Section 3

Summary of Foodborne Disease Outbreaks

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 of 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 program since 1994 to oversee food and waterborne disease surveillance and investigation. The purpose of the program is to better capture data and investigate food and waterborne diseases, complaints, and outbreaks as well as to increase knowledge and prevent illness.

Foodborne disease outbreaks as defined by the Florida Department of Health, 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, paralytic shellfish poisoning, other rare disease, or a case of a disease that can be definitively related to ingestion of a food, is considered an incident of foodborne illness and warrants further investigation.

Overview

In 2009, Florida reported 65 foodborne disease outbreaks with a total of 725 associated cases. (Table 1).

Table 1. Summary of Foodborne Disease Outbreaks, Florida, 2000-2009

Year	Number of Outbreaks	Number of Cases	Proportion of Outbreaks per 100,000 Population	Proportion of Cases per 100,000 Population	Average Cases per Outbreak
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
2009	65	725	0.35	3.85	11.15

Trends

Over the last 10 years in Florida there has been a general decreasing trend in the total number of reported foodborne disease outbreaks and number of reported foodborne disease outbreaks per 100,000 population (Figures 1 and 2)

Figure 1. Total Number of Reported Foodborne Disease Outbreaks Florida, 1999-2009

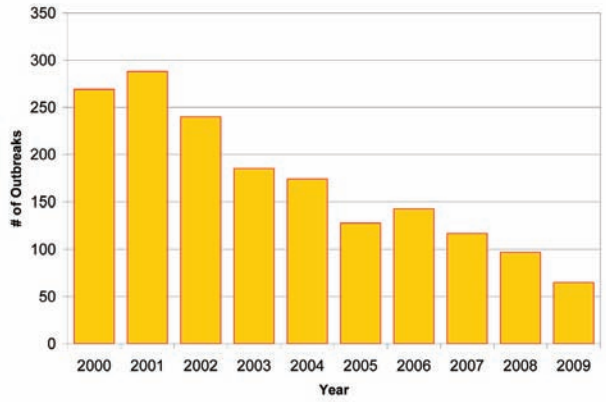
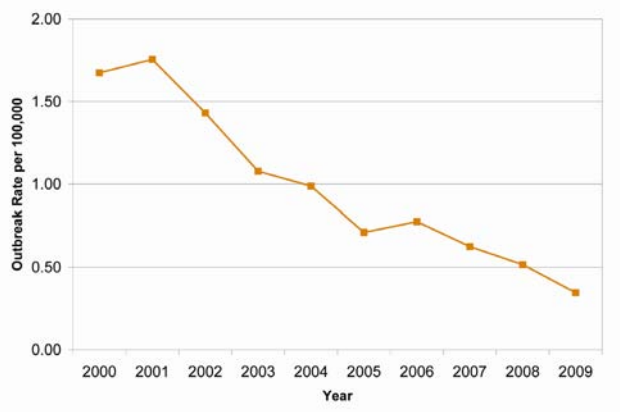


Figure 2. Number of Reported Foodborne Disease Outbreaks per 100,000 Population Florida, 1999-2009



Over the last 10 years, 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 generally declined but not as consistently as for outbreaks.

Figure 3. Total Number of Reported Foodborne Disease Outbreak Cases Florida, 1999-2009

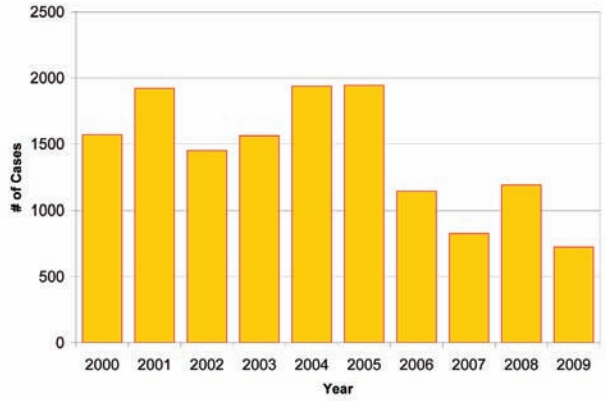
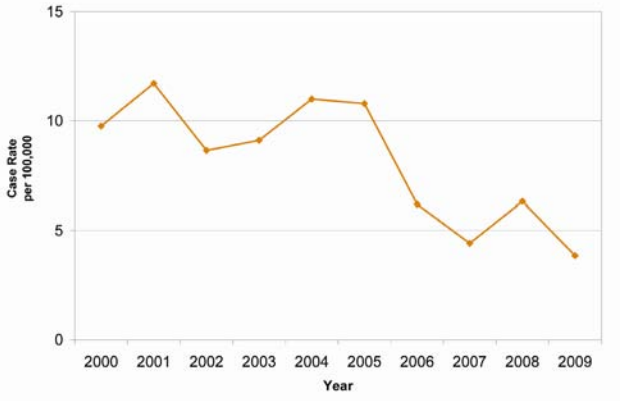


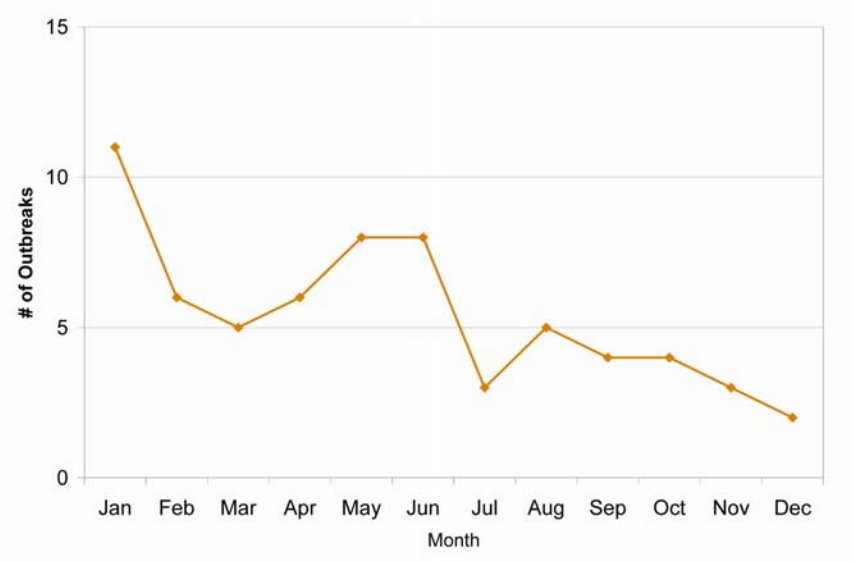
Figure 4. Number of Reported Foodborne Disease Outbreak Cases per 100,000 Florida, 1999-2009



Seasonality

Occurrence of reported foodborne disease outbreaks in Florida for 2009 peaked in January (Figure 5).

Figure 5. Total Number of Reported Foodborne Disease Outbreaks by Month, Florida, 2009



Agent

Foodborne disease outbreaks caused by bacterial (38.5%) and viral (32.3%) pathogens 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 (45.7%) with a known etiology (Figure 7). Pathogen type was unknown for 13.8% of the reported foodborne disease outbreaks and 24.1% of the outbreak-associated cases.

Figure 6. Percentage of Reported Foodborne Disease Outbreaks by Pathogen Type, Florida, 2009

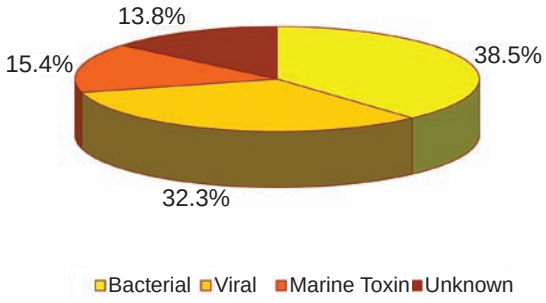
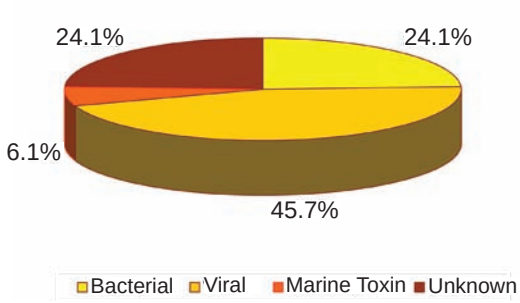


Figure 7. Percentage of Reported Foodborne Disease Outbreak Cases by Pathogen Type, Florida, 2009



The number and percentage of foodborne disease outbreaks and cases by etiology for 2009 is summarized in Table 2. Norovirus was the most frequently reported etiology for outbreaks in Florida for 2009 accounting for 21 outbreaks (32.3%) followed by ciguatera toxin which accounted for nine outbreaks (13.9%). Norovirus accounted for the highest number of cases associated with reported foodborne disease outbreaks with 331 cases (45.7%) followed by *Clostridium perfringens*, which accounted for 60 cases (6.9%)

Table 2. Number and Frequency of Foodborne Outbreaks and Cases by Etiology, Florida, 2009

Pathogen	Outbreaks		Cases	
	Number	Percent	Number	Percent
Unknown	**9**	**13.85%**	**175**	**24.14%**
Bacterial				
V. vulnificus	7	10.77%	7	0.97%
Salmonella	7	10.77%	49	6.76%
B. cereus	4	6.15%	12	1.66%
C. perfringens	4	6.15%	50	6.90%
Staphylococcus	1	1.54%	2	0.28%
Shigella	1	1.54%	13	1.79%
E. coli O157:H7	1	1.54%	42	5.79%
Total Bacterial	**25**	**38.46%**	**175**	**24.14%**
Viral				
Norovirus	21	32.31%	331	45.66%
Total Viral	**21**	**32.31%**	**331**	**45.66%**
Marine Toxin				
Ciguatera	9	13.85%	37	5.10%
Scombroid	1	1.54%	7	0.97%
Total Marine Toxin	**10**	**15.38%**	**44**	**6.07%**
Total	**65**	**100.00%**	**725**	**100.00%**

Implicated Food Vehicles

Multiple items, fish, and multiple ingredients were the most frequently reported general vehicles contributing to foodborne disease outbreaks in Florida for 2009 (Table 3).

Table 3. Foodborne Illness Outbreaks and Cases by General Vehicle, Florida, 2009

General Vehicle	Outbreaks		Cases	
	Number	Percent	Number	Percent
Multiple Items*	18	27.69%	281	38.76%
Fish	11	16.92%	51	7.03%
Multiple Ingredients**	8	12.31%	137	18.90%
Produce-Vegetable	6	9.23%	83	11.45%
Shellfish-Molluscan	6	9.23%	6	0.83%
Poultry	5	7.69%	53	7.31%
Unknown	4	6.15%	45	6.21%
Beef	2	3.08%	53	7.31%
Rice	2	3.08%	8	1.10%
Beverage	1	1.54%	3	0.41%
Pork	1	1.54%	4	0.55%
Shellfish-Crustacean	1	1.54%	1	0.14%
Total	65	100.00%	725	100.00%

*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, baked chicken and grilled shrimp, etc.).

**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.).

Outbreak Location

Most of the reported foodborne disease outbreaks (64.6%) and cases (49.5%) were associated with restaurants (Table 4).

Table 4. Foodborne Illness Outbreaks and Cases by Site, Florida, 2009

Location	Outbreaks		Cases	
	Number	Percent	Number	Percent
Restaurant	42	64.62%	359	49.52%
Home	9	13.85%	45	6.21%
Caterer	4	6.15%	113	15.59%
Correctional Facility	2	3.08%	55	7.59%
School	2	3.08%	65	8.97%
Assisted Living Facility	1	1.54%	13	1.79%
Church	1	1.54%	12	1.66%
Day Care	1	1.54%	30	4.14%
Grocery	1	1.54%	9	1.24%
Hospital	1	1.54%	17	2.34%
Picnic	1	1.54%	7	0.97%
Total	**65**	**100.00%**	**725**	**100.00%**

Contributing Factors

The top contributing factors associated with reported foodborne disease outbreaks in Florida for 2009 are displayed in Table 5. There are three categories of contributing factors (contamination factor, proliferation factor, survival factor) and up to three contributing factors per category can be identified for an outbreak; therefore, the reported numbers may not match the actual number of reported outbreaks and cases.

Table 5. Most Commonly Reported Foodborne Contamination Factors, Florida, 2009

Contamination Factors	Number of Outbreaks	Number of Cases
C10 - Bare-handed contact by a food handler/worker/preparer who is suspected to be infectious	15	185
C7 - Contaminated raw product - food was intended to be consumed raw or undercooked and/or under-processed	9	20
C11 - Glove-hand contact by a food handler/worker/preparer who is suspected to be infectious	9	201
C1 - Toxic substance part of the tissue	9	37
C9 - Cross-contamination of ingredients (cross contamination does not include ill food workers)	6	55
C6 - Contaminated raw product - food was intended to be consumed after a kill-step	3	21
C13 - Foods contaminated by non-food handler/worker/preparer who is suspected to be infectious	3	25
C15 - Other source of contamination	2	44
C14 - Storage in contaminated environment	1	3
C12 - Other mode of contamination (excluding x-contamination) by a food worker who is suspected to be infectious	1	25
Proliferation Factors	**Number of Outbreaks**	**Number of Cases**
P8 - Improper/slow cooling	5	24
P2 - No attempt was made to control temperature of implicated food or length of time food was out of temperature	5	113
P1 - Food preparation practices that support proliferation of pathogens (during food preparation)	5	108
P7 - Improper hot holding due to improper procedure or protocol	4	50
P4 - Improper cold holding due to malfunctioning refrigeration equipment	4	13
P6 - Improper hot holding due to malfunctioning equipment	1	2
P5 - Improper cold holding due to an improper procedure or protocol	1	2
Survival Factors	**Number of Outbreaks**	**Number of Cases**
S1 - Insufficient time and/or temperature control during initial cooking/heat processing	3	76
S2 - Insufficient time and/or temperature during reheating	3	69

Note: There are 3 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.

References: Bender, J.B., et al. (1999). Foodborne disease in the 21st century: What challenges await us? Postgraduate Medicine, 106 (2), 106-119. Mead, P.S. et al. (1999). Food-related illness and death in the United States. Emerging Infectious Diseases, 5 (5), 607-625.