Maricopa County
Department of Public Health

OB1239
Federico's Mexican Restaurant

Submitted by
Division of Disease Control
Office of Epidemiology
Environmental Services Department, Environmental Health Division

November 25, 2013

Brief summary:

Maricopa County Department of Public Health (MCDPH) investigated an *Escherichia coli* O157:H7 outbreak in which 94 ill persons were identified. The source of the outbreak was traced to a single location of Federico's Mexican Restaurant chain located at 13132 W. Camelback Rd., Litchfield Park, with exposure dates occurring from July 18-30, 2013. A case-control study of 180 persons was performed, and environmental samples were collected on multiple dates. The findings from the environmental samples and the case-control study both implicated contaminated lettuce as a probable source of the outbreak and vehicle for the *E. coli* that caused illness.

Summary by Time Sequence:

On July 30, MCDPH was contacted about a potential cluster of cases with bloody diarrhea. The initial report came from a hospital physician who had seen several patients with similar symptoms on the same date. Further investigation revealed that the ill persons were on a high school sports team, or family members of the team members. An exposure history questionnaire was developed and emailed to all team members on July 31.

The initial investigation revealed several links between affected persons, including multiple sports camps and shared meals in the two weeks before illness. To elucidate any common exposures between ill persons, a detailed exposure history for team members and families was developed that included restaurants and locations visited. It was noted that at this point many family members insisted that the only shared meal was at Federico's Mexican Restaurant, 13132 W. Camelback Rd where the team and family members ate on July 23.

On August 1, MCDPH received preliminary results identifying Shiga-toxin producing *E. coli* (STEC) as the suspect pathogen, an indication of potential severe disease. Two of the hospitalized cases were diagnosed with hemolytic uremic syndrome (HUS) on the same day. Maricopa County Environmental Services Department (ES) and Arizona Department of Health Services (ADHS) staff visited Federico's Mexican Restaurant for an initial inspection and to sample food items (see Appendix II). MCDPH released a statement to the media informing residents, especially those in the West Valley, about the need to seek healthcare if they were exhibiting symptoms of bloody diarrhea (see Appendix VIII, section a).

On August 2, investigation into hospitalized cases revealed one ill teenager who was not related to the team; this person did, however, eat at Federico's Mexican Restaurant on July 23. Several more cases were reported with no connection to the team, but with a history of eating at Federico's Mexican Restaurant. At this point, MCDPH contacted Federico's to inform them about the findings. The restaurant decided to voluntarily close for cleaning. MCDPH sent out a SURV alert (see Appendix IX) to hospitals and physicians in Maricopa County, and ADHS alerted the FDA, other Arizona counties, and foodborne disease epidemiologists across the state about the outbreak. Additionally, a more detailed, specific food history questionnaire was developed to better identify suspect food items from the Federico's menu.

At this point, MCDPH knew that the pathogen was potentially severe, that evidence pointed strongly at the single restaurant, that some patients were seriously ill, and that the potential for large numbers of persons to have been infected existed. In order to reach all members of the public who might have been affected and alert them to the need for medical evaluation and care to prevent serious illness, MCDPH released another statement to the media naming the suspect restaurant (see Appendix VIII, section b).

On August 3–4, the restaurant discarded all food items and hired a 3rd party company to clean the facility. On Monday, August 5, the restaurant re-opened with assistance from ES. ES staff verified that the facilities appeared clean and that all food had been thrown out. There was ice present in the ice machine; this ice was also melted, and the ice machine cleaned, prior to restaurant re-opening.

On August 6, MCDPH initiated a case-control study using the food history of ill persons to identify suspect food items. Active case finding was performed by contacting hospitals and healthcare providers to inquire about any persons with bloody diarrhea, as well as encouraging people to seek healthcare if they were experiencing symptoms. Additional cases and controls were identified through contacts of cases. MCDPH also acquired a list of credit card receipts from the restaurant and began contacting restaurant patrons to find both cases and controls for the investigation.

On August 8, preliminary results from the restaurant samples indicated high levels of coliforms (an indication of contamination) in the green salsa and lettuce (see Appendix V). To ensure food safety, ES returned to the restaurant on August 9th to collect another round of food samples. Additionally, identical samples were taken from another Federico's Mexican Restaurant location to serve as control samples.

As the case-control study results were analyzed, lettuce became the most highly suspect food item. On August 14, the results of the food samples taken on August 9 revealed high coliform counts in the lettuce (1400 coliform CFUs/g). No pathogenic *E. coli* was identified (see Appendix V).

On August 16, MCDPH, ES, and ADHS representatives performed a site visit to the restaurant to review lettuce handling protocols and take additional samples. Lettuce handling protocols were observed in detail (see Appendix II), and it was noted that if contamination had been present on a small amount of lettuce, it could have easily spread to contaminate other lettuce in areas such as the prep sink and shredder, or during storage in a large container. For example, dirt from the outside of lettuce heads could have been washed into the prep sink and spread to other clean lettuce sitting in the sink. The bacteria could have continued to spread during the shredding and storage process. While it is impossible to know exactly how the lettuce contamination occurred, this is a possible scenario. Lettuce has been associated with previous *E. coli* O157:H7 outbreaks (Ackers 1998, Hilborn 1999, Solomon 2002) as it is a natural, uncooked food product, and washing does not completely eliminate bacterial contamination.

On August 28, additional recommendations regarding lettuce handling and handwashing protocols were given to the restaurant (see Appendix VII). On September 9, the investigation was closed.

Environmental Services and Arizona Department of Health Services — Environmental Investigation:

Environmental Services staff visited the restaurant on three dates to collect samples: August 1st, August 9th, and August 16th. Samples collected included food items and surface swabs. These specimens were tested at the Arizona State Public Health Laboratory for pathogenic *E. coli* 0157 and total coliforms. All samples, on all dates, were negative for *E. coli* 0157. Several samples had elevated total coliform counts (ready-to-serve food expected levels <1000 CFUs/g of total coliforms). From the August 1st date, elevated levels were found in the green salsa (31,000 CFUs/g) and lettuce (1400 CFUs/g). On August 9th, elevated levels were found in the lettuce (1400 CFUs/g), as well as in the jalapenos at the control location (2100 coliform CFUs/g, 50 *E. coli* CFUs/g). Lettuce samples at the control Federico's location were found to be less than 10 coliform CFUs/g.

On August 16th, elevated levels were detected from the lettuce stored in the cooler of the implicated Federico's location (4300 CFUs/g).

Food Traceback:

Midwest Beef supplies beef and produce to Federico's Mexican Restaurant. This supplier provides food for other Federico's Mexican Restaurant locations, as well as other food service establishments, in Phoenix. No other confirmed cases of illness due to *E. coli* were reported from other restaurant locations.

Case-Control Study – Food Analysis:

A total of 180 persons were interviewed for the case-control study, including 81 cases (confirmed and probable) and 99 controls. The highest risk food item was found to be lettuce (OR 3.64, 95% CI 1.94–6.84). Other foods significantly associated with illness included tacos (OR 3.08, 95% CI 1.67–5.68), water (OR 6.83, 95% CI 1.45–32.14), grated cheese (OR 1.84, 95% CI 1.01–3.33), red chile salsa (OR 1.84, 95% CI 1.01–3.33), and green salsa (OR 1.98, 95% CI 1.01–3.87). (See Appendix VI, section a. for complete results.)

We also looked at the results using **only confirmed cases**. In the results of this analysis, lettuce was even more significant (OR 6.06, 95% CI 2.64–13.93). Tacos (OR 4.37, 95% CI 2.06–9.28), water (OR 11.8, 95% CI 2.43–57.18), beef (OR 2.49, 95% CI 1.22–5.11), pickled jalapenos/carrots (OR 3.2, 95% CI 1.11–9.22), and chicken (OR 2.33, 95% CI 1.04–5.24) were also significant at the 95% confidence level. (See Appendix VI, section b for complete results).

To minimize the effects of confounding, we looked at the results of other food items while stratifying by lettuce. Some food items (such as tacos, for example) contain lettuce, and could appear to be risk factors when the lettuce actually caused illness. When controlling for lettuce, no other food items were a significant risk factor except water. (Water was still significant; however, only 10 people drank water in the case group and 2 in the control group, making it unlikely to be the source of the outbreak. Similarly, we analyzed the results to look at the risk of

lettuce when controlling for other higher risk foods (see Appendix VI, section c for stratified charts). Lettuce remained significant in all analyses. Lettuce was by far the most suspect food item, and it is highly likely that it was the contaminated vehicle in this outbreak.

Discussion & Conclusion:

E. coli 0157:H7 was found to be the pathogen causing this outbreak of gastrointestinal illness and hemolytic uremic syndrome. The incubation period and symptoms, including hemolytic uremic syndrome, are typical for this pathogen. Molecular testing of clinical patient specimens indicates that cases were exposed to a single point source, in this case, eating at Federico's during July 18-31, 2013. The specific source of the bacterial exposure is uncertain; however, both the environmental samples and the case-control study implicate lettuce as the most likely contaminated source. The lettuce could have been contaminated in the field from manure or contaminated irrigation water, during processing, transport, handling, or through improper storage. Improper lettuce washing and preparation at the restaurant may have contributed to the spread of disease. The restaurant corrected these processes and complied with all other recommendations and no new cases were identified, effectively ending the outbreak.

It is notable that the food supplier that provides produce to this restaurant also provides food to other Federico's locations in Phoenix, as well as other food establishments in the valley. No confirmed cases of illness were recorded from other local restaurants. This point source exposure could have occurred due to contamination at any one of several levels. It could have occurred at the restaurant from an ill food handler, although no employee illnesses were reported from the restaurant during the month of July and this would be a large number of cases to be contracted from a single ill food handler. Cross contamination from another contaminated food source at the restaurant – such as beef, for example – is also a possibility. It is also possible that this restaurant received a small, highly contaminated batch of lettuce that did not go to any other facilities.

Recommendations and Interventions:

Findings from the case-control study, environmental investigation, and laboratory testing were shared with the restaurant to guide future prevention efforts. In particular, specific recommendations were developed for lettuce handling and storage, as well as handwashing protocols, to minimize any risk of *E.coli* contamination. Additionally, the restaurant performed intensive cleaning of the entire facility and implemented additional lettuce washing protocols to ensure food safety.

Appendices

I. Timeline

A summary of the investigation is provided in the time table below.

Date	Action
7/30/13	• MCDPH notified of outbreak, investigation initiated
7/31/13	• Initial questionnaire distributed
8/1/13	• Meal at restaurant identified as common exposure among first group reported ill • Preliminary identification of pathogen as Shiga-toxin producing *E. coli*; 2 HUS cases identified • Initial inspection of restaurant and sampling of food items • Active case finding began • First media release distributed
8/2/13	• Identification of additional cases beyond initial group • Restaurant contacted about illnesses and closed voluntarily for deep cleaning • Media release distributed naming restaurant
8/5/13	• Restaurant re-opened with assistance from ES
8/6/13	• Case-control study began
8/9/13	• Second round of sampling at restaurant and at control location
8/12/13	• Preliminary identification of implicated food item based on case control study analysis and food samples.
8/16/13	• Third set of samples taken from restaurant; lettuce-handling procedures inspected in detail
8/28/13	• Recommendations to restaurant on handling of food item of concern, discussion of findings, case control study wrap up
9/5/13	• Hot wash conducted on outbreak investigation
9/9/13	• Investigation closed

II. Summary report from the Environmental Services investigation

Communicable Disease Investigative Report
Foodservice Facility

Date: 08/01/2013
Establishment Name: Federico's Mexican Food Restaurant
Permit #: FD-14451
Complaint #: CC-13-18547
Illness Type: Shiga toxin-producing E. coli
Number of cases reported: 5
This inspection was conducted as a result of a communicable disease report and inspection request from the Maricopa County Department of Public Health.
Discussions and/or recommendations:
Additional employee Illnesses: Yes or **No**

- Name(s) of additional ill employee(s):
- Phone number(s) for additional ill employee(s):
- Position of ill employee(s):
- Date(s) of Illness:
- Symptoms/Diagnosis:
- Comments: Establishment does not maintain a log of employee illnesses. Person in Charge stated that no employees had called out ill since at least July 1. Person in Charge stated that some employees missed scheduled shifts for other reasons, such as attending a concert and maternity leave.

Employee illness policy:

- Does the person in charge (PIC) demonstrate sufficient knowledge of foodborne illness prevention and employee illness? **Yes** or No
- Comments: No deficiencies observed. The establishment posts information about the five major foodborne pathogens on the door of the walk-in unit at the center of the kitchen and the Person in Charge demonstrated adequate knowledge of foodborne illness prevention and employee illness.

- **Employee hygiene**: No deficiencies observed.

- **Hand washing**: No deficiencies observed.

- **Bare hand contact**: No deficiencies observed.

- **Use and storage of sanitizers and wiping cloths**: Establishment uses a chlorine based solution as a sanitizer. The concentration of chlorine in the sanitize compartment of the three-compartment sink measured between 50 and 100ppm. However, the concentration of chlorine was undetectable in the wiping cloth buckets near the back prep tables and at the cook line. The Person in Charge added chlorine to the buckets until the concentration measured between 50 and 100ppm. Between uses, wiping cloths were correctly stored in wiping cloth buckets.

- **Additional comments**: At approximately 10:45am, observed two plastic buckets of cooked red chiles cooling in the walk-in unit. Ice had been added on top of the chiles to help them cool. The Person in Charge stated that the chiles had finished cooking around 05:00am and that after cooling at room temperature and rinsing with cold water, at or around 06:30am, they were placed in the plastic buckets and put in the walk-in with ice on top to complete cooling. At the center of the product, a temperature of approximately 62*F was observed. Due to failure to meet the time/temperature milestones for cooling as outlined in the 2009 FDA Food Code, this product was embargoed.

All other temperatures of PHF/TCS foods were observed to be in compliance, including for hot holding, cold holding and cooking.

No deficiencies were observed with respect to procedures for preventing cross-contamination. Establishment correctly stores food in the walk-in unit and in the prep units along the cook line. Establishment uses separate prep tables for vegetables and meat, although each table is not used solely for one type of product (in other words, the products are always prepped on different tables, but one day a prep table may be used for meat and the next day the same prep table may be used for vegetables). Per the Person in Charge, prep tables are washed, rinsed and sanitized between uses.

Procedures for washing, rinsing and sanitizing equipment were correct but were not directly observed at the time of the investigation.

Establishment uses Midwest Beef (1220 E. Jackson St., Phoenix, AZ 85034; 602-252-6328) for meat and produce. Copies of invoices from 07/01/2013-08/01/2013 were obtained and are included with this report as a separate document.

The following samples were taken: pickled vegetables from salsa bar; green salsa from salsa bar; red salsa from salsa bar; green salsa from walk-in unit; red salsa from walk-in unit; pico de gallo from walk-in unit; sealed package of cooked ground beef taco meat product; cooked ground beef taco meat product from the cook line; avocado; shredded lettuce; uncut tomatoes; uncut cilantro; shredded cheese. In addition, swabs were taken of food prep surfaces and equipment. These samples were transported to the ASL by ADHS. Sampled items were prepared between 7/29/13 to 7/31/13.
Ground beef taco meat product comes pre-cooked. No raw ground beef is stored onsite at the establishment. Establishment does receive whole cuts of raw beef for carne asada, etc.
Per PIC, meal items often come with shredded lettuce and grated cheese.
Per PIC, shredded lettuce is washed 3 separate times prior to service. Beans and rice are made from scratch every 3-5 hours.
Per PIC, red salsa production is as follows:
- Boiling of peppers
- Cool down of peppers
- Cooled peppers are placed in blender with ice water and blended with canned tomato sauce, garlic powder and salt

On 8/9/13, RS 781 and 1021 visited two Federico's Mexican Food locations to collect food samples. The following items were sampled in the 13132 W. Camelback Rd location:
1. Fresh tomatillo (received 8/3)
2. Fresh jalapeno (received 8/3)
3. Shredded lettuce (received and prepared 8/8)
4. Fresh cilantro (received 8/8)
5. Hot held carne asada (made 8/9)
6. Shredded beef in walk-in cooler (made 8/8)
7. Green salsa in walk-in cooler (made 8/4)
8. Green salsa in salsa bar (made 8/4)
9. Red salsa in walk-in cooler (made 8/9)
10. Red salsa in salsa bar (made 8/8)

The following items were sampled in the 6680 W. Peoria Ave location:
1. Fresh tomatillo
2. Fresh jalapeño
3. Shredded lettuce (prepared 8/7)
4. Fresh cilantro
5. Hot held carne asada (made 8/9)
6. Shredded beef in walk-in cooler (made 8/8)
7. Green salsa in walk-in cooler (made 8/8)
8. Green salsa in salsa bar (made 8/8)
9. Red salsa in walk-in cooler (made 8/1)
10. Red salsa in salsa bar (made 8/1)
11. Red salsa in walk-in cooler (made 8/7)
12. Taco meat (ground beef with date of 5/3/13)

On 8/16/13, RS 781 and 1021 accompanied representatives from the State and County public health agencies to observe cleaning procedures for the lettuce that the establishment uses and its shredder which is used to process lettuce. The following observations were made:
Lettuce shredding procedure
- From walk-in to prep sink (near 3-compartment sink)
- Gloved hands: tear off outside leaves
- Washed lettuce one time in prep sink
- Return box of lettuce to walk-in
- Washed hands for less than 10 secs
- Apply gloves
- Use shredder: lettuce leaves torn apart to enter shredder (swabbed before use)
- Strainer used to receive shredded lettuce (16 inches in diameter, 9 inches deep)
- Shredded lettuce washed in prep sink using strainer
- Second wash of shredded lettuce into 5 gallon bucket
- Strainer with ice placed on top of bucket and water added into bucket
- Temp check: 35°F -> thermometer dipped in chlorine water before and after use

Shredder cleaning procedure
- Blade and blade guard into 3-compartment sink (scrub and soak)
- Head of shredder machine into 3-compartment sink (scrub and soak): head fits to soak in compartment sink to sanitize
- Rinse step: used a sprayer
- Body of shredder scrubbed in 3-compartment sink. Rinsed with a sprayer. Standard procedure was to use wipe down the body with a towel with chlorine solution. Advised to use a bottle spray instead to spray body of shredder with chlorine solution between 50 – 100 ppm.

3-compartment sink depth: 12-13 inches, length: 18.5 inches, width: 18.5 inches
Cutting board make table length: 75-78 inches
Shredder used primarily for cheese and lettuce but sometimes used for tomato, onion, cheese, and bell pepper
Cabbage packing: Suprema California Lettuce Agro Jal farms Santa Maria, CA

III. Epidemiology case investigation results

a. Case definitions

The following case definitions were used for the investigation.

Confirmed Case (n=59)

History of eating at Federico's Mexican Restaurant (13132 W. Camelback Rd.) from July 18–31, with **any one** of the following criteria:

- Onset of bloody diarrhea within 10 days of meal
- *E. coli* O157:H7 positive culture result
- Shiga-toxin positive test result
- Hemolytic Uremic Syndrome (HUS)

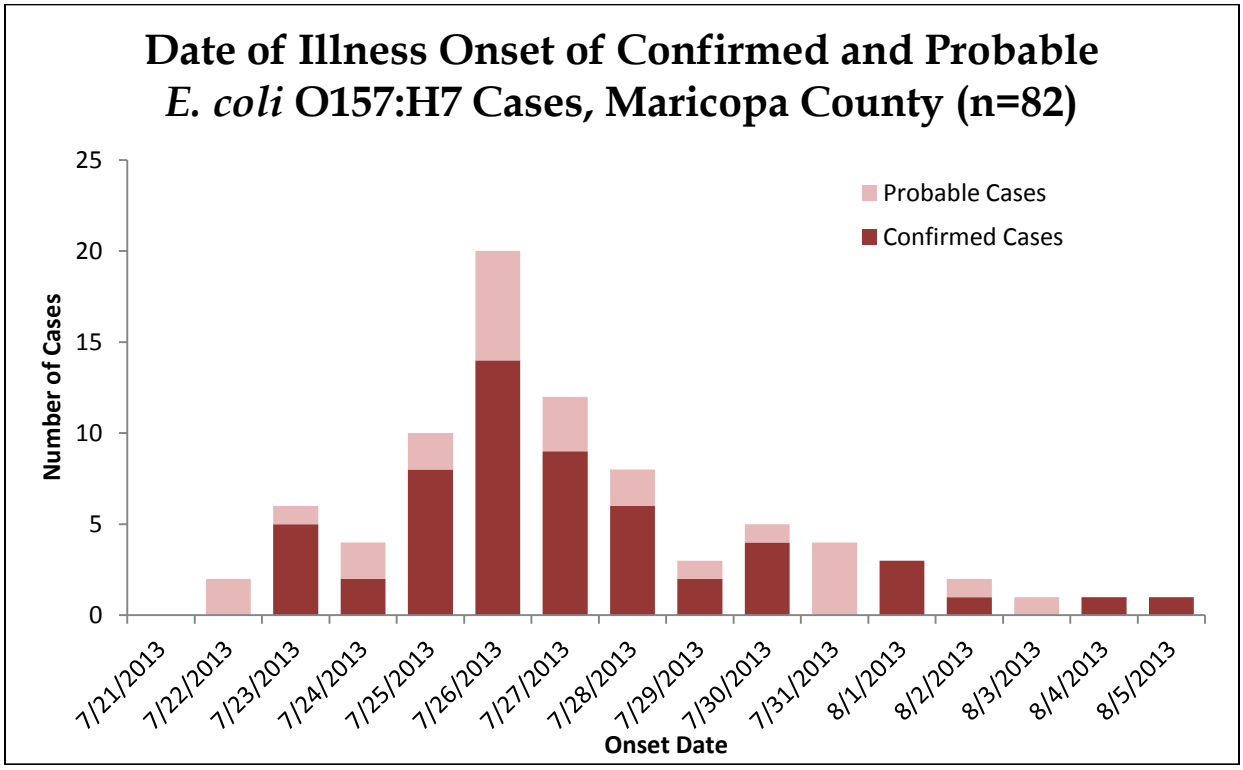
Probable Case (n=35)

History of eating at Federico's Mexican Restaurant (13132 W. Camelback Rd.) from July 18–31 with onset of diarrhea (non-bloody) within 10 days of meal

This figure shows the date of illness onset of confirmed and probable cases. Illness onset dates associated with this outbreak ranged from July 22–August 5.

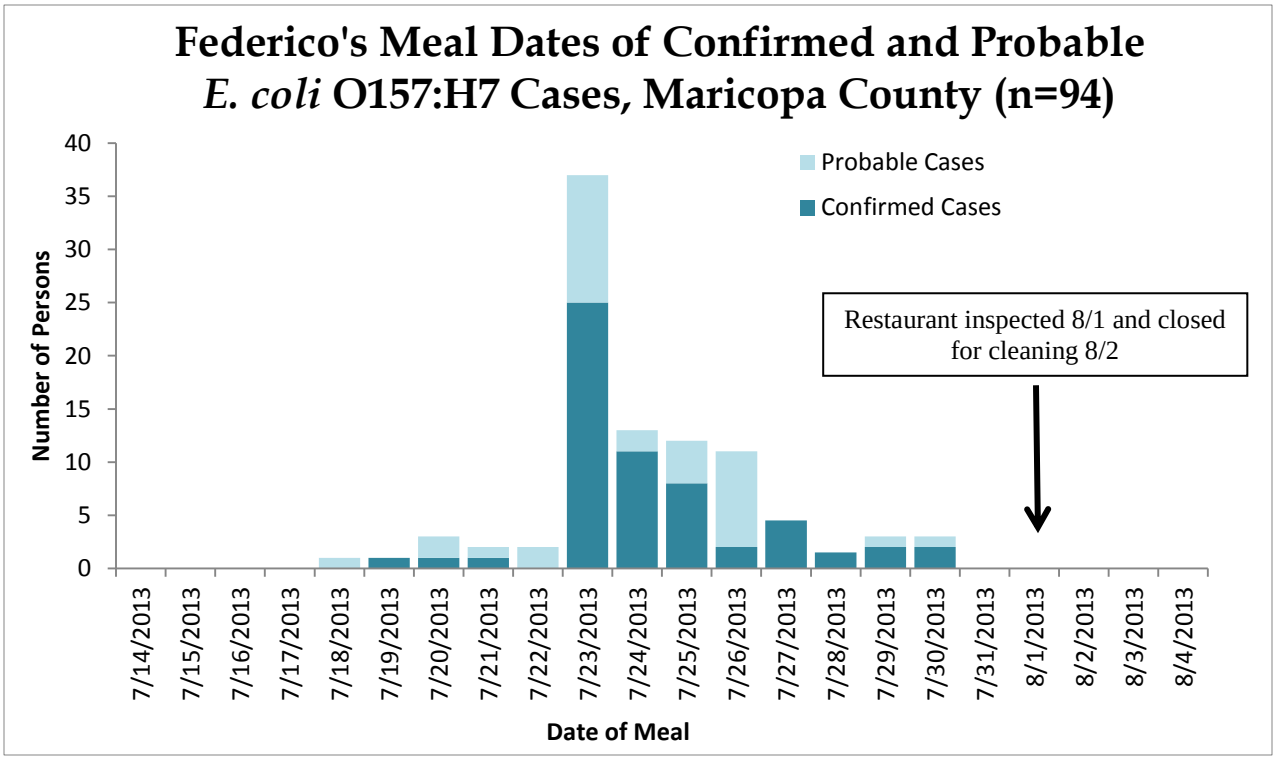
b. Date of illness onset of confirmed and probable E. coli O157:H7 cases, Maricopa County

This figure shows the date of illness onset of confirmed and probable cases. Illness onset dates associated with this outbreak ranged from July 22–August 5.

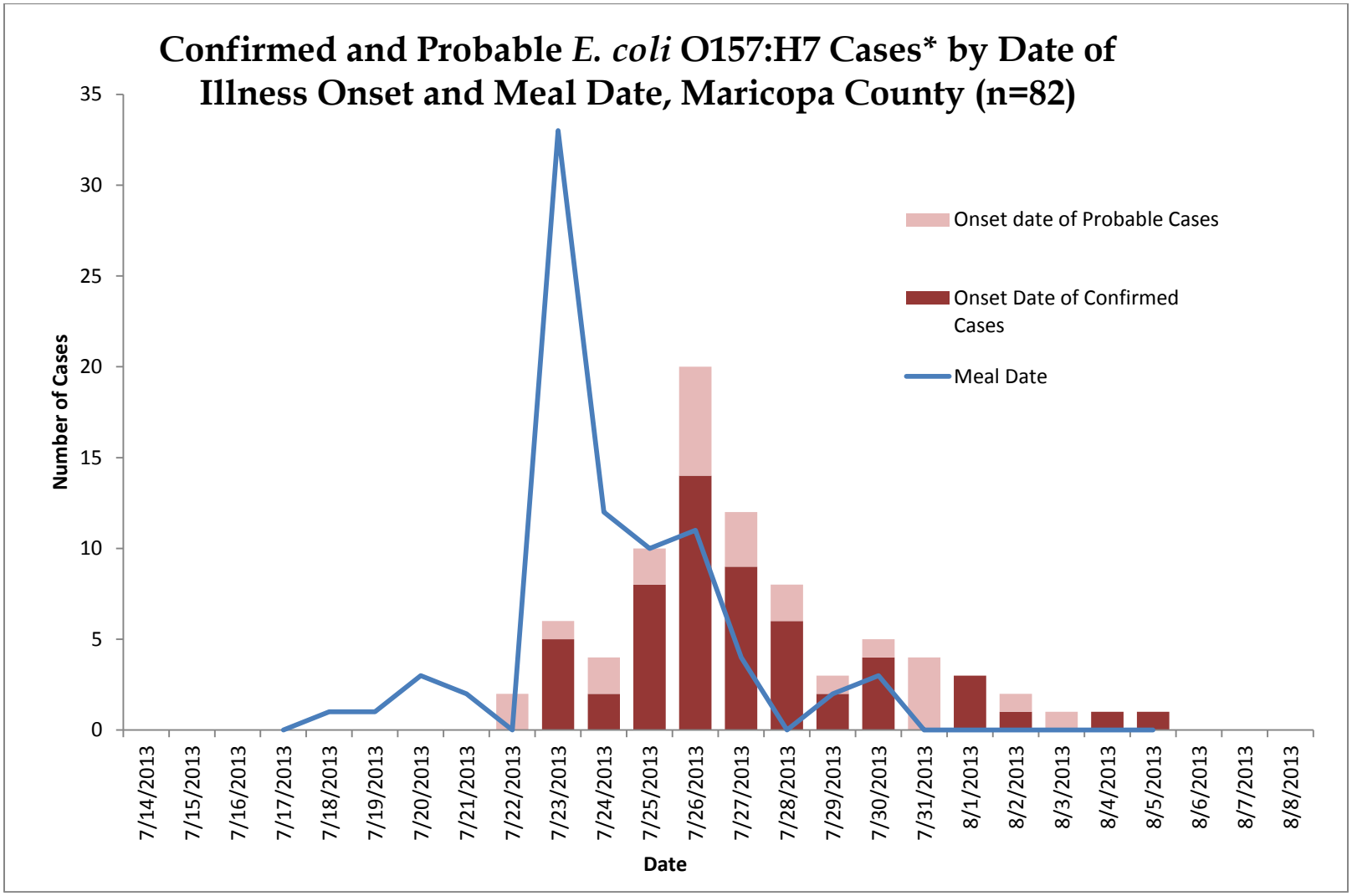


c. **Federico's meal dates of confirmed and probable *E. coli* O157:H7 cases, Maricopa County**

The figure below shows the dates that confirmed and probable cases ate at Federico's Mexican Restaurant. Meal dates began as early as July 18, and went through July 30. On August 1, ES inspected the restaurant and collected samples for laboratory testing. On August 2, the restaurant voluntarily closed for cleaning.



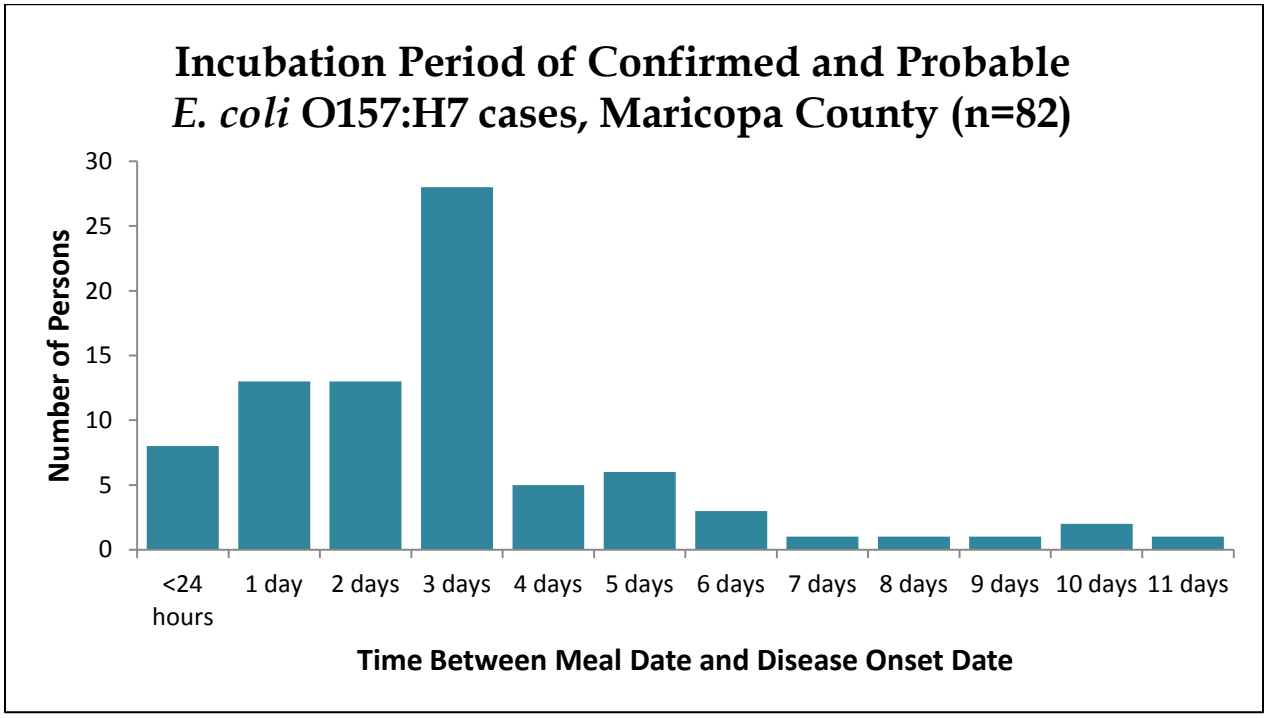
d. Confirmed and probable *E. coli* O157:H7 cases by date of illness onset and meal date, Maricopa County



*Only for cases with known meal date and onset date

e. Incubation period of confirmed and probable *E. coli* O157:H7 cases, Maricopa County

The incubation period, or time between exposure (meal date) and disease onset, ranged from less than 24 hours to eleven days with a median incubation period of 3 days.



e. Case demographic information, symptoms, and outcomes

Sex Distribution: 53 (56.4%) cases were female, 41 (43.6%) cases were male.

Age Distribution: 24 (25.5%) cases were children <18 years; 70 (74.5%) were adults. The median age was 32 (range 2–88) years.

Age (years)	N	(%)
≤12	9	(10)
13-29	35	(37)
30-39	19	(20)
40-49	14	(15)
50-59	7	(8)
60-69	4	(4)
70-79	3	(3)
≥80	1	(1)
Unknown	2	(2)
Total	94	(100)

Signs and Symptoms:

Symptoms	N	(%)
Diarrhea	94	(100)
Bloody diarrhea	58	(62)
Nausea*	50	(63)
Abdominal cramps*	73	(92)
Fever*	29	(37)
Vomiting*	28	(35)

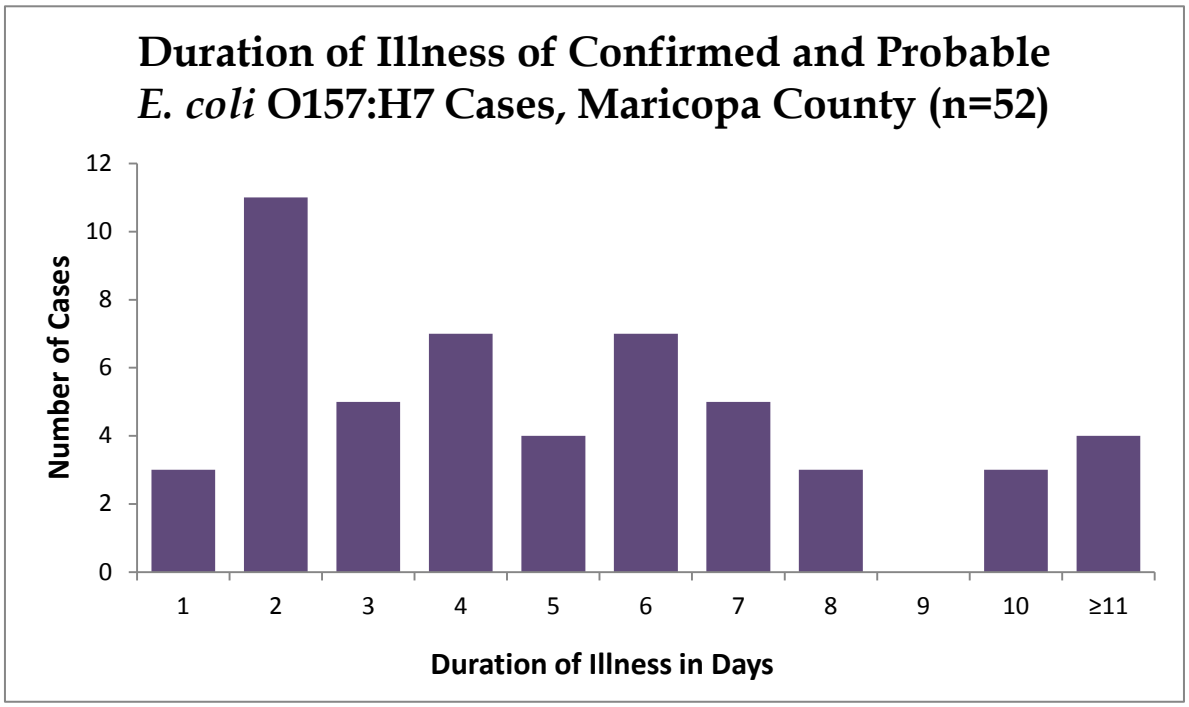
*Symptoms were not available for all cases; percentages were calculated out of 79 persons with complete results

Hospitalization or visit to the doctor: 22 (23%) persons were hospitalized; an additional 11 visited an emergency department or urgent care clinic.

Deaths: There were no deaths associated with the outbreak.

f. Duration of illness of confirmed and probable E. coli O157:H7 cases, Maricopa County

Information on the duration of illness was available for 52 persons, and ranged from 1 to 21 days. The median time for duration of illness was 4.5 days.



IV. Case-patient clinical laboratory test results

Specimen Type	Test	Number of positive specimens	Result
Stool	Culture	14	*E. coli* O157:H7
Stool	Pulse field gel electrophoresis (PFGE)	11	XBA1: EXHX01.1347 BLN1: EXHA26.1602
Stool	Shiga-toxin EIA	12	Positive for shiga toxins 1 and/or 2

Note: this reflects confirmed results from the Arizona State Public Health Laboratory only, and does not include results from specimens tested only at hospital laboratories.

V. Environmental sample laboratory results

Collection date	Sample type	Item/location	Total Coliforms (CFU*/g)	*E. coli* (CFU*/g)
8/1/13	Food	Shredded Cheese	<10	<10
	Food	Pico de gallo	30	<10
	Food	Green salsa (cooler)	31,000	2000
	Food	Ground taco meat (unopened)	<10	<10
	Food	Ground taco meat (opened)	10	<10
	Food	Shredded lettuce	1,400	<10
	Food	Green salsa (salsa bar)	27,000	1,000
	Food	Red salsa (salsa bar)	<10	<10
	Food	Pickled vegetables (salsa bar)	<10	<10
	Food	Avocado	20	<10
	Food	Red salsa (cooler)	20	<10
	Swab	Hot food prep area	-	None
	Swab	Knife holder	-	None
	Swab	Cheese compressor	-	None
	Swab	Cold prep (under veggie containers)	-	None
	Swab	Cold food prep surface	-	None
	Swab	Shredder base for veggies	-	None
	Swab	Cheese shredder	-	None
	Swab	"Masher"	-	None

Collection date	Sample type	Item/location	Total Coliforms (CFU*/g)	*E. coli* (CFU*/g)
8/9/13	Food	Tomatillo	40	<10
	Food	Jalapeno	<10	<10
	Food	Shredded lettuce	1,400	10
	Food	Cilantro	<10	<10
	Food	Carne asada	<10	<10
	Food	Shredded beef	10	<10
	Food	Green salsa (cooler)	10	<10
	Food	Green salsa (salsa bar)	10	<10
	Food	Red salsa (cooler)	40	<10
	Food	Red salsa (salsa bar)	40	<10
	Food – CONTROL	Tomatillo	<10	<10
	Food – CONTROL	Jalapeno	2,100	50
	Food - CONTROL	Shredded lettuce	<10	<10
	Food - CONTROL	Cilantro	<10	<10
	Food - CONTROL	Carne asada	<10	<10
	Food - CONTROL	Shredded beef	280	<10
	Food - CONTROL	Green salsa (cooler)	<10	<10
	Food - CONTROL	Green salsa (salsa bar)	<10	<10
	Food - CONTROL	Red salsa (cooler - made 8/1)	<10	<10
	Food - CONTROL	Red salsa (salsa bar)	<10	<10
	Food - CONTROL	Red salsa (cooler - made 8/7)	70	<10
	Food - CONTROL	Taco meat (ground)	<10	<10
8/16/13	Food	Lettuce freshly shredded	10	<10
	Food	Lettuce (from cooler)	4,300	40
	Food	Whole head of lettuce	<10	<10
	Swab	Top of shredder	<10	<10
	Swab	Shredder blade	<10	<10
	Swab	Shredder back plastic piece	<10	<10
	Swab	Plastic cooler curtains	<10	<10
	Swab	Cold prep bench	<10	<10
	Swab	Cold prep bench (2)	<10	<10
	Swab	Knife sharpener	40	<10
	Swab	Gloves	<10	<10

*CFU = Colony Forming Units

VI. Case-control results

a. Case-control food item results: all confirmed and probable cases of *E. coli* O157:H7, Maricopa County

Food item	Cases (n=81)		Controls (n=99)		Odds Ratio	(95% Confidence Interval)	P value*
	Ate item	(%)	Ate item	(%)			
Any lettuce	59	72.8	42	42.4	3.64	(1.94–6.84)	0
Shredded lettuce	56	69.1	40	40.4	3.3	(1.78–6.14)	0.0001
Taco	50	61.7	34	34.3	3.08	(1.67–5.68)	0.0002
Water	10	12.3	2	2	6.83	(1.45–32.14)	0.0057
Ketchup	4	4.9	.	.	I	.	0.0253
Chips	1	1.2	8	8.1	0.14	(0.02–1.16)	0.036
Grated cheese	49	60.5	45	45.5	1.84	(1.01–3.33)	0.0445
Red chile salsa	49	60.5	45	45.5	1.84	(1.01–3.33)	0.0445
Green salsa	27	33.3	20	20.2	1.98	(1.01–3.87)	0.046
Rice	16	19.8	31	31.3	0.54	(0.27–1.08)	0.079
Beans	20	24.7	36	36.4	0.57	(0.3–1.1)	0.0924
Beef	36	44.4	32	32.3	1.68	(0.91–3.08)	0.0952
Breakfast	14	17.3	9	9.1	2.09	(0.85–5.11)	0.1014
Tea	.	.	3	3	0	.	0.1141
Country breakfast burrito	2	2.5	.	.	I	.	0.1159
Burrito	30	37	48	48.5	0.63	(0.34–1.14)	0.1231
Bean burrito	11	13.6	22	22.2	0.55	(0.25–1.22)	0.136
Pickled jalapeno/carrots	11	13.6	7	7.1	2.07	(0.76–5.6)	0.1475
Tostada	3	3.7	9	9.1	0.38	(0.1–1.47)	0.1494
Guacamole	10	12.3	20	20.2	0.56	(0.24–1.27)	0.1594
Quesadillas	4	4.9	10	10.1	0.46	(0.14–1.53)	0.1982
Bacon breakfast burrito	7	8.6	4	4	2.25	(0.63–7.96)	0.1998
Any cheese	69	85.2	77	77.8	1.64	(0.76–3.57)	0.2065

Food item	Cases (n=81)		Controls (n=99)		Odds Ratio	(95% Confidence Interval)	P value*
	Ate item	(%)	Ate item	(%)			
Horchata water	2	2.5	6	6.1	0.39	(0.08–2)	0.2447
Tamarindo water	1	1.2	.	.	I	.	0.2676
Any chicken	19	23.5	17	17.2	1.48	(0.71–3.08)	0.2943
Any pico	22	27.2	21	21.2	1.38	(0.7–2.75)	0.3518
Any cabbage	.	.	1	1	0	.	0.3644
Huevos rancheros	.	.	1	1	0	.	0.3644
Chorizo special breakfast burrito	.	.	1	1	0	.	0.3644
Soda	14	17.3	22	22.2	0.73	(0.35–1.54)	0.4099
Torta	2	2.5	1	1	2.48	(0.22–27.86)	0.4468
Enchiladas	5	6.2	9	9.1	0.66	(0.21–2.05)	0.4671
Salad	3	3.7	2	2	1.87	(0.3–11.44)	0.4941
Chile relleno	2	2.5	4	4	0.6	(0.11–3.37)	0.5591
Pico de gallo	11	13.6	11	11.1	1.26	(0.51–3.07)	0.6149
Avocado	5	6.2	5	5.1	1.24	(0.35–4.43)	0.7436
Any avocado	22	27.2	29	29.3	0.9	(0.47–1.73)	0.7521
Melted queso	12	14.8	16	16.2	0.9	(0.4–2.04)	0.8041
Dessert	2	2.5	3	3	0.81	(0.13–4.97)	0.8197
Drinks or Dessert	31	38.8	37	37.4	1.06	(0.58–1.94)	0.8504
Ice	27	33.3	32	32.3	1.05	(0.56–1.96)	0.8858
Fries	3	3.7	4	4	0.91	(0.2–4.2)	0.9075

*P values were calculated using the chi square test

b. Case-control food item results: confirmed cases ONLY of *E. coli* O157:H7, Maricopa County

Food item	Cases (n=46)		Controls (n=99)		Odds Ratio	(95% Confidence Interval)	P value*
	Ate item	(%)	Ate item	(%)			
Shredded lettuce	37	80.4	40	40.4	6.06	(2.64–13.93)	<0.0001
Any lettuce	37	80.4	42	42.4	5.58	(2.43–12.8)	<0.0001
Taco	32	69.6	34	34.3	4.37	(2.06–9.28)	<0.0001
Water	9	19.6	2	2	11.8	(2.43–57.18)	0.0102
Ketchup	3	6.5	.	.	I	.	0.0473
Beef	25	54.3	32	32.3	2.49	(1.22–5.11)	0.0445
Pickled jalapeno/carrots	9	19.6	7	7.1	3.2	(1.11–9.22)	0.0445
Chicken	15	32.6	17	17.2	2.33	(1.04–5.24)	0.046
Chips	.	.	8	8.1	0	.	0.079
Red chile salsa	29	63	45	45.5	2.05	(1–4.2)	0.0924
Green salsa	18	39.1	25	25.3	1.9	(0.9–4.01)	0.0952
Quesadillas	1	2.2	10	10.1	0.2	(0.02–1.59)	0.1014
Any Cheese	41	89.1	77	77.8	2.34	(0.83–6.64)	0.1141
Soda	5	10.9	22	22.2	0.43	(0.15–1.21)	0.1159
Green salsa (reported item)	15	32.6	20	20.2	1.91	(0.87–4.2)	0.1231
Grated cheese	27	58.7	45	45.5	1.71	(0.84–3.46)	0.136
Q125 Country breakfast burrito	1	2.2	.	.	I	.	0.1475
Q133 Tamarindo water	1	2.2	.	.	I	.	0.1494
Bean burrito	6	13	22	22.2	0.53	(0.2–1.4)	0.1982
Tea	.	.	3	3	0	.	0.1998
Dessert	.	.	3	3	0	.	0.2065
Q122 Bacon breakfast burrito	4	8.7	4	4	2.26	(0.54–9.48)	0.2447

Food item	Cases (n=46)		Controls (n=99)		Odds Ratio	(95% Confidence Interval)	P value*
	Ate item	(%)	Ate item	(%)			
Any breakfast	7	15.2	9	9.1	1.79	(0.62–5.16)	0.2676
Any burrito	18	39.1	48	48.5	0.68	(0.34–1.39)	0.2943
Guacamole	6	13	20	20.2	0.59	(0.22–1.59)	0.3518
Q131 Horchata water	1	2.2	6	6.1	0.34	(0.04–2.95)	0.3644
Tostada	2	4.3	9	9.1	0.45	(0.09–2.19)	0.3644
Q130 Junior bean burrito w/ fries	.	.	2	2	0	.	0.4099
Any avocado	10	21.7	29	29.3	0.67	(0.29–1.53)	0.4468
Rice (reported item)	11	23.9	31	31.3	0.69	(0.31–1.53)	0.4671
Beans (reported item)	14	30.4	36	36.4	0.77	(0.36–1.62)	0.4941
Pico de gallo (reported item)	7	15.2	11	11.1	1.44	(0.52–3.98)	0.5591
Any cabbage	.	.	1	1	0	.	0.6149
Q117 Huevos rancheros	.	.	1	1	0	.	0.7436
Q121 Chorizo special breakfast burrito	.	.	1	1	0	.	0.7521
Fries	3	6.5	4	4	1.66	(0.36–7.73)	0.8041
Chile relleno	1	2.2	4	4	0.53	(0.06–4.86)	0.8197
Torta	1	2.2	1	1	2.18	(0.13–35.61)	0.8504
Any pico de gallo	11	23.9	21	21.2	1.17	(0.51–2.68)	0.8858
Drinks or Dessert	18	39.1	37	37.4	1.08	(0.53–2.21)	0.9075

*P values were calculated using the chi square test

c. Case-control stratified food item analysis results (confirmed cases only)

Results from other food items stratified by lettuce consumption				
Food item	**Ate lettuce (n=77)**		**Did not eat lettuce (n=68)**	
	OR	**P value***	**OR**	**P value***
Taco	2.06	0.20	2.12	0.34
Water	10.76	0.01	7.25	0.25
Beef	1.88	0.25	0.48	0.34
Pickled jalapenos/carrots	2.89	0.13	2.07	1.00
Chicken	1.27	0.65	2.07	1.00
Red chile salsa	1.93	0.24	0.78	1.00

*Fisher's exact test used to calculate P values if cell counts less than 5

Stratified by food item	**Risk from lettuce (n=77)**	
	OR	**P value***
Ate tacos	3.9	0.15
No tacos	4.0	0.04
Drank water	8.0	0.35
No water	5.4	<0.001
Ate beef	13	0.0013
No beef	3.4	0.02
Ate pickled jalapenos/carrots	6.8	0.06
No pickled jalapenos/carrots	4.8	<0.001
Ate chicken	3.2	0.23
No chicken	5.3	<0.001
Ate red chile salsa	9.1	<0.001
No red chile salsa	3.7	0.02

*Fisher's exact test used to calculate P values if cell counts less than 5

VII. Recommendations given to restaurant: lettuce handling and handwashing protocols

1) Use only food grade containers to store lettuce.

2) Clean and disinfect lettuce containers thoroughly between every batch of newly shredded lettuce

3) Lettuce washing and handling recommendations:
    a. Be sure to only handle lettuce when wearing gloves or using tongs
    b. Remove and throw away the external (dirty) leaves of lettuce. Do not put dirty heads of lettuce in the wash sink or rinse the outside of the lettuce heads in the sink.
    c. Put lettuce heads in a clean container.
    d. Clean and sanitize the sink where lettuce will be washed
    e. Wash lettuce heads with running water
    f. Shred lettuce
        i. Check that lettuce shredder or knife has been cleaned and sanitized before use
        ii. If chopping lettuce by hand, ensure cutting board has been cleaned and sanitized
    g. Wash shredded lettuce thoroughly in colander under running water
    h. Put shredded lettuce into lettuce container
        i. Ensure lettuce container has been cleaned and sanitized before use
    i. Label container with date and food item
    j. Begin lettuce cooling process to lower lettuce temperature below 41ºF within 4 hours
        i. If using ice water, ensure container used to transport water has been cleaned and sanitized
    k. Put shredded lettuce container in cooler
    l. Ensure that the lettuce container(s) are covered when not being actively used.

4) Ensure employees follow proper handwashing protocols
    a. To wash hands:
        i. Moisten hands with hot water and apply soap
        ii. Vigorously rub hands together, scrubbing between fingers, under fingernails, on forearms, and on the backs of hands. **Scrub for at least 20 seconds.**
        iii. Completely rinse hands under running water and dry them with a disposable paper towel
    b. Times to wash hands
        i. Arrival to work
        ii. Before handling food, utensils, and single-service articles

iii. Before putting on gloves to handle ready-to-eat foods and between glove changes
iv. Before and after handling or touching any raw foods such as raw meats, chicken, and eggs
v. After using the bathroom and a second time when returning to the kitchen
vi. After touching any part of the body or uniform
vii. After handling dirty equipment, dishes, or utensils
viii. After taking a break
ix. After any other activity that might contaminate hands such as washing dishes, sweeping the floor, taking out the trash, eating or drinking, coughing, or sneezing

c. Only use designated hand sinks; do not wash hands in sinks used to wash dishes or prepare food

VIII. MCDPH press releases

a. August 1, 2013 press release

For Immediate Release

MEDIA AVAILABILITY - Dr. Bob available for interviews until 7 pm. Please call Jeanene Fowler, 602-722-1806, jeanenefowler@mail.maricopa.gov to set up.

Maricopa County Public Health Investigating Bloody Diarrhea Outbreak in the West Valley

Residents Being Urged to Watch for Symptoms

PHOENIX (August 1, 2013) – The Maricopa County Departments of Public Health and Environmental Services in collaboration with the Arizona Department of Health Services is investigating a series of illnesses associated with bloody diarrhea in the West Valley.

So far 11 people have reported illness and 7 of those people have been hospitalized.

"We are working as hard and fast as we can to identify the source of this illness but in the meantime, because of the seriousness of those ill, we wanted to make sure that anyone who is experiencing bloody diarrhea seeks medical care," said Dr. Bob England, director of Maricopa County Department of Public Health (MCDPH).

Residents in the West Valley who are experiencing bloody diarrhea are being asked to contact their healthcare provider so a stool culture can be ordered. Options for people without a health care provider include urgent care centers or community health centers.

The illness appears to be caused by a class of bacteria that produces a toxin. This toxin can cause severe illness and, especially in children, can lead to kidney failure and even death.

It is important for health care providers to suspect this class of bacteria in their diagnoses because treating children with antibiotics can increase the risk of serious consequences. Providers who have patients who they suspect may be related to this outbreak should order a stool culture and contact MCDPH's disease reporting line at 602-747-7500.

"As of this morning, we know that we have a cluster of people who are sick with this type of bacteria and who all know each other. Disease investigators are now trying to piece together the puzzle of how/what made these people sick and if anyone else was put at risk. Of course, as we discover this information, we will continue to share what we know with the public," England added.

Follow Maricopa County Public Health: Facebook.com/MCDPH or Twitter.com/MaricopaHealth.

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b. August 2, 2013 press release

For Immediate Release

Contact: Jeanene Fowler, 602-722-1806, jeanenefowler@mail.maricopa.gov

Bloody Diarrhea Outbreak Likely Caused by E Coli 0157 and Linked to Federico's at 13132 W Camelback; Restaurant is Voluntarily Closing

PHOENIX (August 2, 2013) – The Maricopa County Departments of Public Health and Environmental Services in collaboration with the Arizona Department of Health Services is investigating an outbreak that appears to be linked to the Federico's Mexican Restaurant located at 13132 W Camelback.

So far, at least 11 of the 15 individuals with bloody diarrhea that MCDPH has been able to interview have either purchased food from or eaten at this particular Federico's. MCDPH has also received preliminary laboratory results indicating that the bacteria causing the illness is *E. coli* O157.

"Just to be clear, it is only this one Federico's establishment where many of the cases have reported eating or purchasing food," said Dr Bob England, director of MCDPH. "The investigation remains ongoing and we have all hands on deck to figure out the specific source."

The Maricopa County Environmental Services Department (MCESD) responded by inspecting the facility immediately and taking food samples. "The restaurant has been extremely cooperative with our investigation. In fact, out of an abundance of caution and concern for their customers, the restaurant is voluntarily closing," said Steven Goode, deputy director for MCESD.

Anyone who has eaten at **this particular** Federico's Mexican Food from on or after July 23 **AND** is experiencing bloody diarrhea should see a healthcare provider so a stool culture can be ordered. Options for people without a health care provider include urgent care centers or community health centers.

The illness appears to be caused by a class of bacteria that produces a toxin. This toxin can cause severe illness and, especially in children, can lead to kidney failure and even death.

It is important for health care providers to be aware of this outbreak because treating children with antibiotics for this bacteria can increase the risk of serious consequences. Providers who have patients who they suspect may be related to this outbreak should order a stool culture and contact MCDPH's disease reporting line at 602-747-7500.

"Unfortunately, there is still much to uncover about this outbreak such as what specific food may have been contaminated, how the food was contaminated and how many people have been exposed. As we discover this information, we will continue to share with the public," England added.

Follow Maricopa County Public Health: Facebook.com/MCDPH or Twitter.com/MaricopaHealth.

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IX. MCDPH SURV alert to healthcare providers – August 2, 2013

PUBLIC HEALTH
Surveillance ALERT

MARICOPA COUNTY DEPARTMENT OF PUBLIC HEALTH
August 2, 2013

Shiga-Toxin *E coli* Outbreak

Maricopa County Department of Public Health is currently investigating a large cluster of cases presenting to healthcare facilities with bloody diarrhea, preliminarily identified as *E coli* O157. Thus far, the cases have been focused in the West Valley. The outbreak appears to be associated with consuming food or drinks at Federicos restaurant located at 13132 W. Camelback Rd. At this time, twenty cases are under investigation, eight have been hospitalized and two cases have developed hemolytic uremic syndrome (HUS).

Patients with a shiga-toxin (producing) *E coli* (STEC) infection typically present with diarrhea, often bloody, and severe abdominal cramping. Fever occurs in less than one third of cases and is usually not pronounced. Enteric cultures should be ordered on suspect STEC patients; test should include culturing for *E coli* O157:H7 and shiga-toxin EIA.

Infectious Disease should be consulted and judicious use of antibiotics taken into consideration especially with pediatric patients as antibiotics may precipitate HUS in this population.

Suspect cases of STEC should not handle food or provide child or patient care until diarrhea resolves.

Please report cases and suspect cases to Maricopa County Department of Public Health at (602) 747-7111.

Thank you for your assistance!

Maricopa County Department of Public Health
Offices of Epidemiology

X. References

FDA Food Safety Manual
http://www.fda.gov/downloads/Food/FoodSafety/RetailFoodProtection/IndustryandRegulatoryAssistanceandTrainingResources/UCM088896.pdf

Maricopa County Food Code Reference for Produce
http://www.maricopa.gov/envsvc/EnvHealth/pdf/ProduceFoodCodeReferences.pdf

CDC Environmental Health Services: Food Worker Handwashing and Restaurant Factors.
http://www.cdc.gov/nceh/ehs/ehsnet/plain_language/Food-Worker-Handwashing-Restaurant-Factors.htm

Recommendations for Diagnosis of Shiga Toxin-Producing Escherichia coli Infections by Clinical Laboratories.
http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5812a1.htm

Solomon, Ethan B., Sima Yaron, and Karl R. Matthews. "Transmission of Escherichia coli O157: H7 from contaminated manure and irrigation water to lettuce plant tissue and its subsequent internalization." *Applied and Environmental Microbiology* 68.1 (2002): 397-400.

Ackers, Marta-Louise, et al. "An outbreak of Escherichia coli O157: H7 infections associated with leaf lettuce consumption." *Journal of Infectious Diseases* 177.6 (1998): 1588-1593.

Hilborn, Elizabeth D., et al. "A multistate outbreak of Escherichia coli O157: H7 infections associated with consumption of mesclun lettuce." *Archives of Internal Medicine* 159.15 (1999): 1758.