A: Percent Total Foodborne Outbreaks and Outbreak-related Cases, 1996-2005, Florida

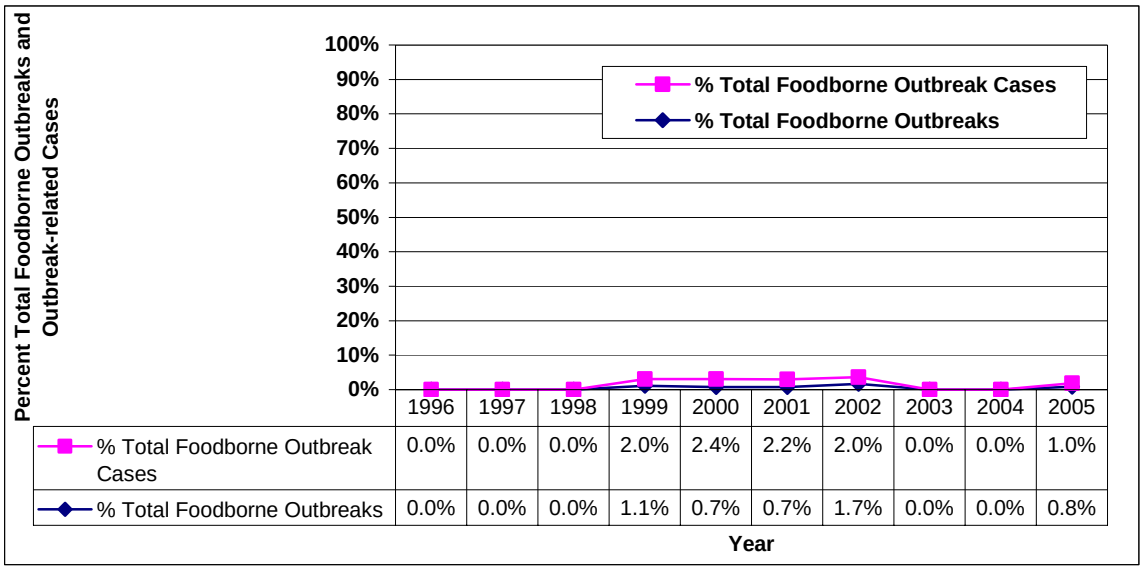


Table 9: Number of Reported Foodborne Hepatitis A Outbreaks in Florida, 1996-2005[11]

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Confirmed Foodborne Hepatitis A Outbreaks	0	0	0	1	2	2	4	0	0	1
Suspected Foodborne Hepatitis A Outbreaks	0	0	0	2	0	0	0	0	0	0
Total	0	0	0	3	2	2	4	0	0	1
Total # Foodborne Outbreaks	**300**	**428**	**299**	**272**	**268**	**290**	**243**	**185**	**173**	**128**
% Outbreak-related Hepatitis A	**0%**	**0%**	**0%**	**1.1%**	**0.7%**	**0.7%**	**1.6%**	**0%**	**0%**	**0.7%**

[11] Source: Bureau of Community Environmental Health, Food and Waterborne Disease Program

Table 10: Number of Foodborne Outbreak-related Hepatitis A Cases in Florida, 1996- 2005[12]

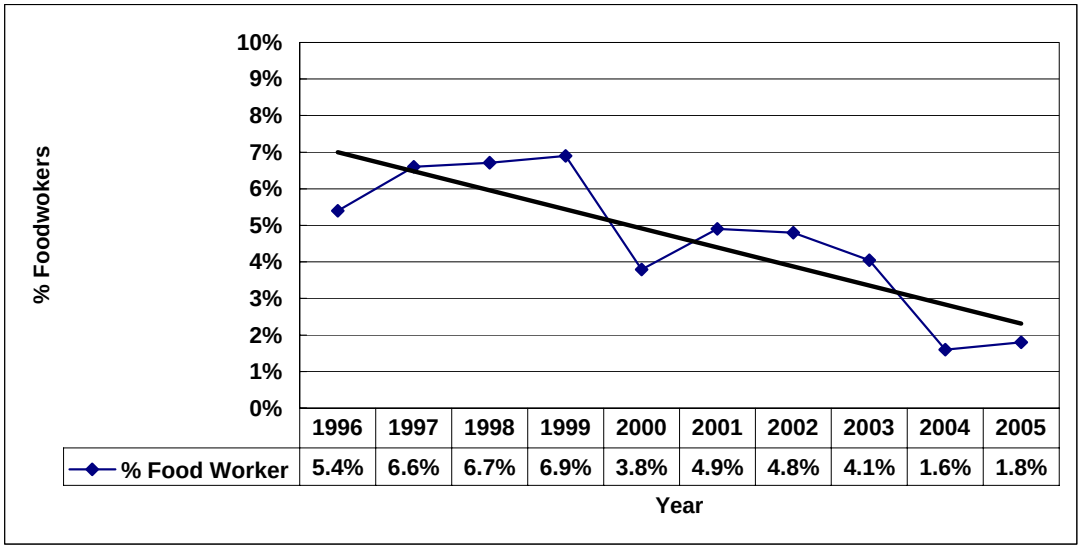
	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Cases in Confirmed Foodborne Hepatitis A Outbreaks	0	0	0	17	23	40	29	0	0	20
Cases in Suspected Foodborne Hepatitis A Outbreaks	0	0	0	12	0	0	0	0	0	0
Total	**0**	**0**	**0**	**29**	**23**	**40**	**29**	**0**	**0**	**20**
Total # Foodborne Outbreak-related Cases	**2224**	**2677**	**3194**	**1463**	**1527**	**1921**	**1466**	**1564**	**1911**	**1944**
% Foodborne Hepatitis A Cases	**0%**	**0%**	**0%**	**2%**	**1.5%**	**2%**	**1.98%**	**0%**	**0%**	**1%**

An examination of the total number of reported hepatitis A cases in Florida shows that foodworkers with hepatitis A account for 5.5% of the total confirmed hepatitis A cases statewide (1995- 2004).[13] The percentage of foodworker hepatitis A in Florida shows a slight downward trend of about 3% from 1995-2004.

Table 11: Percentage of Foodworker Hepatitis A Cases of Total Reported Hepatitis A Cases, Florida, 1996-2005

Statewide Confirmed Hepatitis A Cases	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**Total**
# Confirmed Cases	720	812	611	855	659	990	1,016	368	512	654	7,197
# Foodworker Cases	39	54	41	59	25	49	63	15	8	12	365
% Food Worker	**5.4%**	**6.6%**	**6.7%**	**6.9%**	**3.8%**	**4.9%**	**4.8%**	**4.1%**	**1.6%**	**1.6%**	**5.5%**

Figure 7: Hepatitis A in Florida, Percent Foodworkers of Total Cases, 1996-2005



[12] Source: Bureau of Community Environmental Health, Food and Waterborne Disease Program
[13] Source: DOH Merlin Reportable Disease System

It is relatively easy to find a job in the foodworker industry and the foodworker workforce is transient and mobile. Possible contributing factors to hepatitis A in foodworkers include an increase in the immigrant population who may have cultural and socio-economic differences in food safety standards, hygiene and language barriers, generating challenges in foodworker training. Younger people entering the food service industry also present a training challenge as many have little knowledge of food safety and hygiene.

All of the above factors point to a need for better training of the food industry particularly where proper hygiene and handwashing are concerned. This is an ongoing effort on the part of inspectors, epidemiologists and health care practitioners.

Current efforts include:

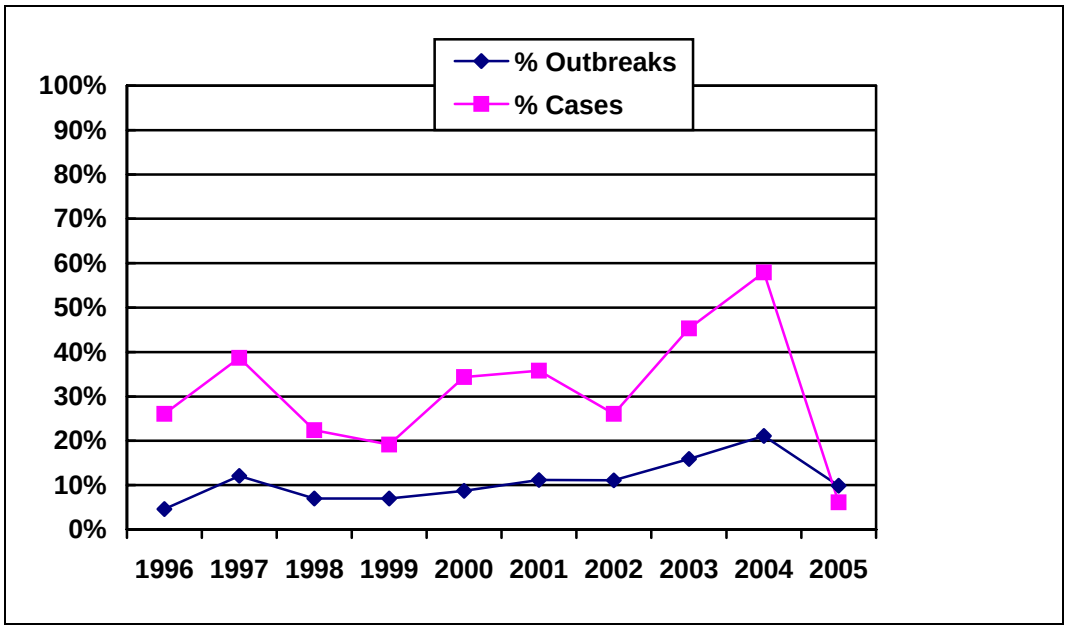
- The national and Central Florida FightBac! campaign sponsored by FDA (website provides materials for educators, the public, media, materials also available in Spanish),
- Food worker training by DBPR, DOH and DOACS, to county health departments, interested community groups, university classes,
- Refresher training by DBPR, DOH and DOACS when outbreaks occur or when food workers are confirmed for hepatitis A,
- Exclusion form letter to notify other agencies of foodworker exclusions,
- Hepatitis A training by the Food and Waterborne Disease Program,
- Hepatitis prevention efforts by the DOH Viral Hepatitis Program,
- Newsletter articles for the Hepatitis Program newsletter,
- Handwashing magnets developed and distributed through 9 Regional Food and Waterborne Disease Epidemiolgists to targeted community populations and groups. These magnets have been translated into Spanish and Haitian Creole as well as visual arts that are more culturally diverse,
- Adults at increased risk (men who have sex with men, intravenous drug users) vaccinated based on behavioral risk factor rather than employment.

Proposed activities for further foodborne hepatitis A prevention include:

- Bureau of Community Environmental Health Foodborne Hepatitis A WebPage:
  - How you get it
  - How to prevent it
  - Basic charts
  - Links to other websites
- More community training, discuss with the Florida Department of Education possibilities of handwashing training in classrooms, perhaps reapply for grant funding.

An Overview of Foodborne *Norovirus* Reported in Florida, 1996-2005

Figure 8: Trends of *Norovirus* in Reported Outbreaks and Outbreak Cases, Florida, 1996-2005



Of the estimated 23 million cases of *Norovirus* each year, foodborne *Norovirus* accounts for an estimated 9.2 million cases (67% of the total foodborne illness cases) per year nationally. It is estimated that 20,000 (33% total) hospitalizations and 124 (7% total) deaths can be attributed to foodborne *Norovirus* infections.[14]

In Florida, 11% of total food and waterborne outbreaks or 28% total food and waterborne cases can be attributed to *Norovirus* infections (no data are available on hospitalizations or deaths). Reported food and waterborne *Norovirus* outbreaks and cases show a slight upward trend over time. From 1996-2005, there has been a total of 274 food or waterborne *Norovirus* outbreaks with 6,540 associated cases (see Tables 12 and 13). Vehicles of transmission include sandwiches, salads, meal garnishes, oysters, recreational water and ice. The primary contributing factors are the lack of good personal hygiene and handwashing in addition to bare hand contact with food, as well as overboard dumping of raw sewage causing oyster-related outbreaks. Control of the outbreaks involves excluding the ill foodworker(s) where possible and appropriate, handwashing education and education of sport and commercial fishermen.

[14] Food Related Illness and Death in the United States, Mead, Paul et al. Emerging Infectious Diseases (5) 5:607-625, http://www.cdc.gov/ncidod/eid/vol5no5/mead.htm (as of 01/19/05)

Table 12: Number of Reported Food and Waterborne *Norovirus* Outbreaks, Florida, 1996-2005

Outbreaks	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Total
Suspected	6	30	15	14	15	17	18	16	15	4	150
Confirmed	8	23	7	6	10	17	9	14	22	8	124
Total	**14**	**53**	**22**	**20**	**25**	**34**	**27**	**30**	**37**	**12**	**274**
% Total Outbreaks	**4.6%**	**12.1%**	**7.0%**	**7.0%**	**8.7%**	**11.2%**	**11.1%**	**15.9%**	**21.1%**	**9.5%**	**8.9%**

Table 13: Number of Reported Food and Waterborne *Norovirus* Outbreak-related Cases, Florida, 1996-2005

Outbreak-related cases	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Total
Suspected	92	377	296	136	154	212	212	438	136	70	2,123
Confirmed	633	686	442	160	450	522	170	311	995	48	4,417
Total	**725**	**1063**	**738**	**296**	**604**	**734**	**382**	**749**	**1131**	**118**	**6,540**
% Total Outbreak-related cases	**26.1%**	**38.7%**	**22.4%**	**19.2%**	**34.4%**	**35.8%**	**26.1%**	**38.3%**	**57.8%**	**5.9%**	**19.8%**

Laboratory confirmation has been obtained in 67 (24%) of these outbreaks. Since the development of the Department of Health Bureau of Laboratories ability to test stools for *Norovirus*, food and waterborne outbreak investigations have focused on collecting both enteric and viral stool samples for ruling out/confirmation of *Norovirus*. The Food and Waterborne Disease Program has been working with county health departments to encourage proper sampling procedures. Regional food and waterborne disease epidemiologists are available to present *Norovirus* training to county health departments, professional associations and interested community groups around the state. The training has also been given to a cruise line who requested it.

Appendix: Statewide Data Tables and Figures

Table 14: Number of Reported Food and Waterborne Outbreaks With Laboratory-Confirmed Etiologic Agents and Number of Cases Associated With These Outbreaks, Florida, 2005

# Outbreaks	Pathogen	# Cases
1	B. cereus	4
1	C. botulinum	1
2	C. perfringens	76
1	Campylobacter	5
1	Chemical	2
1	Ciguatera	1
1	Cryptosporidium	47
1	Cyclospora	592
1	Hepatitis A	20
1	Legionella	2
1	Mercury Poisoning	2
4	Norovirus	70
7	Salmonella	74
5	V. vulnificus	5
28	**Total**	**901**

Figure 9: Percent Reported Outbreaks With Laboratory-Confirmed Etiologic Agents and Percent Cases Associated With These Outbreaks, Florida, 2005

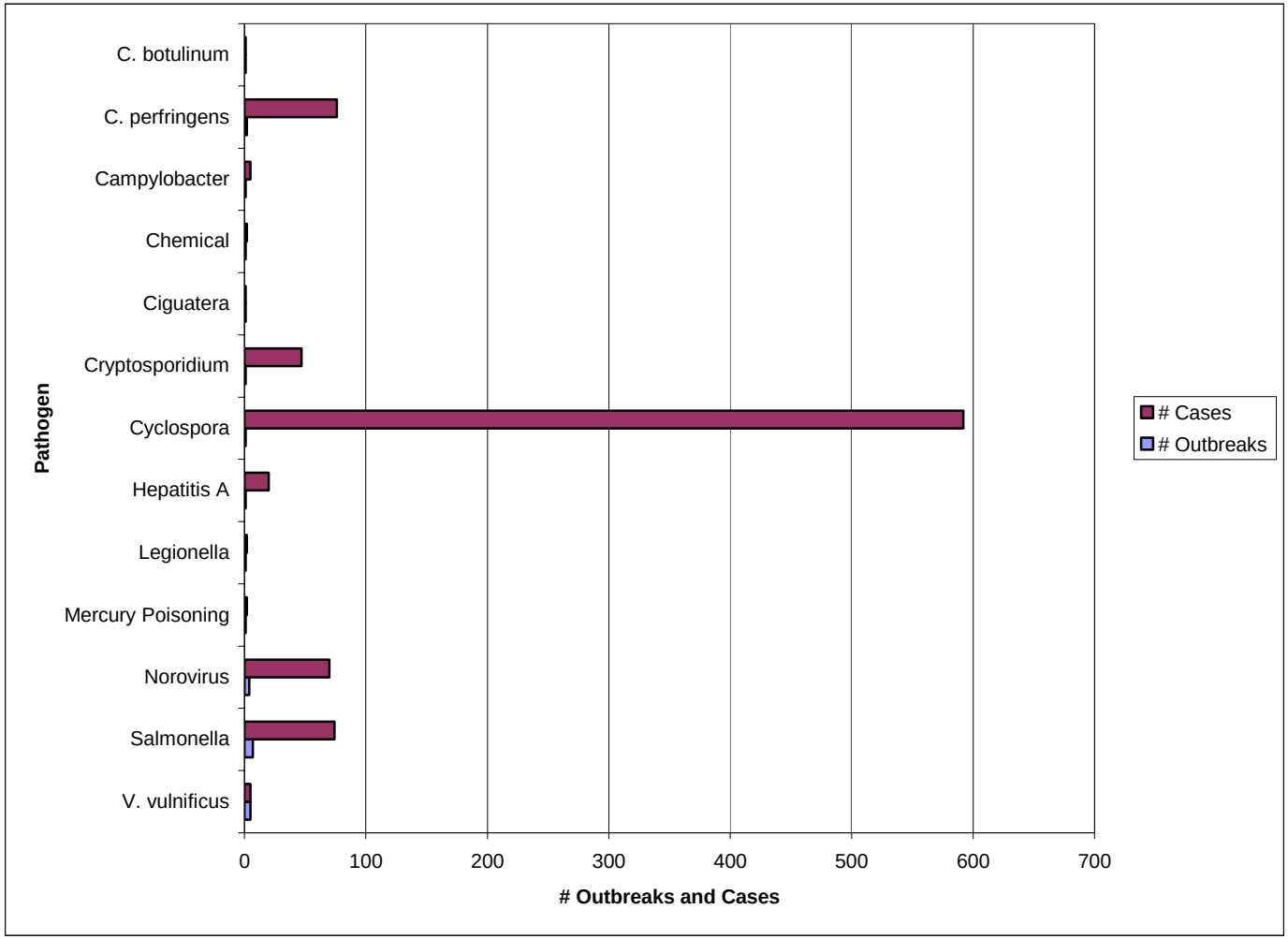
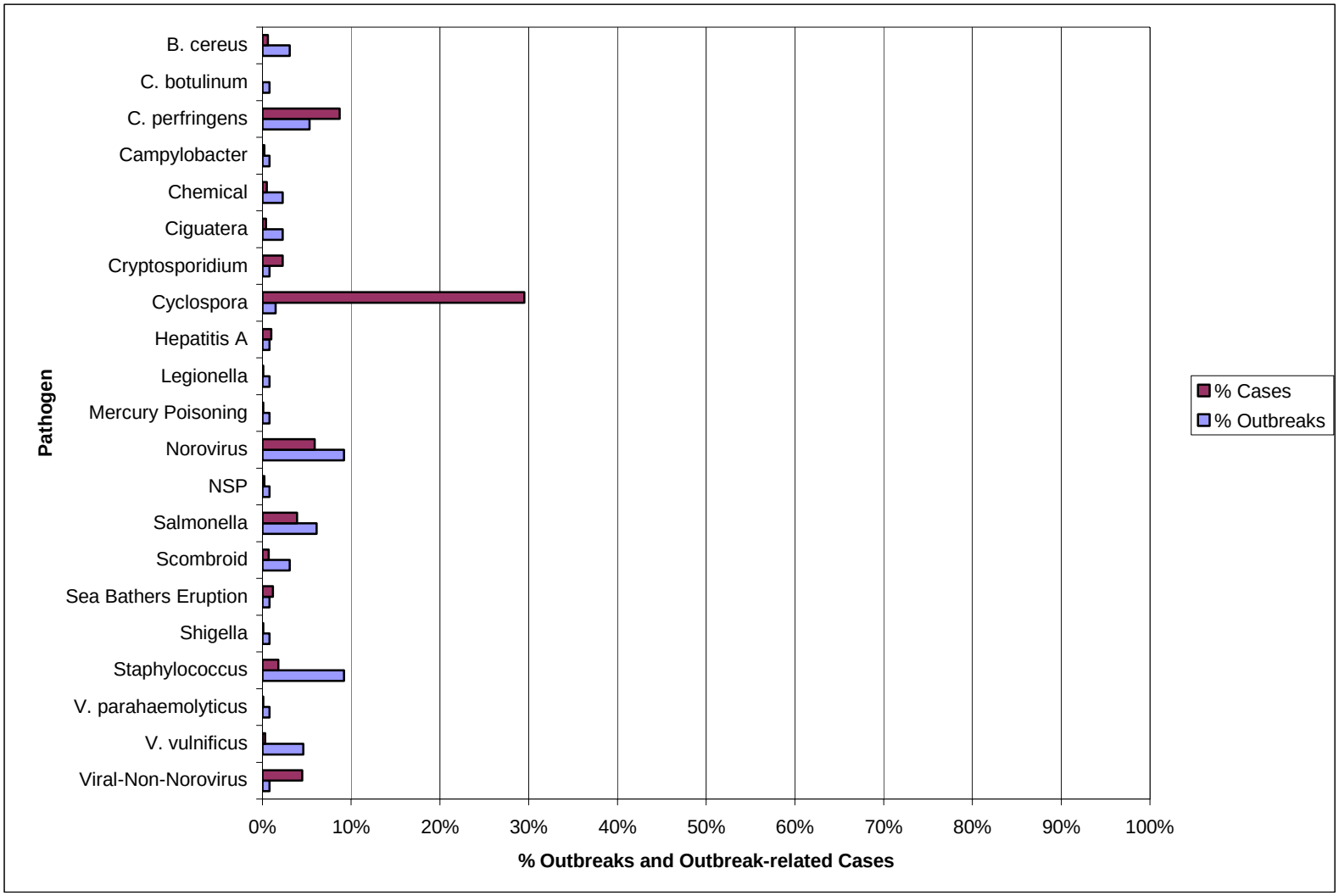
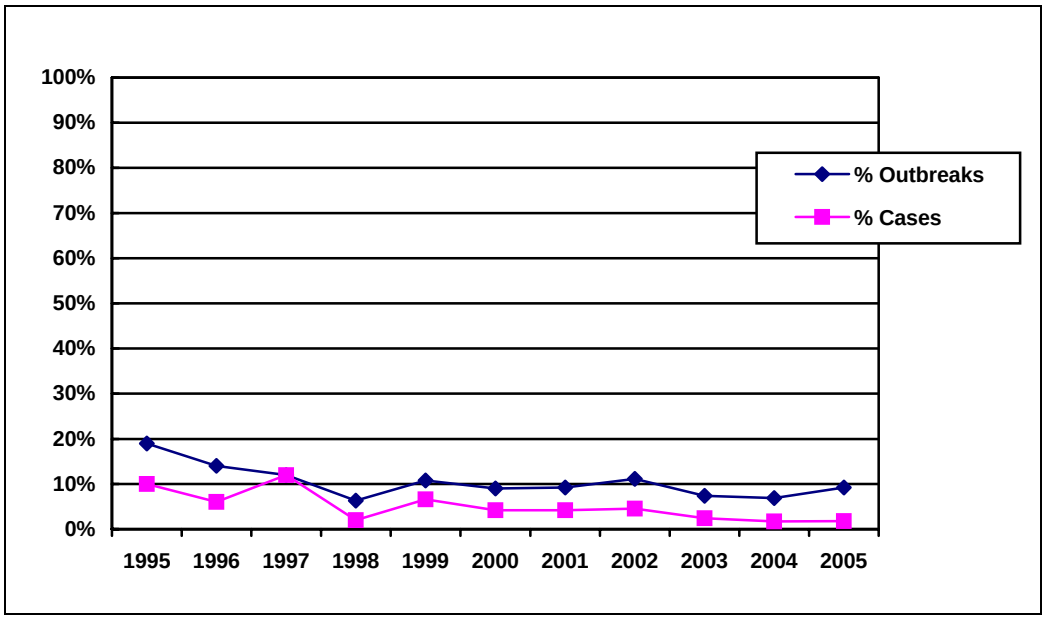


Figure 10: Percent Total Food and Waterborne Disease Outbreaks and Cases by Etiologic Agent, Florida, 2005*



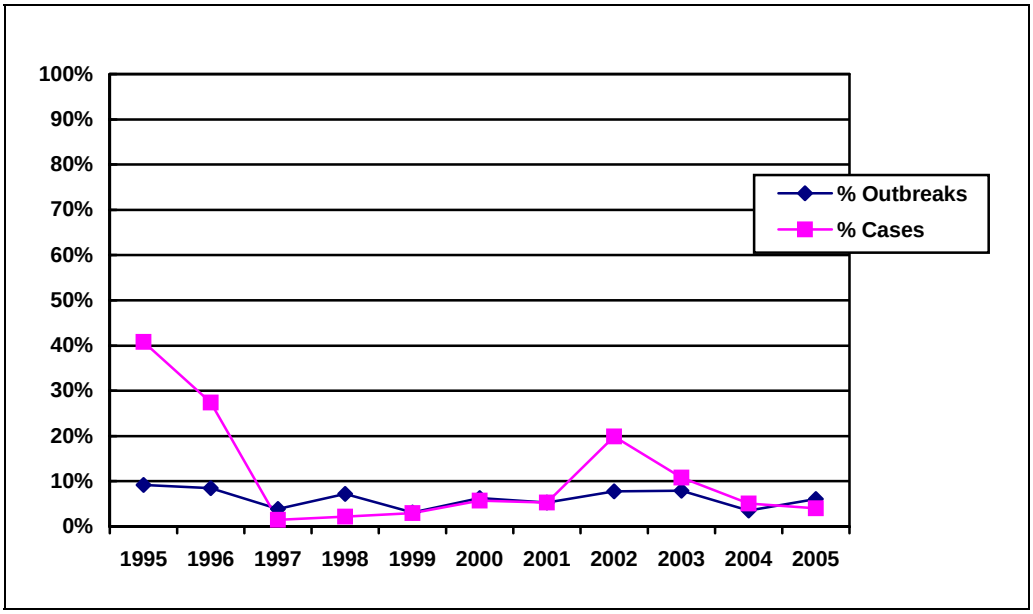
*The etiologic agent was unknown in 45% of the outbreaks and 38% of the cases.

Figure 11: Trends of Staphylococcus in Reported Food and Waterborne Outbreaks and Outbreak-related Cases, Florida, 1995-2005



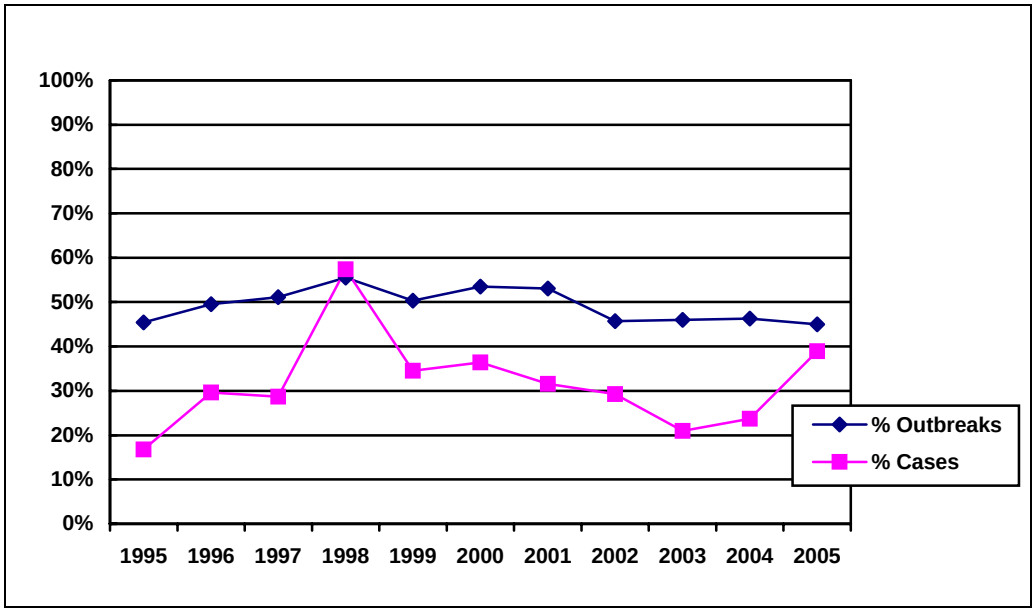
Reported food and waterborne Staphylocccus outbreaks and cases show a downward trend over time.

Figure 12: Trends of Salmonella in Reported Food and Waterborne Outbreaks and Outbreak-related Cases, Florida, 1995-2005



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

Figure 13: Trends of Unknown Pathogens in Reported Food and Waterborne Outbreaks and Outbreak-related Cases, Florida, 1995-2005



The amount of food and waterborne outbreaks and outbreak-related cases from unknown causes remains fairly stable over time.

Figure 14: Percent Total Food and Waterborne Outbreaks and Outbreak-related Cases by Site, Florida, 2005

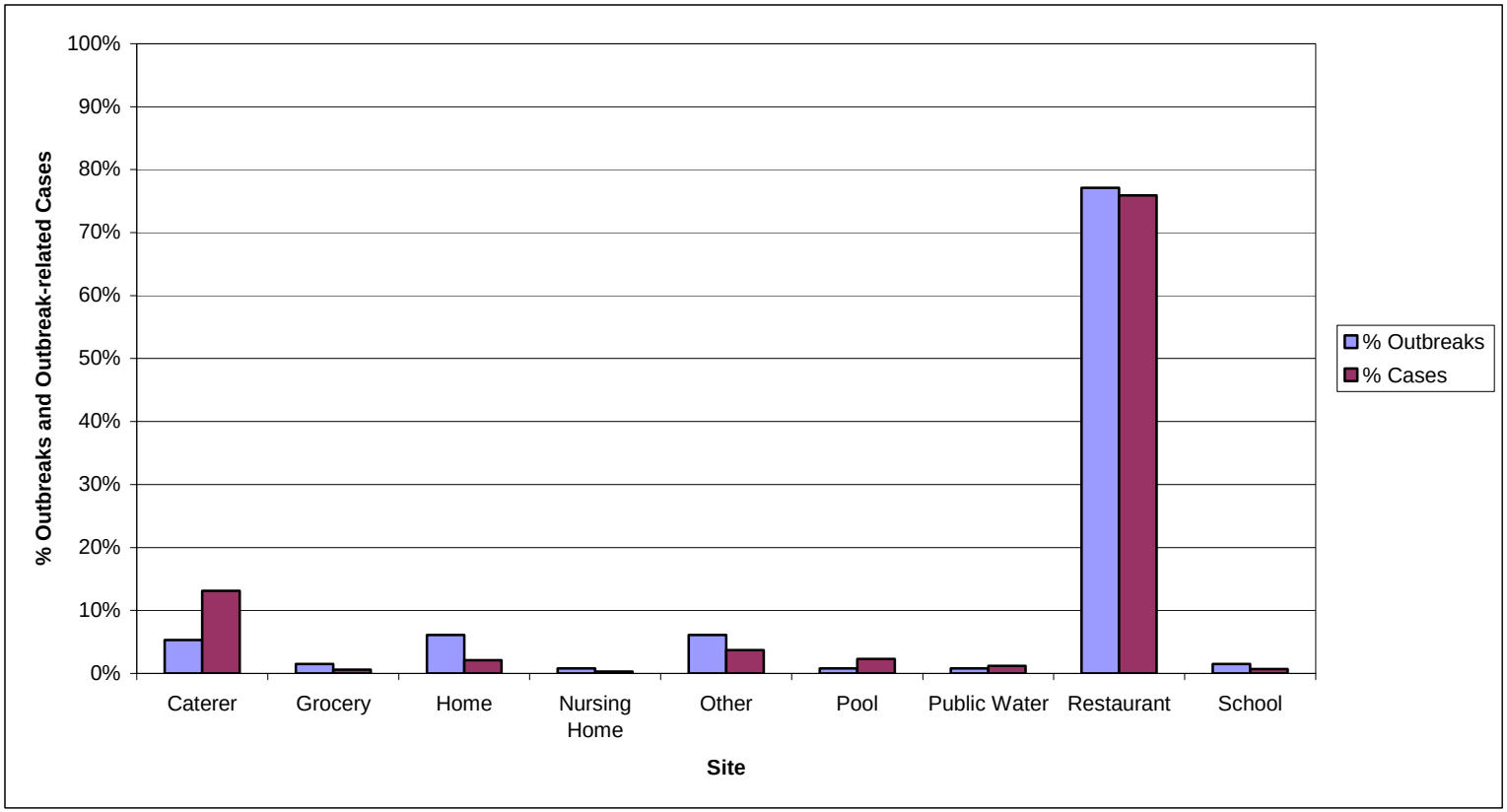


Table 15: Food and Waterborne Outbreaks by Site, Florida, 2005[15]

Status	Caterer	Grocery	Home	Nursing Home	Other	Pool	Public Water	Restaurant	School	Total
Confirmed	4	1	6	0	3	1	0	18	0	33
row %	12.1%	3.0%	18.2%	0.0%	9.1%	3.0%	0.0%	54.5%	0.0%	25.2%
col %	57.1%	50.0%	75.0%	0.0%	37.5%	100.0%	0.0%	17.8%	0.0%	
Suspected	3	1	2	1	5	0	1	83	2	98
row %	3.1%	1.0%	2.0%	1.0%	5.1%	0.0%	1.0%	84.7%	2.0%	74.8%
col %	42.9%	50.0%	25.0%	100.0%	62.5%	0.0%	100.0%	82.2%	100.0%	
Total	7	2	8	1	8	1	1	101	2	131
% Total	**5.3%**	**1.5%**	**6.1%**	**0.8%**	**6.1%**	**0.8%**	**0.8%**	**77.1%**	**1.5%**	**100%**

Table 16: Food and Waterborne Outbreak-related Cases by Site, Florida, 2005[16]

Status	Caterer	Grocery	Home	Nursing Home	Other	Pool	Public Water	Restaurant	School	Total
Confirmed	233	11	29	0	52	47	0	1245	0	1617
row %	14.4%	0.7%	1.8%	0.0%	3.2%	2.9%	0.0%	77.0%	0.0%	80.2%
col %	87.9%	84.6%	67.4%	0.0%	70.3%	100.0%	0.0%	81.4%	0.0%	
Suspected	32	2	14	7	22	0	24	285	14	400
row %	8.0%	0.5%	3.5%	1.8%	5.5%	0.0%	6.0%	71.3%	3.5%	19.8%
col %	12.1%	15.4%	32.6%	100.0%	29.7%	0.0%	100.0%	18.6%	100.0%	
Total	265	13	43	7	74	47	24	1530	14	2017
% Total	**13.1%**	**0.6%**	**2.1%**	**0.3%**	**3.7%**	**2.3%**	**1.2%**	**75.9%**	**0.7%**	**100%**

[15] First percentage figure under confirmed row is a measure of the total outbreaks, the second percentage figure is a measure of the outbreaks in that column.
[16] First percentage figure under suspected row is a measure of the total cases, the second percentage figure is a measure of the cases in that column.

Table 17: Food and Waterborne Outbreaks and Cases Reported by Agency of Jurisdiction,[17,18] Florida, 2005

Agency	# Outbreaks	% Outbreaks	# Cases	% Cases
DOACS	6	4.6%	28	1.4%
DBPR	107	81.7%	1836	91.0%
DOH	8	6.1%	104	5.2%
OTHER	10	7.6%	49	2.4%
Total	131	100.0%	2017	100.0%

Figure 15: Reported Food and Waterborne Disease Outbreaks by Agency of Jurisdiction, 1995-2005

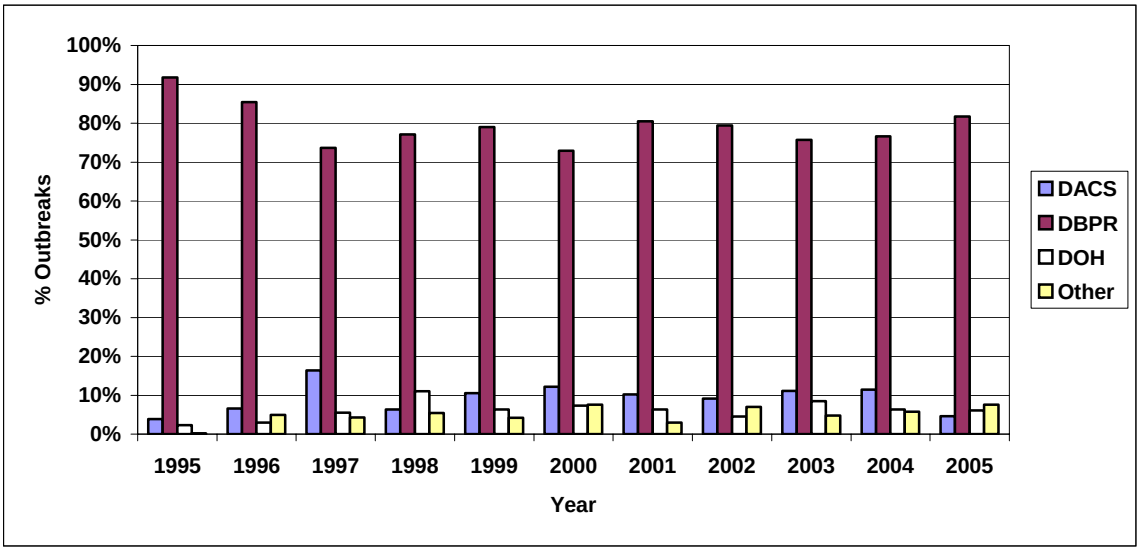
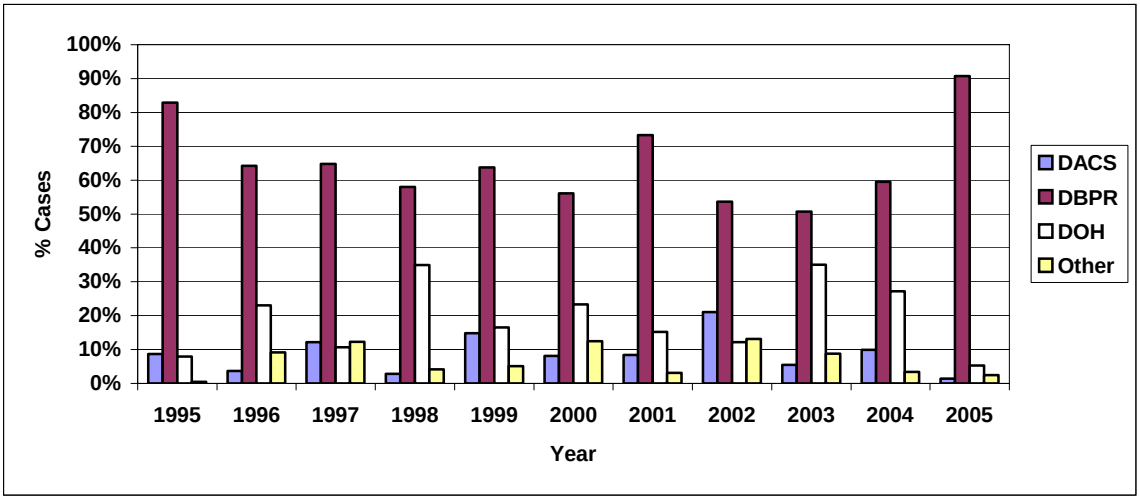


Figure 16: Cases Associated With Reported Food and Waterborne Disease Outbreaks by Agency of Jurisdiction, 1995–2005



[17] Agency of jurisdiction refers to the agency regulating the primary food source and/or food workers identified as the cause of the outbreak (DOACS = 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).

[18] Data from previous years can be found in the 2002 and 2003 Annual Reports.

Figure 17: Percent Total Food and Waterborne Outbreaks and Outbreak-related Cases by Vehicle, Florida, 2005

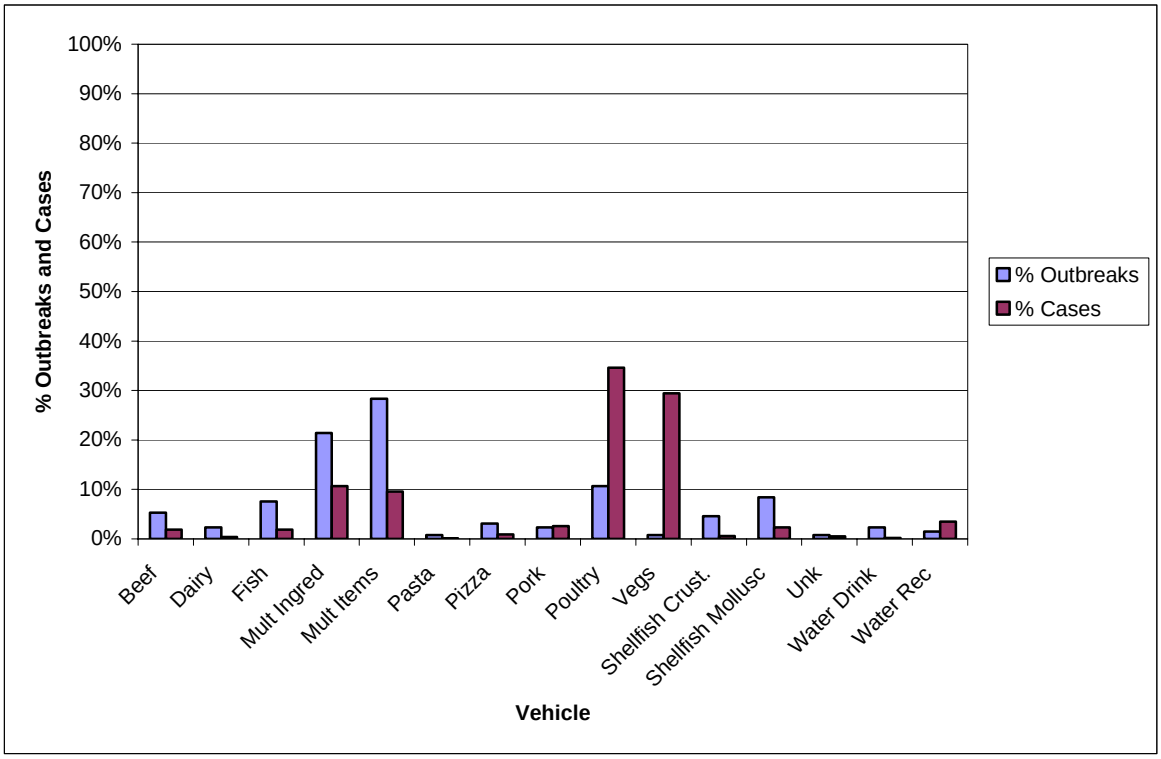


Table 18: Food and Waterborne Outbreaks by Vehicle, Florida, 2005[19]

Status	Beef	Dairy	Fish	Mult Ingred	Mult Items	Pasta	Pizza	Pork	Poultry	Vegs	Shellfish Crust.	Shellfish Mollusc	Unk	Water Drink	Water Rec	Total
Confirmed	1	1	3	4	7	0	0	2	0	4	1	1	7	1	0	1
row %	3.0%	3.0%	9.1%	12.1%	21.2%	0.0%	0.0%	6.1%	12.1%	3.0%	3.0%	21.2%	3.0%	0.0%	3.0%	25.2%
col %	14.3%	33.3%	30.0%	14.3%	19.4%	0.0%	0.0%	66.7%	28.6%	100%	16.7%	63.6%	100%	0.0%	50.0%	
Suspected	6	2	7	24	30	1	4	1	10	0	5	4	0	3	1	98
row %	6.1%	2.0%	7.1%	24.5%	30.6%	1.0%	4.1%	1.0%	10.2%	0.0%	5.1%	4.1%	0.0%	3.1%	1.0%	74.8%
col %	85.7%	66.7%	70.0%	85.7%	80.6%	100%	100%	33.3%	71.4%	0.0%	83.3%	36.4%	0.0%	100%	50.0%	
Total	**7**	**3**	**10**	**28**	**37**	**1**	**4**	**3**	**14**	**1**	**6**	**11**	**1**	**3**	**2**	**131**
	5.3%	**2.3%**	**7.6%**	**21.4%**	**35.5%**	**0.8%**	**3.1%**	**2.3%**	**10.7%**	**0.8%**	**4.6%**	**8.4%**	**0.8%**	**2.3%**	**1.5%**	

Table 19: Food and Waterborne Outbreak-related Cases by Vehicle, Florida, 2005[20]

Status	Beef	Dairy	Fish	Mult Ingred	Mult Items	Pasta	Pizza	Pork	Poultry	Vegs	Shellfish Crust.	Shellfish Mollusc	Unk	Water Drink	Water Rec	Total
Confirmed	18	4	9	120	81	0	0	49	657	592	1	29	10	0	47	Total
row %	1.1%	0.2%	0.6%	7.4%	5.0%	0.0%	0.0%	3.0%	40.6%	36.6%	0.1%	1.8%	0.6%	0.0%	2.9%	1617
col %	47.4%	44.4%	23.7%	55.6%	36.9%	0.0%	0.0%	94.2%	94.3%	100%	8.3%	61.7%	100%	0.0%	66.2%	80.2%
Suspected	20	5	29	96	128	2	19	3	40	0	11	18	0	5	24	
row %	5.0%	1.3%	7.3%	24.0%	32.0%	0.5%	4.8%	0.8%	10.0%	0.0%	2.8%	4.5%	0.0%	1.3%	6.0%	400
col %	52.6%	55.6%	76.3%	44.4%	58.4%	100%	100%	5.8%	5.7%	0.0%	91.7%	38.3%	0.0%	100%	33.8%	19.8%
Total	**38**	**9**	**38**	**216**	**219**	**2**	**19**	**52**	**697**	**592**	**12**	**47**	**10**	**5**	**71**	
	1.9%	**0.4%**	**1.9%**	**10.7%**	**9.6%**	**0.1%**	**0.9%**	**2.6%**	**34.6%**	**29.4%**	**0.6%**	**2.3%**	**0.5%**	**0.2%**	**3.5%**	**2017**

[19] First percentage figure under confirmed row is a measure of the total outbreaks, the second percentage figure is a measure of the outbreaks in that column.
[20] First percentage figure under suspected row is a measure of the total cases, the second percentage figure is a measure of the cases in that column.

Table 20: Total Food and Waterborne Outbreaks, Florida, 2005: Etiologic Agent by Vehicle

Pathogen	Beef	Dairy	Fish	Multiple Ingred.	Multiple Items	Pasta	Pizza	Pork	Rice	Poultry	Vegs	Shellfish Crust.	Shellfish Mollusc	Unk	Water Drinking	Water Rec	Total
B. cereus	0	2	0	0	1	0	0	0	0	0	0	1	0	0	0	0	4
C. botulinum	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
C. perfringens	2	0	0	1	1	0	0	1	0	2	0	0	0	0	0	0	7
Campylobacter	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
Chemical	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2	0	3
Ciguatera	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Cryptosporidium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Cyclospora	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	2
Hepatitis A	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
Legionella	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
Mercury Poisoning	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Norovirus	0	0	0	3	6	0	0	0	0	2	0	0	1	0	0	0	12
NSP	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
Salmonella	1	0	0	2	2	0	0	1	0	2	0	0	0	0	0	0	8
Scombroid	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Shigella	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
Staphylococcus	1	1	0	2	4	0	0	1	0	2	0	1	0	0	0	0	12
Sea Bathers Eruption	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Unknown	3	0	2	19	18	1	3	0	1	6	0	2	3	1	0	0	59
V. parahaemolyticus	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
V. vulnificus	0	0	0	0	0	0	0	0	0	0	0	1	5	0	0	0	6
Viral-Non-Norovirus	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Total	**7**	**3**	**10**	**28**	**36**	**1**	**4**	**3**	**1**	**14**	**1**	**6**	**11**	**1**	**3**	**2**	**131**

Table 21: Total Food and Waterborne Outbreak-related Cases, Florida, 2005: Etiologic Agent by Vehicle

Pathogen	Beef	Dairy	Fish	Multiple Ingred.	Multiple Items	Pasta	Pizza	Pork	Rice	Poultry	Vegs	Shellfish Crust.	Shellfish Mollusc	Unk	Water Drink	Water Rec	Total
B. cereus	0	7	0	0	2	0	0	0	0	0	0	3	0	0	0	0	12
C. botulinum	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
C. perfringens	26	0	0	10	2	0	0	13	0	124	0	0	0	0	0	0	175
Campylobacter	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	5
Chemical	0	0	0	0	7	0	0	0	0	0	0	0	0	0	3	0	10
Ciguatera	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	8
Cryptosporidium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	47	47
Cyclospora	0	0	0	0	0	0	4	0	0	0	592	0	0	0	0	0	596
Hepatitis A	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0	0	20
Legionella	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2
Mercury Poisoning	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Norovirus	0	0	0	27	74	0	0	0	0	12	0	0	5	0	0	0	118
NSP	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	4
Salmonella	2	0	0	19	10	0	0	36	0	12	0	0	0	0	0	0	79
Scombroid	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	15
Shigella	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	3
Staphylococcus	2	2	0	8	9	0	0	3	0	10	0	2	0	0	0	0	36
Sea Bathers Eruption	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24	24
Unknown	8	0	13	61	80	2	15	0	16	539	0	4	13	10	0	0	761
V. parahaemolyticus	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2
V. vulnificus	0	0	0	0	0	0	0	0	0	0	0	1	5	0	0	0	6
Viral-Non-Norovirus	0	0	0	91	0	0	0	0	0	0	0	0	0	0	0	0	91
Total	**38**	**9**	**38**	**216**	**193**	**2**	**19**	**52**	**16**	**697**	**592**	**12**	**47**	**10**	**5**	**71**	**2017**

Table 22: Confirmed Food and Waterborne Outbreaks, Florida, 2005: Etiologic Agent by Vehicle

Pathogen	Beef	Dairy	Fish	Multiple Ingred.	Multiple Items	Pork	Poultry	Vegs	Shellfish Crust.	Shellfish Mollusc	Unk	Water Rec.	Total
B. cereus	1	1	0	0	0	0	0	0	0	0	0	0	1
C. botulinum	0	0	0	0	1	0	0	0	0	0	0	0	1
C. perfringens	1	0	0	1	0	1	2	0	0	0	0	0	5
Ciguatera	0	0	2	0	0	0	0	0	0	0	0	0	2
Cryptosporidium	0	0	0	0	0	0	0	0	0	0	0	1	1
Cyclospora	0	0	0	0	0	0	0	1	0	0	0	0	1
Hepatitis A	0	0	0	0	0	0	0	0	0	1	0	0	1
Mercury Poisoning	0	0	1	0	0	0	0	0	0	0	0	0	1
Norovirus	0	0	0	0	4	0	0	0	0	0	0	0	4
NSP	0	0	0	0	0	0	0	0	0	1	0	0	1
Salmonella	0	0	0	2	2	1	1	0	0	0	0	0	6
Unknown	0	0	0	0	0	0	1	0	0	0	1	0	2
V. vulnificus	0	0	0	0	0	0	0	0	1	5	0	0	6
Viral-Non-Norovirus	0	0	0	1	0	0	0	0	0	0	0	0	1
Total	**1**	**1**	**3**	**4**	**7**	**2**	**4**	**1**	**1**	**7**	**1**	**1**	**33**

Table 23: Food and Waterborne Outbreak-related Cases in Confirmed Outbreaks, Florida, 2005: Etiologic Agent by Vehicle

Pathogen	Beef	Dairy	Fish	Multiple Ingred.	Multiple Items	Pork	Poultry	Vegs	Shellfish Crust.	Shellfish Mollusc	Unk	Water Rec.	Total
B. cereus	0	4	0	0	0	0	0	0	0	0	0	0	4
C. botulinum	0	0	0	0	1	0	0	0	0	0	0	0	1
C. perfringens	18	0	0	10	0	13	124	0	0	0	0	0	165
Ciguatera	0	0	7	0	0	0	0	0	0	0	0	0	7
Cryptosporidium	0	0	0	0	0	0	0	0	0	0	0	47	47
Cyclospora	0	0	0	0	0	0	0	592	0	0	0	0	592
Hepatitis A	0	0	0	0	0	0	0	0	0	20	0	0	20
Mercury Poisoning	0	0	2	0	0	0	0	0	0	0	0	0	2
Norovirus	0	0	0	0	70	0	0	0	0	0	0	0	70
NSP	0	0	0	0	0	0	0	0	0	4	0	0	4
Salmonella	0	0	0	19	10	36	7	0	0	0	0	0	72
Unknown	0	0	0	0	0	0	526	0	0	0	10	0	536
V. vulnificus	0	0	0	0	0	0	0	0	1	5	0	0	6
Viral-Non-Norovirus	0	0	0	91	0	0	0	0	0	0	0	0	91
Total	18	4	9	120	81	49	657	592	1	29	10	47	1617

Table 24: Suspected Food and Waterborne Outbreaks, Florida, 2005: Etiologic Agent by Vehicle

Pathogen	Beef	Dairy	Fish	Multiple Ingred.	Multiple Items	Pasta	Pizza	Pork	Rice	Poultry	Shellfish Crust.	Shellfish Mollusc	Water Drink	Water Rec.	Total
B. cereus	0	1	0	0	1	0	0	0	0	0	1	0	0	0	3
C. perfringens	1	0	0	0	1	0	0	0	0	0	0	0	0	0	2
Campylobacter	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
Chemical	0	0	0	0	1	0	0	0	0	0	0	0	2	0	3
Ciguatera	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
Cyclospora	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
Legionella	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
Norovirus	0	0	0	3	2	0	0	0	0	2	0	1	0	0	8
Salmonella	1	0	0	0	0	0	0	0	0	1	0	0	0	0	2
Scombroid	0	0	4	0	0	0	0	0	0	0	0	0	0	0	4
Shigella	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
Staphylococcus	1	1	0	2	4	0	0	1	0	2	1	0	0	0	12
Sea Bathers Eruption	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Unknown	3	0	2	19	18	1	3	0	1	5	2	3	0	0	57
V. parahaemolyticus	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
Total	**6**	**2**	**7**	**24**	**29**	**1**	**4**	**1**	**1**	**10**	**5**	**4**	**3**	**1**	**98**

Table 25: Food and Waterborne Outbreak-related Cases in Suspected Outbreaks, Florida, 2005: Etiologic Agent by Vehicle

Pathogen	Beef	Dairy	Fish	Multiple Ingred.	Multiple Items	Pasta	Pizza	Pork	Rice	Poultry	Shellfish Crust.	Shellfish Mollusc	Water Drink	Water Rec.	Total
B. cereus	0	3	0	0	2	0	0	0	0	0	3	0	0	0	8
C. perfringens	8	0	0	0	2	0	0	0	0	0	0	0	0	0	10
Campylobacter	0	0	0	0	5	0	0	0	0	0	0	0	0	0	5
Chemical	0	0	0	0	7	0	0	0	0	0	0	0	3	0	10
Ciguatera	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
Cyclospora	0	0	0	0	0	0	4	0	0	0	0	0	0	0	4
Legionella	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2
Norovirus	0	0	0	27	4	0	0	0	0	12	0	5	0	0	48
Salmonella	2	0	0	0	0	0	0	0	0	5	0	0	0	0	7
Scombroid	0	0	15	0	0	0	0	0	0	0	0	0	0	0	15
Shigella	0	0	0	0	3	0	0	0	0	0	0	0	0	0	3
Staphylococcus	2	2	0	8	9	0	0	3	0	10	2	0	0	0	36
Sea Bathers Eruption	0	0	0	0	0	0	0	0	0	0	0	0	0	24	24
Unknown	8	0	13	61	80	2	15	0	16	13	4	13	0	0	225
V. parahaemolyticus	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2
Total	20	5	29	96	112	2	19	3	16	40	11	18	5	24	400

Figure 18: Percent Total Food and Waterborne Outbreaks and Cases by Month, Florida, 2005

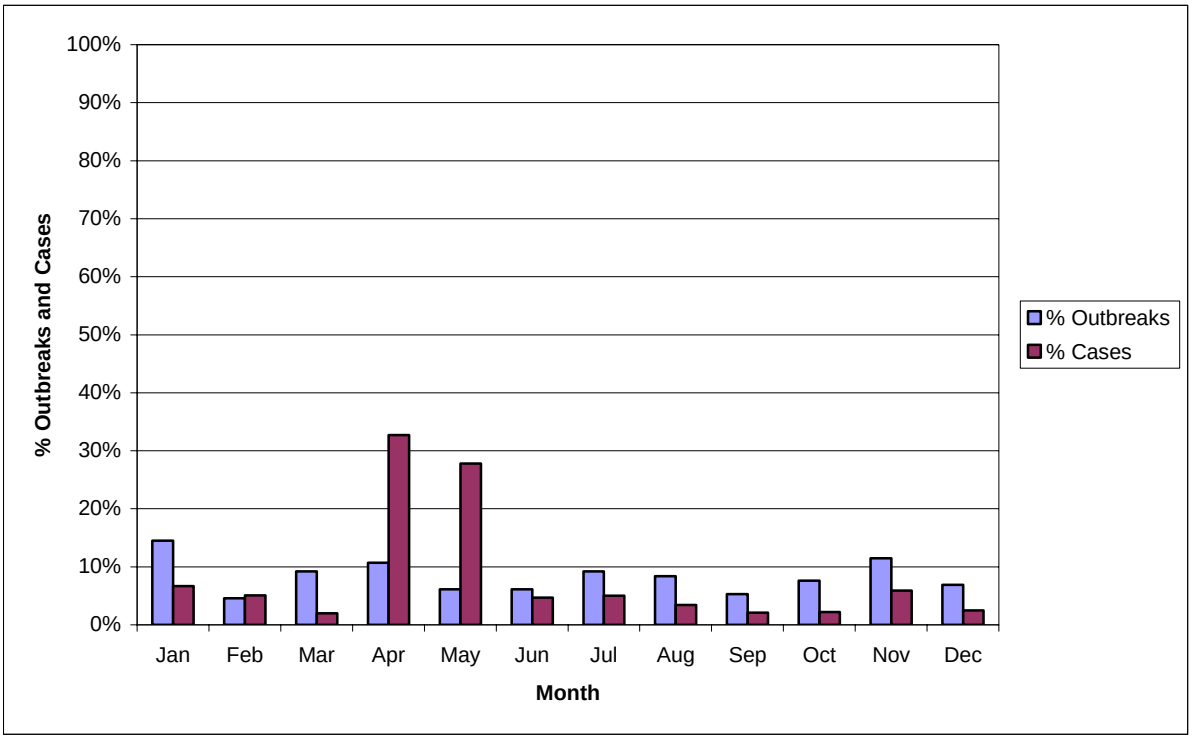


Table 26: Food and Waterborne Outbreaks by Month, Florida, 2005

Status	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Confirmed	4	1	3	3	2	3	3	5	2	1	4	2	33
row%	12.1%	3.0%	9.1%	9.1%	6.1%	9.1%	9.1%	15.2%	6.1%	3.0%	12.1%	6.1%	25.2%
col%	21.1%	16.7%	25.0%	21.4%	25.0%	37.5%	25.0%	45.5%	28.6%	10.0%	26.7%	22.2%	
Suspected	15	5	9	11	6	5	9	6	5	9	11	7	98
row%	15.3%	5.1%	9.2%	11.2%	6.1%	5.1%	9.2%	6.1%	5.1%	9.2%	11.2%	7.1%	74.8%
col%	78.9%	83.3%	75.0%	78.6%	75.0%	62.5%	75.0%	54.5%	71.4%	90.0%	73.3%	77.8%	
Total	19	6	12	14	8	8	12	11	7	10	15	9	131
Total %	14.5%	4.6%	9.2%	10.7%	6.1%	6.1%	9.2%	8.4%	5.3%	7.6%	11.5%	6.9%	100.1%

Table 27: Food and Waterborne Outbreak-related Cases by Month, Florida, 2005

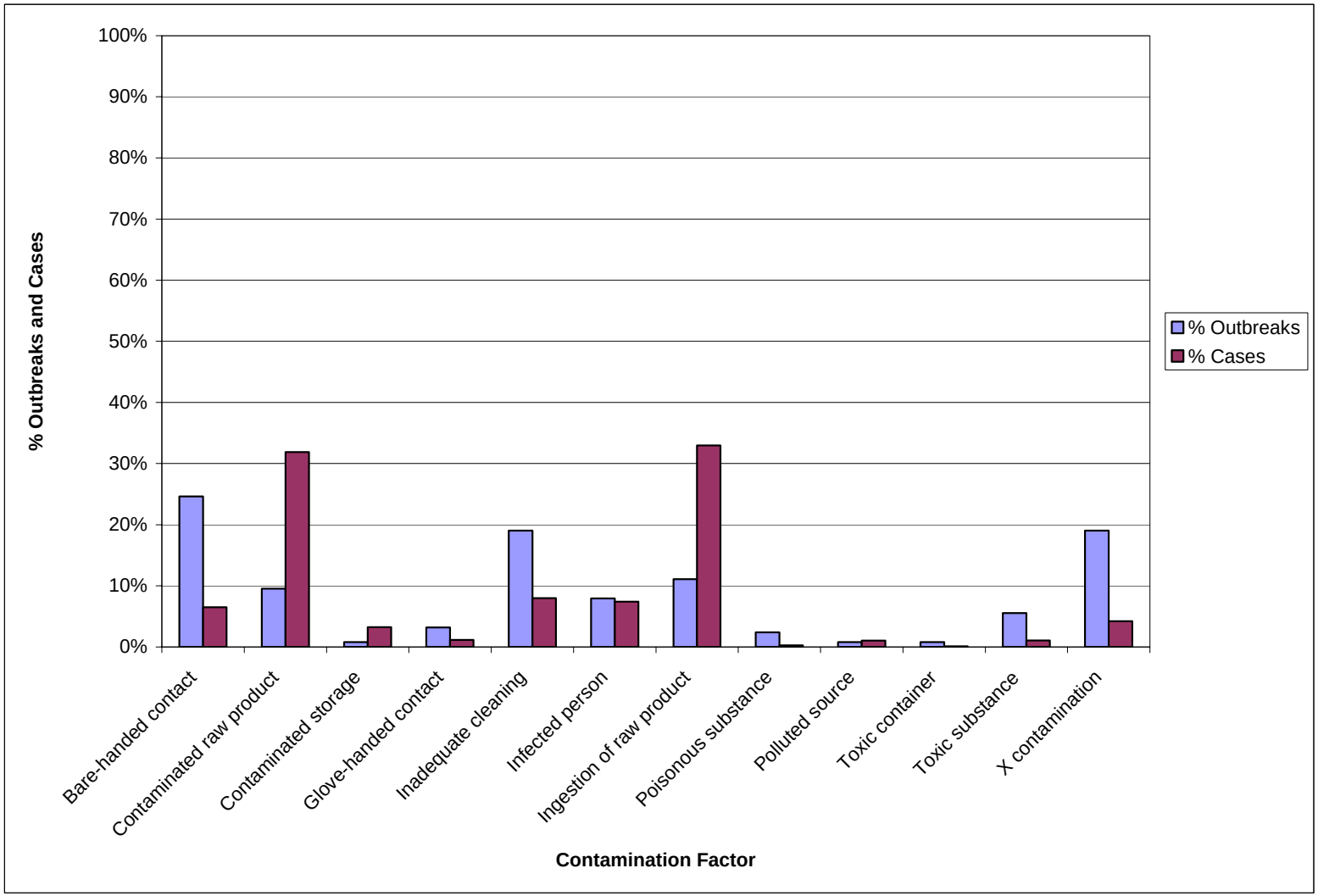
Status	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Confirmed	95	91	12	621	540	61	45	47	27	1	71	6	1617
row%	5.9%	5.6%	0.7%	38.4%	33.4%	3.8%	2.8%	2.9%	1.7%	0.1%	4.4%	0.4%	80.2%
col%	70.4%	89.2%	30.0%	94.1%	96.3%	64.9%	45.0%	69.1%	62.8%	2.3%	59.7%	11.8%	
Suspected	40	11	28	39	21	33	55	21	16	43	48	45	400
row%	10.0%	2.8%	7.0%	9.8%	5.3%	8.3%	13.8%	5.3%	4.0%	10.8%	12.0%	11.3%	19.8%
col%	29.6%	10.8%	70.0%	5.9%	3.7%	35.1%	55.0%	30.9%	37.2%	97.7%	40.3%	88.2%	
Total	135	102	40	660	561	94	100	68	43	44	119	51	2017
Total %	6.7%	5.1%	2.0%	32.7%	27.8%	4.7%	5.0%	3.4%	2.1%	2.2%	5.9%	2.5%	100.1%

Table 28: Food and Waterborne Outbreaks With Greater Than 10 Cases (n=19), Florida, 2005[21]

Status	County	# Cases	Site	Vehicles	Pathogen	Pathogen Status
Confirmed	Lee	11	Grocery	Bread pudding	Salmonella	Confirmed
Suspected	Broward	11	Restaurant	Red snapper	Unknown	Unknown
Suspected	Polk	12	Caterer	Chicken and ribs	Unknown	Unknown
Confirmed	Lee	13	Home	Roasted pork	C. perfringens	Confirmed
Confirmed	Escambia	14	Restaurant	Unknown	Norovirus	Confirmed
Confirmed	Saint Johns	15	Restaurant	Salads	Norovirus	Confirmed
Suspected	Pasco	16	Caterer	Cuban sandwiches	Norovirus	Suspected
Suspected	Dade	16	Restaurant	Pork and congri rice	Unknown	Unknown
Confirmed	Manatee	18	Caterer	Roast beef	C. perfringens	Suspected
Confirmed	Indian River	20	Restaurant	Raw oysters	Hepatitis A	Confirmed
Suspected	Nassau	24	Public water	Pool and ocean	Sea bathers eruption	Suspected
Confirmed	Orange	33	Restaurant	Tiramisu, quiche	Norovirus	Confirmed
Confirmed	Volusia	36	Other	Pork sandwich	Salmonella	Confirmed
Confirmed	Duval	47	Pool	Recreational water	Cryptosporidium	Confirmed
Confirmed	Sarasota	61	Caterer	Portabella chicken	C. perfringens	Suspected
Confirmed	Osceola	63	Caterer	Chicken	C. perfringens	Confirmed
Confirmed	Hillsborough	91	Caterer	Lettuce	Viral-non-norovirus	Suspected
Confirmed	Dade	526	Restaurant	Chicken and sauce	Unknown	Unknown
Confirmed	Sarasota	592	Restaurant	Fresh basil	Cyclospora	Confirmed
	Total	**1,619**				

[21] The total number of outbreaks with more than ten cases is: 33 (18.9% of the total). The total number of cases associated with these outbreaks is 1494 (77% of the total).

Figure 19: Contamination Factor – Percent Total Foodborne Outbreaks (n=128) and Outbreak-related Cases (n=1944), Florida, 2005 [22]



[22] Each outbreak may have up to three contamination factors, thus the numbers and percentages will not add up to the actual number of outbreaks and outbreak-related cases.

Table 29: Contamination Factor - Number of Foodborne Outbreaks (n=128) and Outbreak-related Cases (n=1944), Florida, 2005[23]

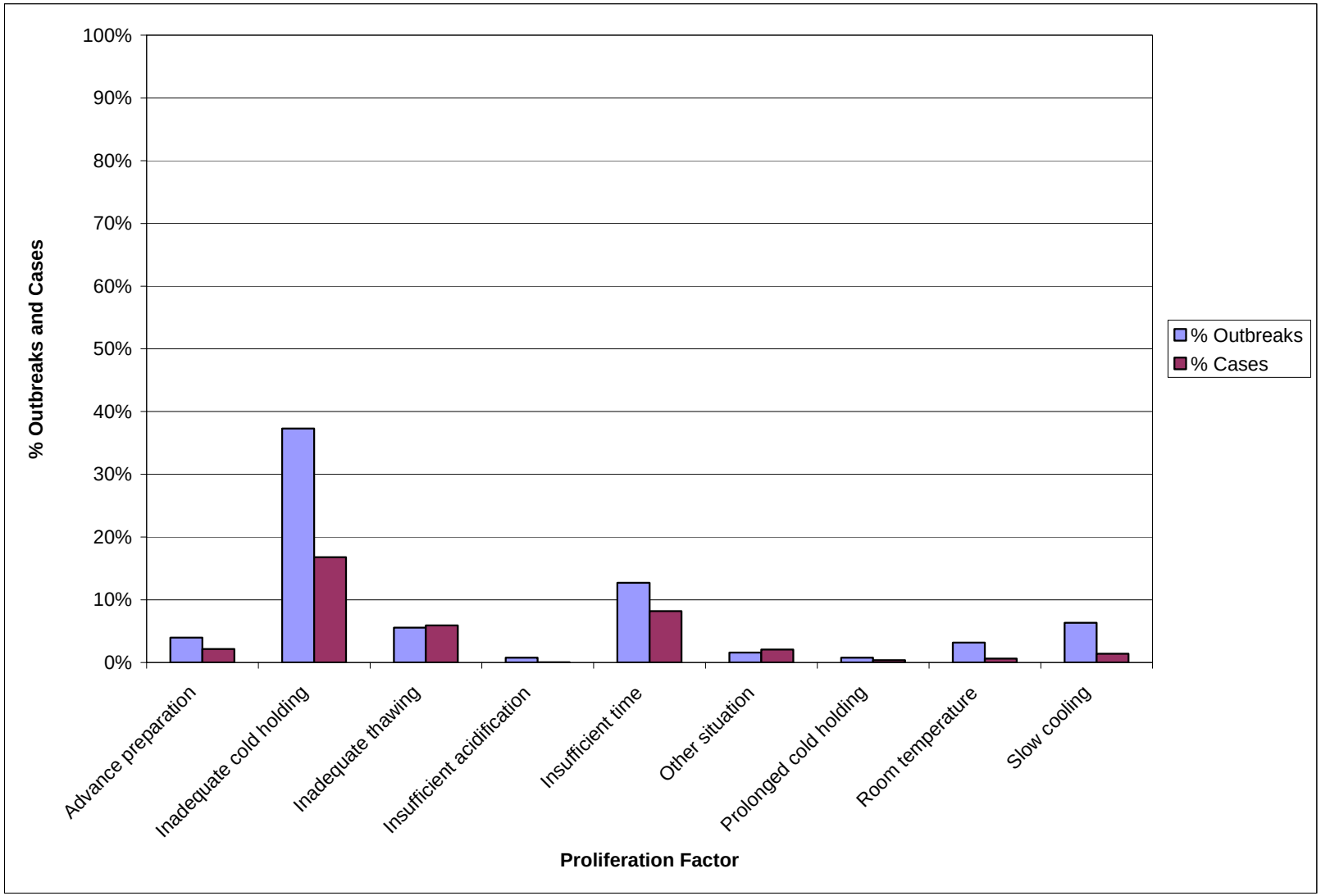
Contamination factor	# Outbreaks	# Cases
Bare-handed contact	31	126
Contaminated raw product	12	619
Contaminated storage	1	63
Glove-handed contact	4	22
Inadequate cleaning	24	155
Infected person	10	144
Ingestion of raw product	14	640
Poisonous substance	3	5
Polluted source	1	20
Toxic container	1	2
Toxic substance	7	21
X contamination	24	82

Table 30: Contamination Factor: Percent of Total Foodborne Outbreaks (n=128) and Outbreak-related Cases (n=1944), Florida, 2005

Contamination factor	# Outbreaks	# Cases
Bare-handed contact	24.6%	6.5%
Contaminated raw product	9.5%	31.9%
Contaminated storage	0.8%	3.2%
Glove-handed contact	3.2%	1.1%
Inadequate cleaning	19.0%	8.0%
Infected person	7.9%	7.4%
Ingestion of raw product	11.1%	33.0%
Poisonous substance	2.4%	0.3%
Polluted source	0.8%	1.0%
Toxic container	0.8%	0.1%
Toxic substance	5.6%	1.1%
X contamination	19.0%	4.2%

[23] Each outbreak may have up to three contamination factors, thus the numbers and percentages will not add up to the actual number of outbreaks and outbreak-related cases.

Figure 20: Proliferation/Amplification Factor: Percent Total Foodborne Outbreaks (n=128) and Outbreak-related Cases (n=1944), Florida, 2005[24]



[24] Each outbreak may have up to three proliferation/amplification factors, thus the numbers and percentages will not add up to the actual number of outbreaks and outbreak-related cases.

Table 31: Proliferation/Amplification Factor:
Number of Foodborne Outbreaks (n=128) and Outbreak-related Cases (n=1944), Florida, 2005

Proliferation Factor	# Outbreaks	# Cases
Advance preparation	5	42
Inadequate cold holding	47	326
Inadequate thawing	7	115
Insufficient acidification	1	1
Insufficient time during cooking/reheating	16	159
Other situation	2	40
Prolonged cold holding	1	7
Room temperature	4	12
Slow cooling	8	27

Table 32: Proliferation/Amplification Factor:
Percent Total Foodborne Outbreaks (n=128) and Outbreak-related Cases (n=1944), Florida, 2005

Proliferation Factor	# Outbreaks	# Cases
Advance preparation	4.0%	2.2%
Inadequate cold holding	37.3%	16.8%
Inadequate thawing	5.6%	5.9%
Insufficient acidification	0.8%	0.1%
Insufficient time during cooking/reheating	12.7%	8.2%
Other situation	1.6%	2.1%
Prolonged cold holding	0.8%	0.4%
Room temperature	3.2%	0.6%
Slow cooling	6.3%	1.4%

Figure 21: Survival Factor: Percent Total Foodborne Outbreaks (n=128) and Outbreak-related Cases (n=1944), Florida, 2005[25]

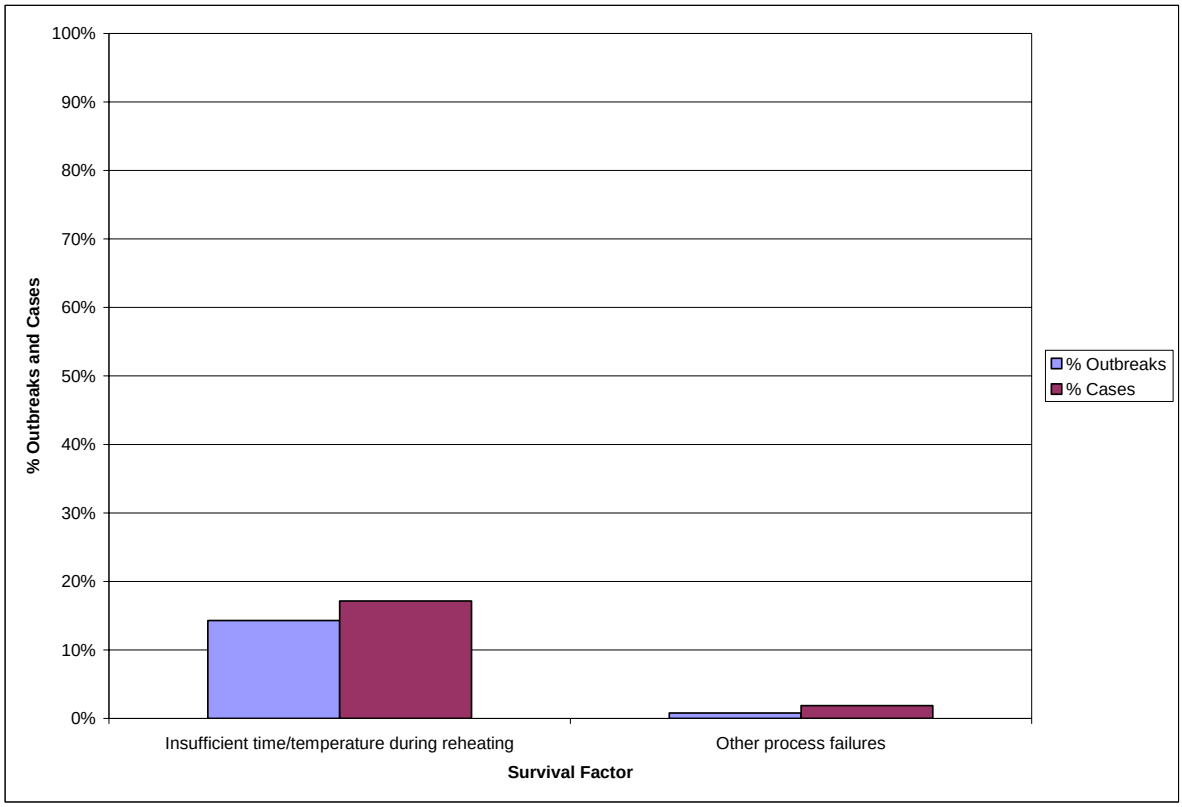


Table 33: Survival Factor:
Number of Foodborne Outbreaks (n=128) and Outbreak-related Cases (n=1944), Florida, 2005

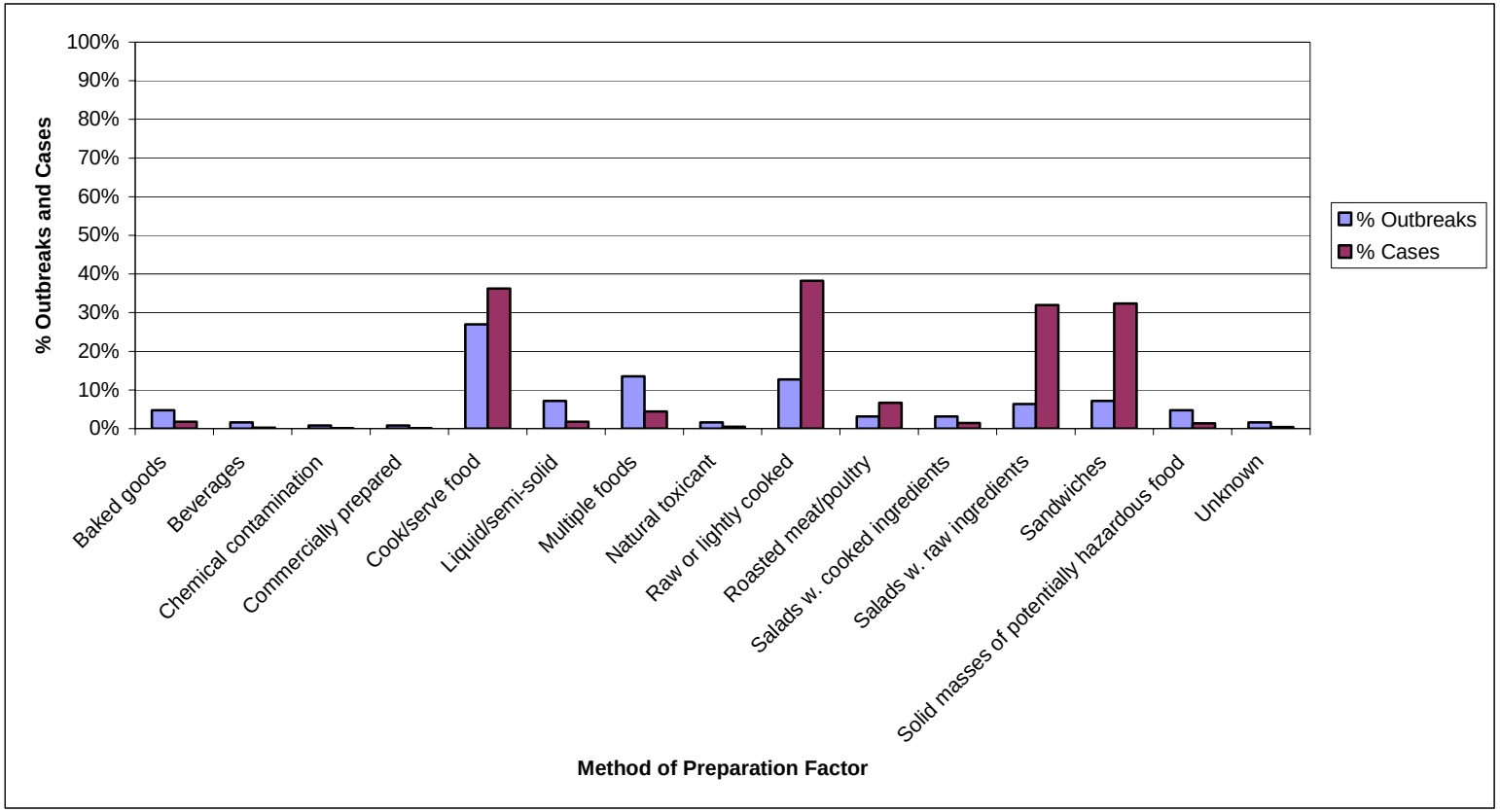
Survival Factor	# Outbreaks	# Cases
Insufficient time/temperature during reheating	18	333
Other process failures	1	36

Table 34: Survival Factor:
Percent Total Foodborne Outbreaks (n=128) and Outbreak-related Cases (n=1944), Florida, 2005

Survival Factor	% Outbreaks	% Cases
Insufficient time/temperature during reheating	14.3%	17.2%
Other process failures	0.8%	1.9%

[25] Each outbreak may have up to three survival factors, thus the numbers and percentages will not add up to the actual number of outbreaks and outbreak-related cases.

Figure 22: Method of Preparation Factor: Percent Foodborne Outbreaks (n=128) and Outbreak-related Cases (n=1944), Florida, 2005[26]



[26] Each outbreak may have up to three method of preparation factors, thus the numbers and percentages will not add up to the actual number of outbreaks and outbreak-related cases.

Table 35: Method of Preparation Factor:
Number of Foodborne Outbreaks (n=128) and Outbreak-related Cases (n=1,944), Florida, 2005

Method of Preparation Factor	# Outbreaks	# Cases
Baked goods	6	34
Beverages	2	4
Chemical contamination	1	2
Commercially prepared	1	2
Cook/serve food	34	703
Liquid/semi-solid	9	34
Multiple foods	17	86
Natural toxicant	2	10
Raw or lightly cooked	16	743
Roasted meat/poultry	4	130
Salads w. cooked ingredients	4	28
Salads w. raw ingredients	8	620
Sandwiches	9	629
Solid masses of potentially hazardous food	6	27
Unknown	2	8

Table 36: Method of Preparation Factor:
Percent Total Foodborne Outbreaks (n=128) and Outbreak-related Cases (n=1,944), Florida, 2005[27]

Method of Preparation Factor	# Outbreaks	# Cases
Baked goods	4.8%	1.8%
Beverages	1.6%	0.2%
Chemical contamination	0.8%	0.1%
Commercially prepared	0.8%	0.1%
Cook/serve food	27.0%	36.2%
Liquid/semi-solid	7.1%	1.8%
Multiple foods	13.5%	4.4%
Natural toxicant	1.6%	0.5%
Raw or lightly cooked	12.7%	38.3%
Roasted meat/poultry	3.2%	6.7%
Salads w. cooked ingredients	3.2%	1.4%
Salads w. raw ingredients	6.3%	31.9%
Sandwiches	7.1%	32.4%
Solid masses of potentially hazardous food	4.8%	1.4%
Unknown	1.6%	0.4%

[27] Each outbreak may have up to three method of preparation factors, thus the numbers and percentages will not add up to the actual number of outbreaks and outbreak-related cases.

Table 37: Contamination Factors by Etiologic Agent for Foodborne Outbreaks Reported in Florida (n=128), 2005

Pathogen	Bare handed contact	Contam raw product	Storage contam	Glove handed contact	Inad cleaning	Infected person	Ingestion raw product	Poison substance	Polluted source	Toxic container	Toxic substance	X contam	Total
B. cereus	2	1	0	0	0	0	0	0	0	1	0	1	5
C. botulinum	0	0	0	0	0	0	1	0	0	0	0	0	1
C. perfringens	1	0	1	0	1	0	0	0	0	0	0	0	3
Campylobacter	0	0	0	0	0	1	0	0	0	0	0	0	1
Chemical	1	0	0	0	1	0	0	3	0	0	0	0	5
Ciguatera	0	0	0	0	0	0	0	0	0	0	2	0	2
Cryptosporidium	0	0	0	0	0	1	0	0	0	0	0	0	1
Cyclospora	0	1	0	0	0	0	1	0	0	0	0	0	2
Hepatitis A	0	0	0	0	0	0	1	0	1	0	0	0	2
Mercury Poisoning	0	2	0	0	0	0	0	0	0	0	1	0	3
Norovirus	5	0	0	0	1	6	0	0	0	0	0	0	12
NSP	0	0	0	0	0	0	0	0	0	0	2	0	2
Salmonella	0	1	0	1	1	1	1	0	0	0	0	1	6
Scombroid	0	0	0	0	0	0	0	0	0	0	2	0	2
Staphylococcus	7	0	0	0	4	0	1	0	0	0	0	6	18
Unknown	14	1	0	3	15	1	3	0	0	0	0	16	53
V. parahaemolyticus	1	0	0	0	1	0	0	0	0	0	0	0	2
V. vulnificus	0	6	0	0	0	0	6	0	0	0	0	0	12
Total	31	12	1	4	24	10	14	3	1	1	7	24	132

Table 38: Contamination Factors by Etiologic Agent for Cases in Foodborne Outbreaks Reported in Florida (n=1,944), 2005

Pathogen	Bare handed contact	Contam raw product	Storage contam	Glove handed contact	Inad cleaning	Infected person	Ingestion raw product	Poison substance	Polluted source	Toxic container	Toxic substance	X contam	Total
B. cereus	5	4	0	0	0	0	0	0	0	2	0	2	13
C. botulinum	0	0	0	0	0	0	1	0	0	0	0	0	1
C. perfringens	2	0	63	0	63	0	0	0	0	0	0	0	128
Campylobacter	0	0	0	0	0	5	0	0	0	0	0	0	5
Chemical	7	0	0	0	7	0	0	5	0	0	0	0	19
Ciguatera	0	0	0	0	0	0	0	0	0	0	7	0	7
Cryptosporidium	0	0	0	0	0	47	0	0	0	0	0	0	47
Cyclospora	0	592	0	0	0	0	592	0	0	0	0	0	1184
Hepatitis A	0	0	0	0	0	0	20	0	20	0	0	0	40
Mercury Poisoning	0	4	0	0	0	0	0	0	0	0	2	0	6
Norovirus	42	0	0	0	8	76	0	0	0	0	0	0	126
NSP	0	0	0	0	0	0	0	0	0	0	8	0	8
Salmonella	0	7	0	7	8	11	7	0	0	0	0	8	48
Scombroid	0	0	0	0	0	0	0	0	0	0	4	0	4
Staphylococcus	19	0	0	0	9	0	2	0	0	0	0	18	48
Unknown	49	6	0	15	58	5	12	0	0	0	0	54	199
V. parahaemolyticus	2	0	0	0	2	0	0	0	0	0	0	0	4
V. vulnificus	0	6	0	0	0	0	6	0	0	0	0	0	12
Total	126	619	63	22	155	144	640	5	20	2	21	82	1899

Table 39: Proliferation/Amplification Factors by Etiologic Agent for Foodborne Outbreaks Reported in Florida (n=128), 2005

Pathogen	Advance Preparation	Inad cold holding	Inad thaw	Insufficient acidification	Insufficient time/T during hot holding	Other situation	Prolonged cold holding	Room T	Slow cooling	Total
B. cereus	1	2	0	0	2	0	0	0	1	6
C. botulinum	0	0	0	1	0	0	0	0	0	1
C. perfringens	2	2	1	0	3	0	0	0	1	9
Campylobacter	0	1	0	0	0	0	0	0	0	1
Chemical	0	1	0	0	0	0	0	0	0	1
Norovirus	0	3	0	0	0	0	0	0	0	3
Salmonella	2	2	2	0	2	1	1	0	0	10
Scombroid	0	3	1	0	0	0	0	1	0	5
Shigella	0	1	0	0	1	0	0	0	0	2
Staphylococcus	0	8	1	0	2	0	0	1	1	13
Unknown	0	22	2	0	6	1	0	2	5	38
V. parahaemolyticus	0	1	0	0	0	0	0	0	0	1
Viral-non-Norwalk	0	1	0	0	0	0	0	0	0	1
Total	5	47	7	1	16	2	1	4	8	91

Table 40: Proliferation/Amplification Factors by Etiologic Agent for Cases in Foodborne Outbreaks Reported in Florida (n=1,944), 2005

Pathogen	Advance Preparation	Inad cold holding	Inad thaw	Insufficient acidification	Insufficient time/T during hot holding	Other situation	Prolonged cold holding	Room T	Slow cooling	Total
B. cereus	4	5	0	0	5	0	0	0	3	17
C. botulinum	0	0	0	1	0	0	0	0	0	1
C. perfringens	23	81	63	0	73	0	0	0	2	242
Campylobacter	0	5	0	0	0	0	0	0	0	5
Chemical	0	7	0	0	0	0	0	0	0	7
Norovirus	0	16	0	0	0	0	0	0	0	16
Salmonella	15	15	41	0	41	36	7	0	0	155
Scombroid	0	10	2	0	0	0	0	5	0	17
Shigella	0	3	0	0	3	0	0	0	0	6
Staphylococcus	0	22	3	0	8	0	0	2	2	37
Unknown	0	69	6	0	29	4	0	5	20	133
V. parahaemolyticus	0	2	0	0	0	0	0	0	0	2
Viral-non-Norwalk	0	91	0	0	0	0	0	0	0	91
Total	42	326	115	1	159	40	7	12	27	729

Table 41: Survival Factors by Etiologic Agent for Foodborne Outbreaks Reported in Florida (n=128), 2005

Pathogen	Insufficient time/T during cooking, processing, reheating	Other process failure	Total
B. cereus	1	0	1
C. perfringens	7	0	7
Campylobacter	1	0	1
Salmonella	4	1	5
Staphylococcus	1	0	1
Unknown	4	0	4
Total	18	1	19

Table 42: Survival Factors by Etiologic Agent for Cases in Foodborne Outbreaks Reported in Florida (n=1,944), 2005

Pathogen	Insufficient time/T during cooking, processing, reheating	Other process failure	Total
B. cereus	4	0	4
C. perfringens	218	0	218
Campylobacter	5	0	5
Salmonella	87	36	123
Staphylococcus	2	0	2
Unknown	17	0	17
Total	333	36	369

Table 43: Method of Preparation Factors by Etiologic Agent for Foodborne Outbreaks Reported in Florida (n=128), 2005

Pathogen	Baked goods	Drinks	Chem. contam	Commerc. processed	Cook/ serve food	Liquid/ semi-solid	Multiple foods	Natural toxicant	Raw or lightly cooked	Roasted meat/ poultry	Salads w cooked ingred	Salads w raw ingred	Sandw	Solid masses	Unk	Total
B. cereus	1	0	0	0	1	1	1	0	0	0	0	0	0	0	0	4
C. botulinum	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
C. perfringens	0	0	0	0	2	1	1	0	0	3	0	0	0	0	0	7
Campylobacter	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
Chemical	0	1	1	0	0	0	1	0	0	0	0	0	0	0	0	3
Ciguatera	0	0	0	0	2	0	0	1	0	0	0	0	0	0	0	3
Cyclospora	0	0	0	0	0	0	0	0	1	0	0	1	1	1	0	4
Hepatitis A	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
Norovirus	0	0	0	0	1	0	4	0	0	0	1	2	2	0	0	10
NSP	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	2
Salmonella	1	0	0	0	0	0	0	0	1	1	0	0	2	2	0	7
Scombroid	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	4
Shigella	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
Staphylococcus	0	0	0	0	5	2	4	0	0	0	0	1	0	1	0	13
Unknown	4	1	0	1	19	3	5	0	5	0	3	4	4	2	2	53
V. parahaemolyticus	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
V. vulnificus	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	5
Viral-non-Norwalk	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
Total	6	2	1	1	34	9	17	2	16	4	4	8	9	6	2	121

Table 44: Method of Preparation Factors by Etiologic Agent for Cases in Foodborne Outbreaks Reported in Florida (n=1,944), 2005

Pathogen	Baked goods	Drinks	Chem. contam	Commerc. processed	Cook/ serve food	Liquid/ semi-solid	Multiple foods	Natural toxicant	Raw or lightly cooked	Roasted meat/ poultry	Salads w/ cooked ingred	Salads w/ raw ingred	Sandw	Solid masses	Unk	Total
B. cereus	4	0	0	0	3	3	2	0	0	0	0	0	0	0	0	12
C. botulinum	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
C. perfringens	0	0	0	0	69	10	2	0	0	94	0	0	0	0	0	175
Campylobacter	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	5
Chemical	0	1	2	0	0	0	7	0	0	0	0	0	0	0	0	10
Ciguatera	0	0	0	0	2	0	0	6	0	0	0	0	0	0	0	8
Cyclospora	0	0	0	0	0	0	0	0	592	0	0	592	592	4	0	1780
Hepatitis A	0	0	0	0	0	0	0	0	20	0	0	0	0	0	0	20
Norovirus	0	0	0	0	5	0	50	0	0	0	15	11	18	0	0	99
NSP	0	0	0	0	0	0	0	4	4	0	0	0	0	0	0	8
Salmonella	11	0	0	0	0	0	0	0	7	36	0	0	7	15	0	76
Scombroid	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	15
Shigella	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	3
Staphylococcus	0	0	0	0	17	5	8	0	0	0	0	6	0	3	0	39
Unknown	19	3	0	2	592	9	14	0	23	0	13	11	12	5	8	711
V. parahaemolyticus	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	2
V. vulnificus	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	5
Viral-non-Norwalk	0	0	0	0	0	0	0	0	91	0	0	0	0	0	0	91
Total	34	4	2	2	703	34	86	10	743	130	28	620	629	27	8	3060

Figure 23: Waterborne Disease Factors: Percent Total Waterborne Outbreaks (n=3) and Outbreak-related Cases (n=73), Florida, 2005[28]

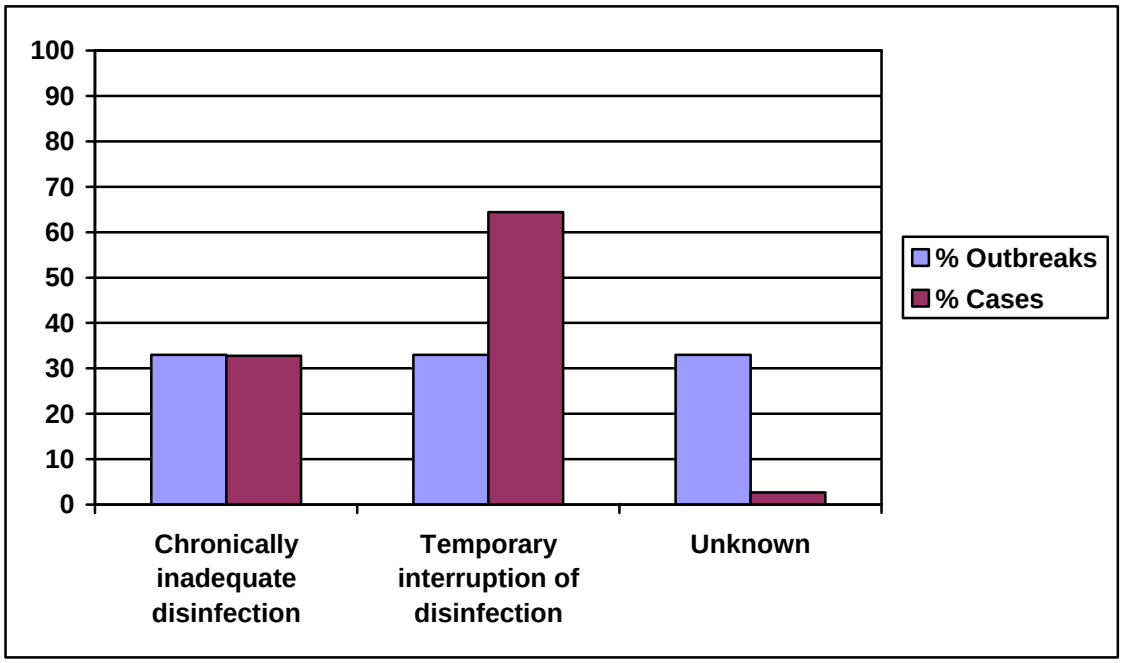


Table 45: Waterborne Disease Factors:
Number of Waterborne Outbreaks (n=3) and Outbreak-related Cases (n=73), Florida, 2005

Water	# Outbreaks	# Cases
Chronically inadequate disinfection	1	24
Temporary interruption of disinfection	1	47
Unknown	1	2

Table 46: Waterborne Disease Factors:
Percent Total Waterborne Outbreaks (n=3) and Outbreak-related Cases (n=73), Florida, 2005[29]

Water	% Outbreaks	% Cases
Chronically inadequate disinfection	33%	32.8%
Temporary interruption of disinfection	33%	64.4%
Unknown	33%	2.7%

[28] Each outbreak may have up to three waterborne disease factors, thus the numbers and percentages will not add up to the actual number of outbreaks and outbreak-related cases.
[29] Each outbreak may have up to three waterborne disease factors, thus the numbers and percentages will not add up to the actual number of outbreaks and outbreak-related cases.

Table 47: Contributing Factors by Etiologic Agent for All Waterborne Outbreaks (n=3), Florida, 2005

Pathogen	Chronically inadequate disinfection	Temporary interruption of disinfection	Unknown	Total
Cryptosporidium	0	1	0	1
Legionella	0	0	1	1
Sea Bather's Eruption	1	0	0	1
Total	**1**	**1**	**1**	**3**

Table 48: Contributing Factors by Etiologic Agent for Cases Associated With All Waterborne Outbreaks (n=73), Florida, 2005

Pathogen	Chronically inadequate disinfection	Temporary interruption of disinfection	Unknown	Total
Cryptosporidium	0	47	0	47
Legionella	0	0	2	2
Sea Bather's Eruption	24	0	0	24
Total	24	47	2	73

Table 49: Line List of Waterborne Outbreaks (n=3), Florida, 2005

County	Status	# Cases	Site	Vehicle	Pathogen	Pathogen Status
Broward	Suspected	2	Other	Unknown	Legionella	Confirmed
Nassau	Suspected	24	Public Water	Pool And Ocean	Sea Bathers Eruption	Suspected
Duval	Confirmed	47	Pool	Recreational Water	Cryptosporidium	Confirmed
	Total	**73**				

Explanation of Contributing Factors For Foodborne Illness Outbreaks From CDC Form 52.13

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[30]

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

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

Statewide Cyclosporiasis Outbreak
Florida, March-June 2005

Final Report

Bureau of Community Environmental Health
Division of Environmental Health
Department of Health

List of Tables, Figures and Appendices

Background

In mid-April, 2005, a private laboratory reported a dozen cases of cyclosporiasis to the Florida Department of Health, Bureau of Epidemiology Surveillance Section. The total number of cases reported in 2004 was 9, and the average for 2003-2005 for reporting week 14, ending April 16 (the week the positive results were received from the private lab) was 1.67, 20% higher than normally expected. By reporting week 17, the percent increase was 162%, a clear indication of a possible outbreak. Cases were reported from numerous counties with no initial apparent pattern.

Investigation Summary

A system was set up whereby private laboratory results were sent to a single Department of Health coordinator. From past experiences with outbreaks of cyclosporiasis, and according to the surveillance case definition, the private laboratories were asked to send their slides to the Department of Health, Bureau of Laboratories for confirmation. Laboratory results were sent in steadily, sometimes up to 30 per day or more. A decision was also made to use the Merlin Outbreak Module as well, so individual counties could enter case information on the outbreak. The CDC Division of Parasitic Diseases was contacted and consulted during the course of the outbreak investigation. Regular updates were e-mailed to selected DOH administration staff as well as to other state agency partners. These updates were also posted on the DOH disease alert notification system, EpiCom. Also, a summary was posted on EpiX as a call for out-of-state cases.

The case definition for this outbreak investigation was: a probable or confirmed case of cyclospora infection, using the surveillance case definition, with onset since March 1, 2005, in a resident of or visitor to Florida. The Florida Department of Health surveillance case definition is:

> Confirmed: a clinically compatible case that is laboratory confirmed
> Probable: a clinically compatible case that is epidemiologically linked to a confirmed case.

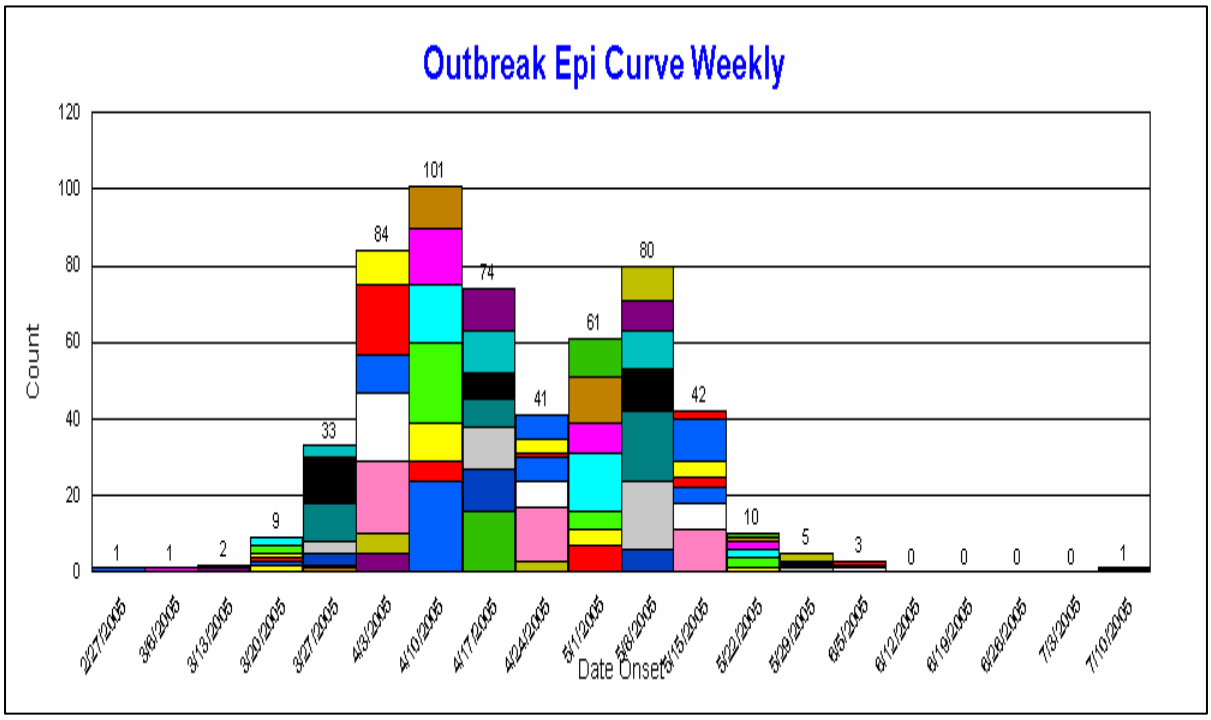
Dates of exposure in the clustered cases ranged from March 19 – May 15, 2005. Dates of onset in the clustered cases ranged from March 24 – June 24, 2005 (see Table 1). Dates of onset of both sporadic and clustered cases ranged from March 1– July 10, 2005 (see Figure 1). Predominant symptoms included: diarrhea (78.5%), fatigue (64%) and abdominal pain (61.8%; see Table 2). Over 75% of the cases were over 40 years old, 81% of the cases were white, 79% non-Hispanic and 57% were female, 43% male (see Tables 3-6). Differences between the total number of answers to these questions and overall total number of cases can be attributed to incomplete interviews (primarily of out-of-state cases) or lack of answers by cases. Each case was asked a series of risk factor questions including a long consumption list of various raw fruits and vegetables, other foods and travel histories. The widespread nature of the cases and the lack of any readily apparent common food item was a strong indicator of a widely distributed food. The only weakly significant preliminary risk factors were iceberg lettuce with an

OR of 2.94, 95% CI = (1.17, 7.42), p-value < 0.02 and limes with an OR of 8.54, 95% CI = (1.13, 64.79), p-value <0.02. Initially all the cases appeared to be sporadic, but then some clusters emerged (see Table 1). Investigation of three of these clusters, from Pinellas, Flagler and Sarasota Counties were used to determine the implicated food item (see Table 8 and appendices). The Palm Beach County and the Orange County cluster investigations had inconclusive results.

Table 1: Cyclospora Clusters, 2005: Range of Dates of Exposure and Dates of Onset

County	Exposure	Onset
Pinellas # 1	4/1-4/2	3/25-4/23[31]
Pinellas # 2	4/1-4/9	4/5-4/18
Flagler	4/1-4/12	4/9-4/21
Sarasota # 1[32]	3/19-4/17	3/24-4/21
Palm Beach	4/10	4/13-4/18
Sarasota # 2	5/5-5/15	5/9-6/24
Orange	5/2-5/6	5/4-6/8

Figure 1: Epi-Curve by Week of the 2005 Cyclospora Outbreak



Note: the epi curve is by week of onset, thus the first case of March 1 occurred during the week of February 27 – March 5, 2005.

[31] The 3/25 case is included due to presumed recall bias by the case as to when symptoms began.
[32] Includes a sporadic, community group that ate at the independent restaurant, plus 4 sub-clusters that ate food catered from the same restaurant.

Table 2: Frequency of Symptoms

Symptoms	Frequency	Percent
Diarrhea	465	79%
Fatigue	379	64%
Abdominal Pain	366	62%
Weight Loss	353	60%
Nausea	326	55%
Anorexia/Loss of Appetite	320	54%
Bloating	273	46%
Chills	130	22%
Headache	126	21%
Fever/Chills	105	18%
Fever	95	16%
Muscle Aches	66	11%
Constipation	41	7%

n=592

Table 3: Cases by Age

Age Group	Number	Percent
0 - 4	4	<1%
5 - 9	0	0%
10 - 14	3	<1%
15 - 19	4	<1%
20 - 24	21	4%
25 - 29	29	5%
30 - 39	73	13%
40 - 49	144	26%
50 - 59	138	25%
60 +	147	26%

n = 563

Table 4: Cases by Race

Race	Number	Percent
American Indian/Alaskan Native	1	<1%
Asian/Pacific Islander	0	0%
Black	3	<1%
Other	2	<1%
White	458	81%
Unknown	30	5%
Not Answered	69	12%

n = 563

Table 5: Cases by Gender

Gender	Number	Percent
Male	240	43%
Female	322	57%
Unknown	1	<1%

n = 563

Table 6: Cases by Ethnicity

Ethnicity	Number	Percent
Hispanic	17	3%
Non Hispanic	447	79%
Unknown	26	5%
Not Answered	73	13%

n = 563

The first cluster to emerge was the Pinellas County cluster, associated with consuming food at chain restaurant A. In this cluster, there was a total of 42 cases (17 laboratory confirmed, 25 probable). The range of exposures was from April 1-2, 2005. The range of dates of onset was March 25 – April 23, 2005. The implicated menu item was herb-flavored oil used for bread dipping with the following ingredients: olive oil, fresh basil, Italian parsley, rosemary, and fresh garlic with an OR 52, 95% CI: 8.99, 300.78. During the investigation of the cluster associated with chain restaurant A, another small cluster became apparent at a different chain restaurant owned by the same company. A total of 8 cases (4 confirmed, 4 probable) was linked to this second cluster. The implicated item in the second cluster was bread dipping oil mixed with pesto. Both restaurants from different chains receive Italian parsley and fresh basil from the same distributor.

The second cluster, in Flagler County, was associated with consuming food at an independent restaurant. This cluster had a total of 20 cases (16 confirmed, 4 probable) with exposures ranging from April 1 – 12, 2005. The Flagler County cluster investigation also implicated a flavored bread dipping oil with the following ingredients: olive oil, fresh basil, fresh garlic, and Parmesan cheese with an OR 27, 95% CI = 2.29, 534.3, p-value = 0.002.

The Sarasota County cluster is really 5 separate doctor's offices whose staff was provided catered lunches from the same independent restaurant by drug company representatives. There was an additional sporadic group associated with eating at the same independent restaurant. Exposures ranged from March 19 – April 17, 2005 and dates of onset from March 24 – April 21, 2005. While no single, statistically significant food item was identified, an ingredient can be implicated through the food histories. All 5 medical groups were served a lunch of meat wraps, vegetable wraps and Greek salad, all with sun-dried tomato vinaigrette. The sporadic cases ate at the restaurant where Greek salad, Moroccan salad and cucumber salad were on the menu. The Greek salad, meat wrap and veggie wrap all contained sun dried tomato vinaigrette with the following ingredients: olive oil, balsamic vinegar, sun dried tomatoes, fresh onions,

salt and pepper and fresh basil. The inability to generate a statistically significant food is attributed to the lack of controls available for the case-control study, the suspected food ingredient being in multiple menu items and lack of recall for food histories.

Table 7 shows a summary of the 3 primary clusters used to determine the implicated food item. Additionally, a short questionnaire was administered to 35 confirmed Cyclospora cases picked at random from the sporadic outbreak cases in various areas of the state to assess fresh basil consumption habits. Five cases were selected from each of seven areas. Questions were asked pertaining to exposure to herbed green salads, basil, herbs, bruschetta, pesto, and pasta salads. There were also three questions related to visiting Italian, Thai and gourmet restaurants that commonly serve dishes with fresh basil or fresh basil garnish. The frequencies of response to the questions included two questions that had more than 50% of respondents answering affirmatively. These were eating at Italian restaurants (64.7%) and bread dipped in oil with fresh herbs (68.8%). An analysis of these two variables showed significance in going to an Italian restaurant and having bread dipped in olive oil with fresh herbs. The Fisher exact value was p=0.03. Eighty one percent (81%) of the 31 cases who responded to both questions had visited an Italian restaurant where the practice of dipping bread was customary and where they ate bread in this manner. Given the significance of all these findings as determined by DOH, CDC and FDA, the Department of Health, in consultation with epidemiologists at CDC and FDA, requested a formal traceback of the fresh basil.

Table 7: Summary of Primary Clusters Used to Determine the Outbreak Vehicle, Florida 2005

	County (Cluster #)	Date(s) of Exposure	Date(s) of Onset	# Confirmed Cases	# Probable Cases	Menu Item (s)	Ingredients/common item	Basic Statistics	Food Establishment
1.	Pinellas (1)	4/1/05 & 4/2/05	3/25/05 - 4/23/05	17	25	Bread dipping oil with fresh chopped herbs:	Basil, Italian parsley, rosemary, garlic	OR 52 (95% CI: 9-301)	Chain restaurant A
2.	Pinellas (2)	4/1/05-4/9/05	4/5/05-4/18/05	7	7	Bread dipping oil with pesto	Basil, garlic, parmesan cheese (Italian parsley only used as garnish and in wasabi herb sauce served with crab cakes)	OR 3.25 (95% CI: 0.16-64.62)[33]	Chain restaurant B

[33] Supported by epidemiologic evidence but not statistically significant due to sample size.

	County (Cluster #)	Date(s) of Exposure	Date(s) of Onset	# Confirmed Cases	# Probable Cases	Menu Item (s)	Ingredients/common item	Basic Statistics	Food Establishment
3.	Sarasota (Community group)	3/19/05-4/17/05	3/24/05 - 4/21/05	11	37	Mixed baby greens, Moroccan salad, Greek salad	Romaine lettuce, red and green leaf lettuce, balsamic vinegar, fresh mint, fresh cilantro, cucumbers, tomatoes, olives, parmesan cheese, and sun-dried tomato vinaigrette (see recipe above)	Mixed baby greens OR 0.87(95% CI, 0.17-4.39); Moroccan salad OR 0.08 (95% CI, 0.01-0.49); Greek salad OR 0.33 (95% CI,0.05-2.17) Combined OR 0.36 (95% CI, 0.12-1.03)`	Independent restaurant A

	County (Cluster #)	Date(s) of Exposure	Date(s) of Onset	# Confirmed Cases	# Probable Cases	Menu Item (s)	Ingredients/common item	Basic Statistics	Food Establishment
4.	Sarasota (Medical Group G)	3/29/05	4/3/05-4/7/05	2	19	Meat wrap, veggie wrap, Greek salad – all with herbed vinaigrette; cucumber salad	Sun-dried tomato vinaigrette: balsamic vinegar, sun-dried tomatoes, fresh onions, salt, pepper, fresh basil	Meat wrap OR 6.11 (95% CI,0.65-57.1); veggie wrap OR 2.72 (95% CI,0.28-26.5); Greek salad OR 1.08 (95% CI,0.17-6.65); Combined OR 2.19 (95% CI, 0.69-7.18); cucumber salad OR 0.36 (95% CI, 0.04-2.88)	Independent restaurant A

	County (Cluster #)	Date(s) of Exposure	Date(s) of Onset	# Confirmed Cases	# Probable Cases	Menu Item (s)	Ingredients/common item	Basic Statistics	Food Establishment
5.	Sarasota (Medical group L)	3/29/05	4/4/05-4/13/05	2	6	Meat wrap, veggie wrap, Greek salad – all with herbed vinaigrette; cucumber salad	Sun-dried tomato vinaigrette: balsamic vinegar, sun-dried tomatoes, fresh onions, salt, pepper, fresh basil	Meat wrap OR 6.11 (95% CI,0.65-57.1); veggie wrap OR 2.72 (95% CI,0.28-26.5); Greek salad OR 1.08 (95% CI,0.17-6.65); Combined OR 2.19 (95% CI, 0.69-7.18); cucumber salad OR 0.36 (95% CI, 0.04-2.88)	Independent restaurant A

	County (Cluster #)	Date(s) of Exposure	Date(s) of Onset	# Confirmed Cases	# Probable Cases	Menu Item (s)	Ingredients/common item	Basic Statistics	Food Establishment
6.	Sarasota (Medical group M)	4/5/05	4/8/06-4/14/05	2	10	Meat wrap, veggie wrap, Greek salad – all with herbed vinaigrette; cucumber salad	Sun-dried tomato vinaigrette: balsamic vinegar, sun-dried tomatoes, fresh onions, salt, pepper, fresh basil	Meat wrap OR 6.11 (95% CI,0.65-57.1); veggie wrap OR 2.72 (95% CI,0.28-26.5); Greek salad OR 1.08 (95% CI,0.17-6.65); Combined OR 2.19 (95% CI, 0.69-7.18); cucumber salad OR 0.36 (95% CI, 0.04-2.88)	Independent restaurant A

	County (Cluster #)	Date(s) of Exposure	Date(s) of Onset	# Confirmed Cases	# Probable Cases	Menu Item (s)	Ingredients/common item	Basic Statistics	Food Establishment
7.	Sarasota (Medical group A)	4/13/2005	4/18/05 - 4/21/05	0	4	Meat wrap, veggie wrap, Greek salad – all with herbed vinaigrette; cucumber salad	Sun-dried tomato vinaigrette: balsamic vinegar, sun-dried tomatoes, fresh onions, salt, pepper, fresh basil	Meat wrap OR 6.11 (95% CI,0.65-57.1); veggie wrap OR 2.72 (95% CI,0.28-26.5); Greek salad OR 1.08 (95% CI,0.17-6.65); Combined OR 2.19 (95% CI, 0.69-7.18); cucumber salad OR 0.36 (95% CI, 0.04-2.88)	Independent restaurant A

	County (Cluster #)	Date(s) of Exposure	Date(s) of Onset	# Confirmed Cases	# Probable Cases	Menu Item (s)	Ingredients/common item	Basic Statistics	Food Establishment
8.	Flagler	4/1/05-4/12/05	4/9/05-4/21/05	13	6	Bread dipping oil with herbs	Fresh basil, garlic, parmesan cheese	3/1/05-5/1/05: OR 8 (95% CI, 1.16-69.56); 4/1/05-4/12/05 OR 27 (95% CI, 2.29-534.3)	Independent restaurant A

Results

This outbreak was caused by *Cyclospora cayetanensis*, a single celled protozoan with symptoms of watery diarrhea, nausea, loss of appetite, abdominal pain, fatigue and weight loss. The case fatality rate is very low. The incubation period is 1-7 days, usually about 1 week and the ensuing illness can last anywhere from 1-3 weeks. Typical vehicles include raspberries, basil, lettuce, snow peas and water. Though water has been implicated, 90% of outbreaks of Cyclosporiasis are foodborne. Cyclosporiasis is endemic in many developing countries and is often associated with diarrhea in travelers to Asia, the Caribbean, Mexico and Peru.[34] CDC reports that there have been 5,000 cases reported in the last 5 years.[35] Table 8 shows a selection of previous outbreaks in Florida, other states, and other countries:

Table 8: Previous Cyclospora Outbreaks and Vehicles

Year	Location	Vehicle
Florida[36]		
1996	Palm Beach County (primarily), multiple clusters, part of multi-state outbreak[37]	raspberries
1997	Leon County	mesclun lettuce
1997	Orange County	mesclun lettuce
1999	Palm Beach County	undetermined (multiple fruits)
National		
1990	Chicago[38]	contaminated tap water
1996	Multi-state[39][40]	raspberries
1997	Multi-state[41]	raspberries
1997	N. Virginia/Baltimore/Washington, DC[42]	fresh basil
1998	Pennsylvania[43]	snow peas

[34] Control of Communicable Diseases Manual, 18th Edition, 2004, pp. 141-142.
[35] Barbara Herwaldt, MD, MPH, CDC Division of Parasitic Diseases, personal communication.
[36] Florida Department of Health, Bureau of Community Environmental Health, Food and Waterborne Disease Program Annual Reports, http://www.doh.state.fl.us/environment/community/foodsurveillance/annualreports.htm.
[37] Outbreaks of Cyclospora cayetanensis Infection -- United States, 1996. MMWR 45(25):549-551, June 28, 1996, http://www.cdc.gov/mmwr/PDF/wk/mm4525.pdf.
[38] Cyclospora: An Enigma Worth Unraveling. Emerging Infectious Diseases 5(1):48-53, January-February, 1999, http://www.cdc.gov/ncidod/eid/vol5no1/sterling.htm.
[39] Outbreaks of Cyclospora cayetanensis Infection -- United States, 1996. MMWR 45(25):549-551, June 28, 1996, http://www.cdc.gov/mmwr/PDF/wk/mm4525.pdf.
[40] Update: Outbreaks of Cyclospora cayetanensis Infection — United States and Canada, 1996. MMWR (45) 28:611-612, http://www.cdc.gov/mmwr/PDF/wk/mm4528.pdf.
[41] Update: Outbreaks of Cyclosporiasis — United States and Canada, 1997. MMWR 46 (23):521-523, June 13, 1997, http://www.cdc.gov/mmwr/PDF/wk/mm4623.pdf.
[42] Outbreak of Cyclosporiasis — Northern Virginia-Washington, D.C.-Baltimore, Maryland, Metropolitan Area, 1997. MMWR (46)30:689-691, http://www.cdc.gov/mmwr/PDF/wk/mm4630.pdf
[43] Outbreak of Cyclosporiasis Associated with Snow Peas – Pennsylvania, 2004. MMWR 53(37):876-878. September 24, 2004, **http://www.cdc.gov/mmwr/PDF/wk/mm5337.pdf.**

Year	Location	Vehicle
International		
1992	Nepal[44]	untreated water
1998	Canada[45]	raspberries
2005	Canada	fresh basil

The implicated food item in this outbreak was fresh basil imported from Peru, a widely distributed food ingredient used raw in many salads, sauces and garnishes.[46] It has been called a "stealth" ingredient by many because unless one knows the ingredients of a particular menu item, one might not remember having eaten it. Anecdotal evidence from a visit to the implicated farm in Peru indicates that farm conditions could have been conducive to provide opportunities for contamination of the basil. There was a total of 592 cases (365 confirmed, 227 probable; see Table 9). The clusters accounted for 71 confirmed and 210 probable cases (see Table 10). A total of 493 cases were residents of Florida with 10 cases in Canadian residents and 89 residents of other states, all having visited Florida during their exposure period.

Table 9: Florida Statewide Cyclospora Outbreak, 2005: Total Laboratory-Confirmed and Probable Cases

Laboratory-confirmed Cases	365
Probable Cases	227
Total Cases	592

Table 10: Summary of Cyclospora Cluster Cases: Confirmed and Probable

County	Confirmed	Probable
Pinellas # 1	17	25
Pinellas # 2	7	7
Flagler	16	4
Sarasota # 1	17	78
Palm Beach	4	7
Sarasota # 2	6	28
Orange	4	61
Cluster Totals	**71**	**210**

[44] Cyclospora: An Enigma Worth Unraveling. Emerging Infectious Diseases 5(1):48-53, January-February, 1999, http://www.cdc.gov/ncidod/eid/vol5no1/sterling.htm.

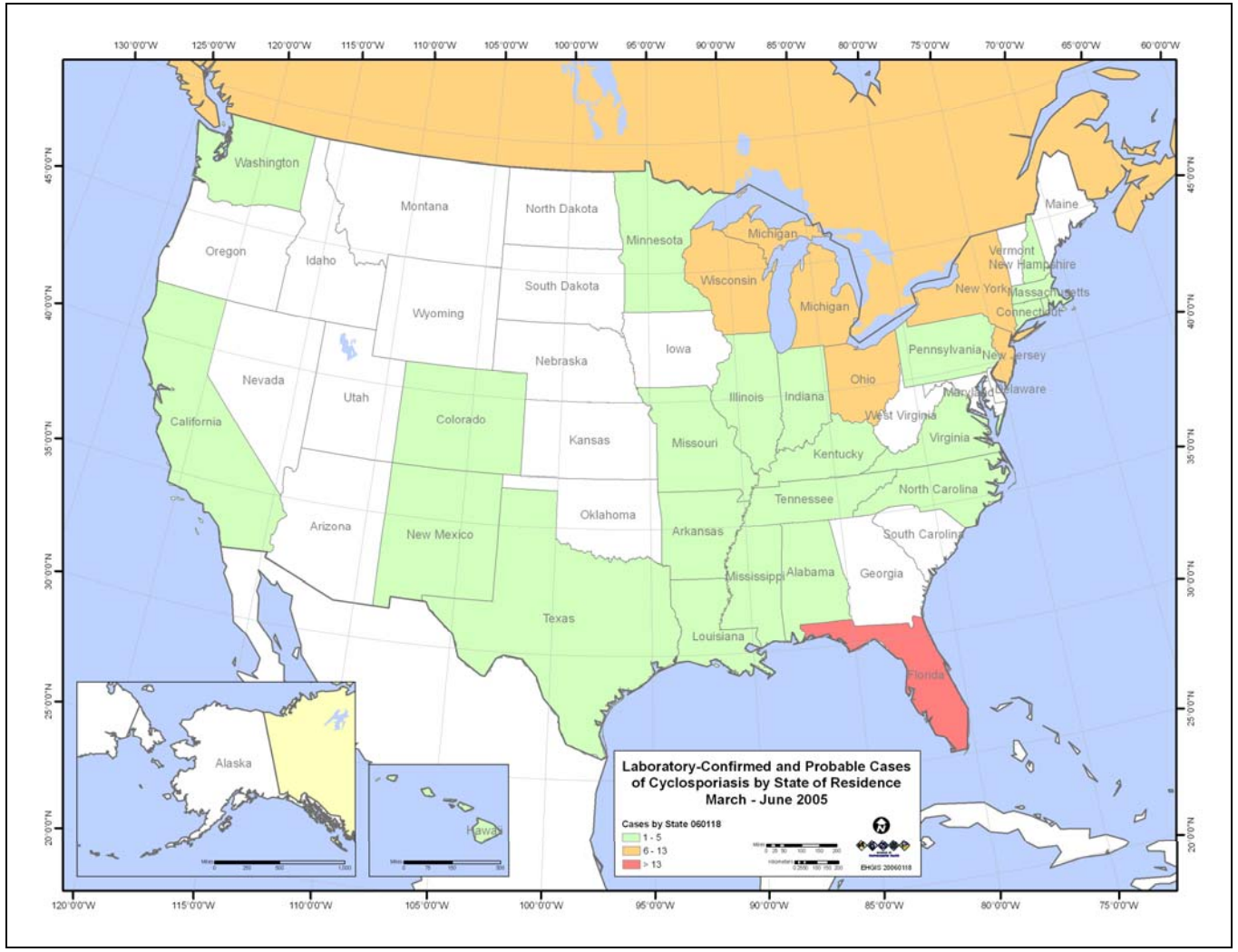
[45] Outbreak of Cyclosporiasis — Ontario, Canada, May 1998. MMWR 47(38):806-809, October 2, 1998, http://www.cdc.gov/mmwr/PDF/wk/mm4738.pdf.

[46] FoodTrack Exclusive: Florida Outbreak Linked to Fresh Basil From a Grower in Peru. Outbreak Bulletin, Cyclospora – USA (Florida) – UD#18, August 20, 2005.

Table 11: Cyclospora Cases Number of Cases by State of Residence (Exposed in Florida)

State	# Cases
Alabama	4
Arkansas	2
California	3
Canada	10
Colorado	2
Connecticut	1
Florida	492
Hawaii	1
Illinois	1
Indiana	5
Kentucky	1
Louisiana	2
Massachusetts	3
Michigan	6
Minnesota	1
Mississippi	1
Missouri	3
New Hampshire	1
New Jersey	13
New Mexico	1
New York	7
North Carolina	1
Ohio	9
Pennsylvania	5
Rhode Island	2
Tennessee	3
Texas	1
Virginia	1
Washington	4
Wisconsin	6
Total	**592**

Figure 2: Laboratory-Confirmed and Probable Cases of Cyclosporiasis by State of Residence[47]

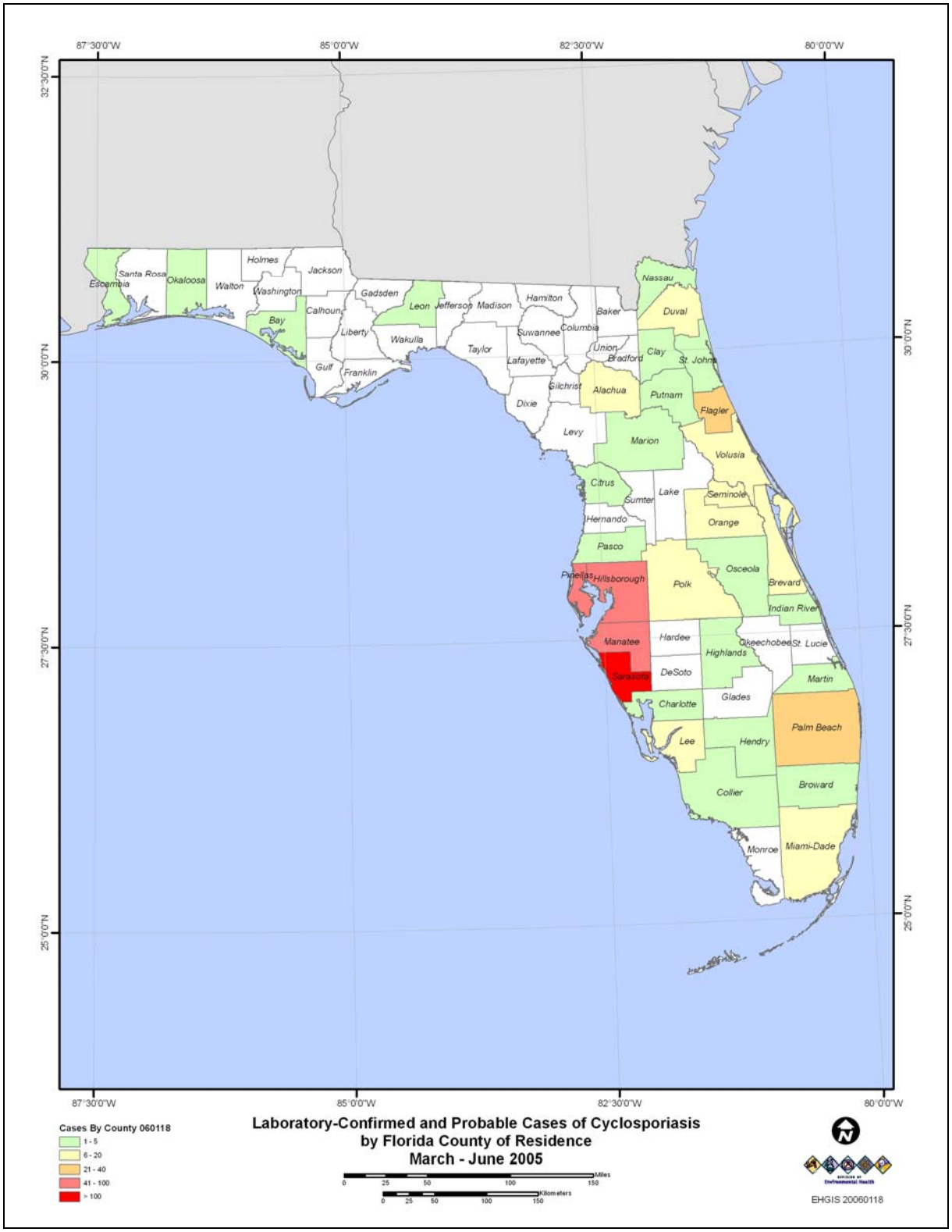


[47] All out-of-state cases were visitors to Florida who were exposed in Florida during their incubation period.

Table 12: Florida Resident Cases of Cyclosporiasis by County, 2005 Statewide Outbreak

CHD	# Cases
Alachua	11
Bay	2
Brevard	11
Broward	5
Charlotte	1
Citrus	3
Clay	1
Collier	5
Duval	12
Escambia	2
Flagler	33
Hendry	3
Highlands	1
Hillsborough	41
Indian River	2
Lee	10
Leon	4
Manatee	46
Marion	4
Martin	2
Miami - Dade	19
Nassau	2
Okaloosa	1
Orange	12
Osceola	2
Palm Beach	24
Pasco	5
Pinellas	58
Polk	17
Putnam	1
St. Johns	2
Sarasota	116
Seminole	10
Volusia	9
Unknown	15
Total	**492**

Figure 3: Laboratory-confirmed and Probable Cases of Cyclosporiasis by Florida County of Residence, March-June 2005



Conclusion

Due to the nature of this widely distributed “stealth” ingredient used raw in many common foods, this outbreak was large and diffuse and the investigation thereof was exceedingly complex, involving the entire Regional Environmental Epidemiology Strike Team, the

Department of Health Bureau of Laboratories, staff from the Bureau of Epidemiology and all county health departments who reported cases. The Department of Health also collaborated with multiple partners in this outbreak investigation including private laboratories who reported cases, the Department of Business and Professional Regulation, the Department of Agriculture and Consumer Services, the Food and Drug Administration and the CDC Division of Parasitic Diseases.

Recommendations

Due to increased distribution of foods, particularly "stealth" ingredients such as basil, changes in consumption of these ingredients towards raw consumption, unusual ingredients and unusual recipes and due to the importation of foods from underdeveloped countries possibly with less developed water and processing sanitation standards as well as the increased expectation for availability for out-of-season produce from other countries, we can expect to see more, similar outbreaks in the future. The potential for large outbreaks of this kind is great in Florida, given the large population (18M) and estimated annual number of visitors (74.5M). The Florida Department of Health continues to conduct surveillance for cyclospora cases along with other emerging and reportable pathogens in order to discover outbreaks early in their occurrence so that their cause can be discovered and further spread of illness can be prevented. FDA continues its ongoing efforts in working with produce exporting countries to ensure that produce exported to this country is safe and free from disease.[48][49][50][51][52]

[48] FDA Survey of Imported Fresh Produce, January 30, 2001, http://www.cfsan.fda.gov/~dms/prodsur6.html.
[49] Presidential Initiative – Safety of Imported Food, Status Report, December 11, 1999, http://www.foodsafety.gov/~dms/fs-impor.html.
[50] Prior Notice of Imported Food – Questions and Answers, May 2004, http://www.cfsan.fda.gov/~pn/pnqagui2.html.
[51] FDA and CBP Bolster Safeguards on Imported Food, December 3, 2003, http://www.cfsan.fda.gov/~lrd/fpbtamou.html.
[52] Multi-Year Research Strategy Under The Produce And Imported Food Safety Initiative, September 1998, http://www.foodsafety.gov/~dms/fsrstrat.html.