Salmonella poisoning and chicken shawarmas, Western Riyadh, June 1997

On the morning of June 23, 1997, 36 patients from five different families sought emergency treatment at Prince Salman Hospital in Riyadh for abdominal cramps, diarrhea, fever or vomiting. All patients reported eating food purchased the previous evening from a small restaurant. The restaurant sold only shawarmas and hamburgers. An epidemiological investigation was initiated to determine both the magnitude of the outbreak and the food responsible.

A case was defined as any ill person who ate food from the restaurant and presented to any medical facility in Riyadh with loose stools (≥3 times/24 hours) between June 22 and 25. A questionnaire was constructed and given to all persons in households with one or more cases. Hospitalized patients and family contacts were interviewed directly, and outpatients and family contacts by telephone.

We identified 142 cases. The median age of case-persons was 13 (range 1-61 years), both sexes were equally affected and 93% were Saudi nationals. Of the cases, 35% were admitted to four hospitals; the average hospitalization was 4.7 days (range 3-9). *Salmonella* (Group D) was isolated from rectal swabs of 82% of the case-persons. Most (98%) case-persons were seen at least once in a health institution and 96% (89 persons) received treatment with an antispasmodic, an anti-emetic and/or antibiotics. Onset of illness occurred over a 42-hour period after the food from the restaurant was eaten; the median incubation period was 9-12 hours (range 3-42 hours). All persons interviewed reported buying their food throughout the serving time for shawarmas (1600-2230) on June 22.

We interviewed and obtained full food histories for all persons in 22 family groups with one or more cases. These included 80 case-patients and 14 family contacts who also ate food from the restaurant on June 22 but did not become sick, giving an attack rate (AR) of 85% for eating from the restaurant on June 22. The AR for eating shawarma was 88%, compared with 0% for persons who did not eat a shawarma (Table 1). The AR for eating only hamburger was 0%, and the AR for eating both hamburger and shawarmas was 50%. Both hamburgers and shawarmas contained mayonnaise from common containers in the kitchen. No specific ingredient of the shawarma was alone associated with an excess risk of illness.

The restaurant made 154 to 184 shawarmas per day. Answers to the questionnaire indicated that each person ate an average of 1.0 (range=0.2-2.0) shawarma. Using the 88% AR, the estimate of total illness that developed during this outbreak ranged from 135 to 162.

On June 23, an intact chicken shawarma that had been purchased on June 22 and kept in a plastic bag inside one family's refrigerator was recovered. From it, the Riyadh Public Health Laboratory isolated *Salmonella* (group D), *Escherichia coli* and *Vibrio cholerae* non-O1.

Food handlers reported that 22-23 frozen chickens were purchased daily. The chickens were left in a large container of tap water for three hours to thaw. They were then skinned, cut, deboned and immersed all together in a marinade of garlic, spices and yogurt. This preparation process, beginning with the frozen chickens, required seven hours at room temperature. The chicken marinade mixture was put in a single large container in the refrigerator for 24 hours. The following day the chicken was built on the spit just before grilling. Grilling began at 1600 and ended at about 2230, when all the chicken from the spit had been consumed.

Three cooks prepared the hamburgers and the chicken sandwiches. None was sick. All were screened for asymptomatic carriage of pathogens (stool culture and rectal, nose and throat swabs), but no pathogens were recovered. The restaurant could not be inspected because the police closed it when the cases were first reported.

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Editorial Note: Both the epidemiology and the microbiologic evidence indicate that chicken shawarma sandwiches were responsible for this explosive outbreak of salmonellosis. Although the shawarmas also contained mayonnaise, salad, pickles and fried potato, the investigation indicates

Table 1: Food-specific attack rates among cases and controls from a chicken shawarma outbreak, western Riyadh, June 1997.

	Ate		Did not eat			
Food item	AR*	Ill/total	AR*	Ill/total	RR**	P-value
Shawarma	88%	80/91	0%	0/3	∞	0.003
Any shawarma contents	98%	54/55	67%	26/39	1.47	<0.01
Hamburger	40%	2/5	88%	78/89	0.57	0.04
Chicken	88%	77/88	50%	3/6	1.75	0.04
Mayonnaise	85%	72/85	88%	8/9	0.95	1
Potato	88%	74/84	83%	5/6	1.06	0.55
Salads	85%	72/85	89%	8/9	0.95	1
Pickles	96%	58/59	67%	22/33	1.43	<0.01

*AR - Attack rate **RR - Relative risk