

FOODBORNE OUTBREAKS

ETIOLOGY

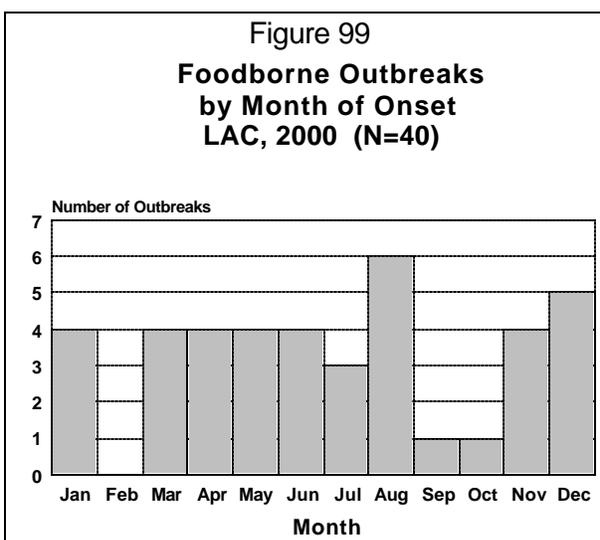
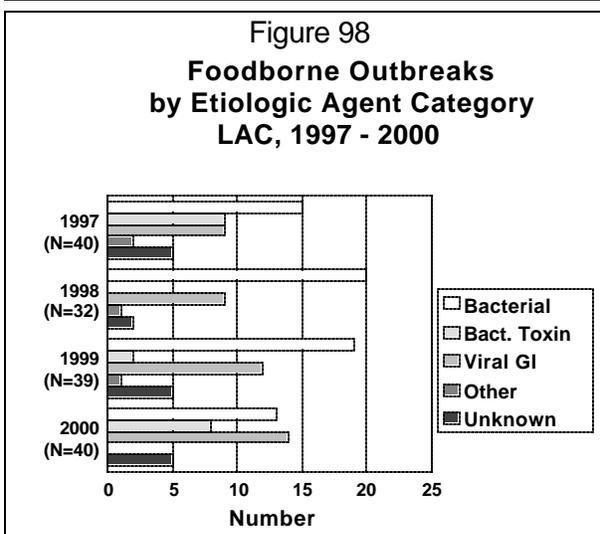
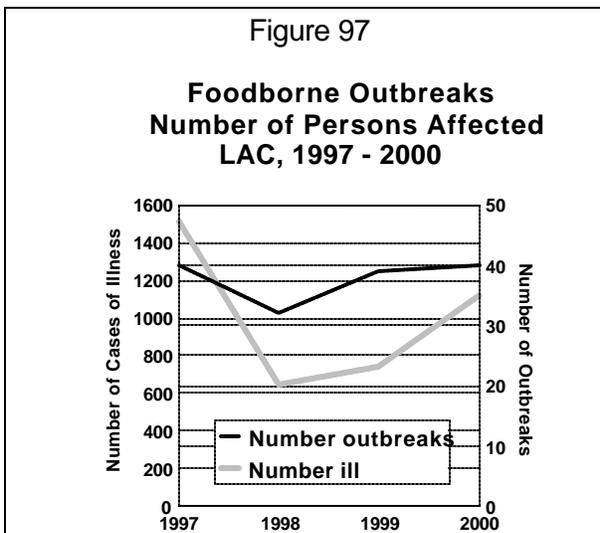
Foodborne outbreaks are caused by a variety of bacterial, viral, and parasitic pathogens and toxic substances. To be considered as a foodborne outbreak, CDC requires a minimum of “the occurrence of two or more cases of a similar illness resulting from the ingestion of a common food.”¹

The system used by LAC DHS for detection of foodborne outbreaks begins with the Foodborne Illness Report (FBIR), which monitors complaints from residents, illness reports associated with commercial food facilities, and foodborne exposures uncovered during disease-specific case investigations (e.g. *Salmonella*, *Shigella*, *Campylobacter*). LAC Environmental Health Services’ Food and Milk (F&M) Program investigates each FBIR by contacting the reporting individual and evaluating the public health importance of the report. When warranted, a thorough inspection of the facility and interview of the employees is conducted. In 2000, 64% of the reports resulted in investigation of the facility, which is often sufficient public health action to prevent additional foodborne illnesses.

Acute Communicable Disease Control (ACDC) Food and Water Safety Unit reviews all FBIRs. Typically an epidemiologic foodborne outbreak investigation will be initiated when there are multiple illnesses from multiple households, multiple reports from the same establishment with similar symptoms and close in time, large events, potential for others to become ill, or a need for public health intervention efforts to prevent additional illnesses.

DISEASE ABSTRACT

- This summary includes those foodborne outbreaks investigated by ACDC and reported to the California Department of Health Services.



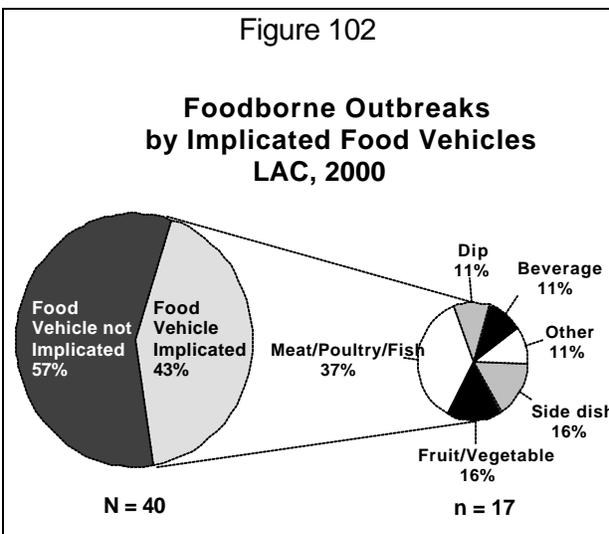
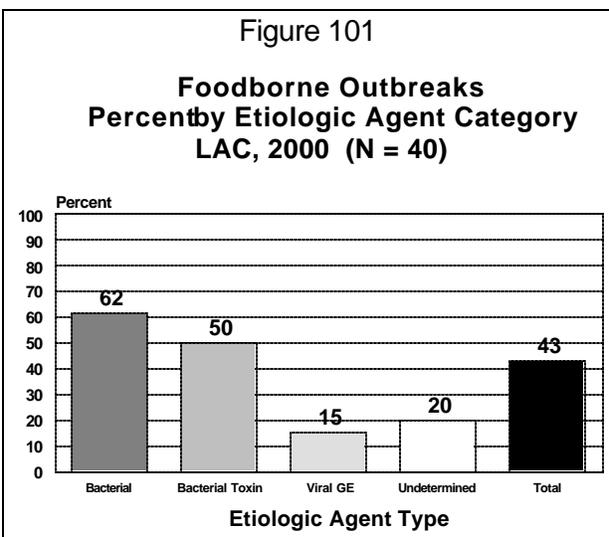
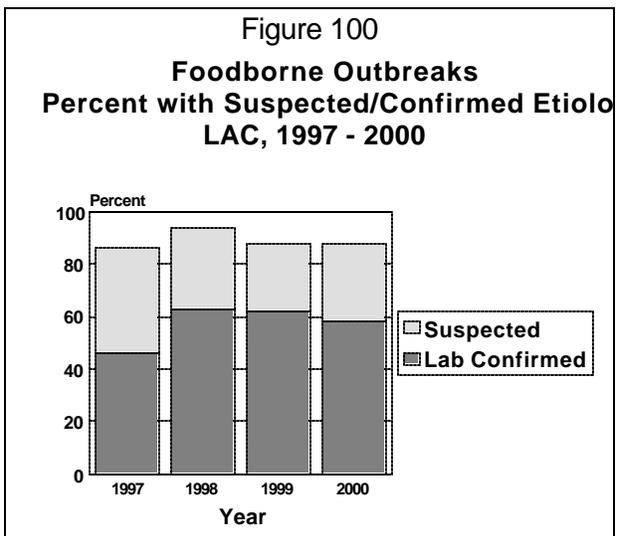
- Until 2000, bacteria had been the pathogen type most implicated in foodborne outbreaks. Viral pathogens have surpassed bacteria as etiologic agents (Figure 98).

DATA

Overview: Of the 1603 FBIR's in 2000 in consumers eating food from establishments located in LAC, F&M investigated 1023 (64%). Of the total FBIR's received in 2000, 496 were potential outbreaks: single reports of multiple illnesses within one household (382), single reports of two or more illnesses in multiple households (86), or multiple reports for same establishment (28). As always, ACDC investigates those foodborne outbreaks with the greatest public health importance. In 2000, ACDC investigated 40 outbreaks representing 1125 cases of foodborne illness (Table 11; Figure 97). These outbreaks were caused by a variety of pathogens (Figure 98). The mean number of cases per foodborne outbreak was 28 (range 2 - 188).

Seasonality: The number of foodborne outbreaks often increases in summer and during the holiday season, probably due to the increase in gatherings around these times. In 2000 there were peaks of foodborne outbreaks in August and December (Figure 99).

Agent: Typical foodborne pathogens can be categorized according to characteristics of illness they have in common. The categories used in this report includes five types of pathogens. Bacterial agents which cause infection include *Salmonella*, *Shigella*, *Campylobacter*, *Vibrio spp.*, and *E.coli*. Bacteria that elaborate toxins include *Staphylococcus aureus*, *Clostridium perfringens*, and *Bacillus cereus*. Viral gastroenteritis (Viral GE) includes the Norwalk-like viruses (NLV) of the *Caliciviridae* family. The "other" category includes Hepatitis A virus, fish poisonings, and parasites.



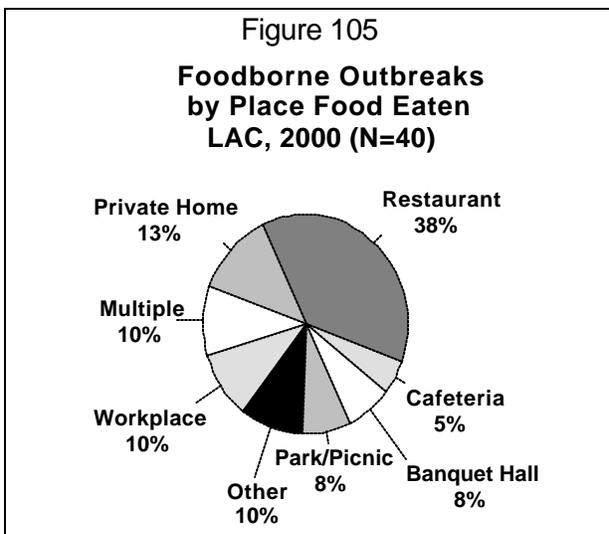
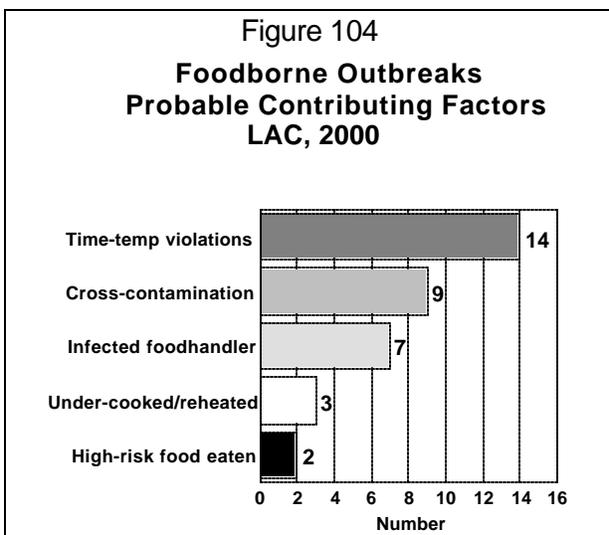
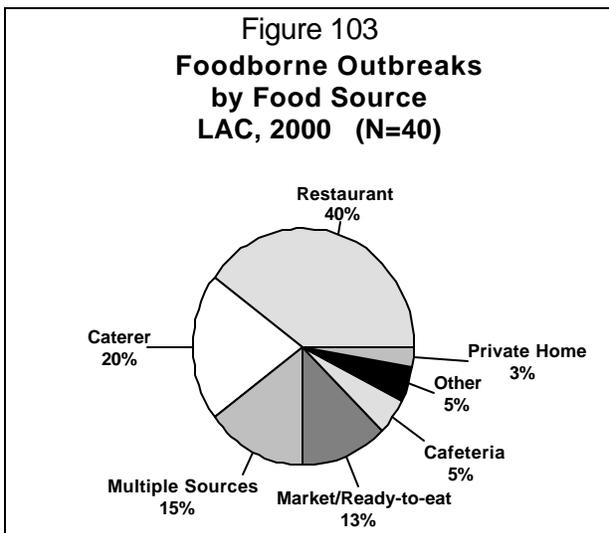
Of foodborne outbreaks investigated, a specific pathogen was laboratory confirmed in 58% and epidemiologically suspected in 30% (Figure 100). Ten outbreaks, all bacterial, were identified by routine disease surveillance (Table 12). Laboratory testing was conducted in 28 of the 40 foodborne outbreaks. Some reasons for no laboratory testing include lack of cooperation (7); unclear epidemiologic picture (5); too late for testing (3); none requested by ACDC (2).

Incubation: Incubation periods vary for the many foodborne pathogens and among symptomatic individuals in the same outbreak due to dose ingested, pre-existing medical conditions, and variations in an individual host's response to the pathogen. Toxins (bacterial and other) tend to have short incubations (less than 12 hrs) while bacterial and viral infections tend to have longer incubation (≥ 12 hrs).

The Food: In 43% of foodborne outbreak investigations, we were able to implicate a food vehicle epidemiologically (Figure 101) and were able to isolate and confirm an organism in a food item in 3 outbreaks. In suspected bacterial outbreaks, the food vehicle was identified 62% of the time; while in viral GE suspected outbreaks, a food item was identified in only 15%. Implicated food vehicles are categorized in Figure 102. The largest proportion of outbreaks was caused by the meat/poultry/fish category (37%), followed by fruit/vegetable and side dish categories (16% each). Two outbreaks had multiple implicated food items.

Food associated with an outbreak was most often prepared by a restaurant (40%) or a caterer (20%; Figure 103).

In 21 of 40 outbreak investigations, probable contributing factors of the cause of the outbreak were found (Figure 104). More than one factor could be cited for each outbreak. The most frequent factors identified were time-temperature violations (14); cross-contamination (9); infected foodhandler (7); under-cooked/reheated foods (3); and high-risk food consumed (2). On average, 2 contributing factors were reported per outbreak.



Outbreak Location: The most common eating places for foodborne outbreaks were restaurants (38%), followed by private homes (13%; Figure 105).

The geographic distribution of the outbreaks by SPA is summarized in Table 13. SPA 3 had the most foodborne outbreaks (8); SPAs 6 and 1 had the least (1 each). Three outbreaks involved multiple SPAs, 4 of which involved multiple counties and 3 of which involved multiple states.

Specific Outbreak Summaries:

OB#228 - *Clostridium perfringens* in a Juvenile Correctional Facility

On the evening, November 18, 2000, a juvenile correctional facility reported a gastrointestinal illness cluster of approximately 200 individuals. All meals are prepared and served daily at this establishment to all juveniles. Staff members have the opportunity to eat the meals during their shift. Illness was evident in juveniles throughout the facility, and in some staff members. Of approximately 570 individuals exposed, 188 reported illness. One stool specimen was collected and tested positive for *C. perfringens* at 1×10^5 organisms per gram. The suspected meal consisted of pork, refried beans, tortillas, sour cream, salad, ranch dressing, apple, and milk. *C. perfringens* was isolated from the beans at 1×10^6 organisms, thereby implicating this food item and agent as the cause of this outbreak. Environmental Health Services inspected the kitchen and found several violations. Recommendations were made to the juvenile hall staff to prevent future outbreaks.

OB#232-Norwalk-like Virus Associated with a Bat Mitzvah

LAC DHS received a report of an illness cluster associated with a Bat Mitzvah dinner at a commercial food establishment. There were several events that were associated with the Bat Mitzvah: a small dinner party, morning temple ceremony, kiddish/lunch, a large dinner party, and a small brunch. Environmental Health Services inspected the temple and kiddish caterer. ACDC interviewed 154 individuals, of whom 60 met the case definition (attack rate = 39%). Symptoms were nausea, fatigue, diarrhea, vomiting. The mean duration of illness was 2 days. There were 3 secondary cases. The kiddish was statistically associated with illness. No food item was implicated. Of three specimens collected, one was positive for NLV. Norwalk can be spread by aerosols, by food, person-to-person, or by fomite. One person was ill and vomited at the ceremony; those aware of the ill person had a higher risk of becoming ill (RR = 1.7; 95% CI = 1.2, 2.4).

Viral GE Summary:

Fourteen of the 40 foodborne outbreaks (35%) investigated in 2000 were caused by viral GE. Laboratory testing was completed on 11 of these viral GE outbreaks, with nine testing positive for NLV. A majority of the viral GE outbreaks (71%) occurred in spring and summer. The mean number of cases per outbreak for 2000 is 28 cases. The average of the median duration for each outbreak is 1.9 days. A majority of the viral GE outbreaks (79%) had an undetermined implicated food item. Restaurants were the most common food source for the 2000 viral GE outbreaks (71%). The most frequent contributing factor identified for viral GE outbreaks was ill foodhandlers (36%); however, many were undetermined (50%).

COMMENTS

Since 1999, the LAC Public Health Laboratory has been testing for NLV using the reverse transcription-polymerase chain reaction (RT-PCR) method. This method is still considered to be experimental and is only used to diagnose outbreaks as a whole, not for individual patients. There

has been a marked increase in the number of viral GE and confirmed NLV outbreaks since 1999. For the first time in 2000, the number of viral GE outbreaks was higher than bacterial, which had been the leading identified etiologic agent type. This could be due to one or more factors, including the confirmation of previously undiagnosed outbreaks, an increased awareness among the investigating epidemiologists, and/or the decrease in the incidence of bacterial pathogen cases in recent years.

PulseNet is a fairly new network which uses the collaboration of laboratories, health departments, and the Internet to detect outbreaks through pulsed field gel electrophoresis (PFGE) of pathogens. The PFGE results are monitored for matching pathogen strains. When a match is detected, an investigation is often initiated. In addition, a solitary case can be linked to a larger, previously identified outbreak. LAC was involved in the investigation of 4 of these foodborne outbreaks in 2000.

Mild symptoms, long incubation periods, and poor public/medical community awareness of public health procedures may contribute to under-reporting of foodborne outbreaks.

REFERENCE

1. Centers for Disease Control and Prevention: Surveillance for Foodborne-Disease Outbreaks - United States, 1988-1992. *MMWR* 1996;45(SS-5):58.

ADDITIONAL RESOURCES

LAC Communicable Disease Reporting System - Hotline: (888) 397-3993,
Faxline: (888) 397-3779, E-mail: cdsreprt@dhs.co.la.ca.us

LAC DHS Public Health Programs and Services
<http://www.lapublichealth.org>

-Foodborne Disease Section in B-73 Manual
<http://lapublichealth.org/acd/procs/b73/b73fh.pdf>

CDC - Foodborne and Diarrheal Diseases Branch
<http://www.cdc.gov/ncidod/dbmd/foodborn.htm>

- Outbreak Response and Surveillance Unit
<http://www.cdc.gov/ncidod/dbmd/outbreak/>

- FoodNet
<http://www.cdc.gov/foodnet/>

FDA - Center for Food Safety and Applied Nutrition
<http://vm.cfsan.fda.gov/list.html>

Gateway to Government Food Safety Information
<http://www.FoodSafety.gov>

Table 11. Foodborne Outbreaks In Los Angeles County, 2000 (N=40)

Disease	Serotype	Cases	SPA/Jurisdictions
LAB CONFIRMED			
C. PERFRINGENS		188	7
CAMPYLOBACTER		19	8
CAMPYLOBACTER	JEJUNI	< 5	5
CAMPYLOBACTER	JEJUNI	< 5	2
NLV		8	8
NLV		45	3
NLV		10	3
NLV		22	8
NLV		6	5,2
NLV		55	5
NLV		9	3
NLV		60	2,4,5
NLV		42	3
SALMONELLA	ENTERITIDIS	12	3
SALMONELLA	ENTERITIDIS	17*	MULTI-STATE (CA,NV,CO)
SALMONELLA	ENTERITIDIS	20	1
SALMONELLA	NEWPORT	23	MULTI-COUNTY (LAC,OC)
SALMONELLA	POONA	< 5*	MULTI-STATE (CA,OR,NV,WA,NM)
SALMONELLA	THOMPSON	12*	MULTI-STATE (CA,AZ)
SALMONELLA	THOMPSON	47	7
SALMONELLA	ENTERITIDIS	14	3
SHIGELLA	SONNEI	109*	MULTI-STATE (CA,WA,OR)
SHIGELLA	SONNEI	8	4
UNCONFIRMED			
BACTERIAL TOXIN		33	7
BACTERIAL TOXIN		6	2
BACTERIAL TOXIN		25	2
BACTERIAL TOXIN		< 5	5
C PERFRINGENS		15	MULTI-COUNTY (LAC,OC)
STAPH AUREUS		16	3
STAPH AUREUS		58	8
UNKNOWN GE		69	7
UNKNOWN GE		14	3
UNKNOWN GE		6	4
UNKNOWN GE		< 5	4
UNKNOWN GE		< 5	8
VIRAL GE		37	2
VIRAL GE		19	7
VIRAL GE		19	5, PASADENA
VIRAL GE		35	2
VIRAL GE		31	2,3,7

*Cases include only the LAC cases from a larger outbreak.

**Table 12. Laboratory Summary
Outbreaks by Suspect/Confirmed Etiologic Agent "Type"**

	Bacterial	Bacterial Toxin	Norwalk- Like Virus	Unknown	Total
# OBs Investigated	13	8	14	5	40
#OBs Lab Tested	13	3	11	1	28
#OBs Lab Confirmed Agent	13	1	9	--	23
#OBs Identified By Surveillance	10	--	--	--	10

**Table 13: 2000 - Frequency of Foodborne Outbreaks by
Service Planning Area (SPA)/Jurisdictions**

SPA	Frequency	Percent
1	1	3
2	5	13
3	8	20
4	3	7
5	3	7
6	1	3
7	4	10
8	5	13
Multi-SPA	3	7
Multi-County*	3	7
Multi-State	4	10
Total	40	100

*Multi-County/Multi-Jurisdiction