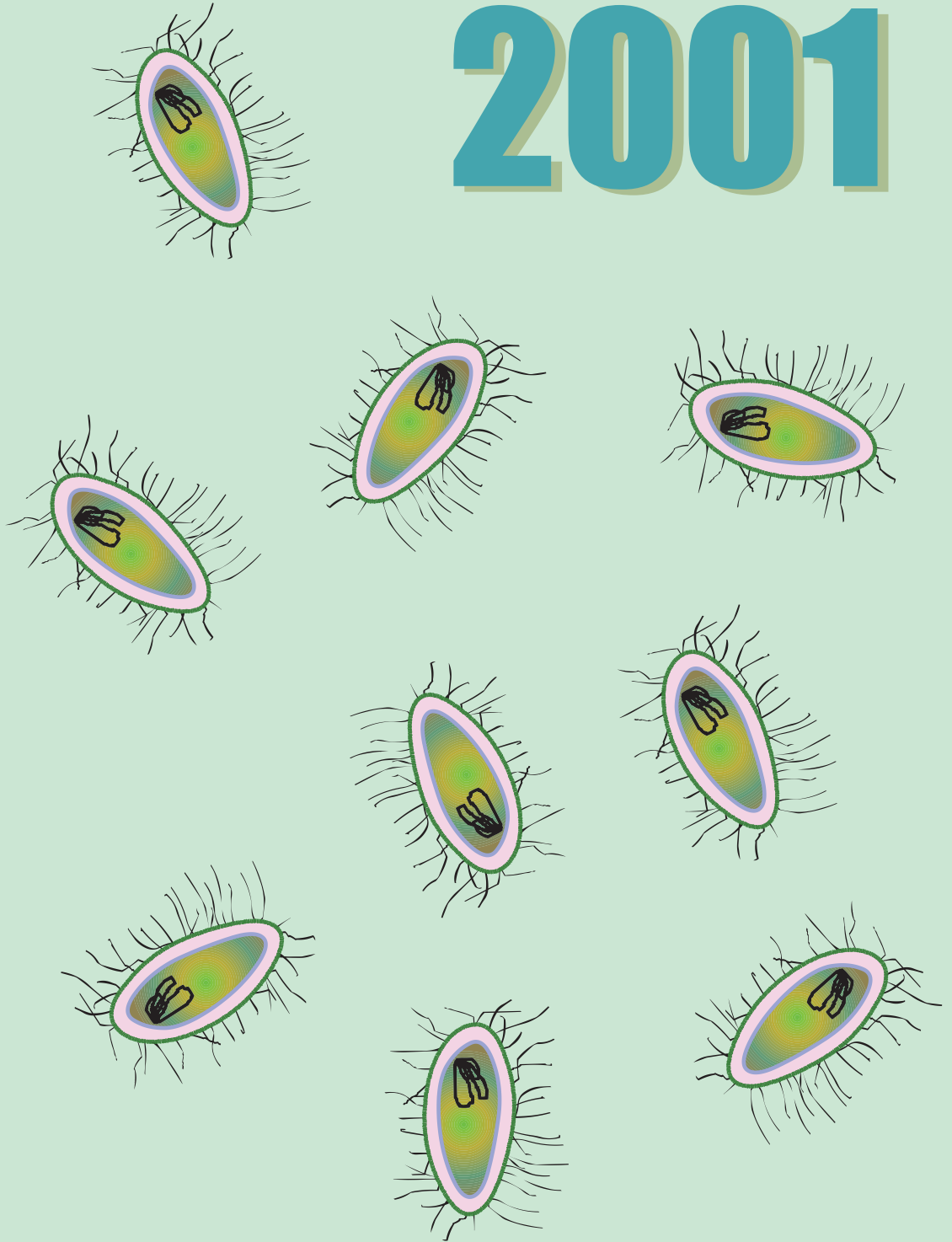


Salmonella

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



National *Salmonella* Surveillance System

Annual Summary, 2001

This issue of the Annual Summary of the National *Salmonella* Surveillance System contains surveillance data on reported laboratory-confirmed *Salmonella* isolates in the United States for the year 2001. The National *Salmonella* Surveillance System collects reports of isolates of *Salmonella* from human sources from every state in the United States. This information is reported through the Public Health Laboratory Information System (PHLIS), an electronic reporting system, 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 *Salmonella* Surveillance System is based on data collected by state and territorial public health laboratories. *Salmonella* isolates are submitted to the state public health laboratory by clinical diagnostic laboratories. The state and territorial laboratories confirm the isolates as *Salmonella*, perform serotyping according to the modified Kauffmann-White scheme, and submit the data for reporting through PHLIS. Unusual or difficult isolates are forwarded to the National *Salmonella* 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 through PHLIS.

Beginning in 2003, the National *Salmonella* Reference Laboratory will switch from the modified Kauffmann-White serotyping scheme to the standard Kauffmann-White scheme used by the rest of the world. The PHLIS reporting software will reflect this change. This will improve the comparability of United States surveillance data with data from other countries.

The capture of isolates in the National *Salmonella* Surveillance System is considered to be fairly complete. However, some *Salmonella* isolates may not be forwarded to public health laboratories, and therefore are not reported. In addition, irrespective of the surveillance system, many cases of *Salmonella* 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 the necessary diagnostics tests. The results of surveillance reported herein should be considered underestimates.

The National *Salmonella* Surveillance System database is dynamic; the number of isolates reported for previous years may change according to the addition or correction of isolate reports. For example,

the number of human *Salmonella* isolates published in the 2000 Annual Summary for 2000 was 32,022, whereas the number of isolates reported for 2000 in this Annual Summary is 33,310.

The number of isolates reported by geographical area (e.g. state) represents the area where laboratory confirmation and serotyping was performed. In some instances, the reporting area is not the same as the area of residence of the person from whom the isolate was obtained. For *Salmonella* serotype Typhi, only the first isolation in a year for each person is counted. For non-Typhi serotypes, only the first isolation in any two consecutive months for each person is counted, given that the serotype and clinical source (e.g. stool or blood) are the same.

The data presented for *Salmonella* isolates from animals and related sources (i.e. environment and feeds) are gathered from isolates submitted to the U.S. Department of Agriculture, Animal and Plant Health Inspection Services, National Veterinary Services Laboratories (USDA/APHIS/NVSL) for serotyping. These isolates are submitted by animal disease diagnostic laboratories and the USDA, Food Safety and Inspection Service (FSIS) laboratories throughout the United States. Data from other United States laboratories that serotype *Salmonella* from animals and related sources and submit isolates to the NVSL are also included in this report. *Salmonella* serotyping results from clinical cases of animal disease are designated as “clinical” and shown in Table 6. Serotyping results from herd and flock monitoring and surveillance, feed sample testing, environmental testing, research projects, and isolates from USDA, FSIS food testing programs are designated as “nonclinical” (Table 7). Samples from non-human sources are tested for *Salmonella* for a variety of purposes and are obtained in a variety of ways. The sampling is therefore neither complete nor random and undoubtedly has sampling biases. The interpretation of data should consider this limitation.

The Adobe Acrobat (PDF) version of this document can be viewed on the world-wide web at www.cdc.gov/ncidod/dbmd/phlisdata/salmonella.htm. Further information concerning data described in this report can be obtained by contacting the Foodborne and Diarrheal Diseases Branch at telephone number (404) 639-2206. For further information concerning PHLIS please contact the Biostatistics and Information Management Branch at telephone number (404) 639-1364.

The *Salmonella* Outbreak Detection Algorithm (SODA), developed by BIMB and FDDB, is a statistical algorithm based on the National *Salmonella* Surveillance System. It is designed to detect unusual clusters of isolates of *Salmonella* infection. SODA compares current *Salmonella* isolates reported through PHLIS by serotype to a 5-year historical baseline for that serotype and week 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 at telephone number (404) 639-3365.

Annual Tabulation Highlights for 2001

Human Sources

A total of 31,675 *Salmonella* isolates were reported from public health laboratories in 50 states in 2001. This represents a 22% decrease compared with 1991 and a 19% decrease from 1996. The national rate of reported *Salmonella* isolates in 2001 was 11.3 per 100,000 population based on 2000 census population figures for the United States.

Similar to other years, *Salmonella* was isolated most frequently from children under 5 years of age, accounting for 26% of isolates. About 10% of isolates came from persons in each of the second through fifth decades of life, with declining numbers thereafter. The distribution of isolates between the sexes was similar.

The twenty most common serotypes of *Salmonella* in 2001 are listed in Table 1. These represent 79% of all *Salmonella* isolates. Of the top twenty serotypes, those with the largest percent decrease in numbers compared with 1991 were *S. Hadar* and *S. Agona*. Both had consistent decreases in the time periods 1991–1996 and 1996–2001. *S. Java* had consistent increases during the same time periods. *S. Newport* and *S. Mississippi* had significant increases in numbers in the later 6 year period 1996–2001. A relatively low number of *S. Berta* isolates were reported in 1996 compared to 1991 and 2001. The two most common serotypes, *S. Typhimurium* and *S. Enteritidis*, had substantial increases in numbers from 1991–1996, then decreased in number by 2001 (Table 8). In 2001, serotypes *S. Java*, *S. Mississippi* and *S. Bareilly* increased in rank to be included in the top twenty serotypes, whereas *S. Reading*, *S. Panama* and *S. Anatum* dropped from the top twenty serotypes compared with 1991.

The three most common serotypes of *Salmonella* in 2001 (*Typhimurium*, *Enteritidis*, and *Newport* respectively) accounted for 50% of isolates. Compared with 1991, the frequency rank of *S. Typhimurium* and *S. Enteritidis* in 2001 remained first and second respectively, though in 1994–1996 their rank was temporarily reversed (1). A large proportion of *S. Typhimurium* isolates were resistant to multiple drugs; in a 2000 national survey, 50% were resistant to one or more drugs and 28% had a five-drug resistance pattern characteristic of a single phage type, DT104 (2). Similarly, *S. Newport* has emerged as a major multidrug-resistant pathogen. In 2001, 33 (26%) of 128 *S. Newport* isolates submitted to the National Antimicrobial Resistance Monitoring System were resistant to at least nine of

17 antimicrobial agents tested, including extended-spectrum cephalosporins (3).

Similar to other years, there were marked regional differences in the frequency of *Salmonella* isolates among serotypes. The rate of isolations by region has been followed closely for *S. Enteritidis* as a means of assessing the impact of egg safety regulations and industry improvements. As indicated in Figure 1, *S. Enteritidis* rates of isolation had been relatively high in New England, Mid Atlantic and Pacific regions, but have shown significant decreases since 1995. The number of *S. Enteritidis* isolates reported has not decreased since 1999 for the United States as a whole, however, some regions (e. g., New England) have seen increases again in the last two years.

Non-human Sources

Data on *Salmonella* isolates obtained from non-human sources can help identify possible sources of human illness. *S. Typhimurium*, the most common serotype in humans, is also the most common serotype from clinical and non-clinical porcine sources and from clinical bovine sources. Similarly, *S. Enteritidis*, the second most common serotype in humans, is the most common serotype from clinical chicken sources. *S. Heidelberg* was the most common serotype found in non-clinical samples from both chicken and turkey sources.

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