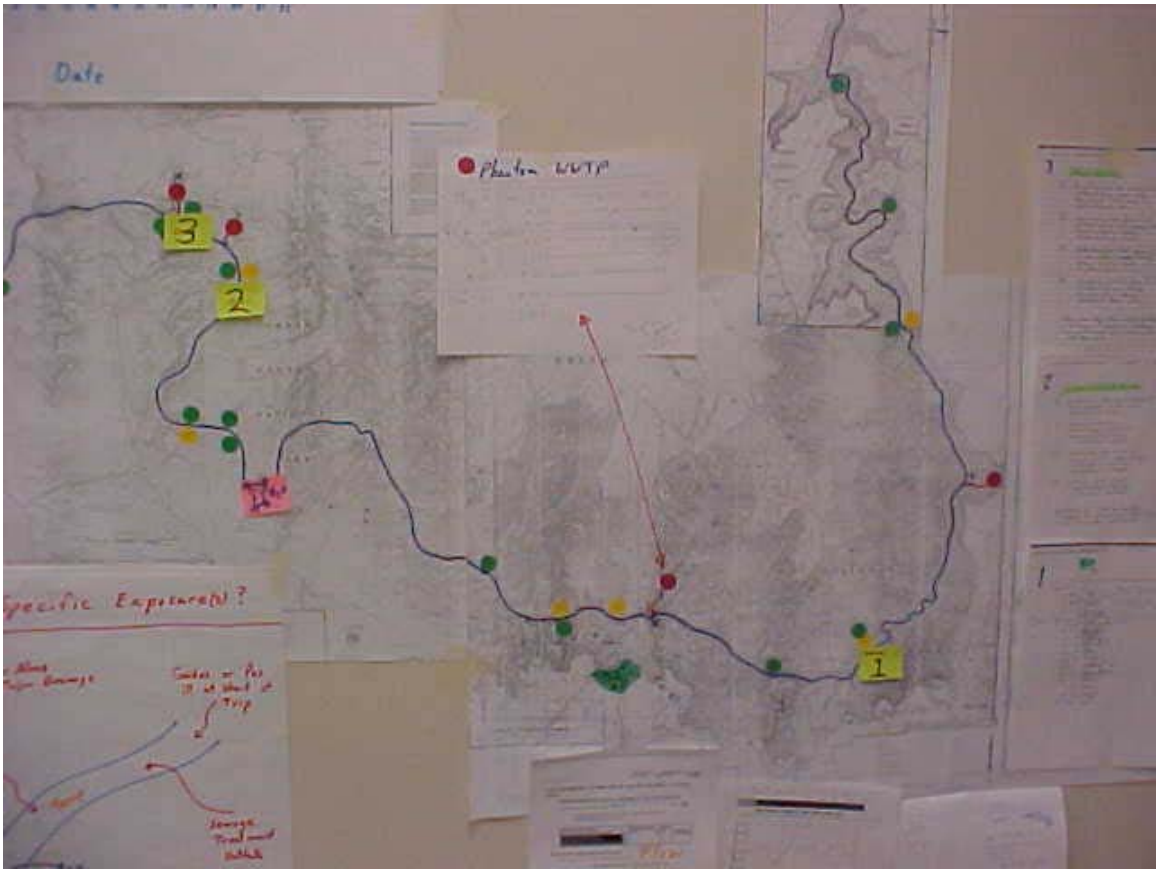
IV. Outbreaks



Foodborne Illness Outbreaks in Arizona, 2004

Background

Foodborne illnesses are a widespread public health problem with an estimated 76 million cases and 5,000 deaths occurring each year in the United States. Health officials in Arizona have several different mechanisms for identifying outbreaks: routine surveillance of reportable diseases and investigations of these cases to identify common exposures and clinical symptoms; routine testing, subtyping, and comparison of enteric isolates including using advanced molecular identification techniques such as pulsed field gel electrophoresis (PFGE) to detect matching or possibly linked cases; and public reports of suspected foodborne illness to their local health department using foodborne illness hotlines.

Definitions:

Confirmed Foodborne/Waterborne Outbreak:
A confirmed foodborne illness outbreak is an incident or exposure in which two or more persons experience a similar illness after ingestion of a common food, water source, or meal and epidemiologic evaluation implicates the item was the source of illness. Outbreaks may or may not be laboratory-confirmed. Waterborne outbreaks may be associated with drinking water or recreational water. Confirmed outbreaks may be classified into the following categories:

1. Laboratory-confirmed: Outbreaks in which laboratory evidence of a specific etiologic agent is obtained.
2. Epidemiologically-defined: Outbreaks in which clinical and epidemiological evidence define a likely agent, but laboratory confirmation is not obtained.
3. Outbreak of undetermined etiology: Outbreaks in which laboratory confirmation is not obtained and epidemiologic evidence cannot clearly define an agent.

Probable Foodborne/Waterborne Outbreak:
A probable foodborne illness outbreak is defined as an incident or exposure in which two or more persons experience a similar illness after ingestion of a common food item or water source, and a specific item is suspected, but person-to-person transmission or other exposures cannot be ruled out.

ADHS is working to develop an Arizona foodborne illness hotline to improve identification of enteric illness in individuals who may not be clinically diagnosed. Healthcare providers also report suspected foodborne illness outbreaks when they see an unexpected number of patients with gastrointestinal illness. Restaurants, daycare providers, schools, and healthcare facilities (i.e., hospitals, long-term care facilities) may also report outbreaks to Arizona's local and state health departments.

Norovirus continues to be major cause of gastrointestinal outbreaks in Arizona with 17 confirmed outbreaks during 2004. A study by the CDC found that norovirus was detected in 93% of outbreaks of nonbacterial gastroenteritis. The majority of norovirus outbreaks in Arizona are thought to be spread via person-to-person transmission. Additionally, ill food workers handling ready-to-eat items such as sandwiches, drinks, and salads can also cause outbreaks of norovirus. Prevention of further disease transmission occurs by encouraging proper hand-washing techniques, minimizing bare-hand contact with ready-to-eat items, removing environmental contamination, and excluding ill employees from work until 72 hours after recovery.

Salmonella was the second-most common cause of gastroenteritis clusters in Arizona during 2004, causing three documented foodborne outbreaks. One outbreak was associated with food served to patrons at a restaurant, while the other two were linked to food that was catered for events. The cause of restaurant and catered outbreaks can be difficult to ascertain since several factors may be involved, including infected food handlers, cross-contamination of raw and ready-to-eat food items, environmental contamination, consumption of undercooked foods of animal origin, or inadequate cooking, hot holding, cooling, and reheating of multiple food items.

Bacterial intoxication caused by such pathogens as *Clostridium perfringens*, *Bacillus cereus*, and *Staphlyococcus aureus* was also an important cause of foodborne clusters in 2004 . These outbreaks often lack laboratory confirmation since laboratory tests are unable to detect the bacteria and toxin as they are short-lived in the stool of ill individuals. Commonly-identified factors leading to bacterial intoxications are improper time and temperature control of potentially hazardous food items such as meat, rice and sauces.

Confirmed Foodborne Illness Outbreaks

A. Possible Bacterial Intoxication Outbreak Among Students at Day School, April – Pima County

On April 30, 2004 the Pima County Environmental Health Department received a call from an elementary school in Pima County after several students became ill with nausea, vomiting, diarrhea, cramps, and headache on April 28th and 29th. The Pima County Health Department initiated an investigation to identify the source of infection and compiled a questionnaire regarding symptoms and menu items consumed during the week of April 26th.

Questionnaires were administered to classrooms; each child and faculty member responded to the questions. Of the 140 individuals interviewed, 28 met the case definition of vomiting or diarrhea and one or more of the following: nausea, cramps, fever, and headache. The average age of respondents was 14, with a range of 8 years to 45 years of age. An analysis of the food data revealed two lunch items as a possible source of illness. Both the bean and cheese "burro" and the tortilla chips were shown to be significantly associated with illness ($p<0.05$). However, after controlling for persons that also ate the bean and cheese burro, the tortilla chips lost their statistical significance ($p=0.28$). The average incubation period of those that became ill after lunch on the 27th was 12 hours, with a range of 6 to 35 hours. The average duration of illness for the cases was 24 hours.

Since no food samples or clinical specimens were available for laboratory testing, a causative agent was not identified. *Clostridium perfringens* intoxication was the suspected cause of illness given the short incubation period (6-24 hours) and short duration of illness (24 hours or less). Although this bacterium is often associated with improper time and temperature control of food items, inspections of the lunch vendor by Environmental Health found that the beans in the burros had been cooked and cooled appropriately. However, the burros were prepared offsite and delivered to the school, presenting the possibility for inappropriate handling during delivery.

B. Norovirus Outbreak Among Diners at Buffet Restaurant, May – Maricopa County

On Friday, May 21, 2004, Maricopa County Environmental Health Services (MCEHS) received three separate complaints regarding a local buffet restaurant. All three complainants reported

eating at the restaurant on May 18th, 2004. One of the complaints was from an attendee of a school fundraiser held at the restaurant. Subsequently, the school reported that approximately 53 of the individuals who attended this event developed gastrointestinal symptoms. School officials did not provide a list of attendees, but ill individuals were instructed to call the health department. Cases who phoned the health department were interviewed regarding their symptoms and exposures.

According to these interviews, the ice cream and/or yogurt dispensed from the soft serve machine at the restaurant appeared to be associated with infection. This association was identified epidemiologically prior to MCEHS inspection at the restaurant, allowing for the collection of food samples from the soft serve machine and ice cream/yogurt containers. Testing of these samples at the ASPHL depicted evidence of bacterial contamination, notably in samples collected from previously unopened containers. MCEHS inspectors also noted that six employees called in sick between May 2nd and May 21st. Three of those employees worked on May 18th. Of the employees experiencing gastrointestinal symptoms, onset was suspected to be after May 18th.

In addition to food testing, stool specimens were collected by the county health department to determine the etiologic agent. One of the stool specimens collected tested positive for norovirus at ASPHL. While bacterial contamination identified in the food sample may be indicative of improper handling or disinfection procedures, the cluster of illnesses may also have been caused by one or both pathogens. There is some variation in incubation times suggesting that bacterial intoxication may have occurred in addition to the identified norovirus infections. Bacterial intoxication is extremely difficult to determine from testing of stool specimens. In addition, two more complaints of illness concerning this restaurant were received on May 24th and June 9th by the county health department. The facility was re-inspected by MCEHS and additional food samples from the soft serve machine were obtained. This second batch of samples also showed high levels of bacterial contamination. After visually inspecting detailed cleaning of the machine, tests from later samples were within normal limits.

C. Salmonella Outbreak Associated With Consumption of Shrimp Cocktail at Restaurant in Mexico, June – Mexico

On July 22, 2004, ASPHL notified ADHS of eight *Salmonella enteritidis* isolates, collected between June 24, 2004 and July 10, 2004, which matched by PFGE, suggesting a common exposure. Shortly after this discovery, the foodborne branch of CDC notified ADHS that the Salmonella Outbreak Detection Algorithm (SODA) maintained by the CDC detected an increase in the number of positive cases of *S. enteritidis*. A total of 20 *S. enteritidis* isolates, collected between June 24 and July 12 were found to have the same PFGE pattern.

These cases were distributed among several counties: 12 in Maricopa, 1 in Pinal, 3 in Pima, 1 in Coconino, 1 in Yavapai, and 1 in Navajo County. County health department interviews revealed that many of the cases traveled to Mexico during the 1-7 days prior to their onset of illness, the incubation period for *Salmonella*. ADHS incorporated this information into more focused questionnaire including information on hotels and meals consumed in Mexico, and re-interviewed cases.

These interviews revealed that 18 of the 20 identified cases had traveled to Rocky Point, Mexico, between June 1 and July 5. In addition, 10 of these 18 cases consumed shrimp at various restaurants, with the majority (70%) specifically recalling consumption of shrimp

cocktail. Since the suspected food was served at restaurants outside of the United States, further investigation into the exact source of the infection could not take place.

D. Salmonella Outbreak Among Conference Attendees, August – Maricopa County

Reports were received from the Wisconsin and Oregon state health departments regarding two cases of *Salmonella oranienburg* that attended a conference in Maricopa County during the first week of August. The Maricopa County Department of Public Health (MCDPH) conducted an inspection of the facility and obtained information about the conference. Meanwhile, the California State Health Department called to report a third case of *S. oranienburg* in a California resident who also attended the conference in Arizona.

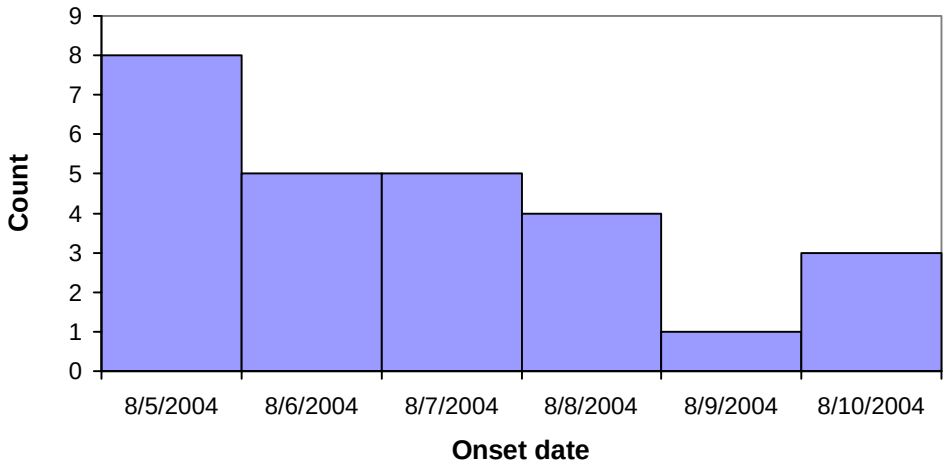
Upon further investigation by the MCDPH and Maricopa County Environmental Health Services (MCEHS), additional cases of illness were reported among conference attendees. According to the company holding the conference, an informal e-mail group of people reporting illnesses identified approximately 18 conference attendees with gastrointestinal symptoms. Approximately 500 people nationwide attended the conference in Arizona and additional case-finding measures were initiated. An inspection completed by MCEHS did not find any food code violations at the conference center facilities and no ill employees documented. MCEHS also obtained a menu of the foods served by the facility throughout the entire conference.

Since the outbreak involved people from multiple states, the investigation was completed by ADHS. The PFGE patterns on the three *Salmonella* specimens from Wisconsin, Oregon, and California revealed that all three matched. These results supported the theory that a common-source outbreak of *Salmonella* had occurred. Interestingly, a review of the PFGE database at the Arizona State Public Health Laboratory (ASPHL) did not find any results matching the patterns seen in the three conference attendees from other states. ADHS verified foods consumed during the conference and obtained a list of attendees from the conference organizers. This information was used to develop a questionnaire and a case-control study was initiated.

Telephone interviews were conducted on all individuals reporting illness. In addition, controls were randomly selected and interviewed from the list of 500 attendees. Additional cases were identified during control interviews; any controls matching the case definition were classified as cases and additional controls were enrolled. A total of 30 cases and 50 controls were identified during interviews.

Survey data were analyzed to identify common patterns in onset dates and food consumption. The majority of those cases reported onset dates the second day of the conference (Figure 29). Since the incubation period for *Salmonella* generally ranges from 18 to 72 hours, this finding indicates that the exposure probably occurred during the single meal served the first day of the conference. However, statistical analysis of the foods consumed at this meal did not reveal any item as significantly associated with illness. Since the identification and investigation of this cluster occurred over a month after the onset, recall and interviewer bias may have impacted the results.

Figure 29. Cases of Salmonella by onset date, Arizona 2004.



E. Salmonella Outbreak Associated With Wedding Reception, October – Yuma County

During the last week of October 2004, a Yuma County resident called the local county health department to report illness after attending a wedding reception on Friday, October 22, 2004. The resident's 16-year-old daughter had presented to a local healthcare facility on October 23, 2004, with diarrhea, vomiting, nausea, fever, chills, and abdominal cramps. The caller reported that other individuals who had also attended the reception had similar symptoms.

No stools were collected for testing; however, the healthcare provider stated that 14 or 15 others at the reception had been seen between October 24th and 25th with similar symptoms. In addition, the local health department noted an increase in gastrointestinal cases (10 cases) during this period in the daily list of emergency room visits maintained by the local hospital. On October 28, laboratory results revealed that three out of the ten suspected gastroenteritis cases at the local hospital were positive for *Salmonella*. Two of these individuals attended the wedding reception on October 22nd, while the third positive case reported attending a birthday party (quinceañera) on Saturday, October 23. Two other individuals also reported developing gastrointestinal symptoms after this party. Investigations revealed that this party was held within 24 hours of the wedding reception, at the same location and catered by the same company as the wedding reception.

Attendees of the wedding reception were interviewed to identify a possible source for the *Salmonella* infections. Unfortunately, information on the birthday party could not be obtained. The county health department acquired a menu for the wedding, which included shredded beef (barbacoa), Spanish rice, beans, lettuce salad, salsa, ranch dressing, and corn tortillas. Of the 162 people who attended the wedding reception, the health department identified 57 that met the case definition for salmonellosis. Based upon interviews with 35 of the 57 ill, onset of illness was 7-72 hours after the wedding reception, suggesting a point source infection. Interviews were not able to pinpoint a specific contaminated food item, since ill attendees consumed various combinations of dishes.

The Yuma County Environmental Health Department completed an inspection with the catering company for both events and did not find any reports of ill food handlers. Environmental health inspectors found that food preparation occurred in a non-commercial, unlicensed kitchen in the home of a catering company employee. In addition, the caterer did not have proper knowledge on food handling practices. Although no food was available for bacterial testing, the epidemiologic and environmental investigations suggest a high possibility of cross-contamination among all of the food prepared for the wedding reception.

F. Norovirus Outbreak Among Conference Attendees, October – Maricopa County

On Tuesday, October 26, 2004, the Maricopa County Department of Public Health (MCDPH) received a phone call from emergency department staff at a local hospital stating that several persons with nausea, vomiting, diarrhea, and fever had sought treatment at their facility the prior evening; all patients were guests at a local resort/conference center. MCDPH staff initiated an outbreak investigation and began working closely with conference center staff. The facility reported approximately 500 national and international attendees to the conference, with 82 individuals reporting symptoms—80 attendees and two employees. MCDPH was able to obtain 2 stool specimens for testing, which tested positive for norovirus at ASPHL.

Since attendees had returned home to various states and countries before interviews could be conducted, MCDPH chose to administer questionnaires via e-mail. This method yielded a fairly high return rate for cases; however, no controls completed the questionnaire. The major symptoms reported by attendees were nausea, vomiting, weakness, diarrhea, and anorexia. Since all of the resort meals were served buffet style with a large number of choices, an implicated food item could not be determined.

An inspection completed by MCEHS revealed that the facility had been compliant with recommendations to restrict ill food handlers until symptoms resolved. However, during the MCEHS inspection, it was noted that several food workers were absent in the days prior to the onset of illness among guests and that at least two of the absent food workers had symptoms suggestive of norovirus.

G. Norovirus Outbreak Among Diners at Popular Restaurant, December – Cochise County

On Monday, December 13, 2004, the Cochise County Environmental Health Division (CCEHD) received a call from the public stating that several people who had eaten at a popular, local restaurant on Thursday, December 9, developed gastrointestinal symptoms. A second group of individuals also dining the same night called with similar complaints. County epidemiologists obtained a list of group members and initiated interviews.

Of the 81 diners contacted by CCEHD, 35 had symptoms suggestive of norovirus infection. The health department was able to collect six stool specimens on patrons on December 15th; two were positively identified as norovirus at the ASPHL. Analysis of interviews showed a significant association between consuming salad at the restaurant and developing gastrointestinal symptoms ($p<0.05$). In addition, CCEHD inspections found several violations in the kitchen of the restaurants. There were several discrepancies noted in the food handling processes of the salad. Salad greens had been washed in the hand sink, lettuce shipping boxes were reused to store washed lettuce, and salad bowls (which were wet stacked) filled with lettuce were stacked on top of each other, with the above bowl nested in the lettuce of the

bowl below. Although the origin of norovirus in the salad is under question, analysis of interviews and inspection results firmly point to the salad as the source of the outbreak.

Probable Foodborne Illness Outbreaks

H. Norovirus Outbreak Among Inmates at Correctional Facility, November – Maricopa County

On November 12, 2004, the Office of Environmental Health (OEH) at ADHS received an incident report of several inmates ill with gastrointestinal symptoms at a correctional facility in Maricopa County. The report from a correctional officer described prisoners presenting with vomiting and diarrhea beginning about 11:55 pm on Wednesday, November 10, 2004. Shortly after receiving the report, staff from EHS traveled to the facility to interview prisoners and inspect the establishment.

Of the 20 inmates interviewed, 16 reported gastrointestinal symptoms including vomiting and diarrhea. OEH requested stool specimens and submitted specimens to ASPHL for testing. In addition, frozen samples of the foods served at each dining period in the last 72 hours were obtained for bacterial testing at the ASPHL. Numerous deficiencies were noted during the inspection, including the use of dirty, greasy wash water and no rinse water in the 3-compartment sink.

Test results, follow-up interviews, and data analysis revealed the possibility of an infected food handler contaminating food served on Tuesday, November 9th. Stool cultures from inmates tested positive for norovirus at ASPHL. The ill kitchen worker had onset of stomach cramps and vomiting at 11:00 am on November 9th, approximately 36 hours prior to the onset of the majority of inmates. The food worker continued to work in the kitchen during the time he felt ill. No stool samples or tests were taken on this food worker.

Interviews revealed that the sausage served for the lunch meal on Wednesday, November 10th was associated with illness (p-value<0.05). In addition, OEH staff noted that temperature control sheets obtained from the food service contractor indicated that the sausage had not been heated to the appropriate temperature.