



**OUTBREAK ASSOCIATED WITH “A DEPARTMENT STORE”
JOHNSON COUNTY, KANSAS
NOVEMBER 2004**

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Outbreak investigators

Ida Nesmith, Disease Containment Manager [§]
Wusan Chen, Epidemiologist [§]
Denise Brennan, Epidemiologist [§]
Jose Izaguirre, Epidemiologist [§]
Renee Semarge, Epidemiologist [§]
Tanya Honderick, Epidemiologist [§]
Nkolika Obiesie, Epidemiologist [¶]
Kevin Syke, Epidemiologist [¶]
Cheryl Banez, Epidemiologist [¶]
Margaret Smith (Dr.), Medical Epidemiologist [¶]

Report Authors

Wusan Chen [§]
Nkolika Obiesie [¶]

[§] Johnson County Health Department, Division of Disease Containment

[¶] Kansas Department of Health and Environment, Division of Epidemiology Services

Introduction

In late November 2004, during routine review of the state’s disease reporting and tracking system (HAWK), an epidemiologist with the Epidemiologic Service Section (ESS) within the Bureau of Epidemiology and Disease Prevention (BEDP) at the Kansas Department of Health and Environment (KDHE) noticed an increase in number of Salmonella cases reported from Overland Park, Kansas in Johnson County. An Epidemiologist at the Johnson County Health Department (JCHD) had been following this increased number of cases. KDHE suggested that the county continue to monitor the Salmonella cases for any possible common risk factors.

Preliminary information revealed that there were several cases, both confirmed and suspect of Salmonella typhimurium in the southern part of the county. Active surveillance coupled with continued passive surveillance revealed that many of the cases were employees of a retail store or patrons of the store’s food bar. The retail store is a part of a national chain, with several locations in Johnson County. However, only one location was associated with an increased disease occurrence. Review of the information obtained revealed that the number of confirmed cases associated with the retail store was suggestive of an outbreak.

With the cooperation of the retail store (Store X) and their corporate office, JCHD and ESS began an outbreak investigation on December 8. The purpose of the investigation was to determine the scope of the outbreak, to identify potential sources of exposure, and to implement appropriate prevention and control measures.

Background

Johnson County is located in northeastern Kansas. The county shares a border with the State of Missouri. It is the largest, and the fastest growing County in Kansas, with a population of 486,515¹. It is adjacent to Wyandotte, Leavenworth, Douglas, and Miami Counties on the Kansas side and Jackson and Cass Counties on the Missouri side. (Attachment 1). Overland Park is the largest city in the county with a population density of 2627 persons/m²¹.

Store X is one of five stores in Johnson County that are part of the X National Department Store chain. The store is located in a shopping center in a newly developing residential area in southern Johnson County. The store usually employs 110 people, the majority of whom are students working on a part-time basis. Workers are placed in different categories depending on their roles and the section of the store where they primarily work. These categories include Managers, Team Leaders (sectional supervisors), Food Service, Front and Back workers. Front workers include cashiers and those with work in areas located in the front section of the store. Back workers include storage room workers, hardware, etc.

The food bar in Store X is located near the east entrance of the store, opposite the cash registers. The food bar serves pizza, bread sticks, sandwiches, hotdogs, salads, popcorns, frozen yogurts, soda and water. Out of the 110 employees, seven are Food Service workers; ten are cross-trained in Food Service. All other employees in the Front group are required to fill-in in the food service area when the need arises. For example, they attend to a customer in the food bar if the assigned Food Service staff is on break. Approximately, 39 of the employees could potentially work in the food service area.

During the month of November 2004, social gatherings were held at Store X for employees and families in celebration of Thanksgiving. On November 19, a potluck party was held for the employees and the workers brought in food. On November 26, the store held a Thanksgiving party for both employees and families. A local restaurant catered food. Food was left out and available for at least 7 hours during each event. Workers could access the food as their schedule permitted.

The Manager of the Store X reported an increase number of call-ins from workers over the period of late November to first week in December.

¹ U. S. Census Bureau: State and County QuickFacts. <http://quickfacts.census.gov>.

Outbreak Investigation

Epidemiologic Methods

On December 8, JCHD conducted interviews with the six confirmed salmonella cases (four workers at Store X and two patrons of the food bar) using a simple fact finding questionnaire, the Potential Enteric Worksheet. The Manager at Store X was also interviewed in order to gather information related to the activities at the store's social events, the foods served and information about employees who called-in sick from late November to the first week in December.

Based on the information collected, a case was initially defined as any person who (a) had a positive *Salmonella typhimurium* laboratory result or (b) experienced vomiting and/or watery or bloody diarrhea (defined as 3 or more loose stools in a 24-hour period) with an onset date of November 16 or later. As we obtained more information, the case definition was modified and a case was defined as any person who (a) had *Salmonella typhimurium*, (b) had an association with Store X, and (c) had onset date of illness beginning November 10 or later.

JCHD and KDHE developed a more detailed questionnaire. The Division of Disease Containment at JCHD administered the questionnaire through face-to-face interviews. At the time of the interviews, there were 100 employees working at Store X. The Division of Disease Containment interviewed 99 of the employees within a two-day period. One person refused to participate in the interviews.

Completed questionnaires were entered into Epi Info 2002 and analyzed using both Epi Info and SAS 9.1. Descriptive statistical analyses and univariate analyses were performed to determine any association between illness and activity and illness and food consumption.

Environmental Methods

The Johnson County Environmental Department, Sanitation Division conducted two separate inspections of the Store X food bar. The purpose of the inspections was to determine general compliance with the State statutes and regulations. Inspectors focused on the food preparation procedures, handling of ready-to-eat foods, employee health, and information on the sources and/or supply of the food items.

Laboratory Methods

All employees who met the case definition, and had not been tested were requested to submit stool samples for testing to Kansas Department of Health and Environmental Laboratory (KDHEL). A total of nine stool specimens were tested. Since Kansas' regulations require submission of *Salmonella* isolates to KDHEL, those clinics/hospitals that had not submitted an isolate to KDHEL were contacted. Requests were made for submission of isolates for the purpose of performing pulse-field gel electrophoresis (PFGE) DNA sub-typing. The Missouri State Laboratory was contacted for PFGE results on the isolates of Kansas' residents sent to Missouri.

Intervention Methods

On December 17, JCHD, Division of Disease Containment with the help of the Division of Sanitation, using video presentations conducted an in-house educational training for Store X, Food Service workers. The training emphasized proper hand washing technique, food safety, proper handling of food items and ready to eat foods. The Managers and Supervisors were also trained on the State of Kansas laws regarding isolation of a food handler with vomiting and/or diarrhea from food handling processes.

Outbreak Investigation Results

Epidemiologic Results

All 99 questionnaires of the Store X employees interviewed were used for data analysis. Of the 99 questionnaires analyzed, 27 (27%) individuals met the case definition. Table 1 summarizes the results of the descriptive statistics.

TABLE 1. Number and percent of selected descriptive characteristics of respondents and statistic indicating significance of tabled counts

Characteristic		Ill (n=27)		Not Ill (n=73)		χ^2	p-value
		No.	(%)	No.	(%)		
Sex							
Male	n = 42	11	(41)	31	(43)	0.51	0.775
Female	n = 37	16	(59)	41	(57)		
Worked in food service							
Regularly	n = 6	1	(4)	5	(7)	0.65	0.723
Backup	n = 27	8	(30)	19	(26)		
Food exposure sources							
Thanksgiving dinner	n = 36	10	(37)	26	(36)	6.30	0.178
Team Leader potluck	n = 57	15	(56)	42	(58)		
Store X food bar patron	n = 62	23	(85)	39	(54)		
Age							Respondents (n=99)
Mean, yrs			26		34		31
Median, yrs			24		31		27
Range, yrs			17-56		16-67		16-67

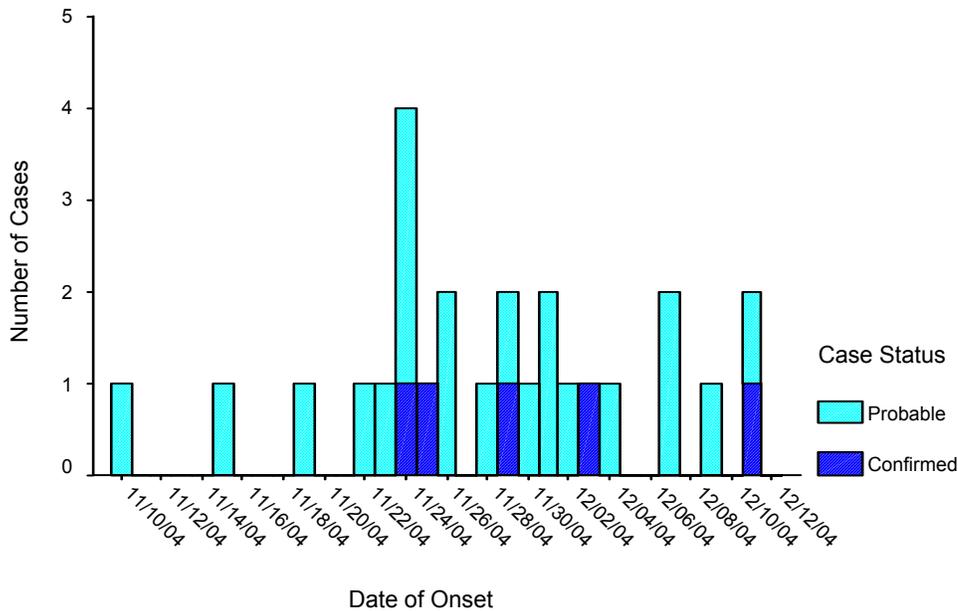
There were no significant difference in demographic characteristics between those who

were ill and those who were not ill. Of the 27 ill employees, 7 (26%) persons had medical visits, 9 (33%) were tested and 6 (22%) were positive for *S. typhimurium*. The median incubation period could not be determined because the specific time illness occurred was not collected.

TABLE 2. Symptoms Reported by Cases (n=27)

	No.	(%)
Diarrhea	27	(100)
Watery	20	(74)
bloody	1	(4)
watery/bloody	6	(22)
Nausea	22	(81)
Abdominal cramps	21	(78)
Headache	19	(70)
Fever	16	(59)
Vomiting	14	(52)

FIGURE 1. Epidemiologic curve of Johnson County Salmonella outbreak 11/2004
Presenting the number of persons with illness, by onset date and case status.



* Onset data 12/31/2004 was not included. It is more than two incubation periods from the last onset date of 12/11/2004.

Results of the univariate statistical analyses are shown in Table 3. Illness appeared to be associated with eating at the Store X food bar. When illness and exposure to specific individual food items from the food bar were analyzed and compared, varying associations were found, but bread sticks showed the strongest association with illness.

TABLE 3. Analysis of risk of eating selected individual food items from the food bar and becoming ill

Ate item(s) from the food area	Yes		No		RR	95% C.I.
	Ill	Not ill	Ill	Not Ill		
Any food item	23	39	4	33	3.4	1.3 – 9.1*
Bread sticks**	15	21	12	51	2.2	1.2 – 4.1*
Turkey sandwich	3	4	24	68	1.6	0.7 – 4.1
Pepperoni pizza	9	16	18	56	1.5	0.7 – 2.9
Cheese pizza	4	9	23	63	1.2	0.5 – 2.8
Drank any soda	12	19	15	53	1.8	0.9 – 3.3
Drank water	10	15	17	57	1.7	0.9 – 3.3

*Significant association

** Some persons had pizza, sauce for dipping with bread sticks; these two items were not separated in the data collection.

Environmental Results

During the inspections of Store X food bars, no violations were noted. However, interviews of the Food Service regular and backup staff by the Johnson County Health Department, Division of Disease Containment revealed that some employees did work when they were having diarrhea.

Laboratory Results

PFGE DNA subtyping of six of the laboratory confirmed cases had matching TYPX003 pattern.

Discussion

Based on the information collected during the outbreak investigation, employees most likely became infected with *S. typhimurium* as a result of consuming food from the food bar. Statistical analyses revealed that employees who ate any food from the food bar had a more than three times higher risk of becoming ill compared to those who did not eat food from the food bar [RR = 3.4; 95% C.I. = 1.3, 9.1]. The sustained number of cases throughout the time period under investigation indicates a possible propagated source outbreak.

“Eating at the food bar” had a statistically significant association with Salmonella infection [RR = 3.4; 95% C.I. = 1.3, 9.1]. Individual item analyses revealed no significant

association other than the single item of breadsticks [RR = 2.2; 95% C.I. = 1.2, 4.1]. Individual analysis of the pizza/dipping sauce could not be conducted because of lack of data. Though *Salmonella* infections are most often attributed to consumption of foods of animal origin such as poultry, beef, fish, eggs, and dairy products. Fruits, vegetables, and bakery products have been implicated in outbreaks². In this outbreak, it appears that foods of animal origins were a less likely source of infection than an infected person/persons as indicated by the epidemiologic curve. It may be possible that an infected person/employee had the opportunity to contaminate food items that were subsequently served to other employees and patrons.

A food handler infected with *Salmonella typhimurium* may have contaminated ready-to-eat food served at the food bar. A violation of food handling practices that is a frequent cause of food contamination is lack of hand washing or ineffective hand washing. Inspections of the food bar found no critical violations. When the staff of the JCHD, Division of Disease Containment visited Store X for the interviews, they noticed that there was no warm water in the employee restrooms. Because the outbreak occurred during cold weather, employees could have been discouraged from properly washing their hands after using the restrooms. This could have contributed to the spread of the infection.

Conclusion

The *Salmonella* outbreak at Store X appeared to be associated with eating at the food bar. Epidemiological evidence was highly suggestive of a propagated source transmission, and eating at the food bar was the most likely exposure. The statistically significant association between illness and bread sticks suggests a possible contamination of the bread sticks at the food bar by an infected food handler.

A case-control study was initiated following the cohort study. The cases from Store X who had *Salmonella typhimurium* TYPX003 pattern and other cases with matching TYPX003 pattern in the Kansas City metro area were used to further investigate the source of the outbreak. The results will be reported in the case-control study final report.

Limitations

The outbreak at Store X proved to be a challenge to investigate and analyze because of staff roles and assignments. The source of illness was difficult to identify due to many possible exposures related to employees' and family social activities. Many employees shared roles in the food bar including the multi-functions of the back-up food handlers and those crossed trained to help in the food bar. This made it difficult for proper identification and isolation of symptomatic food handlers in accordance with the state laws and restricting work during diarrhea illnesses. The actual cause of *Salmonella* illnesses associated with Store X was not immediately apparent.

² RED BOOK: 2003 Report of the Committee on Infectious Diseases.

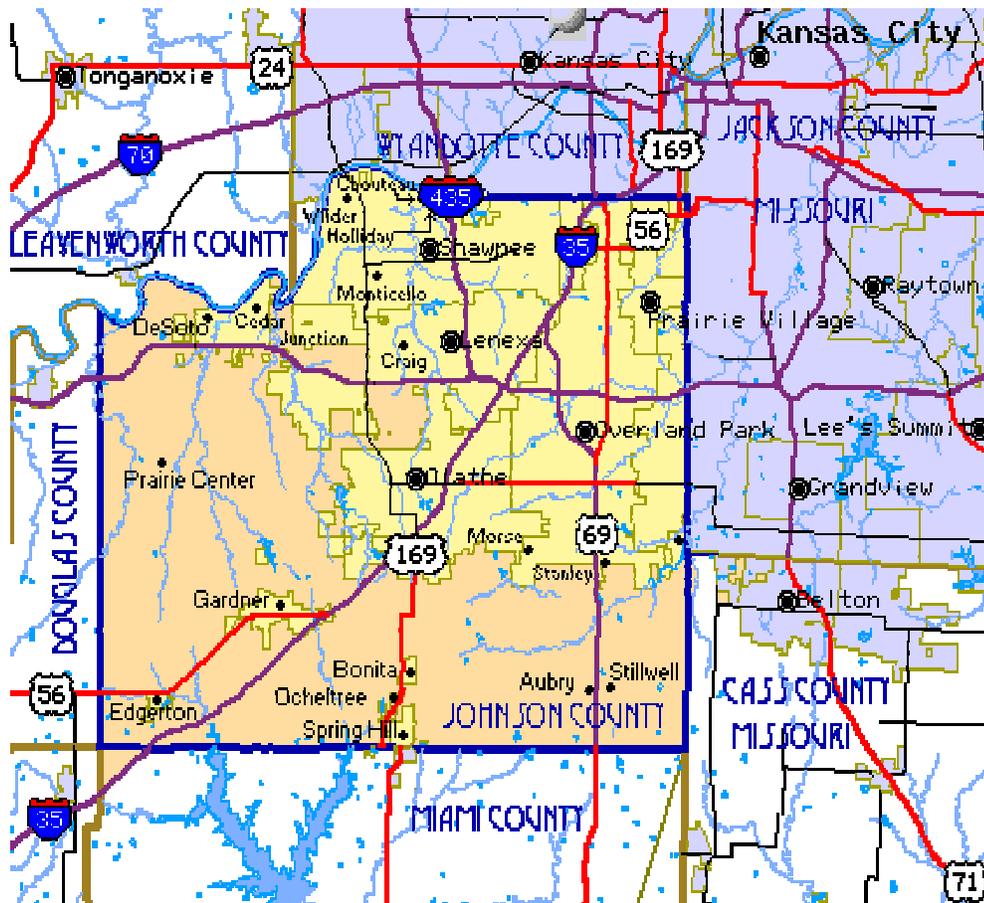
Recommendations

- Store X might consider limiting the number of employees that work in the food bar.
- Exclude all employees with diarrhea and/or vomiting from food duties.
- Provide opportunities for employees with diarrhea excluded from food handling to perform other duties.
- Periodic training for food handlers on food safety and proper food handling.
- Ensure that running water in the restroom is at temperature, which will encourage workers to properly wash their hands.

Attachments

1. Map of Johnson County, Kansas
2. Kansas Potential Enteric Worksheet
3. Outbreak Investigation Questionnaire

Map of Johnson County, Kansas.



POTENTIAL ENTERIC OUTBREAK WORKSHEET

For use by Epi Services Staff

Date outbreak reported: ____/____/____

Investigator's Initials: _____

CALLER INFORMATION

Name: _____
 Agency: _____
 City: _____
 County: (____) _____
 Contact Phone: _____

Caller Type:
 Food Inspector
 Laboratorian
 Nurse
 Physician
 Private Citizen
 Other _____

Suspected Type of Outbreak Reported:
 Foodborne
 Person-to-person
 Waterborne

ILLNESS INFORMATION

Date First Person Became Ill: ____/____/____
 Time of First Illness: ____ AM PM
 # of Ill Individuals Reported: _____
 Total # of Individuals in Group: _____
 Symptoms Reported:
 Watery Diarrhea Vomiting
 Bloody Diarrhea Fever
 Abdominal cramping Headache
 Nausea Dizziness
 Other _____
 # of Individuals who:
 Had doctor visits _____
 Had ER visits _____
 Were hospitalized _____
 # of Stool Samples Collected To Date _____
 (Note: Attempt to collect some samples if none already taken.)

EVENT INFORMATION

Date of First Known Exposure: ____/____/____
Time of First Exposure: ____ AM PM
 Place of Exposure:
 Day care Private Residence
 Nursing Home Reception Hall
 Office setting Restaurant
 School
 Other _____
 Name of Place: _____
 City & County _____
 If catered event:
 Catering Company _____
 City & County _____
 If foodborne, other common meals shared:
 1. _____
 2. _____
 3. _____

COMMENTS

DIARRHEA ILLNESS INVESTIGATION

JOHNSON COUNTY HEALTH DEPARTMENT

SECTION 1

Name: _____ DOB: _____ Age: _____
Address: _____ Sex: ___ Male ___ Female
City: _____ Zip _____ State: _____
Phone: () _____ Cell Phone/work phone: _____
Occupation: Food worker Healthcare worker Daycare Location: _____
If Target employee, which section do you work? _____
Other employments _____

SECTION 2

Have you experienced any illness since Nov. 14, 2004? () Yes () No
(If Yes, please fill out the rest of the information. If not, go to section 3.)
Date of first illness: _____ Time of first illness: _____ AM/PM
First symptom: _____ Date of Last illness _____ Time _____ AM/PM
Other symptoms: () Watery Diarrhea () Bloody Diarrhea () Vomiting
() Fever () Abdominal cramping
() Headache () Nausea () Dizziness
() Other: _____
Was an MD seen? Yes ___ No ___ (If yes, name and phone of MD _____)
Was a stool specimen taken? _____ (Diarrhea is defined as 3 or more loose stools in 24 hours)
Are you still having symptoms? () Yes () No

SECTION 3

Did you attend the Target Family and Friends Thanksgiving Party on Nov. 26th? () Yes () No
(If yes, continue and indicate foods eaten, if no go to section 4)

Food Item	Yes	No	Food Item	Yes	No
Barbeque Beef	<input type="checkbox"/>	<input type="checkbox"/>	Extra sauce	<input type="checkbox"/>	<input type="checkbox"/>
Beans	<input type="checkbox"/>	<input type="checkbox"/>	Pork	<input type="checkbox"/>	<input type="checkbox"/>
Bread	<input type="checkbox"/>	<input type="checkbox"/>	Potato salad	<input type="checkbox"/>	<input type="checkbox"/>
Turkey	<input type="checkbox"/>	<input type="checkbox"/>	Pickles.	<input type="checkbox"/>	<input type="checkbox"/>
Cole slaw	<input type="checkbox"/>	<input type="checkbox"/>	Bottled water	<input type="checkbox"/>	<input type="checkbox"/>
Soda	<input type="checkbox"/>	<input type="checkbox"/>	Ice	<input type="checkbox"/>	<input type="checkbox"/>

Other foods (Lists) _____

SECTION 4

Did you attend the Team Leaders meeting on Nov. 19th? () Yes () No
(If yes, continue and indicate foods eaten, if no go to section 5)

Food Item	Yes	No	Food Item	Yes	No
Beef	<input type="checkbox"/>	<input type="checkbox"/>	Extra sauce	<input type="checkbox"/>	<input type="checkbox"/>
Beans	<input type="checkbox"/>	<input type="checkbox"/>	Pork	<input type="checkbox"/>	<input type="checkbox"/>
Bread	<input type="checkbox"/>	<input type="checkbox"/>	Potato salad	<input type="checkbox"/>	<input type="checkbox"/>
Turkey	<input type="checkbox"/>	<input type="checkbox"/>	Pickles.	<input type="checkbox"/>	<input type="checkbox"/>
Cole slaw	<input type="checkbox"/>	<input type="checkbox"/>	Bottled water	<input type="checkbox"/>	<input type="checkbox"/>
Soda	<input type="checkbox"/>	<input type="checkbox"/>	Ice	<input type="checkbox"/>	<input type="checkbox"/>

Other foods (Lists) _____

SECTION 5

Did you eat at the Target Food Service Bar between Nov. 13th and Dec 10th ? () Yes () No
(If yes, continue and indicate foods eaten, if no go to section 6)

Food Item	Yes	No	Food Item	Yes	No
Cheese Pizza	<input type="checkbox"/>	<input type="checkbox"/>	Hot Dogs	<input type="checkbox"/>	<input type="checkbox"/>
Pepperoni Pizza	<input type="checkbox"/>	<input type="checkbox"/>	Salad	<input type="checkbox"/>	<input type="checkbox"/>
Ham Sandwich	<input type="checkbox"/>	<input type="checkbox"/>	Ice Cream	<input type="checkbox"/>	<input type="checkbox"/>
Turkey Sandwich	<input type="checkbox"/>	<input type="checkbox"/>	frozen Yogurt	<input type="checkbox"/>	<input type="checkbox"/>
Chicken Sandwich	<input type="checkbox"/>	<input type="checkbox"/>	Soda	<input type="checkbox"/>	<input type="checkbox"/>
Bread Sticks	<input type="checkbox"/>	<input type="checkbox"/>	Water	<input type="checkbox"/>	<input type="checkbox"/>
Ice with Soda/water	<input type="checkbox"/>	<input type="checkbox"/>			

Did you use condiments not prepackaged? Please circle, Parmesan, Mustard, Relish, Salad dressings, other _____

Other foods (Lists) _____

SECTION 6

Have you eaten in any other restaurant? () Yes () No
(If yes, continue and list restaurants/places, and foods eaten, if no go to section 7)

Restaurant/location	Date	Food items eaten
_____	_____	_____
_____	_____	_____

SECTION 7

Do you have pet reptiles in your home? () Yes () No
Do you have other pet or have you been in contact with other animals? () Yes () No
If yes what kind? _____

SECTION 8

Was anyone else in your family or close friends ill? () Yes () No
Is anyone else in your family still sick? () Yes () No
Did he/she attend the Target Family and Friends Thanksgiving Party on Nov. 26th? () Yes () No
Did he/she eat any of the foods served at the Thanksgiving Party on Nov. 26th? () Yes () No
Did he/she eat any food from the Team Leaders Meeting on Nov. 19th? () Yes () No
Did you bring food from home to share in the employee lounge between Nov.19 and Dec. 7? () Yes () No
If yes, what _____ *Date* _____
Did you eat any food in the employee lounge? () Yes () No
If ye, what _____ *Date* _____
Did any of your family or close friends eat at the Target Food Bar? () Yes () No

Name _____ Phone Number _____

Other Commnts _____
