

Section 3: Summary of Foodborne Diseases

Description

Foodborne disease investigation and surveillance are essential public health activities. Globalization of the food supply, changes in individual's eating habits and behaviors, and newly emerging pathogens have increased the risk for contracting foodborne diseases. The Centers for Disease Control and Prevention (CDC) estimates foodborne diseases account for approximately 76 million illnesses, 325,000 hospitalizations, and 5,000 deaths per year in the U.S. However, only an estimated 14 million illnesses, 60,000 hospitalizations, and 1,800 deaths are accounted for by confirmed pathogens. Florida has had a unique program in place since 1994 to oversee food and waterborne disease surveillance and investigation for the state with the intent to better capture and investigate food and waterborne diseases, complaints, and outbreaks as well as to increase knowledge and prevent illness with regard to this important public health issue.

Foodborne disease outbreaks, as defined by the Florida Department of Health's Food and Waterborne Disease Program, are incidents in which two or more people have the same disease, have similar symptoms, or excrete the same pathogens; and there is a person, place, and/or time association between these people along with ingestion of a common food. A single case of suspected botulism, mushroom poisoning, ciguatera fish poisoning, 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.

The Florida Department of Health has criteria established for suspected and confirmed foodborne disease outbreaks. A suspected foodborne outbreak is one for which the sum of the epidemiological evidence is not strong enough to consider it 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. Similar criteria have been established for confirmed, suspected, and unknown etiology. An outbreak etiology is classified in the "confirmed" category when epidemiologic evidence implicates an agent and confirmatory laboratory data are available. An outbreak etiology is classified in the "suspected" category when epidemiologic evidence and/or a food preparation review implicate(s) an agent, but no confirmatory laboratory data are available. An outbreak etiology is classified in the "unknown" category where epidemiologic evidence clearly associates food with the outbreak, but no laboratory data are available and the epidemiologic evidence does not clearly implicate a specific agent. Data on reported number of outbreaks and reported number of cases associated with outbreaks is considered provisional until it is published in the Food and Waterborne Disease Annual Report. Numbers may change slightly from what is reported here.

Overview

In 2008, Florida reported 97 foodborne disease outbreaks with a total of 1,190 associated cases. (Table 1).

Table 1. Summary of Foodborne Disease Outbreaks, Florida, 1999-2008

Year	# Outbreaks	# Cases	Proportion of Outbreaks per 100,000 population	Proportion of Cases per 100,000 population	Average Cases per Outbreak
1999	273	1,465	1.74	9.34	5.37
2000	269	1,569	1.67	9.76	5.83
2001	288	1,922	1.75	11.71	6.67
2002	240	1,450	1.43	8.65	6.04
2003	185	1,563	1.08	9.11	8.45
2004	174	1,937	0.99	11.00	11.13
2005	128	1,944	0.71	10.79	15.19
2006	143	1,142	0.78	6.19	7.99
2007	117	827	0.62	4.42	7.07
2008	97	1,190	0.51	6.30	12.27

Foodborne disease outbreaks in Florida are classified by outbreak status (confirmed or suspected) as well as by pathogen status (confirmed, suspected, or unknown). Among the 97 reported foodborne disease outbreaks in 2008, 34 (35.05 %) were determined to be confirmed foodborne disease outbreaks accounting for 671 (56.39 %) of the 1,190 reported cases. Of the total reported outbreaks, 68 (70.10 %) had a suspected and/or confirmed etiology accounting for 811 (68.15 %) of the total cases. Of the total reported outbreaks, 29 (29.90%) had unknown etiologies accounting for 379 (31.85 %) of the total cases (Table 2).

Table 2. Total Number and Percentage of Reported Foodborne Outbreaks and Cases by Pathogen Status, Florida, 2008

	# Outbreaks	# Cases	% Outbreaks	% Cases
Suspected Outbreaks*	63	519	64.95%	43.61%
Confirmed Pathogens**	3	20	3.09%	1.68%
Suspected Pathogens**	32	129	32.99%	10.84%
Unknown Pathogens**	28	370	28.87%	31.09%
Confirmed Outbreaks*	34	671	35.05%	56.39%
Confirmed Pathogens**	27	419	27.84%	35.21%
Suspected Pathogens**	6	243	6.19%	20.42%
Unknown Pathogens**	1	9	1.03%	0.76%

*Definitions for suspected and confirmed outbreaks are described above in the "Description" section.

**Definitions for confirmed, suspected, and unknown etiology are described above in the "Description" section.

Trends

There is a general decreasing trend in the total number of reported foodborne disease outbreaks and number of reported foodborne disease outbreaks per 100,000 population in Florida over the last 10 years (Figures 1 & 2).

Figure 1. Total Number of Reported Foodborne Disease Outbreaks, Florida 1999 - 2008

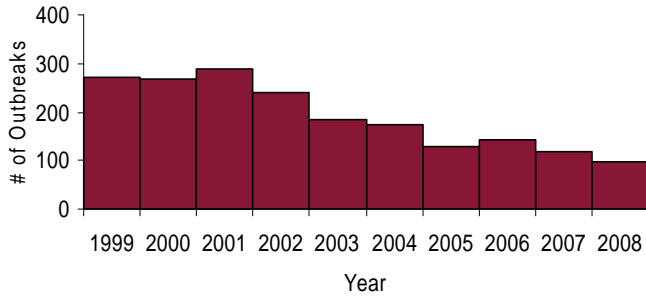
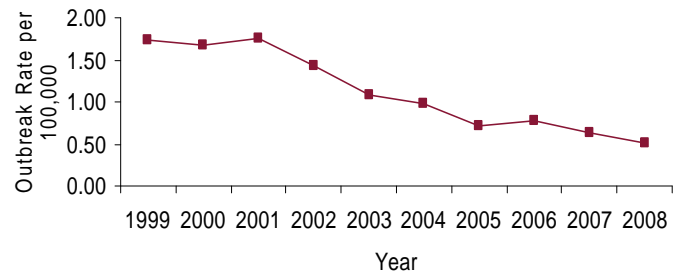


Figure 2. Number of Reported Foodborne Disease Outbreaks per 100,000 population, Florida 1999 - 2008



The total number of reported foodborne illness cases (Figure 3) and the number of reported foodborne illness cases per 100,000 population (Figure 4) in Florida has fluctuated over the last 10 years.

Figure 3. Total Number of Reported Foodborne Disease Outbreak Cases, Florida 1999 - 2008

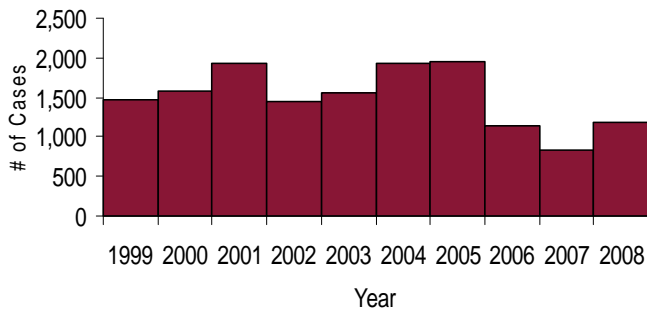
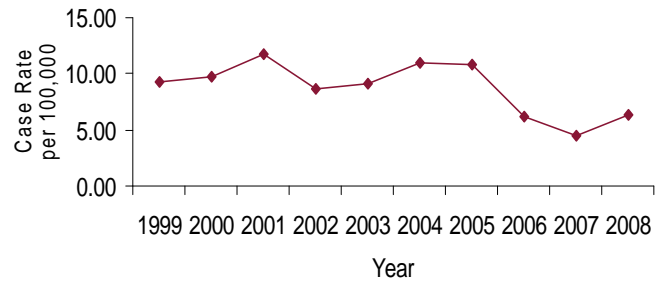


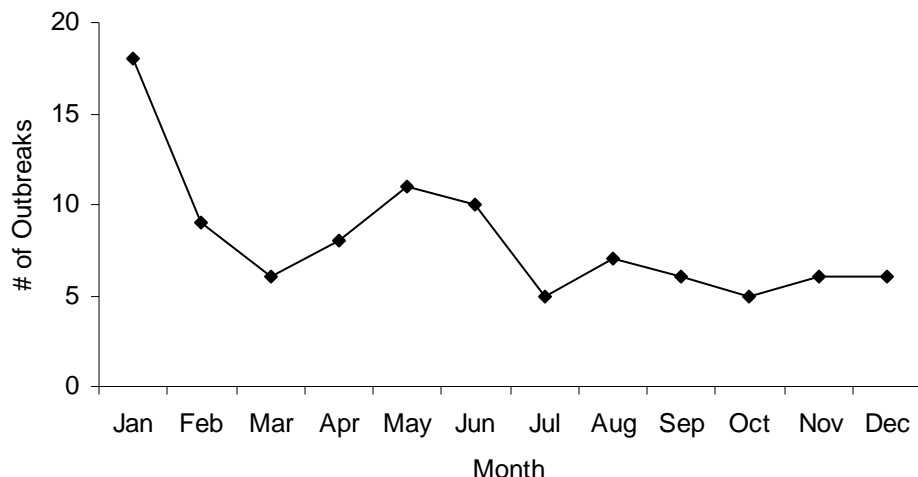
Figure 4. Number of Reported Foodborne Disease Outbreak Cases per 100,000, Florida 1999 - 2008



Seasonality

Occurrence of reported foodborne disease outbreaks in Florida for 2008 peaked in January (Figure 5).

Figure 5. Total Number of Reported Foodborne Disease Outbreaks by Month, Florida 2008



Agent

Foodborne disease outbreaks caused by bacterial (26.8%) and viral pathogens (26.8%) accounted for most of the total reported foodborne disease outbreaks with a known etiology (Figure 6). Foodborne disease outbreaks caused by viral pathogens accounted for the most reported cases (45.2%) with a known etiology (Figure 7). Pathogen type was unknown for 30.9% of the reported foodborne disease outbreaks and 32.6% of the reported cases.

Figure 6. Percentage of Reported Foodborne Disease Outbreaks by Pathogen Type, Florida 2008

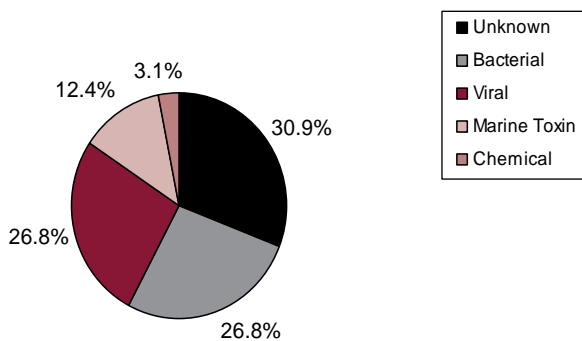
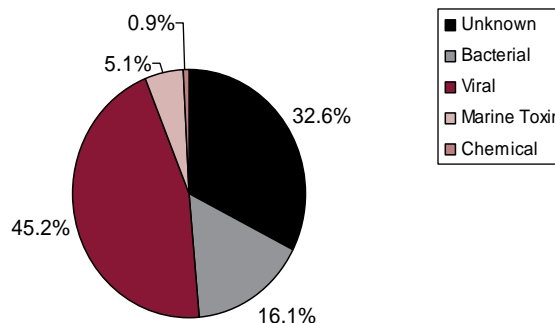


Figure 7. Percentage of Reported Foodborne Disease Outbreak Cases by Pathogen Type, Florida 2008



The number and percentage of foodborne disease outbreaks and cases by etiology for 2008 is summarized in Table 3. Among foodborne disease outbreaks with a suspected and/or confirmed etiology, Norovirus was the most frequently reported etiology for outbreaks in Florida for 2008 accounting for 26 (26.80%) outbreaks followed by ciguatera which accounted for 12 (12.37%) outbreaks. Norovirus accounted for the highest number of cases associated with reported foodborne disease outbreaks with 538 (45.21%) cases followed by *Clostridium perfringens* which accounted for 132 (11.09%) cases.

Table 3. Number and Frequency of Foodborne Outbreaks and Cases by Etiology, Florida 2008

Category	Outbreaks		Cases	
	#	%	#	%
Unknown				
Total Unknown	30	30.93%	388	32.61%
Bacterial				
<i>Staphylococcus</i>	6	6.19%	22	1.85%
<i>B. cereus</i>	6	6.19%	14	1.18%
<i>V. vulnificus</i>	6	6.19%	6	0.50%
<i>Salmonella</i>	3	3.09%	9	0.76%
<i>C. perfringens</i>	2	2.06%	132	11.09%
<i>E. coli</i> O157:H7	2	2.06%	7	0.59%
<i>Campylobacter</i>	1	1.03%	2	0.17%
Total Bacterial	26	26.80%	192	16.13%
Viral				
Norovirus	26	26.80%	538	45.21%
Marine Toxins				
Ciguatera	12	12.37%	61	5.13%
Other				
Chemical	3	3.09%	11	0.92%
Total	97	100.00%	1,190	100.00%

Implicated Food Vehicles

Multiple ingredients, multiple items, and poultry were the most frequently reported general vehicles contributing to foodborne disease outbreaks in Florida for 2008 (Table 4).

Table 4. Foodborne Illness Outbreaks and Cases by General Vehicle, Florida 2008

General Vehicle	# Outbreaks	% Outbreaks	# Cases	% Cases
Multiple Ingredients*	18	18.56%	101	8.49%
Multiple Items**	18	18.56%	151	12.69%
Poultry	13	13.40%	187	15.71%
Fish	12	12.37%	61	5.13%
Unknown	9	9.28%	406	34.12%
Shellfish-Molluscan	5	5.15%	5	0.42%
Beef	4	4.12%	42	3.53%
Pork	4	4.12%	28	2.35%
Produce-Vegetable	4	4.12%	149	12.52%
Beverage	3	3.09%	41	3.45%
Ice	2	2.06%	8	0.67%
Rice	2	2.06%	4	0.34%
Dairy	1	1.03%	2	0.17%
Pizza	1	1.03%	4	0.34%
Shellfish-Crustacean	1	1.03%	1	0.08%
Total	97	100.00%	1,190	100.00%

*Multiple Ingredients are food vehicles in which several foods are combined during preparation or cooking and the entire food product is suspected or confirmed to be contaminated (e.g. casseroles, soups, sandwiches, salads, etc.).

**Multiple Items are food vehicles in which several foods are individually prepared or cooked and more than one food is suspected or confirmed to be contaminated (e.g. buffet, salad bar, chicken and shrimp, etc.).

Outbreak Location

Most of the reported foodborne disease outbreaks (67.01%) and cases (35.71%) were associated with restaurants (Table 5).

Table 5. Foodborne Illness Outbreaks and Cases by Site Florida 2008

Site	# Outbreaks	% Outbreaks	# Cases	% Cases
Restaurant	65	67.01%	425	35.71%
Caterer	8	8.25%	256	21.51%
Home	8	8.25%	51	4.29%
Grocery	6	6.19%	26	2.18%
Recreational Fishing	2	2.06%	2	0.17%
Assisted Living Facility	1	1.03%	4	0.34%
Little League Park	1	1.03%	3	0.25%
Movie Theater	1	1.03%	7	0.59%
Nursing Home	1	1.03%	9	0.76%
Prison	1	1.03%	260	21.85%
Resort Hotel	1	1.03%	39	3.28%
School	1	1.03%	33	2.77%
Sorority House	1	1.03%	75	6.30%
Total	97	100.00%	1,190	100.00%

Contributing Factors

The current systematic data collection regarding contributing factors associated with reported foodborne disease outbreaks began in 2000. The top contributing factors associated with reported foodborne disease outbreaks in Florida for 2008 were associated with time/temperature abuse, poor personal hygiene, and cross contamination (Table 6, 7, 8). Note: There are three categories of contributing factors (contamination factor, proliferation factor, survival factor) and up to three contributing factors per category can be attributed in an outbreak; therefore, the reported numbers may not match the actual number of reported outbreaks and cases.

Table 6. Most Common Reported Foodborne Contamination Factors, Florida 2008

Contamination Factor	# Outbreaks	# Cases
Bare-Handed Contact	20	126
Infected Person or Carrier	15	360
Toxic Substance	11	55
Cross Contamination from Raw Ingredients Animal Origin	10	25
Inadequate Cleaning	9	158

Table 7. Most Common Reported Foodborne Proliferation Factors, Florida 2008

Proliferation Factor	# Outbreaks	# Cases
Inadequate Cold-Holding Temperature	13	40
Slow Cooling	8	150
Insufficient Time/ Temperature Hot Holding	7	143
Room Temperature	2	13
Pooled Raw Eggs	1	5

Table 8. Most Common Reported Foodborne Survival Factors, Florida 2008

Survival Factor	# Outbreaks	# Cases
Insufficient Time/ Temperature During Cooking/ Processing	3	136
Improper Sanitization	2	5
Insufficient Time/ Temperature During Reheating	2	4
Insufficient Thawing Then Insufficient Cooking	1	2
Temperature Control	1	5

References

- Bender JB, et al., "Foodborne disease in the 21st century: What challenges await us?" *Postgraduate Medicine*, Vol. 106, No. 2, 1999, pp. 106-119.
- Mead PS, et al., "Food-related illness and death in the United States." *Emerging Infectious Diseases*, Vol. 5, No. 5, 1999, pp. 607-625.
- Florida Department of Health Memorandum, July 17, 1995. Criteria for Confirmation of a Foodborne Outbreak.