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Intussusception Among Recipients of Rotavirus Vaccine — United States, 1998–1999

On August 31, 1998, a tetravalent rhesus-based rotavirus vaccine (RotaShield®*, Wyeth Laboratories, Inc., Marietta, Pennsylvania) (RRV-TV) was licensed in the United States for vaccination of infants. The Advisory Committee on Immunization Practices (ACIP), the American Academy of Pediatrics, and the American Academy of Family Physicians have recommended routine use of RRV-TV for vaccination of healthy infants (*1,2*). During September 1, 1998–July 7, 1999, 15 cases of intussusception (a bowel obstruction in which one segment of bowel becomes enfolded within another segment) among infants who had received RRV-TV were reported to the Vaccine Adverse Event Reporting System (VAERS). This report summarizes the clinical and epidemiologic features of these cases and preliminary data from ongoing studies of intussusception and rotavirus vaccine.

VAERS

VAERS is a passive surveillance system operated by the Food and Drug Administration (FDA) and CDC (*3,4*). Vaccine manufacturers are required to report to VAERS any adverse event reported to them, and health-care providers are encouraged to report any adverse event possibly attributable to vaccine. Vaccine recipients and their families also can report adverse events to VAERS. For this report, VAERS case reports of intussusception following rotavirus vaccination were reviewed, and health-care providers, parents, or guardians of patients were contacted by telephone for additional clinical and demographic information. Data on RRV-TV distribution were obtained from the manufacturer. To estimate the expected rate of intussusception among infants aged <12 months, hospital discharge data from New York for 1991–1997 were reviewed.

Of the 15 infants with intussusception reported to VAERS, 13 (87%) developed intussusception following the first dose of the three-dose RRV-TV series, and 12 (80%) of 15 developed symptoms within 1 week of receiving any dose of RRV-TV (Table 1). Thirteen of the 15 patients received concurrently other vaccines with RRV-TV. Intussusception was confirmed radiographically in all 15 patients. Eight infants required surgical reduction, and one required resection of 7 inches (18 cm) of distal ileum and

*Use of trade names and commercial sources is for identification only and does not imply endorsement by CDC or the U.S. Department of Health and Human Services.

Rotavirus Vaccine — Continued

TABLE 1. Reported cases of intussusception among recipients of tetravalent rhesus-based rotavirus vaccine (RRV-TV) (RotaShield®*), by state — United States, 1998–1999

State	Age (mos)	Sex	No. doses received of RRV-TV	No. days from dose to symptom onset
California	7	M	2	4
California	4	F	2	14
California	3	M	1	3
California	5	M	1	59
Colorado	4	F	1	4
Colorado	3	M	1	5
Kansas	2	F	1	5
Missouri	11	M	1	5
New York	3	F	1	5
New York	2	M	1	3
North Carolina	4	F	1	5
Pennsylvania	6	M	1	3
Pennsylvania	2	M	1	4
Pennsylvania	2	M	1	29
Pennsylvania	3	M	1	7

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proximal colon. Histopathologic examination of the distal ileum indicated lymphoid hyperplasia and ischemic necrosis. All infants recovered. Onset dates of reported illness occurred from November 21, 1998, to June 24, 1999 (Figure 1). The median age of patients was 3 months (range: 2–11 months). Ten were boys. Intussusception among RRV-TV recipients was reported from seven states (Table 1). Of the 15 cases reported to VAERS, 14 were spontaneous reports and one was identified through active postlicensure surveillance.

The rate of hospitalization for intussusception among infants aged <12 months during 1991–1997 (before RRV-TV licensure) was 51 per 100,000 infant-years† in New York (95% confidence interval [CI]=48–54 per 100,000). The manufacturer had distributed approximately 1.8 million doses of RRV-TV as of June 1, 1999, and estimated that 1.5 million doses (83%) had been administered. Given this information, 14–16 intussusception cases among infants would be expected by chance alone during the week following receipt of any dose of RRV-TV. Fourteen of the 15 case-patients were vaccinated before June 1, 1999, and of those, 11 developed intussusception within 1 week of receiving RRV-TV.

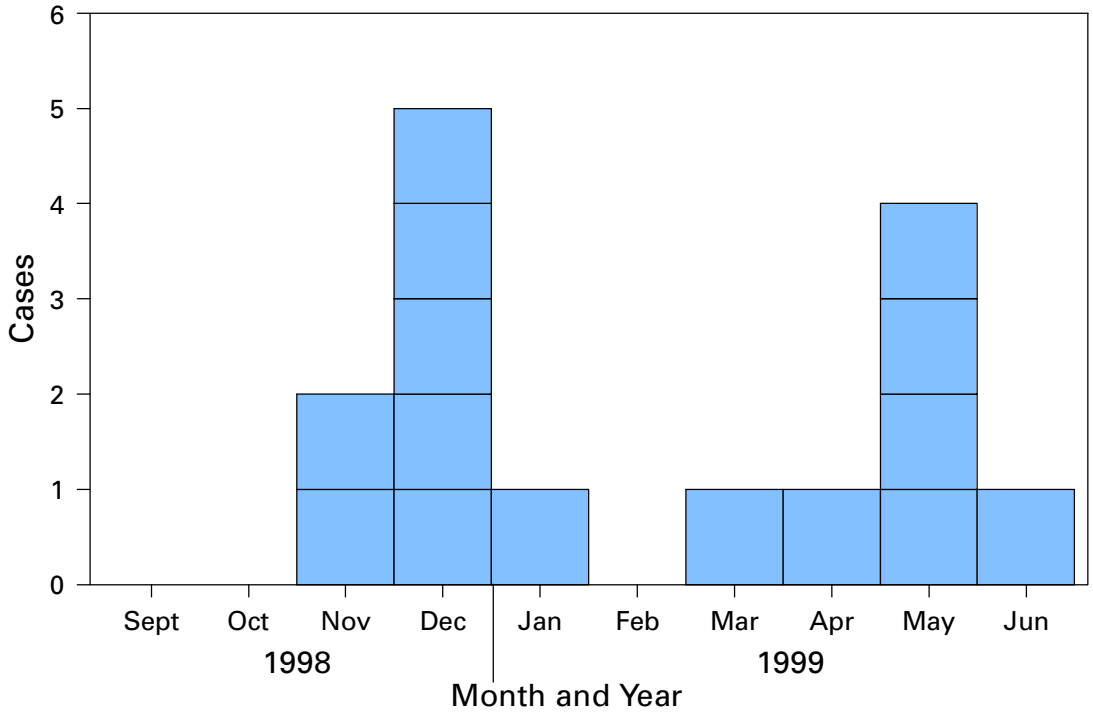
Postlicensure Studies of Adverse Events Following RRV-TV

As part of a preliminary analysis of ongoing postlicensure surveillance of adverse events following vaccination with RRV-TV, cases of intussusception during December 1, 1998–June 10, 1999, were identified among infants aged 2–11 months at Northern California Kaiser Permanente (NCKP) by review of hospital discharge diagnoses, admitting diagnoses for the records for which discharge summaries were not yet

†An infant-year is a unit of measurement combining infants and time used as a denominator in calculating incidence. In this report, it is the sum of the individual units of time (days, weeks, or months) converted to years that the infants in the study population have been followed.

Rotavirus Vaccine — Continued

FIGURE 1. Number of confirmed intussusception cases among recipients of tetravalent rhesus-based rotavirus vaccine (RotaShield®*) reported to the Vaccine Adverse Event Reporting System, by month of onset — United States, September 1998–June 1999



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complete, and computerized records of all barium enemas performed on children aged <1 year. Relative risks were age-adjusted because of differences in the ages of vaccinated and unvaccinated infants, and p values were calculated by Poisson regression.

At NCKP, 16,627 doses of RRV-TV were administered to 9802 infants during December 1, 1998–June 10, 1999. Nine cases of intussusception among infants were identified with onset during that same period, all of which were radiographically or surgically confirmed. Three were among vaccinated children, with intervals of 3, 15, and 58 days following vaccination. The rate of intussusception among never-vaccinated children was 45 per 100,000 infant-years, and among children who had received RRV-TV was 125 per 100,000 infant-years (age-adjusted relative risk [RR]=1.9, 95% CI=0.5–7.7, p=0.39). The rate among children who had received RRV-TV during the preceding 3 weeks was 219 per 100,000 infant-years (age-adjusted RR=3.7, 95% CI=0.7–19, p=0.12). Among children who had received RRV-TV during the previous week, the rate was 314 per 100,000 infant-years (age-adjusted RR=5.7, 95% CI= 0.7–50, p=0.11).

Rotavirus Vaccine — Continued

Minnesota

In Minnesota, intussusception cases were identified among infants aged 30 days–11 months who were born after April 1, 1998, and were hospitalized with radiographically or surgically confirmed intussusception with onset during November 1, 1998–June 30, 1999. During October 1, 1998–June 1, 1999, 62,916 doses of vaccine were distributed. Eighteen cases of intussusception were identified, five of which were among infants who had received RRV-TV. Vaccinated children had a median age of 4 months (range: 3–5 months), and unvaccinated children had a median age of 7 months (range: 5–9 months). Four of the five RRV-TV recipients with intussusception required surgical reduction, and five of 13 unvaccinated children required surgical reduction. Intussusception occurred after receipt of dose one (two children), dose two (two children), and dose three (one child). The five RRV-TV recipients developed intussusception within 2 weeks of receipt of vaccine; intervals were 6 days (two children), 7 days, 10 days, and 14 days after receipt of vaccine. Assuming 85% of RRV-TV doses distributed in Minnesota were administered, the observed rate of intussusception within 1 week of receipt of RRV-TV was 292 per 100,000 infant-years.

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Editorial Note: Rotavirus is the most common cause of severe gastroenteritis in infants and young children aged <5 years in the United States, resulting in approximately 500,000 physician visits, 50,000 hospitalizations, and 20 deaths each year. Worldwide, rotavirus is a major cause of childhood death, accounting for an estimated 600,000 deaths annually among children aged <5 years. Rotavirus vaccines offer the opportunity to reduce substantially the occurrence of this disease (*1*).

In prelicensure studies, five cases of intussusception occurred among 10,054 vaccine recipients and one of 4633 controls, a difference that was not statistically significant (*5*). Three of the five cases among vaccinated children occurred within 6–7 days of receiving rotavirus vaccine. On the basis of these data, intussusception was included as a potential adverse reaction on the package insert, and the ACIP recommended postlicensure surveillance for this adverse event following vaccination (*1*).

Because of concerns about intussusception identified in prelicensure trials, VAERS data were analyzed early in the postlicensure period. The number of reported intussusception case-patients with illness onset within 1 week of receiving any dose of vaccine is in the expected range; however, because reporting to VAERS of adverse events following vaccination is incomplete (*6*), the actual number of intussusception cases among RRV-TV recipients may be substantially greater than that reported.

In response to the VAERS reports, a preliminary analysis of data from an ongoing postlicensure study at NCKP was performed, and a multistate investigation was initiated to determine whether an association exists between administration of RRV-TV and intussusception in infants. Preliminary data from Minnesota and from NCKP also suggest an increased risk for intussusception following receipt of RRV-TV. Observed rates of intussusception among recently vaccinated children were similar in both

Rotavirus Vaccine — Continued

studies. However, the number of cases of intussusception among vaccinated children is small at both NCKP and in Minnesota, and neither study has adequate power to establish a statistically significant difference in incidence of intussusception among vaccinated and unvaccinated children. Available data suggest but do not establish a causal association between receipt of rotavirus vaccine and intussusception, and additional studies are ongoing.

Although neither these studies nor the VAERS reports is conclusive, the consistency of findings from these three data sources raises strong concerns. Because more data are anticipated within several months and rotavirus season is still 4–6 months away in most areas of the United States, CDC recommends postponing administration of RRV-TV to children scheduled to receive the vaccine before November 1999, including those who already have begun the RRV-TV series. Parents or caregivers of children who have recently received rotavirus vaccine should promptly contact their health-care provider if the infant develops symptoms consistent with intussusception (e.g., persistent vomiting, bloody stools, black stools, abdominal distention, and/or severe colic pain). Health-care providers should consider intussusception in infants who have recently received RRV-TV and present with a consistent clinical syndrome; early diagnosis may increase the probability that the intussusception can be treated successfully without surgery. Vaccine providers, parents, and caregivers should report to VAERS intussusception and other adverse events following vaccination.

Information on reporting to VAERS and case report forms can be requested 24 hours a day by telephone, (800) 822-7967, or the World-Wide Web, http://www.nip.gov/nip/vaers.htm.

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Outbreak of *Salmonella* Serotype Muenchen Infections Associated with Unpasteurized Orange Juice — United States and Canada, June 1999

During June 1999, Public Health–Seattle and King County (PHSKC) and the Washington state health department and the Oregon Health Division independently investigated clusters of diarrheal illness attributed to *Salmonella* serotype Muenchen infections in each state. Both clusters were associated with a commercially distributed unpasteurized orange juice traced to a single processor, which distributes widely in the United States. As of July 13, 207 confirmed cases associated with this outbreak have been reported by 15 states and two Canadian provinces; an additional 91 cases of *S.* Muenchen infection reported since June 1 are under investigation. This report summarizes the two state-based investigations and presents preliminary information about the outbreak in the other states and Canada.

Washington

On June 19, state health officials were notified of three cases of *Salmonella* serogroup C2 infection, which were confirmed subsequently as *S.* Muenchen. Interviews of the ill persons revealed one common feature: drinking a fruit smoothie containing unpasteurized orange juice from different outlets of restaurant chain A. PHSKC and the Washington State Department of Health initiated an investigation. A case was defined as illness with onset after June 9, with isolation of *S.* Muenchen from stool or blood or isolation of *Salmonella* serogroup C2 with a pulsed-field gel electrophoresis (PFGE) or restriction fragment length polymorphism pattern that was indistinguishable from the outbreak strain.

In a case-control study by PHSKC of nine ill and 29 well restaurant A patrons, illness was significantly associated with drinking smoothies containing orange juice (100% of cases exposed compared with 14% of controls; odds ratio=undefined, $p<0.001$). By July 9, 85 persons with onset of illness during June 10–30 were identified in Washington. Sixty-seven patients reported either drinking unpasteurized orange juice produced by Sun Orchard* of Tempe, Arizona or eating at an establishment where the juice was served. Among 79 patients for whom information was available, the median age was 27 years (range: 9 months–95 years), and 51% were male. The predominant symptoms reported were diarrhea (94%), fever (75%), and bloody diarrhea (43%). Eight (10%) patients were hospitalized, and one man had a stroke coincident with his *Salmonella* infection. No patients died.

Oregon

On June 23, the Washington County Department of Health received a report of a case of salmonellosis; the isolate was serotyped subsequently as *S.* Muenchen. An investigation by the Oregon Health Division identified four ill persons among a group of 13 that had eaten a brunch buffet in Portland. A case was defined as diarrhea (three or more loose stools within 24 hours) or vomiting in a person who attended the buffet. Illness was significantly associated with drinking unpasteurized orange juice produced by Sun Orchard (relative risk=undefined; $p<0.001$).

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Outbreak of Salmonella — *Continued*

By July 12, 57 persons with *S.* Muenchen infection with onset of illness during June 14–29 were identified in Oregon. The median age was 36 years (range: 9 months–95 years), and 54% were female. Forty-four patients were known to have drank unpasteurized orange juice before illness onset. Among the 39 patients for whom information was available, the predominant symptoms were diarrhea (100%), fever (89%), abdominal cramps (85%), chills (82%), and bloody diarrhea (59%). Seven persons were hospitalized; no patients died.

Recall of Orange Juice

On June 25, on the basis of the epidemiologic information from the investigations in Washington and Oregon and discussions with the Food and Drug Administration (FDA), Sun Orchard voluntarily issued a recall. Unpasteurized orange juice produced by Sun Orchard is distributed to Arizona, California, Colorado, Nevada, New Mexico, Oregon, Texas, Utah, Washington, Wisconsin, and the Canadian provinces of Alberta and British Columbia under the brand names Aloha, Earls and Joeys Tomato's, Markon, Sysco, Trader Joe's, Voila, and Zupan. Other states and provinces received these products through secondary distribution. The juice was distributed to hotels, restaurants, and supermarkets, and was served in individual glasses as "fresh-squeezed" juice in hotels and restaurants. In addition, a frozen form of the unpasteurized juice was sold under the brand name Vareva for use in restaurants and institutions.

On June 28, samples from a previously unopened container of unpasteurized Sun Orchard orange juice analyzed at an FDA laboratory and the Washington State Public Health Laboratory yielded *S.* Muenchen; samples from the smoothie blender and juice dispenser at an outlet of restaurant A analyzed by the Washington State Public Health Laboratory yielded *Salmonella* serogroup C2. Isolates from both sources had a PFGE pattern that was indistinguishable from strains isolated from patients. Subsequently, orange juice collected from the Sun Orchard factory, cultured in an FDA laboratory and serotyped by the California State Public Health Laboratory, yielded *S.* serotype Javiana, *S.* serotype Gaminara, *S.* serotype Hidalgo, and *S.* serotype Alamo in addition to *S.* Muenchen. Efforts are ongoing to determine the source of all orange juice components, whether they might have been used in other brands, and the source of the *Salmonella* contamination.

Other States and Canada

An outbreak-related case was defined as *S.* Muenchen infection after June 1 in a person who drank unpasteurized orange juice or whose isolate had a PFGE pattern with no more than one band difference from the Washington outbreak strain. In addition to the Washington and Oregon cases, 66 cases were reported in persons in 13 other states: Arizona (four), California (21), Connecticut (one), Florida (one), Illinois (one), Iowa (two), Massachusetts (seven), Michigan (three), Minnesota (six), New Mexico (10), Texas (five), Utah (four), and Wisconsin (one). Cases also were reported from the Canadian provinces of Alberta (four) and British Columbia (eight). Among the 66 patients for whom information was available, the median age was 32 years (range: 6 months–66 years), and 58% were female. Six persons were hospitalized. An additional 78 cases of *S.* Muenchen infection occurring after June 1 reported by nine other states and the two Canadian provinces are under investigation.

Outbreak of Salmonella — *Continued*

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Editorial Note: *S.* Muenchen is one of approximately 2400 *Salmonella* serotypes that can cause illness in humans. *Salmonella* infection typically causes gastroenteritis characterized by diarrhea, abdominal cramps, fever, and dehydration. Bacteremia, meningitis, osteomyelitis, and abscesses also can occur. Each year in the United States, 800,000–4 million *Salmonella* infections result in approximately 500 deaths (*1*). *S.* Muenchen is an infrequently isolated serotype, accounting for approximately 1.6% of human *Salmonella* isolates reported in 1997 to the Public Health Laboratory Information System (*2,3*). Oregon typically reports <6 isolates per year and Washington <10 per year.

Juice has been implicated as the vehicle of transmission in at least 15 outbreaks in the United States in this century involving pathogens, including *Escherichia coli* O157:H7, *Cryptosporidium parvum*, and other *Salmonella* serotypes (e.g., *S.* Typhi and *S.* Hartford) (*4*). In an outbreak of *E. coli* O157:H7 infections attributed to unpasteurized apple juice, one child died, and 14 children developed hemolytic uremic syndrome (*5*). The outbreak described in this report is the second and largest *Salmonella* outbreak associated with unpasteurized orange juice (*6*). The acidic nature of orange juice (pH of 3.4–4.0) previously was believed to inhibit bacterial growth and protect against foodborne illness; however, recent outbreaks and laboratory investigations have demonstrated otherwise. *Salmonella* serotypes Gaminara, Hartford, Rubislaw, and Typhimurium have survived in orange juice for up to 27 days at pH 3.5 and 60 days at pH 4.1 (*7*).

In 1998, FDA proposed Hazard Analysis and Critical Control Point (HACCP) and labeling regulations to improve the safety of juice products (*8*). The proposed HACCP regulation requires juice to be produced using methods such as pasteurization or an equivalent process to ensure that pathogenic microorganisms are destroyed. In the outbreak described in this report, the implicated company had a HACCP plan. Investigations are under way to determine where these control measures failed and how the juice became contaminated. FDA published a final rule for the labeling of fruit and vegetable juices that includes a warning statement to advise consumers of the risks associated with drinking unprocessed juices (*9*). However, the labeling requirements

Outbreak of Salmonella *— Continued*

do not apply to juice or products containing juice that are not packaged (i.e., sold by the glass) in retail establishments, such as the product implicated in this outbreak. In Washington, some consumers were unaware that they were drinking unpasteurized commercial orange juice in their fruit smoothies.

Because the source of contamination of the orange juice is unknown and to facilitate outbreak investigation, local and state health departments are encouraged to investigate all cases of *S.* Muenchen infections occurring since June 1 using a questionnaire from CDC's Foodborne and Diarrheal Diseases Branch, Division of Bacterial and Mycotic Diseases, National Center for Infectious Diseases, telephone (404) 639-2206, and to consider referring isolates for PFGE with the standardized PulseNet *Salmonella* protocol by the Washington State Public Health Laboratory or by another PulseNet laboratory. Health departments also should consider investigating cases of *S.* Alamo, *S.* Gaminara, *S.* Hidalgo, and *S.* Javiana in which illness onset occurred after June 1.

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Progress Toward Measles Elimination — Southern Africa, 1996–1998

Despite routine measles vaccination coverage of >70% in southern Africa during the early 1990s, low-level endemic transmission and periodic epidemics of measles continued. Since 1995, six southern African nations (Botswana, Malawi, Namibia, South Africa, Swaziland, and Zimbabwe) have launched measles-elimination initiatives in accordance with the recommendations of the World Health Organization (WHO) African Regional Office (AFR) (*1*). Strategies include programs to 1) achieve routine vaccination coverage of ≥95% with one dose of measles vaccine administered at age 9 months; 2) implement a one-time national catch-up* measles vaccination campaign to interrupt indigenous transmission of measles; 3) implement periodic

*Catch-up is a one-time, nationwide vaccination campaign targeting all children, usually those aged 9 months–14 years, regardless of history of measles or vaccination.

Progress Toward Measles Elimination — Continued

national follow-up[†] measles campaigns to maintain interruption of measles transmission; and 4) establish case-based measles surveillance with laboratory confirmation (*2*). This report presents preliminary data about the progress toward measles elimination in the six southern Africa countries.

Campaigns in each country were planned and implemented by national ministries of health with technical assistance from AFR. The South African government funded its measles campaign. In the other countries, campaigns received primary support from the national governments, the United Kingdom Department for International Development, the United Nations Children's Fund (UNICEF), WHO, and CDC. The campaigns emphasized safe injection practices, safe disposal of used injection equipment, and monitoring for adverse events following vaccination. All countries used disposable syringes and packed used equipment in disposal boxes for incineration or deep burial.

Because the number of qualified vaccinators was limited, particularly in countries where National Immunization Days (NIDs) for poliomyelitis were ongoing, national catch-up measles campaigns were divided into phases by geographic area or target population. The national measles campaign in South Africa was combined with polio NIDs and conducted in 1996 and 1997. Three of nine provinces conducted campaigns in both years, targeting children aged 9 months–4 years during 1996 and children aged 5–14 years during 1997 (Table 1), and the remaining six provinces targeted all children aged 9 months–14 years in a single campaign. Botswana divided the campaign geographically, covering approximately half the districts in 1997 and the remaining districts in 1998. In Swaziland, children aged 9 months–4 years were targeted in the catch-up campaign in 1998 in combination with polio NIDs followed by a second phase for children aged 5–14 years scheduled for May 1999. The remaining three countries—Malawi, Namibia, and Zimbabwe—completed the catch-up campaign in 1 year.

A total of 23 million children were vaccinated during the catch-up campaigns. Overall, reported coverage was 92% in the six countries (range: 85%–114%) (Table 1). Namibia and South Africa conducted additional mopping-up[§] vaccination activities in 1997 in districts where initial coverage was <70%. No deaths or cases with persisting sequelae associated with vaccination were reported. In Zimbabwe, four children died within 30 days after vaccination; however, independent review of the case histories of these four children determined that none of the deaths were attributable to vaccination (N. Halsey, The Johns Hopkins University, personal communication, 1998).

During 1980–1989, when routine measles vaccination was being introduced in Botswana, South Africa, Swaziland, and Zimbabwe, the average annual number of reported measles deaths was 544 (range: 299–1089). During 1990–1996 in these four countries, when routine coverage was >70%, the average annual number of measles deaths was 118 (range: 59–183). Measles mortality data were not reported routinely during 1980–1989 in Malawi and Namibia. To calculate measles morbidity and mortality reduction after the catch-up campaigns, data from Malawi were excluded because

[†]Follow-up campaigns are subsequent nationwide vaccination campaigns conducted every 2–5 years targeting all children born after the catch-up campaign, usually those aged 9 months–4 years.

[§]In this context, "mopping-up" vaccination is intended to increase coverage in pockets of low coverage occurring during "catch-up" or "follow-up" campaigns; vaccination preferably should be conducted house-to-house.

Progress Toward Measles Elimination — Continued

TABLE 1. Routine measles vaccination coverage, 1996, and vaccination coverage during nationwide measles "catch-up" vaccination campaigns, 1996–1998 — six southern African countries

Country	Routine coverage	Dates of campaign	Target age group	Target population	No. vaccinated	Vaccination coverage
South Africa						
4 provinces	—	8/96	9 mos–14 yrs	3,559,252	3,317,400	93%
3 provinces	—	8/96	9 mos– 4 yrs	2,173,753	1,786,048	82%
3 provinces*	—	5/97	5 yrs–14 yrs	4,045,498	3,495,415	86%
2 provinces	—	5/97	9 mos–14 yrs	4,278,598	3,281,321	77%
Total	**82%†**			**14,057,101**	**11,880,184**	**85%**
Botswana						
14 districts		7-8/97§	9 mos–14 yrs	344,280	347,265	101%
8 districts		5/98§	9 mos–14 yrs	234,960	246,420	105%
Total	**82%**			**579,240**	**593,685**	**102%**
Namibia	61%	6/97	9 mos–14 yrs	737,977	677,538	92%
Zimbabwe	77%	6/98	9 mos–14 yrs	5,279,248	4,929,475	93%
Swaziland	70%	6/98	9 mos–59 mos	147,545	146,626	99%
Malawi	90%	10/98	9 mos–14 yrs	4,179,229	4,747,452	114%
Total				**24,980,340**	**22,974,960**	**92%**

*Same three provinces that conducted campaigns in August 1996 for children aged 9 months–4 years.
†Coverage based on a survey in 1998.
§Fourteen of 22 districts conducted the campaign in 1997 and the remaining eight districts in 1998.

its campaign was conducted in October 1998, after the peak measles season had occurred. Following the implementation of measles catch-up vaccination campaigns in the remaining five countries, the number of reported measles cases decreased by 93% (Figure 1); 56,123 cases were reported by the five countries in 1996, compared with 3672 cases in 1998. Reported measles-associated deaths decreased 99%, from 166 in 1996 to two in 1998.

Since completion of catch-up vaccination campaigns, case-based surveillance of suspected measles cases has been initiated in four of the six countries, using the WHO case definition (i.e., any case with rash and fever and at least one of the following symptoms: cough, coryza, or conjunctivitis). Following training for national laboratory technicians of the six countries in July 1998, laboratory capacity to investigate suspected measles cases using a measles IgM enzyme-linked immunoassay (ELISA) was introduced in four countries. Because of the limited availability of measles IgM ELISA kits, serum was tested from 425 (14%) of the 3035 persons with suspected measles in Botswana, Namibia, South Africa, and Zimbabwe since the catch-up campaigns. Of 425 suspected measles cases tested, 17 (4%) were measles IgM-positive (Table 2). In South Africa, of the 275 measles IgM-negative serum samples that were tested for rubella IgM, 140 (46%) were positive.

Reported by: Ministries of health of Botswana, Namibia, and Swaziland. Ministry of Health and Population, Malawi. Dept of Health, South Africa. Ministry of Health and Child Welfare, Zimbabwe. WHO African Regional Office, Harare, Zimbabwe; Vaccines and Other Biologicals Dept, World Health Organization, Geneva, Switzerland. Respiratory and Enteric Viruses Br, Div

Progress Toward Measles Elimination — Continued

FIGURE 1. Reported measles cases and routine measles vaccination coverage — Botswana, Malawi, Namibia, South Africa, Swaziland, and Zimbabwe, 1980–1998

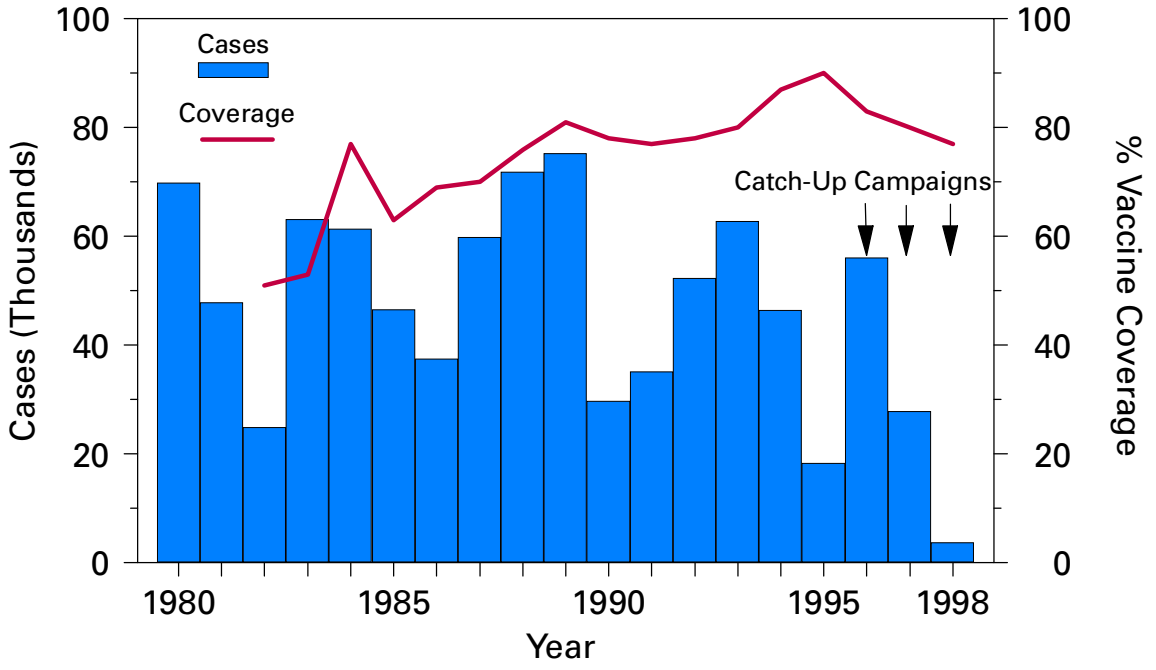

TABLE 2. Number of reported measles cases, number tested, and number and percentage positive following catch-up vaccination campaigns — four southern African countries, 1997–1998

Country	No. reported cases	No. tested	IgM-positive	
			No.	(%)
Botswana	469	21	0	—
Namibia	1795	48	4	(8)
South Africa	331	307	13	(4)
Zimbabwe	440	49	0	—
Total	**3035**	**425**	**17**	**(4)**

of Viral and Rickettsial Diseases, National Center for Infectious Diseases, and Vaccine Preventable Disease Eradication Div, National Immunization Program, CDC.

Editorial Note: Despite the availability of a safe and effective vaccine since 1963, measles still accounts for nearly 1 million deaths annually (*3*). In 1990, the World Summit for Children adopted the goal of vaccinating 90% of children against measles by 2000. Regional measles elimination goals have been established in the Americas (by 2000), Europe (by 2007), and the Eastern Mediterranean (by 2010) (*3*).

The six countries described in this report achieved and sustained routine vaccination coverage of approximately 80% before initiation of measles elimination campaigns. Routine vaccination had a substantial impact on measles epidemiology: measles morbidity declined, the interval between epidemics was lengthened, the

Progress Toward Measles Elimination — Continued

average age of patients increased, and measles mortality was reduced to low levels. As a result of these conditions and successful polio eradication strategies, measles elimination campaigns were initiated in the six countries.

High vaccination coverage was achieved during the mass campaigns in the six countries. Reported campaign coverage may overestimate true coverage (e.g., in countries reporting coverage of >100%) because children outside the target age range who were vaccinated in the campaign were included in the numerator or the target population was underestimated.

The catch-up vaccination campaigns have been highly effective in reducing morbidity and mortality resulting from measles in the six countries. Since the campaigns were completed, none of the 70 suspected measles cases tested in Botswana and Zimbabwe was laboratory-confirmed, suggesting that measles transmission in those countries may have been interrupted. Circulation of measles virus has been reduced to very low levels in Namibia and South Africa.

To sustain the elimination initiative, the six southern African countries will need to continue to implement all WHO-recommended strategies. First, to increase routine vaccination coverage to ≥95%, these countries should eliminate missed opportunities for vaccination, introduce tracking systems to find children who miss appointments for vaccination, and strengthen outreach services to reach communities not routinely covered. Second, epidemiologic analysis of measles cases and data about district-specific routine and catch-up measles vaccination coverage will help ministries monitor the accumulation of susceptible persons in the population and plan appropriate follow-up vaccination campaigns. Finally, case-based surveillance of suspected measles cases should be strengthened. A serum specimen should be obtained for measles IgM testing from at least five patients in each outbreak and from 80% of persons with sporadic cases; specimens should be obtained at the time the patient first seeks health care. In addition, measles virus for each outbreak should be isolated to distinguish importations of measles virus from ongoing indigenous transmission (*4*).

Experience from the Americas has highlighted the need to ensure that all WHO-recommended strategies are fully implemented (*5*). To sustain progress toward measles elimination in southern Africa, continued national commitment to support and implement WHO strategies is needed to prevent the re-establishment of measles transmission, and possibly to avoid large outbreaks, in countries where elimination has been achieved.

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4. Pan American Health Organization. Measles eradication field guide. Washington, DC: Pan American Health Organization, Pan American Sanitary Bureau, Regional Office of the World Health Organization, 1998. (Technical paper no. 41).
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Notice to Readers

Recommendations of the Advisory Committee on Immunization Practices: Revised Recommendations for Routine Poliomyelitis Vaccination

Since 1979, the only indigenous cases of poliomyelitis reported in the United States (n=144) have been associated with use of the live oral poliovirus vaccine (OPV) (an additional six imported cases have been reported since 1979, the last of which occurred in 1993). Until recently, the benefits of OPV use (i.e., intestinal immunity, secondary spread) outweighed the risk for vaccine-associated paralytic polio (VAPP) (one case per 2.4 million doses distributed) (*1*). In 1997, to decrease the risk for VAPP while maintaining the benefits of OPV, the Advisory Committee on Immunization Practices (ACIP) recommended a sequential schedule of inactivated poliovirus vaccine (IPV) followed by OPV (*2*). Since 1997, the global polio eradication initiative has progressed rapidly, and the likelihood of poliovirus importation into the United States has decreased substantially. In addition, since 1997, the sequential schedule has been well accepted. No declines in childhood vaccination coverage were observed, despite the need for additional injections (*3*).

On the basis of these data, on June 17, 1999, to eliminate the risk for VAPP, the ACIP recommended an all-IPV schedule for routine childhood polio vaccination in the United States. As of January 1, 2000, all children should receive four doses of IPV at ages 2 months, 4 months, 6–18 months, and 4–6 years.

OPV should be used only for the following special circumstances:

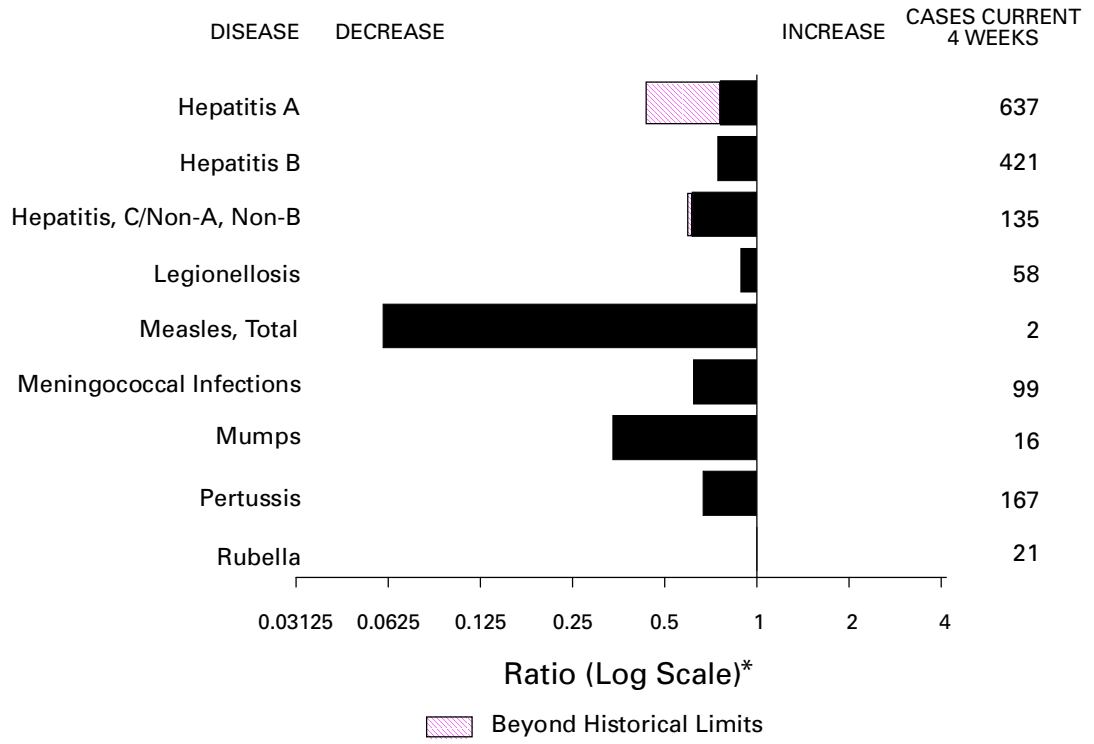
1. Mass vaccination campaigns to control outbreaks of paralytic polio.
2. Unvaccinated children who will be traveling in <4 weeks to areas where polio is endemic.
3. Children of parents who do not accept the recommended number of vaccine injections. These children may receive OPV only for the third or fourth dose or both; in this situation, health-care providers should administer OPV only after discussing the risk for VAPP with parents or caregivers.

Availability of OPV is expected to be limited in the future in the United States. ACIP reaffirms its support for the global polio eradication initiative and use of OPV as the vaccine of choice to eradicate polio from the remaining countries where polio is endemic.

References

1. CDC. Paralytic poliomyelitis—United States, 1980–1994. MMWR 1997;46:79–83.
2. CDC. Poliomyelitis prevention in the United States: introduction of a sequential schedule of inactivated poliovirus vaccine followed by oral poliovirus vaccine. MMWR 1997;46(no. RR-3).
3. CDC. Impact of the sequential IPV/OPV schedule on vaccination coverage levels. MMWR 1998; 47:1017–9.

FIGURE I. Selected notifiable disease reports, comparison of provisional 4-week totals ending July 10, 1999, with historical data — United States



*Ratio of current 4-week total to mean of 15 4-week totals (from previous, comparable, and subsequent 4-week periods for the past 5 years). The point where the hatched area begins is based on the mean and two standard deviations of these 4-week totals.

TABLE I. Summary — provisional cases of selected notifiable diseases, United States, cumulative, week ending July 10, 1999 (27th Week)

	Cum. 1999		Cum. 1999
Anthrax	-	HIV infection, pediatric*§	81
Brucellosis*	19	Plague	2
Cholera	2	Poliomyelitis, paralytic	-
Congenital rubella syndrome	3	Psittacosis*	14
Cyclosporiasis*	11	Rabies, human	-
Diphtheria	1	Rocky Mountain spotted fever (RMSF)	169
Encephalitis: California*	2	Streptococcal disease, invasive Group A	1,193
eastern equine*	2	Streptococcal toxic-shock syndrome*	24
St. Louis*	-	Syphilis, congenital¶	94
western equine*	1	Tetanus	12
Ehrlichiosis human granulocytic (HGE)*	55	Toxic-shock syndrome	62
human monocytic (HME)*	8	Trichinosis	5
Hansen Disease*	41	Typhoid fever	142
Hantavirus pulmonary syndrome*†	7	Yellow fever	-
Hemolytic uremic syndrome, post-diarrheal*	24		

-:no reported cases
*Not notifiable in all states.
† Updated weekly from reports to the Division of Viral and Rickettsial Diseases, National Center for Infectious Diseases (NCID).
§ Updated monthly from reports to the Division of HIV/AIDS Prevention–Surveillance and Epidemiology, National Center for HIV, STD, and TB Prevention (NCHSTP), last update June 27, 1999.
¶ Updated from reports to the Division of STD Prevention, NCHSTP.

TABLE II. Provisional cases of selected notifiable diseases, United States, weeks ending July 10, 1999, and July 11, 1998 (27th Week)

Reporting Area	AIDS		Chlamydia		Cryptosporidiosis		*Escherichia coli* O157:H7*			
							NETSS		PHLIS	
	Cum. 1999†	Cum. 1998	Cum. 1999	Cum. 1998	Cum. 1999	Cum. 1998	Cum. 1999	Cum. 1998	Cum. 1999	Cum. 1998
UNITED STATES	23,194	23,725	293,694	297,705	680	1,010	788	924	469	797
NEW ENGLAND	1,120	810	9,808	10,496	32	73	108	129	77	111
Maine	29	18	193	493	10	18	11	13	-	-
N.H.	26	15	481	500	5	3	15	17	8	22
Vt.	6	10	241	206	6	11	12	5	2	5
Mass.	716	372	4,696	4,270	11	37	42	68	39	63
R.I.	61	69	1,216	1,275	-	4	6	5	6	1
Conn.	282	326	2,981	3,752	-	-	22	21	22	20
MID. ATLANTIC	5,913	6,918	36,296	31,319	101	300	46	94	14	34
Upstate N.Y.	725	856	N	N	60	185	40	60	-	-
N.Y. City	3,003	3,888	19,071	13,694	22	104	-	7	4	6
N.J.	1,158	1,215	5,333	6,011	9	11	6	27	10	21
Pa.	1,027	959	11,892	11,614	10	-	N	N	-	7
E.N. CENTRAL	1,502	1,760	42,783	50,930	61	107	142	180	90	151
Ohio	241	339	11,913	13,904	20	40	56	39	26	24
Ind.	191	323	5,280	5,551	9	20	17	52	16	26
Ill.	682	693	14,326	13,334	11	32	41	50	18	33
Mich.	308	305	11,264	11,206	21	15	28	39	15	29
Wis.	80	100	U	6,935	-	-	N	N	15	39
W.N. CENTRAL	537	441	14,472	17,540	51	127	147	117	78	115
Minn.	82	64	3,264	3,576	14	43	47	37	47	51
Iowa	50	49	1,225	2,071	9	24	15	29	10	22
Mo.	261	210	5,099	6,201	11	11	17	16	15	22
N. Dak.	4	4	325	510	4	14	3	2	1	6
S. Dak.	11	9	832	819	3	17	5	8	4	10
Nebr.	39	37	1,258	1,470	9	15	50	15	-	-
Kans.	90	68	2,469	2,893	1	3	10	10	1	4
S. ATLANTIC	6,366	5,825	66,663	56,944	163	96	102	61	50	64
Del.	80	75	1,417	1,292	-	-	2	-	-	1
Md.	720	717	4,944	4,326	7	9	6	13	-	8
D.C.	242	480	N	N	5	4	-	-	-	-
Va.	340	424	7,623	5,685	10	1	29	-	19	26
W. Va.	31	51	1,011	1,242	-	1	4	3	1	3
N.C.	390	389	11,723	11,283	4	-	22	12	16	15
S.C.	588	381	8,635	9,725	-	-	12	3	5	1
Ga.	958	618	16,560	12,391	86	30	8	24	-	-
Fla.	3,017	2,690	14,750	11,000	51	51	19	6	9	10
E.S. CENTRAL	1,034	933	20,124	20,358	10	15	54	57	19	36
Ky.	152	126	3,333	3,125	2	5	14	16	-	-
Tenn.	405	330	7,102	6,620	4	6	24	24	12	24
Ala.	257	274	5,353	5,281	2	-	12	14	6	11
Miss.	220	203	4,336	5,332	2	4	4	3	1	1
W.S. CENTRAL	2,491	2,889	44,392	44,687	33	17	31	38	35	51
Ark.	90	104	3,119	1,874	-	3	5	4	4	6
La.	463	507	7,726	7,153	21	8	3	3	6	2
Okla.	70	170	4,070	5,074	2	3	7	6	5	4
Tex.	1,868	2,108	29,477	30,586	10	3	16	25	20	39
MOUNTAIN	860	816	16,331	16,601	41	71	65	112	35	109
Mont.	4	15	654	655	7	6	4	6	-	2
Idaho	12	15	641	979	3	14	2	10	2	7
Wyo.	3	1	356	337	-	-	3	21	4	45
Colo.	172	146	3,751	4,154	4	5	24	26	13	21
N. Mex.	46	130	1,731	1,986	17	28	4	10	1	6
Ariz.	427	327	6,657	5,668	7	10	11	15	6	11
Utah	80	65	1,000	1,168	-	1	14	17	7	10
Nev.	116	117	1,541	1,654	3	7	3	7	2	7
PACIFIC	3,371	3,333	42,825	48,830	188	204	93	136	71	126
Wash.	188	230	6,134	5,716	-	-	32	28	26	37
Oreg.	88	94	3,021	2,675	73	22	22	33	21	33
Calif.	3,036	2,930	31,628	38,266	115	179	39	73	22	52
Alaska	13	12	947	975	-	-	-	2	-	-
Hawaii	46	67	1,095	1,198	-	3	-	-	2	4
Guam	5	-	149	189	-	-	N	N	-	-
P.R.	734	995	U	U	-	-	5	-	U	U
V.I.	15	17	N	N	-	-	N	N	U	U
Amer. Samoa	-	-	U	U	-	-	N	N	U	U
C.N.M.I.	-	-	N	N	-	-	N	N	U	U

N: Not notifiable U: Unavailable -: no reported cases C.N.M.I.: Commonwealth of Northern Mariana Islands

*Individual cases may be reported through both the National Electronic Telecommunications System for Surveillance (NETSS) and the Public Health Laboratory Information System (PHLIS).

†Updated monthly from reports to the Division of HIV/AIDS Prevention–Surveillance and Epidemiology, National Center for HIV, STD, and TB Prevention, last update June 27, 1999.

TABLE II. (Cont'd.) Provisional cases of selected notifiable diseases, United States, weeks ending July 10, 1999, and July 11, 1998 (27th Week)

Reporting Area	Gonorrhea		Hepatitis C/NA,NB		Legionellosis		Lyme Disease	
	Cum. 1999	Cum. 1998	Cum. 1999	Cum. 1998	Cum. 1999	Cum. 1998	Cum. 1999	Cum. 1998
UNITED STATES	158,172	174,649	1,900	1,568	473	595	2,968	4,391
NEW ENGLAND	2,960	2,927	56	45	29	36	583	1,502
Maine	15	32	1	-	4	1	-	24
N.H.	39	48	-	-	3	3	1	16
Vt.	28	13	3	2	4	2	1	5
Mass.	1,310	1,020	49	41	9	16	261	340
R.I.	313	182	3	2	3	8	100	88
Conn.	1,255	1,632	-	-	6	6	220	1,029
MID. ATLANTIC	19,946	18,571	87	118	97	135	1,801	2,184
Upstate N.Y.	3,067	3,388	52	59	27	36	957	1,080
N.Y. City	8,136	6,163	-	-	7	26	6	80
N.J.	3,020	3,749	-	-	5	7	124	392
Pa.	5,723	5,271	35	59	58	66	714	632
E.N. CENTRAL	28,159	34,151	1,028	289	129	209	57	262
Ohio	7,179	8,609	1	7	44	74	34	19
Ind.	3,049	3,185	1	4	39	40	20	11
Ill.	10,057	10,893	11	27	10	24	2	10
Mich.	7,874	8,523	433	251	33	36	1	10
Wis.	U	2,941	582	-	3	35	U	212
W.N. CENTRAL	5,818	8,553	69	20	25	33	40	32
Minn.	1,208	1,281	2	6	1	3	13	9
Iowa	306	666	-	5	11	5	10	10
Mo.	2,625	4,650	59	7	9	9	-	7
N. Dak.	31	46	-	-	-	-	1	-
S. Dak.	83	131	-	-	1	2	-	-
Nebr.	553	561	3	2	3	12	6	2
Kans.	1,012	1,218	5	-	-	2	10	4
S. ATLANTIC	48,341	48,297	122	55	56	65	330	313
Del.	863	702	-	-	4	8	9	20
Md.	4,226	4,964	29	5	9	15	233	234
D.C.	1,514	4,085	-	-	-	4	1	4
Va.	5,194	3,360	10	5	13	7	29	25
W. Va.	276	423	13	4	N	N	7	6
N.C.	10,044	9,530	25	12	8	6	34	13
S.C.	4,645	6,282	12	3	7	5	4	3
Ga.	11,045	10,107	1	9	-	2	-	2
Fla.	10,534	8,844	32	17	15	17	13	6
E.S. CENTRAL	16,076	19,198	146	81	56	34	50	36
Ky.	1,494	1,789	8	16	44	17	19	10
Tenn.	5,627	5,636	50	62	10	8	14	16
Ala.	4,848	6,631	1	3	2	3	10	10
Miss.	4,107	5,142	87	-	-	6	7	-
W.S. CENTRAL	24,300	26,899	128	283	2	11	10	8
Ark.	1,547	2,072	3	11	-	1	1	5
La.	6,054	5,932	100	13	1	2	-	-
Okla.	2,051	2,764	6	4	1	6	4	-
Tex.	14,648	16,131	19	255	-	2	5	3
MOUNTAIN	4,578	4,436	78	256	30	33	7	4
Mont.	21	25	4	5	-	1	-	-
Idaho	32	89	4	85	-	-	1	1
Wyo.	12	15	25	60	-	1	1	1
Colo.	1,093	1,067	15	13	8	6	-	-
N. Mex.	311	394	4	54	1	2	1	1
Ariz.	2,382	2,061	18	4	4	4	-	-
Utah	94	114	5	19	11	16	2	-
Nev.	633	671	3	16	6	3	2	1
PACIFIC	7,994	11,617	186	421	49	39	90	50
Wash.	1,057	986	9	10	9	6	2	2
Oreg.	424	374	11	10	N	N	6	8
Calif.	6,218	9,848	166	346	39	32	82	39
Alaska	157	161	-	1	1	-	-	1
Hawaii	138	248	-	54	-	1	-	-
Guam	22	25	-	-	-	2	-	-
P.R.	153	217	-	-	-	-	-	-
V.I.	U	U	U	U	U	U	U	U
Amer. Samoa	U	U	U	U	U	U	U	U
C.N.M.I.	-	21	-	-	-	-	-	-

N: Not notifiable U: Unavailable -: no reported cases

TABLE II. (Cont'd.) Provisional cases of selected notifiable diseases, United States, weeks ending July 10, 1999, and July 11, 1998 (27th Week)

Reporting Area	Malaria		Rabies, Animal		Salmonellosis*			
					NETSS		PHLIS	
	Cum. 1999	Cum. 1998	Cum. 1999	Cum. 1998	Cum. 1999	Cum. 1998	Cum. 1999	Cum. 1998
UNITED STATES	546	633	2,755	3,870	14,091	16,396	10,767	14,881
NEW ENGLAND	21	40	421	700	858	1,087	759	996
Maine	2	3	79	128	62	76	39	30
N.H.	-	3	27	35	48	74	39	101
Vt.	1	-	60	31	37	57	33	41
Mass.	8	14	91	225	475	606	407	587
R.I.	2	2	51	36	52	69	48	31
Conn.	8	18	113	245	184	205	193	206
MID. ATLANTIC	124	179	517	808	1,739	2,793	1,210	2,648
Upstate N.Y.	36	37	342	559	503	629	459	569
N.Y. City	38	105	U	U	377	918	442	800
N.J.	29	21	102	103	332	562	309	514
Pa.	21	16	73	146	527	684	-	765
E.N. CENTRAL	56	62	40	69	1,807	2,903	1,437	2,009
Ohio	9	3	12	40	451	647	283	562
Ind.	8	2	-	4	185	333	149	292
Ill.	18	28	-	6	674	898	399	457
Mich.	19	25	25	15	459	557	421	452
Wis.	2	4	3	4	38	468	185	246
W.N. CENTRAL	23	39	311	417	919	1,028	839	1,092
Minn.	5	18	55	72	238	266	272	302
Iowa	6	3	65	86	90	173	66	153
Mo.	10	10	9	20	294	286	390	387
N. Dak.	-	2	84	80	15	30	4	44
S. Dak.	-	-	44	97	44	41	26	56
Nebr.	-	1	2	3	109	84	-	21
Kans.	2	5	52	59	129	148	81	129
S. ATLANTIC	156	131	1,067	1,309	3,122	2,834	2,183	2,244
Del.	1	1	29	21	43	35	51	51
Md.	48	44	217	278	349	392	341	375
D.C.	10	10	-	-	39	44	-	-
Va.	31	23	271	343	533	465	389	406
W. Va.	1	-	62	46	43	67	62	73
N.C.	10	12	213	332	469	404	414	493
S.C.	2	4	78	81	193	169	150	164
Ga.	13	15	99	107	488	442	607	468
Fla.	40	22	98	101	965	816	169	214
E.S. CENTRAL	11	16	142	155	754	795	305	628
Ky.	2	2	22	19	161	179	-	90
Tenn.	5	8	48	86	203	234	181	323
Ala.	3	4	72	48	234	212	107	174
Miss.	1	2	-	2	156	170	17	41
W.S. CENTRAL	9	11	54	105	1,035	1,291	1,054	1,679
Ark.	-	1	-	19	189	146	76	98
La.	6	4	-	-	159	237	220	306
Okla.	2	1	54	86	145	162	107	58
Tex.	1	5	-	-	542	746	651	1,217
MOUNTAIN	24	32	100	100	1,398	988	937	948
Mont.	4	-	37	29	28	44	1	25
Idaho	1	3	-	-	41	52	35	43
Wyo.	1	-	28	42	15	32	17	28
Colo.	8	7	1	3	394	256	391	239
N. Mex.	2	11	4	2	178	95	110	92
Ariz.	5	5	29	21	430	271	330	306
Utah	2	1	-	3	221	153	-	119
Nev.	1	5	1	-	91	85	53	96
PACIFIC	122	123	103	207	2,459	2,677	2,043	2,637
Wash.	10	9	-	-	225	212	279	314
Oreg.	13	11	1	1	208	145	276	166
Calif.	93	101	95	186	1,809	2,197	1,342	2,029
Alaska	-	-	7	20	23	20	6	16
Hawaii	6	2	-	-	194	103	140	112
Guam	-	1	-	-	18	12	-	-
P.R.	-	-	42	28	198	323	-	-
V.I.	U	U	U	U	-	-	-	-
Amer. Samoa	U	U	U	U	-	-	-	-
C.N.M.I.	-	-	-	-	-	13	-	-

N: Not notifiable U: Unavailable -: no reported cases

*Individual cases may be reported through both the National Electronic Telecommunications System for Surveillance (NETSS) and the Public Health Laboratory Information System (PHLIS).

TABLE II. (Cont'd.) Provisional cases of selected notifiable diseases, United States, weeks ending July 10, 1999, and July 11, 1998 (27th Week)

Reporting Area	Shigellosis*				Syphilis (Primary & Secondary)		Tuberculosis	
	NETSS		PHLIS					
	Cum. 1999	Cum. 1998	Cum. 1999	Cum. 1998	Cum. 1999	Cum. 1998	Cum. 1999†	Cum. 1998†
UNITED STATES	6,050	9,011	2,525	5,421	3,223	3,577	4,220	5,032
NEW ENGLAND	152	218	130	194	30	38	204	226
Maine	3	7	-	-	-	1	11	5
N.H.	7	7	6	11	-	1	4	6
Vt.	4	4	3	-	2	3	-	1
Mass.	95	136	82	129	19	23	118	118
R.I.	14	18	9	12	1	-	20	30
Conn.	29	46	30	42	8	10	51	66
MID. ATLANTIC	395	1,326	190	1,114	128	120	1,074	1,160
Upstate N.Y.	122	254	32	83	17	18	142	152
N.Y. City	98	425	81	455	58	29	679	693
N.J.	103	412	77	394	16	55	253	315
Pa.	72	235	-	182	37	18	U	U
E.N. CENTRAL	912	1,328	433	671	619	535	461	609
Ohio	261	293	47	66	52	78	U	U
Ind.	54	88	16	26	178	93	U	U
Ill.	386	702	269	555	276	220	276	385
Mich.	163	126	80	4	113	104	146	170
Wis.	48	119	21	20	U	40	39	54
W.N. CENTRAL	526	484	335	199	52	80	251	201
Minn.	84	81	90	86	5	5	95	69
Iowa	7	36	9	27	5	-	26	2
Mo.	373	59	215	39	34	62	94	84
N. Dak.	2	4	-	3	-	-	2	3
S. Dak.	8	22	4	18	-	1	3	14
Nebr.	30	265	-	15	4	4	12	5
Kans.	22	17	17	11	4	8	19	24
S. ATLANTIC	1,143	1,811	256	559	1,063	1,390	848	867
Del.	7	9	2	2	4	15	12	17
Md.	61	100	17	31	218	383	U	U
D.C.	30	11	-	-	46	77	24	61
Va.	42	72	12	32	89	89	121	144
W. Va.	5	7	2	5	2	2	23	24
N.C.	115	162	54	84	250	386	209	216
S.C.	63	80	29	31	125	162	124	168
Ga.	108	489	36	138	173	147	335	237
Fla.	712	881	104	236	156	129	U	U
E.S. CENTRAL	641	437	323	261	583	617	289	417
Ky.	113	77	-	36	46	62	82	97
Tenn.	423	73	303	101	331	298	U	U
Ala.	59	255	19	122	130	142	151	201
Miss.	46	32	1	2	76	115	56	119
W.S. CENTRAL	889	1,765	569	1,950	492	470	760	1,103
Ark.	51	102	21	20	38	63	82	54
La.	76	138	53	169	121	162	U	U
Okla.	267	123	82	30	111	26	69	87
Tex.	495	1,402	413	1,731	222	219	609	962
MOUNTAIN	368	562	182	331	112	128	78	144
Mont.	6	3	-	3	-	-	5	12
Idaho	6	11	3	8	1	-	-	7
Wyo.	2	1	1	-	-	1	1	2
Colo.	53	71	42	55	1	8	U	U
N. Mex.	46	142	17	61	-	18	27	31
Ariz.	204	297	113	184	102	88	U	U
Utah	28	17	-	13	2	3	26	33
Nev.	23	20	6	7	6	10	19	59
PACIFIC	1,024	1,080	107	142	144	199	255	305
Wash.	53	59	51	57	39	12	83	129
Oreg.	36	66	37	61	2	1	57	60
Calif.	912	931	-	-	100	185	U	U
Alaska	-	4	-	2	1	-	30	26
Hawaii	23	20	19	22	2	1	85	90
Guam	3	21	-	-	-	1	-	43
P.R.	26	30	-	-	84	115	41	80
V.I.	-	-	-	-	U	U	U	U
Amer. Samoa	-	-	-	-	U	U	U	U
C.N.M.I.	-	13	-	-	-	137	-	60

N: Not notifiable U: Unavailable -: no reported cases

*Individual cases may be reported through both the National Electronic Telecommunications System for Surveillance (NETSS) and the Public Health Laboratory Information System (PHLIS).

†Cumulative reports of provisional tuberculosis cases for 1998 and 1999 are unavailable ("U") for some areas using the Tuberculosis Information System (TIMS)

TABLE III. Provisional cases of selected notifiable diseases preventable by vaccination, United States, weeks ending July 10, 1999, and July 11, 1998 (27th Week)

Reporting Area	*H. influenzae*, invasive		Hepatitis (Viral), by type				Measles (Rubeola)					
			A		B		Indigenous		Imported*		Total	
	Cum. 1999†	Cum. 1998	Cum. 1999	Cum. 1998	Cum. 1999	Cum. 1998	1999	Cum. 1999	1999	Cum. 1999	Cum. 1999	Cum. 1998
UNITED STATES	632	629	7,877	11,659	3,286	4,656	-	30	-	14	44	41
NEW ENGLAND	43	42	91	157	55	103	-	5	-	4	9	2
Maine	5	2	4	13	-	2	-	-	-	-	-	-
N.H.	9	6	7	8	8	10	-	-	-	1	1	-
Vt.	4	2	3	13	1	4	-	-	-	-	-	-
Mass.	17	30	30	53	28	37	-	4	-	2	6	2
R.I.	-	2	9	9	18	31	-	-	-	-	-	-
Conn.	8	-	38	61	-	19	-	1	-	1	2	-
MID. ATLANTIC	88	96	521	888	400	666	-	-	-	2	2	11
Upstate N.Y.	51	30	133	175	109	130	-	-	-	2	2	2
N.Y. City	13	29	82	320	89	228	-	-	-	-	-	-
N.J.	23	30	57	167	40	112	-	-	-	-	-	8
Pa.	1	7	249	226	162	196	-	-	-	-	-	1
E.N. CENTRAL	90	105	1,521	1,626	320	516	-	1	-	-	1	15
Ohio	37	35	382	184	48	42	-	-	-	-	-	1
Ind.	14	25	98	92	27	59	-	1	-	-	1	3
Ill.	32	41	221	408	-	136	-	-	-	-	-	-
Mich.	7	-	794	812	244	227	-	-	-	-	-	10
Wis.	-	4	26	130	1	52	U	-	U	-	-	1
W.N. CENTRAL	52	51	391	905	250	219	-	-	-	-	-	-
Minn.	13	37	35	71	22	18	-	-	-	-	-	-
Iowa	13	1	76	356	103	34	U	-	U	-	-	-
Mo.	19	8	205	384	96	137	-	-	-	-	-	-
N. Dak.	-	-	1	3	-	4	U	-	U	-	-	-
S. Dak.	1	-	8	17	1	1	-	-	-	-	-	-
Nebr.	3	-	37	14	10	9	-	-	-	-	-	-
Kans.	3	5	29	60	18	16	-	-	-	-	-	-
S. ATLANTIC	149	114	984	893	601	488	-	1	-	3	4	6
Del.	-	-	2	3	-	-	-	-	-	-	-	1
Md.	35	40	163	183	86	95	-	-	-	-	-	1
D.C.	4	-	32	30	11	6	-	-	-	-	-	-
Va.	12	12	82	135	51	54	-	1	-	2	3	2
W. Va.	4	4	17	1	13	3	-	-	-	-	-	-
N.C.	22	15	65	51	125	112	-	-	-	-	-	-
S.C.	2	3	21	17	39	14	-	-	-	-	-	-
Ga.	41	22	267	258	72	94	-	-	-	-	-	1
Fla.	29	18	335	215	204	110	-	-	-	1	1	1
E.S. CENTRAL	46	37	242	230	250	209	-	-	-	-	-	2
Ky.	6	5	37	14	25	24	U	-	U	-	-	-
Tenn.	25	23	126	129	122	143	-	-	-	-	-	1
Ala.	13	7	37	48	51	42	-	-	-	-	-	1
Miss.	2	2	42	39	52	-	-	-	-	-	-	-
W.S. CENTRAL	35	33	1,445	2,040	309	1,057	-	1	-	2	3	-
Ark.	1	-	28	48	26	51	-	-	-	-	-	-
La.	7	16	59	42	72	54	U	-	U	-	-	-
Okla.	24	15	258	305	67	41	-	-	-	-	-	-
Tex.	3	2	1,100	1,645	144	911	-	1	-	2	3	-
MOUNTAIN	61	77	759	1,796	334	447	-	2	-	-	2	-
Mont.	1	-	12	59	16	3	-	-	-	-	-	-
Idaho	1	-	27	144	16	17	-	-	-	-	-	-
Wyo.	1	1	4	23	5	2	-	-	-	-	-	-
Colo.	9	14	138	134	45	53	-	-	-	-	-	-
N. Mex.	13	3	29	88	117	176	-	-	-	-	-	-
Ariz.	30	39	455	1,106	84	107	-	1	-	-	1	-
Utah	4	3	27	116	20	39	-	1	-	-	1	-
Nev.	2	17	67	126	31	50	-	-	-	-	-	-
PACIFIC	68	74	1,923	3,124	767	951	-	20	-	3	23	5
Wash.	2	4	169	599	34	55	-	-	-	-	-	1
Oreg.	26	31	142	242	50	96	-	8	-	-	8	-
Calif.	33	31	1,600	2,240	665	785	-	11	-	3	14	4
Alaska	5	1	3	14	11	7	-	-	-	-	-	-
Hawaii	2	7	9	29	7	8	-	1	-	-	1	-
Guam	-	-	2	-	2	2	U	1	U	-	1	-
P.R.	1	2	99	27	83	141	-	-	-	-	-	-
V.I.	U	U	U	U	U	U	U	U	U	U	U	U
Amer. Samoa	U	U	U	U	U	U	U	U	U	U	U	U
C.N.M.I.	-	-	-	1	-	35	U	-	U	-	-	-

N: Not notifiable U: Unavailable -: no reported cases

*For imported measles, cases include only those resulting from importation from other countries.

†Of 131 cases among children aged <5 years, serotype was reported for 61 and of those, 15 were type b.

TABLE III. (Cont'd.) Provisional cases of selected notifiable diseases preventable by vaccination, United States, weeks ending July 10, 1999, and July 11, 1998 (27th Week)

Reporting Area	Meningococcal Disease		Mumps			Pertussis			Rubella		
	Cum. 1999	Cum. 1998	1999	Cum. 1999	Cum. 1998	1999	Cum. 1999	Cum. 1998	1999	Cum. 1999	Cum. 1998
UNITED STATES	1,358	1,615	5	187	416	55	2,621	2,597	2	141	304
NEW ENGLAND	75	71	-	3	1	-	262	480	-	6	37
Maine	5	4	-	-	-	-	-	5	-	-	-
N.H.	10	9	-	1	-	-	53	39	-	-	-
Vt.	4	1	-	-	-	-	9	41	-	-	-
Mass.	46	31	-	2	1	-	184	376	-	6	8
R.I.	2	3	-	-	-	-	8	3	-	-	-
Conn.	8	23	-	-	-	-	8	16	-	-	29
MID. ATLANTIC	119	168	2	24	169	11	588	304	2	19	132
Upstate N.Y.	36	43	-	5	2	4	502	152	2	15	110
N.Y. City	27	21	-	3	153	-	10	14	-	-	9
N.J.	23	41	-	-	6	-	12	9	-	1	12
Pa.	33	63	2	16	8	7	64	129	-	3	1
E.N. CENTRAL	215	249	-	23	49	4	220	238	-	2	-
Ohio	97	85	-	7	19	-	114	73	-	-	-
Ind.	37	43	-	3	5	-	14	66	-	1	-
Ill.	53	70	-	6	8	3	42	27	-	1	-
Mich.	27	27	-	7	17	1	23	34	-	-	-
Wis.	1	24	U	-	-	U	27	38	U	-	-
W.N. CENTRAL	151	135	-	7	20	8	100	198	-	71	30
Minn.	30	24	-	1	10	-	33	115	-	-	-
Iowa	28	19	U	3	6	U	20	44	U	21	-
Mo.	59	52	-	1	3	8	23	15	-	2	2
N. Dak.	3	2	U	-	1	U	-	3	U	-	-
S. Dak.	8	6	-	-	-	-	4	5	-	-	-
Nebr.	9	8	-	-	-	-	1	6	-	48	-
Kans.	14	24	-	2	-	-	19	10	-	-	28
S. ATLANTIC	235	258	-	36	27	13	154	130	-	20	8
Del.	3	1	-	-	-	-	-	2	-	-	-
Md.	34	23	-	3	-	2	42	27	-	1	-
D.C.	1	-	-	2	-	-	-	1	-	-	-
Va.	26	23	-	8	5	-	13	6	-	-	-
W. Va.	4	9	-	-	-	-	1	1	-	-	-
N.C.	27	39	-	8	9	7	42	48	-	19	5
S.C.	30	41	-	3	4	-	8	15	-	-	-
Ga.	43	59	-	2	1	-	16	6	-	-	-
Fla.	67	63	-	10	8	4	32	24	-	-	3
E.S. CENTRAL	114	120	-	3	8	1	44	57	-	1	-
Ky.	29	17	U	-	-	U	3	21	U	-	-
Tenn.	41	41	-	-	1	1	26	17	-	-	-
Ala.	26	43	-	3	4	-	11	17	-	1	-
Miss.	18	19	-	-	3	-	4	2	-	-	-
W.S. CENTRAL	98	191	2	23	39	6	68	173	-	5	79
Ark.	23	24	-	-	-	1	8	21	-	-	-
La.	34	38	U	3	8	U	3	2	U	-	-
Okla.	19	28	-	1	-	-	7	15	-	-	-
Tex.	22	101	2	19	31	5	50	135	-	5	79
MOUNTAIN	91	89	-	12	25	6	256	534	-	14	5
Mont.	2	3	-	-	-	-	2	2	-	-	-
Idaho	8	4	-	1	3	-	93	189	-	-	-
Wyo.	3	4	-	-	1	-	2	7	-	-	-
Colo.	24	17	-	3	4	-	60	124	-	-	-
N. Mex.	11	16	N	N	N	6	34	66	-	-	1
Ariz.	29	31	-	-	5	-	29	99	-	13	1
Utah	9	9	-	5	3	-	34	28	-	-	2
Nev.	5	5	-	3	9	-	2	19	-	1	1
PACIFIC	260	334	1	56	78	6	929	483	-	3	13
Wash.	38	45	-	2	5	5	506	149	-	-	9
Oreg.	45	55	N	N	N	-	21	31	-	-	-
Calif.	168	229	1	47	57	1	392	293	-	3	2
Alaska	5	1	-	1	2	-	3	2	-	-	-
Hawaii	4	4	-	6	14	-	7	8	-	-	2
Guam	-	2	U	1	2	U	1	-	U	-	-
P.R.	5	6	-	-	2	1	13	3	-	-	-
V.I.	U	U	U	U	U	U	U	U	U	U	U
Amer. Samoa	U	U	U	U	U	U	U	U	U	U	U
C.N.M.I.	-	-	U	-	2	U	-	1	U	-	-

N: Not notifiable U: Unavailable -: no reported cases

TABLE IV. Deaths in 122 U.S. cities,* week ending July 10, 1999 (27th Week)

Reporting Area	All Causes, By Age (Years)						P&I† Total
	All Ages	>65	45-64	25-44	1-24	<1	
NEW ENGLAND	421	291	86	29	7	8	26
Boston, Mass.	139	91	29	10	2	7	8
Bridgeport, Conn.	27	17	6	2	2	-	1
Cambridge, Mass.	24	19	2	3	-	-	1
Fall River, Mass.	41	33	5	2	1	-	5
Hartford, Conn.	U	U	U	U	U	U	U
Lowell, Mass.	27	20	7	-	-	-	3
Lynn, Mass.	10	6	2	2	-	-	1
New Bedford, Mass.	U	U	U	U	U	U	U
New Haven, Conn.	30	21	7	2	-	-	2
Providence, R.I.	U	U	U	U	U	U	U
Somerville, Mass.	5	4	1	-	-	-	-
Springfield, Mass.	34	21	9	3	1	-	1
Waterbury, Conn.	32	20	9	3	-	-	2
Worcester, Mass.	52	39	9	2	1	1	2
MID. ATLANTIC	2,112	1,498	401	130	53	30	72
Albany, N.Y.	49	32	10	4	3	-	1
Allentown, Pa.	U	U	U	U	U	U	U
Buffalo, N.Y.	110	82	18	7	-	3	5
Camden, N.J.	32	19	7	2	1	3	2
Elizabeth, N.J.	U	U	U	U	U	U	U
Erie, Pa.	40	26	10	1	1	2	1
Jersey City, N.J.	U	U	U	U	U	U	U
New York City, N.Y.	1,105	777	217	70	27	14	24
Newark, N.J.	U	U	U	U	U	U	U
Paterson, N.J.	U	U	U	U	U	U	U
Philadelphia, Pa.	399	285	78	28	6	2	12
Pittsburgh, Pa.§	75	48	13	9	3	2	3
Reading, Pa.	37	27	6	2	1	1	2
Rochester, N.Y.	117	85	21	3	6	2	12
Schenectady, N.Y.	U	U	U	U	U	U	U
Scranton, Pa.	37	36	1	-	-	-	2
Syracuse, N.Y.	66	48	10	3	4	1	4
Trenton, N.J.	26	17	7	1	1	-	4
Utica, N.Y.	19	16	3	-	-	-	-
Yonkers, N.Y.	U	U	U	U	U	U	U
E.N. CENTRAL	1,611	1,081	320	123	59	25	77
Akron, Ohio	35	21	9	3	1	1	1
Canton, Ohio	28	23	3	2	-	-	4
Chicago, Ill.	396	243	89	42	16	3	18
Cincinnati, Ohio	78	62	6	4	6	-	4
Cleveland, Ohio	U	U	U	U	U	U	U
Columbus, Ohio	203	149	35	13	1	5	12
Dayton, Ohio	81	60	13	7	1	-	1
Detroit, Mich.	172	89	47	23	11	2	7
Evansville, Ind.	42	31	6	3	1	1	4
Fort Wayne, Ind.	44	30	7	3	4	-	2
Gary, Ind.	9	6	1	-	2	-	1
Grand Rapids, Mich.	41	32	7	-	1	1	-
Indianapolis, Ind.	183	117	38	11	9	8	12
Lansing, Mich.	U	U	U	U	U	U	U
Milwaukee, Wis.	92	71	14	4	1	2	1
Peoria, Ill.	36	25	8	2	1	-	1
Rockford, Ill.	39	29	10	-	-	-	2
South Bend, Ind.	U	U	U	U	U	U	U
Toledo, Ohio	77	51	19	4	2	1	6
Youngstown, Ohio	55	42	8	2	2	1	1
W.N. CENTRAL	663	476	104	54	14	15	41
Des Moines, Iowa	69	48	15	5	1	-	8
Duluth, Minn.	23	15	6	1	1	-	-
Kansas City, Kans.	U	U	U	U	U	U	U
Kansas City, Mo.	110	75	16	9	5	5	7
Lincoln, Nebr.	43	35	5	3	-	-	6
Minneapolis, Minn.	189	138	24	20	4	3	13
Omaha, Nebr.	69	51	10	4	-	4	3
St. Louis, Mo.	77	52	15	7	2	1	-
St. Paul, Minn.	83	62	13	5	1	2	4
Wichita, Kans.	U	U	U	U	U	U	U
S. ATLANTIC	697	409	169	82	22	15	28
Atlanta, Ga.	U	U	U	U	U	U	U
Baltimore, Md.	150	78	41	25	6	-	6
Charlotte, N.C.	93	61	22	5	3	2	10
Jacksonville, Fla.	86	54	22	9	1	-	2
Miami, Fla.	112	59	27	18	5	3	-
Norfolk, Va.	41	27	8	3	1	2	2
Richmond, Va.	63	41	9	6	1	6	2
Savannah, Ga.	42	26	10	4	1	1	3
St. Petersburg, Fla.	U	U	U	U	U	U	U
Tampa, Fla.	U	U	U	U	U	U	U
Washington, D.C.	96	59	22	10	4	1	3
Wilmington, Del.	14	4	8	2	-	-	-
E.S. CENTRAL	564	369	132	39	18	4	27
Birmingham, Ala.	122	72	28	13	5	2	8
Chattanooga, Tenn.	77	54	17	-	6	-	7
Knoxville, Tenn.	86	62	17	4	3	-	6
Lexington, Ky.	51	28	18	4	-	1	5
Memphis, Tenn.	U	U	U	U	U	U	U
Mobile, Ala.	72	52	13	7	-	-	-
Montgomery, Ala.	27	21	5	-	1	-	-
Nashville, Tenn.	129	80	34	11	3	1	1
W.S. CENTRAL	955	612	216	67	35	25	53
Austin, Tex.	70	45	12	7	2	4	1
Baton Rouge, La.	47	31	9	3	3	1	3
Corpus Christi, Tex.	46	33	9	1	2	1	2
Dallas, Tex.	135	67	45	10	6	7	2
El Paso, Tex.	U	U	U	U	U	U	U
Ft. Worth, Tex.	75	51	15	5	3	1	3
Houston, Tex.	324	200	80	24	16	4	31
Little Rock, Ark.	55	40	11	3	1	-	-
New Orleans, La.	51	29	12	6	-	4	6
San Antonio, Tex.	U	U	U	U	U	U	U
Shreveport, La.	67	55	9	2	1	-	4
Tulsa, Okla.	85	61	14	6	1	3	1
MOUNTAIN	800	534	146	74	24	22	50
Albuquerque, N.M.	91	57	12	14	4	4	4
Boise, Idaho	32	23	4	3	-	2	4
Colo. Springs, Colo.	65	40	15	6	-	4	3
Denver, Colo.	99	54	30	11	2	2	8
Las Vegas, Nev.	199	133	38	15	8	5	9
Ogden, Utah	14	11	-	2	1	-	1
Phoenix, Ariz.	79	54	14	9	1	1	7
Pueblo, Colo.	33	28	3	1	1	-	-
Salt Lake City, Utah	88	59	14	7	4	4	9
Tucson, Ariz.	100	75	16	6	3	-	5
PACIFIC	632	451	115	35	13	16	56
Berkeley, Calif.	12	9	3	-	-	-	1
Fresno, Calif.	55	39	12	4	-	-	4
Glendale, Calif.	U	U	U	U	U	U	U
Honolulu, Hawaii	53	41	5	4	-	3	3
Long Beach, Calif.	54	38	10	3	1	2	7
Los Angeles, Calif.	U	U	U	U	U	U	U
Pasadena, Calif.	18	11	4	1	2	-	1
Portland, Oreg.	U	U	U	U	U	U	U
Sacramento, Calif.	122	74	31	9	1	5	15
San Diego, Calif.	97	71	13	7	3	3	7
San Francisco, Calif.	U	U	U	U	U	U	U
San Jose, Calif.	144	105	29	5	2	3	12
Santa Cruz, Calif.	31	25	3	2	1	-	1
Seattle, Wash.	U	U	U	U	U	U	U
Spokane, Wash.	46	38	5	-	3	-	5
Tacoma, Wash.	U	U	U	U	U	U	U
TOTAL	8,455¶	5,721	1,689	633	245	160	430

U: Unavailable -: no reported cases

*Mortality data in this table are voluntarily reported from 122 cities in the United States, most of which have populations of 100,000 or more. A death is reported by the place of its occurrence and by the week that the death certificate was filed. Fetal deaths are not included.

†Pneumonia and influenza.

§Because of changes in reporting methods in this Pennsylvania city, these numbers are partial counts for the current week. Complete counts will be available in 4 to 6 weeks.

¶Total includes unknown ages.

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