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Foodborne outbreaks of shigellosis in the USA, 1998–2008

B. L. Nygren[*], **K. A. Schilling**, **E. M. Blanton**, **B. J. Silk**, **D. J. Cole**, and **E. D. Mintz**
Division of Foodborne, Waterborne, and Environmental Diseases, Centers for Disease Control and Prevention, Atlanta, GA, USA

SUMMARY

We examined reported outbreaks of foodborne shigellosis in the USA from 1998 to 2008 and summarized demographic and epidemiological characteristics of 120 confirmed outbreaks resulting in 6208 illnesses. Most reported foodborne shigellosis outbreaks (*n*=70, 58%) and outbreak-associated illnesses (*n*=3383, 54%) were restaurant-associated. The largest outbreaks were associated with commercially prepared foods distributed in multiple states and foods prepared in institutional settings. Foods commonly consumed raw were implicated in 29 (24%) outbreaks and infected food handlers in 28 (23%) outbreaks. Most outbreaks (*n*=86, 72%) were caused by *Shigella sonnei*. Targeted efforts to reduce contamination during food handling at multiple points in the food processing and distribution system, including food preparation in restaurants and institutional settings, could prevent many foodborne disease outbreaks and outbreak-related illnesses including those due to *Shigella*.

Keywords

Food safety; foodborne infections; outbreaks; *Shigella*; surveillance

INTRODUCTION

Shigellosis is an acute enteric infection caused by the Gram-negative bacterium *Shigella*. Foodborne, waterborne, and person-to-person transmission occur through the faecal–oral route. Ingesting as few as ten cells can result in infection [1, 2]. Clinical manifestations vary from mild diarrhoea lasting a few days to an acute febrile illness characterized by malaise, initial copious watery diarrhoea that resolves or is followed by the appearance of nausea, vomiting and dysentery (frequent, small, painful mucoid, bloody stools). Rare complications include reactive arthritis or neurotoxicity, with seizures sometimes occurring in children. An estimated 10–18% of persons with culture-confirmed *Shigella* infection in the USA are hospitalized [3]. Unlike other common foodborne pathogens (e.g. non-Typhi *Salmonella* and *Campylobacter*), humans (and, rarely, other primates) are the only natural hosts of *Shigella* [2].

[*]Author for correspondence : Mr B. L. Nygren, Waterborne Diseases Prevention Branch, Division of Foodborne, Waterborne and Environmental Diseases, National Center for Emerging and Zoonotic Infectious Diseases, Centers for Disease Control and Prevention, 1600 Clifton Rd, MS-A38, Atlanta, GA, USA. (ghz8@cdc.gov).

DECLARATION OF INTEREST
None.

Four species of *Shigella* have been identified: *S. dysenteriae, S. flexneri, S. boydii,* and *S. sonnei*. *S. sonnei* occurs more frequently than other species in industrialized countries, accounting for about 80% of *Shigella* infections in the USA; infections are typically mild and self-limiting. *S. flexneri* is the predominant species in low-income countries and in international travellers returning to the USA [4]. *S. dysenteriae* type 1 has occurred most frequently in South Asia and Sub-Saharan Africa and is rarely detected in the USA [4] ; it is often associated with serious complications including the haemolytic uraemic syndrome (HUS) and has the potential to cause epidemic dysentery [2]. *S. boydii* infections are uncommon, accounting for 2–6% of shigellosis globally [4].

From 1978 to 2003, over 17 000 laboratory-confirmed cases of shigellosis were reported annually in the USA. Reported cases decreased to a low of 14 000 in 2004, and case counts rebounded to about 22 000 by 2008 [5]. Because milder cases are often not diagnosed, the true burden of *Shigella* infections is estimated to be almost nine times higher than reported case counts [6]. *Shigella* outbreaks in the USA frequently result from person-to-person transmission in daycare settings with inadequate hygiene practices [5]. Other outbreaks have been associated with recreational contact with contaminated water, sexual contact among men who have sex with men, living in communities or institutions with crowding or compromised hygiene, and consuming contaminated food or water [7–16]. Foodborne shigellosis outbreaks have been associated with many types of raw and cooked foods (notably produce, but also commercially prepared ready-to-eat products). Outbreaks have been reported in a variety of settings, including restaurants, social gatherings, and airlines and cruise ships [11, 12, 17–22]. Outbreak investigations frequently implicate a particular food item, but the source of contamination is often an infected food handler. Because *Shigella* is easily spread and can survive in refrigerated foods, transmission is often associated with foods that are served cold or raw and require handling during preparation [23–25].

We describe demographic and epidemiological characteristics of foodborne shigellosis outbreaks reported in the USA from 1998 to 2008. We also compare reports of foodborne outbreaks of shigellosis with reports of foodborne outbreaks caused by other pathogens, and compare shigellosis cases associated with foodborne outbreaks with all cases of shigellosis reported to national surveillance.

METHODS

We reviewed reports of confirmed and suspected foodborne outbreaks of shigellosis from 1998 to 2008 using data obtained on 31 March 2011 from the Foodborne Disease Outbreak Surveillance System (FDOSS), an internet-based surveillance system maintained by the U.S. Centers for Disease Control and Prevention (CDC). FDOSS collects outbreak reports that are voluntarily provided by state, local, tribal and territorial health departments. A foodborne disease outbreak (FBDO) is defined 'as an incident in which two or more persons experience a similar illness resulting from the ingestion of a common food' [26]. FDOSS defines a foodborne outbreak aetiology as being confirmed as *Shigella* when organisms of the same serotype are isolated from clinical specimens from two or more ill persons or the organism is isolated from epidemiologically implicated food. By these criteria, laboratory-confirmed outbreaks of shigellosis can be defined as foodborne when food is the epidemiologically linked common exposure among illnesses even when a specific food item is not implicated, or when an implicated food item is either unavailable for testing or does not yield successful laboratory isolation of the pathogen. FDOSS captures information about the outbreak investigation and epidemiology, aetiology, implicated food vehicles and factors contributing to transmission. Contributing factors are defined as aspects of the food preparation and handling process that can lead to contamination with a pathogenic agent, or permit its survival or amplification. Multiple foods or contributing factors can be reported for each outbreak. Outbreaks were considered to be multi-state if exposure occurred in more than one state.

Our analysis of data reported to FDOSS was restricted to laboratory-confirmed *Shigella* outbreaks. We calculated univariate frequencies of outbreak characteristics, including serotype; first date of illness onset ; setting of food preparation and consumption; implicated food (if reported) ; method of preparation; state outbreak reporting rate (foodborne shigellosis outbreaks/100 000 people) ; estimated number of illnesses, hospitalizations, and deaths per outbreak; dates of outbreak; sex and age group distribution of cases; and contributing factors. For specific foods implicated, we report the name or description of the food as it was entered in the outbreak report. We attempted to classify each reported food as raw, possibly raw, or not likely to be raw by assessing descriptions given in the outbreak report when raw food service was not captured as a contributing factor variable.

To compare characteristics of foodborne outbreak-related shigellosis to those of all reported laboratory-confirmed cases of shigellosis in the USA, we analysed isolate-based shigellosis case data reported to the Laboratory-based Enteric Diseases Surveillance (LEDS) system for the same time period. LEDS is an electronic reporting system through which CDC receives reports of laboratory-confirmed infections with *Shigella* and other enteric pathogens from state and territorial public health laboratory and epidemiology programs. The variables we included from LEDS were age, sex, isolate date, and species. We performed all analyses using SAS version 9.2 (SAS Institute, USA).

RESULTS

A total of 13 405 FBDOs were reported to FDOSS from 1998 to 2008, resulting in an estimated 273 120 illnesses, 9109 hospitalizations, and 220 deaths. At least one confirmed or suspected aetiology (bacterial, viral, parasitic, or chemical/toxic) was reported for 8366 (62%) outbreaks; in 4660 (35%) outbreaks an aetiology was confirmed, including 2530 (19%) with a confirmed bacterial aetiology. Shigellosis was confirmed in 120 (2.6% of all confirmed outbreaks) outbreaks resulting in 6208 (2.3%) illnesses, 197 (2.2%) hospitalizations, and one (0.5%) death (Figs 1 and 2). Further analyses were limited to this subset of 120 confirmed *Shigella* outbreaks. Sixteen additional reported *Shigella* outbreaks were unconfirmed, and were not analysed.

The median number of foodborne shigellosis outbreaks reported per year was 10 (range 5–18) (Fig. 1). The proportion of all reported confirmed FBDOs due Foodborne outbreaks of shigellosis, USA 235 to *Shigella* per year ranged between 1.3% and 5.6%. Overall, there appeared to be a slight decline over the 11-year period in both the number of reported *Shigella* outbreaks per year and in the proportion of all reported FBDOs due to *Shigella*. During the same time period, 132 081 laboratory-confirmed cases of shigellosis were reported through LEDS. Both laboratory-confirmed shigellosis in LEDS and FBDO-related *Shigella* illnesses peaked in 2003 and declined in 2004 (Fig. 2). While the number of *Shigella* cases in LEDS increased again in 2008, the proportion of *Shigella*-associated FBDOs and outbreak-related illnesses did not.

For 1998–2008, the median case count in outbreaks was 11, and the median total number of cases per year from foodborne shigellosis outbreaks was 338 (range 153–1389). Larger outbreak-associated case counts were observed from 1998 to 2003 (median total cases per year: 936) compared to 2004–2008 (median total cases per year: 183).

Total case counts of shigellosis due to foodborne outbreaks varied greatly from month to month, whereas isolate-based surveillance data showed a seasonal trend with a peak in late summer and autumn months (Fig. 3). All but two outbreaks with temporal data were reported to last <1 month. Based on the reported first date of illness onset, the highest number of shigellosis FBDOs per month occurred in September (*n*=25, 7% of total reported confirmed FBDOs) and the lowest number occurred in December (*n*=4, 1.0% of total reported).

Foodborne shigellosis outbreaks were reported by 26 states; in seven (6%) outbreaks, case exposures occurred in multiple states. The states that reported the most foodborne shigellosis outbreaks were California (*n*=31 outbreaks; 0.09 foodborne outbreak-associated shigellosis cases/100 000 population), Texas (*n*=18, 0.08/100 000) and Florida (*n*=9, 0.05/100 000). Some other states with large populations reported relatively few outbreaks, including New York (*n*=3 outbreaks, 0.02/100 000), Illinois (*n*=6, 0.05/100 000), and Pennsylvania (*n*=3, 0.02/100 000). The highest population-based rates of foodborne outbreak-associated shigellosis cases were reported by Maine (*n*=2, 0.15/100 000 population), Oregon (*n*=5, 0.1/100 000 population), and Minnesota (*n*=7, 0.1/100 000).

Age data were available for 2910 (47%) of the 6209 outbreak-associated cases of foodborne shigellosis reported through FDOSS and for 114 256 (87%) of the cases of shigellosis reported through LEDS. Children aged 1–4 years accounted for 339 (12%) cases of shigellosis associated with foodborne outbreaks and 35 631 (31%) laboratory-confirmed cases of shigellosis reported through LEDS, which includes all reported cases regardless of mode of transmission. Persons aged ≥50 years accounted for 510 (18%) cases associated with foodborne outbreaks, compared to 7981 (7%) laboratory-confirmed cases of shigellosis reported through LEDS. Sex was reported for 3113 (50%) of the estimated total cases in FDOSS data and 118 283 (90%) of the laboratory-confirmed cases reported through LEDS. In outbreaks where an estimated proportion by sex was provided, women accounted for a slightly larger proportion of the shigellosis cases associated with foodborne outbreaks (*n*=1817, 58%) compared to cases reported through LEDS (*n*=62 296, 53%).

At least one microbiologically or epidemiologically implicated food vehicle was reported in 56 (47%) outbreaks (Table 1). Of these 56 outbreaks, a single contaminated food or ingredient was reported in 45 (80%) outbreaks, of which 11 (20%) were considered to be consumed exclusively raw (e.g. lettuce-based salads) and another 17 (30%) were considered possibly or partially raw food vehicles (e.g. potato salad, fish, salsa). Thirty-seven different specific food items were implicated in single-vehicle outbreaks. Single food items that were implicated more than once included potato salad (*n*=4 outbreaks), green salad (*n*=3), dip (*n*=3), salsa (*n*=3), beef (unspecified type, *n*=2), chicken fingers or nuggets (*n*=2), guacamole (*n*=2), raw oysters (*n*=2), and fish, unspecified type (*n*=2).

Contributing factors (e.g. food-preparation and food-storage practices) were reported in 48 (40%) of the shigellosis outbreaks. Of these 48 outbreaks, more than one contributing factor was reported in 33 (69%). Four contributing factors were reported in 38 (79%) of these outbreaks. These were food handling by an infected person in 28 (58%) outbreaks, direct (bare-handed) contact with ready-to-eat food by preparers in 18 (38%) outbreaks, and inadequate cold-holding temperatures and cleaning procedures in a food-preparation setting in seven (15%) outbreaks. Additional factors reported in outbreaks included contamination of raw food or ingredient with pathogen (*n*=4, 8%), allowing foods to sit at room temperature for several hours (*n*=4, 8%), preparing foods a half day or more before serving (*n*=4, 8%), and storage in a contaminated environment (*n*=3, 6%), Other, unspecified, contributing factors were reported in 12 (25%) outbreaks.

Information was available about the specific location of food preparation for 99 (83%) outbreaks with 4663 cases, and about location of consumption for 105 (88%) outbreaks with 4868 cases (Table 2). In total, 70 (58%) outbreaks were associated with food either prepared or consumed in restaurants, which accounted for 3383 (54%) of all outbreak-associated cases. In outbreaks where locations of preparation and consumption were reported, restaurants were the location of food preparation in 69 (70%) outbreaks involving 2897 (62%) cases and the location of consumption in 61 (58%) outbreaks involving 2923 (60%) cases. Private homes were the next most frequently reported location, indicated as the place of preparation in 11 (11%) and place of consumption in 13 (12%) outbreaks. Institutional or group settings were less frequently reported, but were associated with large outbreaks. Schools were reported as the place of preparation in five (5%) outbreaks, with a median of 50 cases (*n*=273 cases, 6%), and weddings were the place of consumption in two (2%) outbreaks (*n*=104 cases, 2%). Two (2%) multi-state outbreaks transmitted by foods identified as ‘commercial products served without further preparation’ (bean dip, parsley) caused 980 cases (21%; median cases per outbreak: 490). Six outbreaks had two locations where food was prepared and two outbreaks had two locations where food was consumed.

The distribution of specific species of *Shigella* in foodborne outbreaks reported through FDOSS was similar to the species distribution of all laboratory-confirmed cases of shigellosis reported through LEDS. Of 110 (92%) confirmed outbreaks with species data available, 87 (79%) outbreaks were caused by *S. sonnei*, 19 (17%) by *S. flexneri*, four (4%) by *S. boydii*, and one (1%) by *S. dysenteriae* (Table 3). In isolate-based surveillance where species was reported, 83% of isolates were *S. sonnei*, 15% were *S. flexneri*, 1% were *S. boydii*, and <1% were *S. dysenteriae*. In 10 (8%) outbreaks, the *Shigella* species was unknown or the outbreak was not reported as laboratory-confirmed. Similarly, species was unavailable for 14 926 (11%) of all cases identified through isolate-based surveillance.

Shigella was the sole reported aetiology in all outbreaks except for one, where norovirus was also reported. One outbreak was associated with both *S. flexneri* and *S. sonnei*.

DISCUSSION

Data from 1998 to 2008 indicate that illnesses associated with recognized and reported foodborne outbreaks represents a small proportion of the overall shigellosis burden in the USA, but still cause hundreds of cases annually. Outbreaks of foodborne shigellosis occurred in a variety of settings and were associated with several contributing factors, but four factors contributed to 79% of those outbreaks with data. Restaurants accounted for the greatest number of reported outbreaks and overall cases, but most of the large outbreaks were associated with raw foods distributed in multiple states, institutional settings, and group gatherings. Epidemiological and sanitary investigations suggest that infected food handlers and improper food-handling practices frequently contributed to transmission. The variety of food vehicles implicated suggests that handling and preparation practices contribute to contamination across a range of food commodities. However, the high numbers of foods consumed raw or partially raw (e.g. salads, salsas) indicates that these foods deserve particular concern with regards to control measures.

Prevention of foodborne outbreaks requires both safe food-preparation practices in restaurants and good agricultural and food-production practices. *Shigella* caused only a small proportion of reported foodborne disease outbreaks. It is, however, highly infectious and resulted in several large outbreaks reported to FDOSS. Additional details about transmission in these reported outbreaks are well described in the literature; two of these outbreaks, which caused 486 and 886 cases, involved widespread distribution of contaminated food items and inadequate food-handling practices in commercial settings which probably amplified the original source of contamination [19, 22]. Although shigellosis can be introduced into a restaurant through the loading dock, often it is the employees' entrance that is suspected, and many examples reported in these data support this. In one outbreak due to *S. dysenteriae*, the index case was a restaurant manager with a history of recent international travel and all five additional cases identified were restaurant patrons. Although no specific food vehicle was reported, the investigation found that the facility lacked a sink specifically for employees to wash hands.

During large outbreaks, ongoing secondary transmission may complicate investigations. The single largest reported outbreak of foodborne shigellosis (n=964 cases) occurred over several months and involved several adjacent counties in Texas. A common pulsed-field gel electrophoresis (PFGE) pattern was documented among the cases, but no specific food vehicle was identified. Although classified as a foodborne outbreak, it is likely that person-to-person transmission contributed to the overall size of the outbreak, given the long time period over which it occurred and the geographical focus. This example illustrates the difficulties in differentiating foodborne and non-foodborne transmission in many investigations and obtaining precise estimates of case counts in food-associated outbreaks.

This study has several limitations. Outbreaks which are investigated and subsequently reported to FDOSS represent a subset of all foodborne outbreaks and may be subject to bias related to detection, investigation and reporting. Outbreaks are voluntarily reported to FDOSS. Differences in investigative methods, reporting practices and completeness due to a variety of factors may affect data from year-to-year, preventing the determination of potential trends in the yearly number of foodborne outbreaks and estimated total cases related to changes in the burden or transmission pathways of shigellosis. Many cases of mild shigellosis may be missed because patients do not seek healthcare or those that do have no stool culture performed; as a result, detected outbreaks are likely to be larger than they appear to be, and many outbreaks may escape detection altogether. State and local health departments vary in their capacity to detect and investigate outbreaks, and their criteria for reporting them to the CDC. In general, it is difficult for state and local health departments to detect and investigate small or temporally or geographically dispersed outbreaks of shigellosis. PulseNet, a network of laboratories in local, state, and federal health agencies that employs a standard protocol, equipment, and nomenclature for molecular subtyping of *Shigella* by PFGE has been a powerful tool for detecting small and dispersed clusters of shigellosis that would otherwise be missed [27]. However, foodborne transmission may be difficult to identify in small or dispersed outbreaks. Foodborne outbreaks are more likely to be recognized and investigated when they occur in a regulated setting, such as a restaurant, which may bias the relative frequencies of some variables including location of preparation and consumption, and contributing factors [28]. Reported outbreaks, especially those affecting relatively few people, often have incomplete data, and contributing factors are often not reported. The FDOSS data are also obtained from a standard reporting form and may lack certain variables and relevant information that may have been obtained during the investigations that would provide additional insight. In particular, data on race or ethnicity were not available, and only limited information was available about ingredients and production of the commercially prepared foods that were associated with large outbreaks.

Some of the differences we found when comparing data from the FDOSS outbreak reports with data from the LEDS isolate-based surveillance on laboratory-confirmed shigellosis such as younger cases and summer seasonality in LEDS data, are probably attributable to the predominance of person-to-person transmission of shigellosis, and outbreaks related to childcare centres, camps, and recreational water venues in the USA [14]. Differences in clinical criteria for obtaining cultures for diagnosis of individual illnesses compared to diagnosis of outbreak-associated illnesses may also contribute to the higher proportion of children in LEDS isolate-based surveillance compared to outbreak surveillance. Other differences may reflect differences in reporting methods. Underreporting affects both systems, with isolate-based surveillance estimated to capture only 5–11% of the true burden of shigellosis [6, 29]. Although recognized foodborne outbreaks of shigellosis are a relatively small contributor to the overall burden of shigellosis in the USA, food vehicles are probably responsible for many more ‘sporadic’ cases that are not detected by outbreak surveillance [6].

Minimizing the risk of contamination during commercial food production and distribution and during preparation in institutional settings could help prevent large outbreaks and reduce the overall vulnerability of the US food supply to contaminants such as *Shigella* [12, 20]. However, location-specific preventive measures are also warranted, including providing restaurant and food-service workers and managers with education about adherence to proper food-handling and hygiene practices, excluding ill food handlers from work in accordance with local regulations, and paid sick leave to reduce the incentive to work while sick. The potential for intentional spread of *Shigella* should also be considered, as was seen in the case of a deliberate inoculation of pastries with *S. dysenteriae* type 2, which were later distributed to staff at a Texas laboratory, all of whom became ill [30]. While there is evidence in these data of declining numbers of reported foodborne outbreaks due to *Shigella*, increases in foodborne transmission of *Shigella* and other pathogens with similar transmission pathways will be a concern in the future in light of increasing consumer preferences for meals prepared outside the home and the increasing demand for fresh produce throughout the year, which may be centrally processed, widely distributed as commercial products, and imported from countries with varying food safety standards and shigellosis incidence [31, 32]. To effectively reduce foodborne transmission of bacterial diseases, continued efforts are needed to monitor pathogens commonly associated with foodborne disease transmission, and to increase the capacity to detect, investigate and control foodborne outbreaks promptly. These goals will be accomplished by supporting partnerships among local and state health departments and national surveillance systems like FDOSS.

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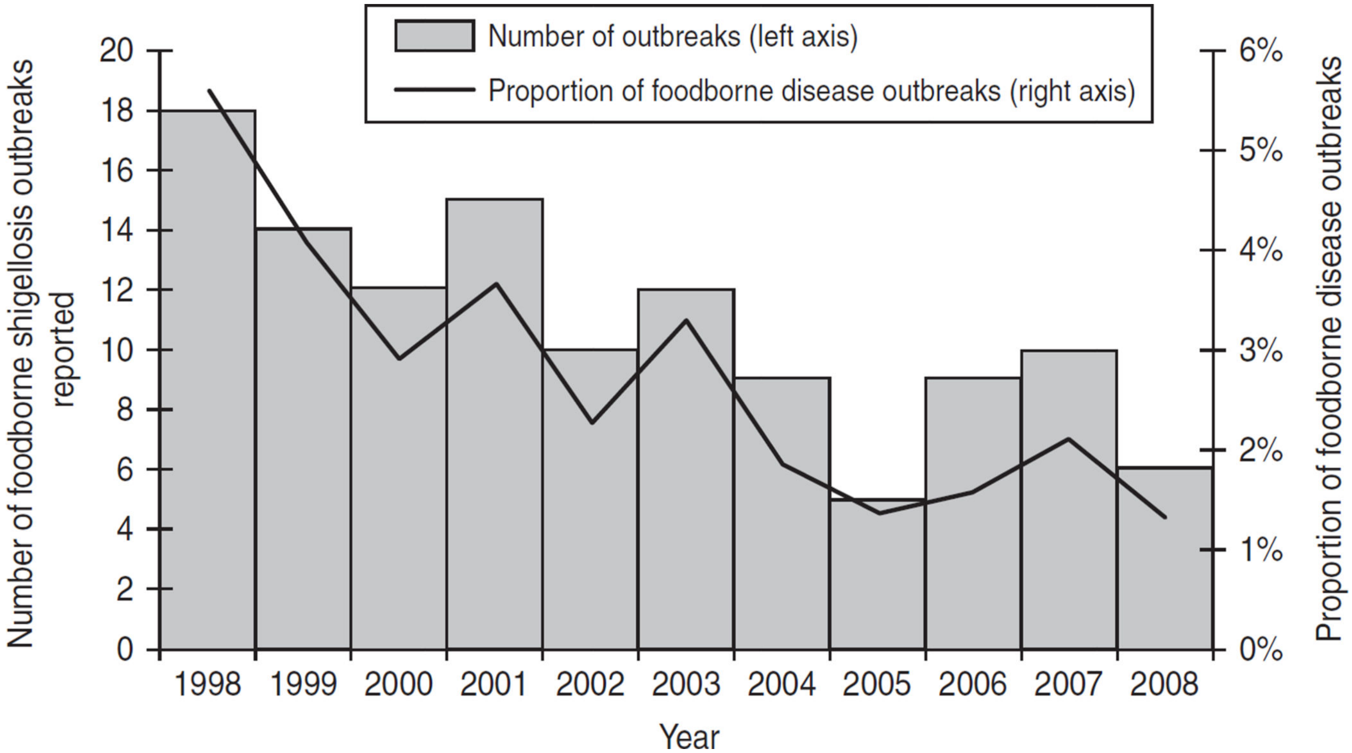

Fig. 1.

Number of confirmed foodborne outbreaks of shigellosis reported and proportion of foodborne disease outbreaks, by year, USA, 1998–2008.

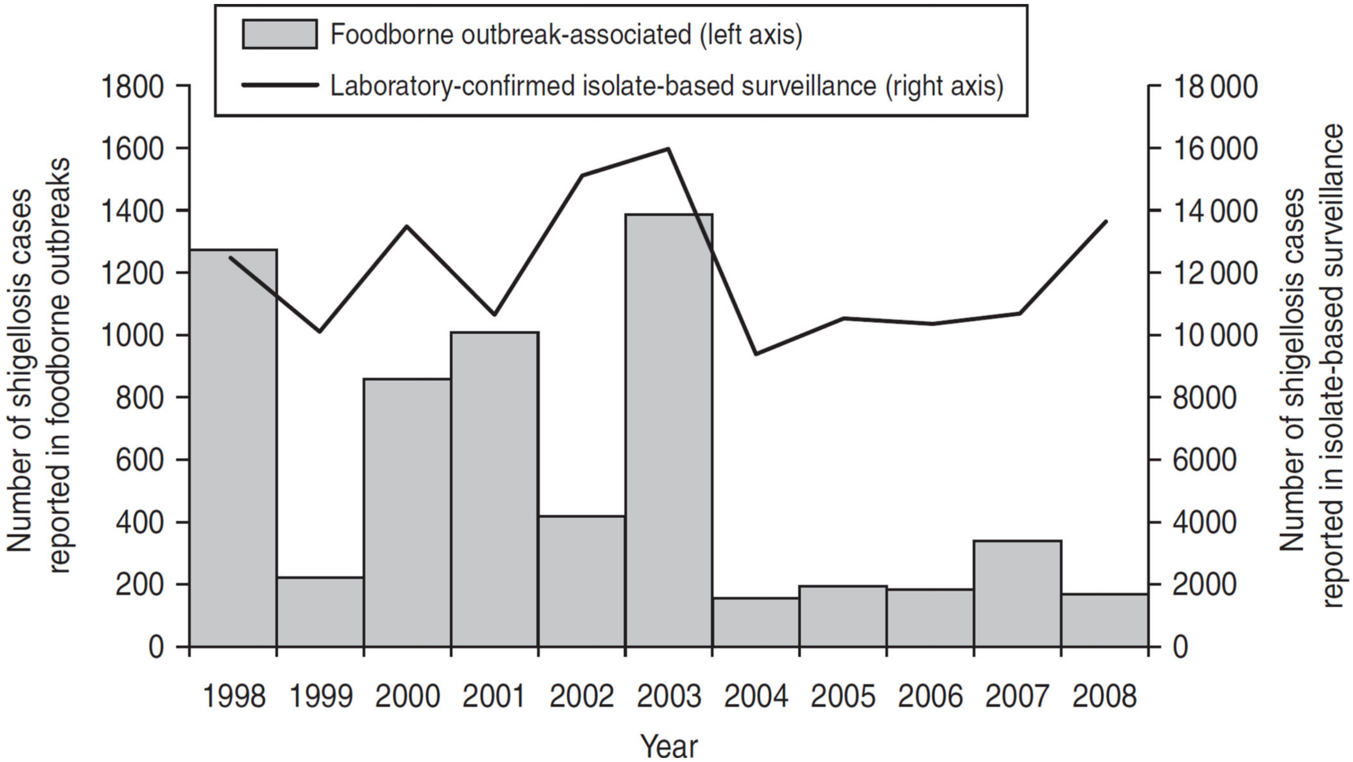

Fig. 2.

Reported shigellosis cases associated with laboratory-confirmed foodborne outbreaks and all laboratory-confirmed shigellosis cases reported through isolate-based surveillance, by year, USA, 1998–2008.

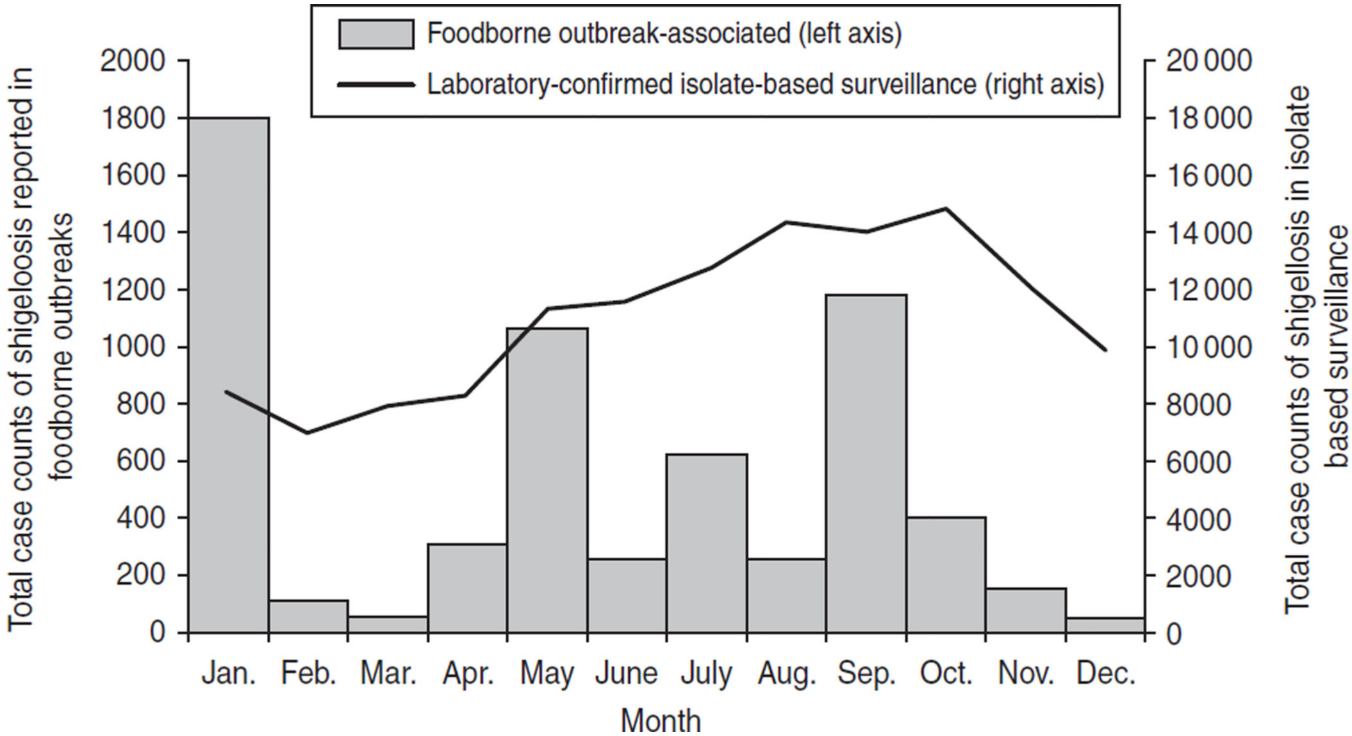

Fig. 3.

Total case counts of shigellosis reported in foodborne outbreaks and isolate-based surveillance, by month, USA, 1998–2008.

Table 1

Frequency of implicated food vehicles and common contributing factors reported in foodborne outbreaks of shigellosis, USA, 1998–2008 (N=120)*

Food vehicles and contributing factors	Restaurant (%)	Non-restaurant (%)	Total (%)
Food vehicle identified (one or more)	37	19	56
Single food vehicle	30 (81%)	15 (79 %)	45 (80%)
Exclusively raw (single vehicle)	9 (24%)	2 (11 %)	11 (20%)
Possibly or partially raw (single vehicle)	11 (30%)	6 (32 %)	17 (30%)
Contributing factors identified	33	15	48
Infected food handler(s)	18 (55%)	10 (67 %)	28 (58%)
Bare-handed food contact by preparer	17 (52%)	1 (7 %)	18 (38%)
Inadequate cold-holding temperature	7 (21%)	0	7 (15%)
Inadequate cleaning of food preparation equipment	7 (21%)	0	7 (15%)

*More than one factor can be reported in an outbreak.

Table 2

Distribution of cases by reported location of food preparation and consumption in foodborne outbreaks of shigellosis, USA, 1998–2008 (N=120 outbreaks and 6208 foodborne outbreak-associated cases)*

	Location of preparation			Location of consumption		
Location	**Number of outbreaks (%) (*n*=99)**	**Median cases (range)**	**Total cases (%) (*n*=4663)**	**Number of outbreaks (%) (*n*=105)**	**Median cases (range)**	**Total cases (%) (*n*=4868)**
Restaurant	69 (70%)	9 (2–886)	2897 (62%)	61 (58 %)	9 (2–886)	2923 (60%)
Private home	11 (11%)	12 (5–100)	313 (7%)	13 (12 %)	7 (2–494)	597 (12%)
School	5 (5%)	50 (26–89)	273 (6%)	8 (8%)	39 (8–123)	354 (7 %)
Daycare centre	1 (1%)	10	10 (<1%)	5 (5%)	10 (4–46)	90 (2%)
Picnic	2 (2%)	16 (7–24)	31 (1%)	4 (4%)	17 (8–24)	66 (1 %)
Other locations	15 (15%)	40 (3–486)	1919 (41%)	15 (14 %)	48 (4–486)	1348 (28%)

*Six outbreaks had two locations where food was prepared and two outbreaks had two locations where food was consumed.

In 21 (18%) outbreaks, the location of preparation was not reported and in 15 (13%) outbreaks the location of consumption was not reported.

Table 3

Shigella species distribution in foodborne outbreaks of shigellosis and isolate-based surveillance USA, 1998–2008 (N=120 outbreaks, 6208 foodborne outbreak-associated cases and 132 081 isolate-based surveillance cases)*

	FDOSS			LEDS
***Shigella* spp.**	**Foodborne outbreaks (%) (*n*=110)**	**Median cases, foodborne outbreaks (range)**	**Total cases, foodborne outbreaks (%) (*n*=5985)**	**Cases, all *Shigella* isolate-based surveillance (%) (*n*=117 155)**
S. sonnei	87 (79%)	12 (2–964)	4668 (78%)	97 734 (83%)
S. flexneri	19 (17%)	10 (2–866)	1194 (20%)	17 458 (15%)
S. boydii	4 (4 %)	24 (7–72)	127 (2 %)	1453 (1 %)
S. dysenteriae	1(1 %)	6	6(<1 %)	510 (<1%)

FDOSS, Foodborne Disease Outbreak Surveillance System; LEDS, Laboratory-based Enteric Diseases Surveillance.

*Species was not reported for 10 (8%) outbreaks and 14 926 (11%) of isolate-based surveillance submissions. One outbreak was associated with both *S. flexneri* and *S. sonnei* species.