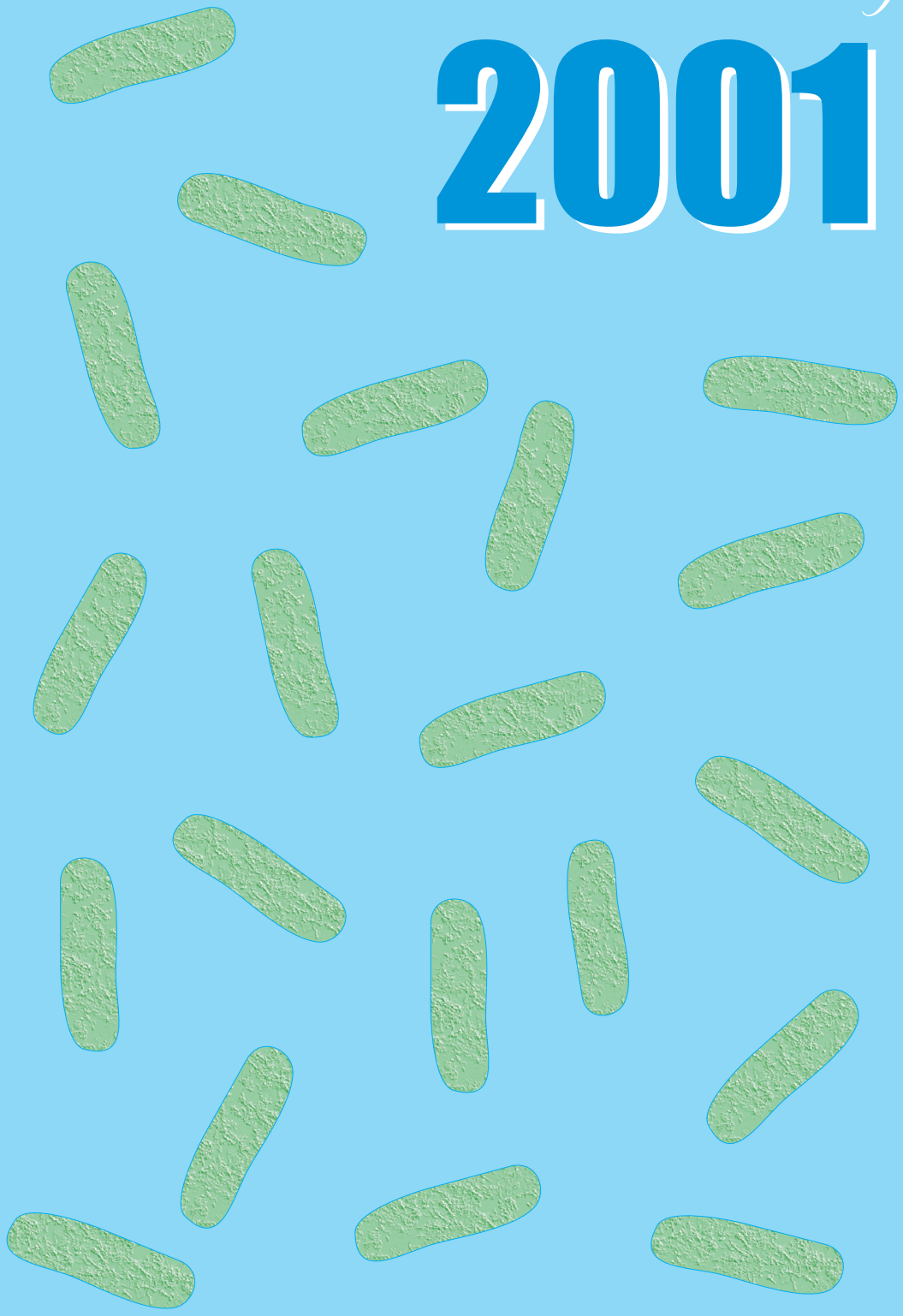
Shigella

Annual Summary

2001



Department of Health and Human Services
Centers for Disease Control and Prevention
National Center for Infectious Diseases
Division of Bacterial and Mycotic Diseases
Foodborne and Diarrheal Diseases Branch
Atlanta, GA 30333

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Laboratory-Confirmed *Shigella* Surveillance
Annual Summary, 2001

The Annual Summary contains surveillance data on reported laboratory-confirmed *Shigella* isolates in the United States. The National *Shigella* Surveillance System collects reports of isolates of *Shigella* from every state in the United States. This information is reported electronically through the Public Health Laboratory Information System (PHLIS) by the State Public Health Laboratory Directors and State and Territorial Epidemiologists to the Foodborne and Diarrheal Diseases Branch (FDDB) and the Biostatistics and Information Management Branch (BIMB) of the Division of Bacterial and Mycotic Diseases in the National Center for Infectious Diseases.

The National *Shigella* Surveillance System is based on data collected by state and territorial public health laboratories. *Shigella* isolates are submitted to the state public health laboratory by clinical diagnostic laboratories. The state and territorial laboratories confirm the isolates as *Shigella,* perform subtyping, and submit the data for reporting through PHLIS. Unusual or untypable isolates are forwarded to the National *Shigella* Reference Laboratory at the Centers for Disease Control and Prevention for further characterization or confirmation. These results are reported back to the state laboratory, where they are reported to CDC through PHLIS.

The capture of isolates in the National *Shigella* Surveillance System is considered to be consistent. However, some *Shigella* isolates may not be forwarded or reported to state public health laboratories and therefore are not captured. In addition, irrespective of the surveillance system, many cases of *Shigella* illness are not reported because the ill person does not seek medical care, the health-care provider does not obtain a specimen for diagnosis or the laboratory does not perform culture for *Shigella*. The results of surveillance reported herein are therefore substantial underestimates of the true number of infections.

The number of isolates reported by state represents the state where laboratory confirmation and subtyping were performed. In some instances, the reporting state is not the same as the state of residence of the person from whom the isolate was obtained. For the Annual Summaries, duplicate records are deleted.

There are 4 major subgroups and 43 recognized serotypes of *Shigella,* shown in Table A below.

Table A. Subgroups, Serotypes and Subtypes of *Shigella*

Subgroups	**Serotypes and Subtypes**
Group A: *Shigella dysenteriae*	15 serotypes (type 1 produces Shiga toxin)
Group B: *Shigella flexneri*	8 serotypes and 9 subtypes
Group C: *Shigella boydii*	19 serotypes
Group D: *Shigella sonnei*	1 serotype

These subgroups and serotypes are differentiated from one another by their biochemical traits (such as ability to ferment mannitol) and antigenic properties (Table B).

Table B. Classification of *Shigella* subgroups.

			Carbohydrate fermentation		
Species	**Group**	**Serotypes**	**Glucose**	**Mannitol**	**Lactose**
S. dysenteriae	A	15	+	-	-
S. flexneri	B	8	+	+	-
S. boydii	C	19	+	+	-
S. sonnei	D	1	+	+	Late

Since there are no recognized environmental or animal reservoirs for *Shigella*, except higher primates, the isolates reported herein are all from infected humans.

This report can be viewed online at **www.cdc.gov/ncidod/dbmd/phlisdata/shigella.htm**. Further information concerning data described in this report can be obtained by contacting the Foodborne and Diarrheal Diseases Branch (404) 639-2206. For further information concerning PHLIS, please contact the Biostatistics and Information Management Branch (404) 639-1364.

The Surveillance Outbreak Detection Algorithm (SODA), developed by BIMB and FDDB, is a statistical algorithm based on the National Surveillance Data. It is designed to detect unusual clusters of *Salmonella* and *Shigella* infection. SODA compares current *Salmonella* and *Shigella* isolates reported through PHLIS by subgroup or serotype with a 5 year historical baseline for that subgroup or serotype for the specified time period to detect unusual increases from the baseline. Analyses can be conducted at state, regional, or national levels. Since 1996, SODA has been implemented at CDC and selected state health departments. If you would like more information on SODA, please call the PHLIS Helpdesk (404) 639-3365.

Annual Highlights for 2001

A total of 10,598 *Shigella* isolates were reported from public health laboratories in 50 states in 2001 (Table 1). This represents a 46% decrease compared with 1991 and a 17% decrease from 2000. The national rate of reported *Shigella* isolates in 2001 was 3.8 per 100,000 population based on 2000 census population figures for the United States.

Similar to previous years, *Shigella* was isolated frequently from children under 5 years of age, who accounted for 27.2% of all isolates. About 25.6% of all isolates came from persons aged 5-19 years, and 32.6% from persons aged 20-59, with declining numbers thereafter. The median age of patients by subgroup is shown in Table 4. Subgroups A, B, C and D represent serologically and biochemically defined groups of shigellae that historically have been treated as species: subgroup A for *S. dysenteriae*; subgroup B for *S. flexneri*; subgroup C for *S. boydii* and subgroup

D for *S. sonnei.* The distribution of *Shigella* isolates between the sexes was similar, with females accounting for 46.9% of persons from whom *Shigella* was isolated. Gender differences were most notable for a preponderance of females in three age groups, 20-29 (59.9%), 60-69 (58%), and 70-79 (56.1%) and for a relative paucity of females in three age groups 30-39 (39.9%), 40-49 (36.7%), and 80+ (35.9%). These estimates, however, are not complete since Illinois does not report age of persons from whom *Shigella* isolates are obtained. The frequency of reported subgroups, and the frequency of reported serotypes within these groups for all *Shigella* isolates are shown in Table 2. Of the 10,598 isolates, 95% were subgrouped. Trends of subgroups remained constant, with subgroup D (*S. sonne*i) accounting for the largest percentage of isolates (77.3%), followed by subgroup B (*S.flexneri,* 15.7%), *subgroup C (S. boydii,* 1.2%) and subgroup A (*S. dysenteriae,* 0.5%). *Shigella* isolate serotype trends by year are shown in Table 5. Over the past decade, the number of isolates of subgroups A, B and C that were not identified as belonging to a specific serotype (and the rate of reporting such unspecified isolates) has declined.

Shigella transmission occurs via the fecal-oral route. The majority of subgroup D (*S. sonnei)* infections in the United States occur in young children and are associated with crowding and poor personal hygiene. Daycare centers have been implicated in many large subgroup D (*S. sonne*i) outbreaks that can last many months and affect many persons (1). In 2001, a prolonged multi-county daycare-associated outbreak of subgroup D (*S. sonnei)* infections in Ohio contributed significantly to the national burden of culture-confirmed shigellosis (2). Subgroup D (*S. sonne*i) has also been transmitted through unchlorinated wading pools (3), interactive water fountains (4), food items such as parsley (5) and bean dip (6), and men who have sex with men (MSM) (7). Until recently, the dominant subgroup causing illness among MSM was subgroup B (*S. flexneri)* (8). However, in a large outbreak among MSM in San Francisco, the dominant serotype was subgroup D (*S. sonnei)* (7).

Geographic trends by region for subgroup D (*S. sonnei)* isolates from 1987 to 2001 are illustrated in Figure 1. All regions except the South Atlantic and East South Central regions exhibited decreases in *subgroup D (S. sonnei)* isolates from 2000 to 2001.

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References

1. Mohle-Boetani JC, Stapleton M, Finger R, Bean N, Poundstone J, Blake P, Griffin PM. Communitywide Shigellosis: Control of an outbreak and risk factors in child day-care centers. Am J Public Health 1995;85:812-816.

2. Shane A, Tucker N, Crump J, Nowicki S, *et. al*. Risk Factors and Costs of a Multi-Community Outbreak of Shigellosis - Southwest Ohio, 2001. 40th Annual Meeting of the Infectious Disease Society of America, Chicago, 2002.

3. CDC. Shigellosis outbreak associated with an unchlorinated fill-and-drain wading pool -- Iowa, 2001. Morbidity and Mortality Weekly Report 2001;50:797-800.

4. CDC. Outbreak of gastroenteritis associated with an interactive water fountain at a beachside park -- Florida, 1999. MMWR 2000:49;565-8.

5. CDC. Outbreaks of *Shigella sonnei* infection associated with eating fresh parsley--United States and Canada, July-August 1998. MMWR 1999;48:285-9.

6. CDC. Outbreak of *Shigella sonnei* infections associated with eating a nationally distributed dip-- California, Oregon, and Washington, January 2000. MMWR 2000;49:60-1.

7. CDC. *Shigella sonnei* outbreak among men who have sex with men--San Francisco, California, 2000-2001. MMWR 2001;50;922-6.

8. Tauxe RV, McDonald RC, Hargrett-Bean N, Blake PA. The persistence of *Shigella flexneri* in the United States: increasing role of adult males. Am J Public Health 1998;78:1432-5.

Eric Mintz, M.D., M.P.H.
Chief, Diarrheal Diseases Epidemiology Section
Foodborne and Diarrheal Diseases Branch

Nancy Strockbine, Ph.D.
Chief, National Reference Lab for *E*. coli and *Shigella*
Foodborne Diseases Laboratory Section
Foodborne and Diarrheal Diseases Branch

Nancy H. Bean, Ph.D.
Chief, Biostatistics and Information
Management Branch

Robert V. Tauxe, M.D., MPH
Chief, Foodborne and Diarrheal Diseases Branch

Division of Bacterial and Mycotic Diseases

National Center for Infectious Diseases

Centers for Disease Control and Prevention

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Centers for Disease Control and Prevention
Foodborne and Diarrheal Diseases Branch
Mail Stop: A38
1600 Clifton Road
Atlanta, Georgia 30333
Telephone: 404-639-2206
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TABLE OF CONTENTS

TABLE 1 1

Shigella serogroups reported to the CDC for 2001

TABLE 2 2

Number of reported isolates of *Shigella* serotypes for 2001

TABLE 3 3

Age and sex of persons from whom isolates of *Shigella* were reported for 2001

TABLE 3A 4

Age and sex of persons from whom isolates of *S. boydii* were reported for 2001

TABLE 3B 5

Age and sex of persons from whom isolates of *S. dysenteriae* were reported for 2001

TABLE 3C 6

Age and sex of persons from whom isolates of *S. flexneri* were reported for 2001

TABLE 3D 7

Age and sex of persons from whom isolates of *S. sonnei* were reported for 2001

TABLE 3E 8

Age and sex of persons from whom isolates of unknown serogroup were reported for 2001

TABLE 4 9

*M*edian age of persons from whom isolates of *Shigella* were reported, by serogroup, for 1987-2001

TABLE 5 10

Number of reported *Shigella* isolates by year for 1987-2001

TABLE 6 14

Number of reported *Shigella* isolates by month for 2001

TABLE 7 16

Number of reported *Shigella* isolates by month for 1987-2001

TABLE 8 18

Number of reported *Shigella* isolates by region for 1987-2001

TABLE 8A 19

Number of reported *S. sonnei* isolates by region for 1987-2001

TABLE 8B 20

Number of reported *S. flexneri* isolates by region for 1987-2001

TABLE 8C 21

Number of reported *S. boydii* isolates by region for 1987-2001

TABLE 8D 22

Number of reported *S. dysenteriae* isolates by region for 1987-2001

TABLE 8E 23

Number of reported *Shigella* isolates with unknown serogroup by region for 1987-2001

TABLE 9 24

Number of reported *Shigella* serogroup isolates by year for 1987-2001

TABLE 10 25

Number of reported *Shigella* isolates by state for 1987-2001

TABLE 10A 28

Number of reported *S. sonnei* isolates by state for 1987-2001

TABLE 10B 31

Number of reported *S. flexneri* isolates by state for 1987-2001

TABLE 10C 34

Number of reported *S. boydii* isolates by state for 1987-2001

TABLE 10D 37

Number of reported *S. dysenteriae* isolates by state for 1987-2001

TABLE 10E 40

Number of reported *Shigella* isolates with unknown serogroup by state for 1987-2001

FIGURE 1 43

Reported *S. sonnei* isolates by Region, United States 1987-2001

FIGURE 2 44

Region Map for *S. sonnei* isolates, United States 1987-2001