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Epidemiologic Notes and Reports

Multistate Outbreak of Viral Gastroenteritis Related to Consumption of Oysters — Louisiana, Maryland, Mississippi, and North Carolina, 1993

On November 17, 1993, the state health departments of Louisiana, Maryland, and Mississippi notified CDC of several outbreaks of gastroenteritis occurring in their states since November 12. Preliminary epidemiologic investigations identified consumption of oysters as the primary risk factor for illness. On November 16, the Louisiana Department of Health and Hospitals (LDHH) had identified the Grand Pass and Cabbage Reef harvesting areas off the Louisiana coast as the source of oysters associated with outbreaks in Louisiana and Mississippi. Tagged oysters associated with outbreaks in Maryland were traced to the same oyster beds. The oysters harvested from these areas had been distributed throughout the United States. On November 18 and 19, the LDHH and CDC notified state epidemiologists of the potential for oyster-associated illness; outbreaks of oyster-associated gastroenteritis subsequently were identified in Florida and North Carolina. Collaborative investigations by state health officials, the Food and Drug Administration (FDA), and CDC were initiated to determine the magnitude and characteristics of the multistate outbreak, identify the etiologic agent, and trace the oysters. This report summarizes the preliminary findings of the ongoing investigation.*

As of December 2, the investigation had identified 23 separate clusters of ill persons in four states. These clusters have accounted for acute gastroenteritis in at least 180 persons who consumed oysters in a variety of settings, ranging from an individual family meal to a 3-day festival attended by 19,000 persons. Similar clinical features of gastroenteritis predominated in all clusters. In Maryland, where 90 ill persons were identified, clinical features included diarrhea (83 [92%]), vomiting (64 [71%]), nausea (60 [67%]), abdominal cramps (55 [61%]), and fever (40 [44%]). For ill persons from Louisiana, Maryland, and Mississippi, the median incubation period was 34 hours (n=146 persons), and median duration of illness was 37 hours (n=137).

*Because the outbreaks in Florida have been linked to consumption of oysters from harvest areas other than the Louisiana coast, those outbreaks are not included in this report.

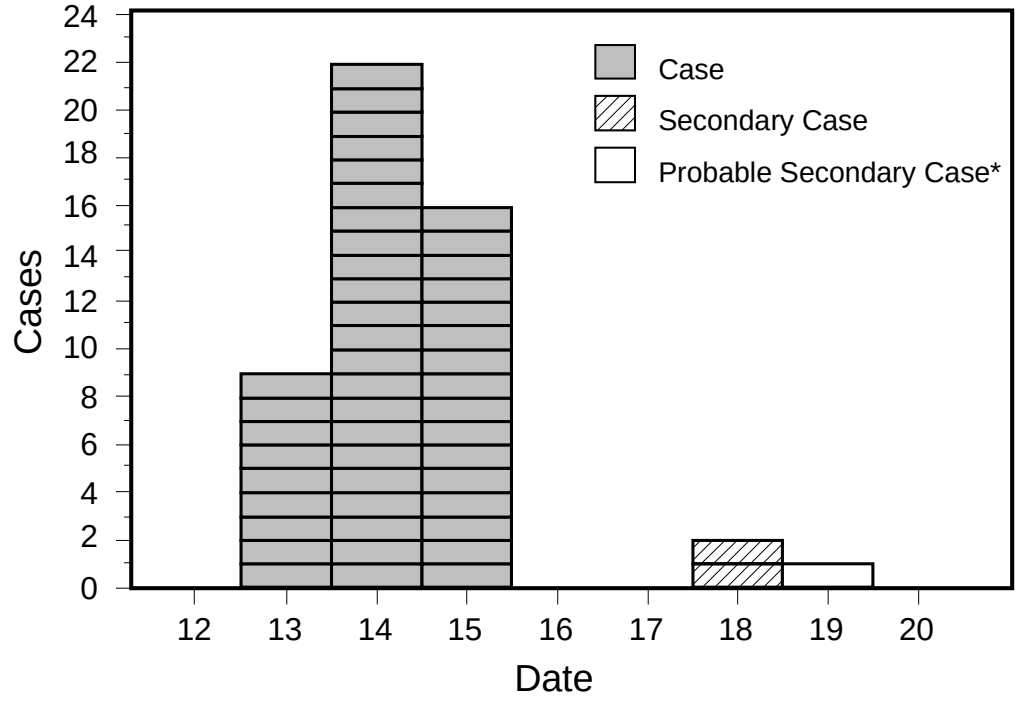
Viral Gastroenteritis — Continued

Raw or steamed oysters were the only food associated with illness; attack rates among the 23 groups ranged from 43% to 100%. Oysters from 20 of 23 outbreaks were traced to the implicated harvest area; oysters or their tags were not available from the other three clusters. Three persons were hospitalized, and at least four cases of secondary transmission have been reported. In one Maryland cluster, associated with a 3-day event beginning on November 12, primary cases first occurred on November 13; secondary cases first occurred on November 18 (Figure 1).

Stool specimens were examined by electron microscopy (EM) and reverse transcription-polymerase chain reaction (RT-PCR) methods. Small round structured viruses or Norwalk-like viruses were detected by EM and confirmed by RT-PCR in 13 of 26 stool specimens from ill persons in Louisiana, Maryland, Mississippi, and North Carolina. Oysters associated with several of the outbreaks are being analyzed for the presence of Norwalk-like viruses by RT-PCR.

In addition to the notification of state and territorial epidemiologists by LDHH and CDC on November 18 and 19, four public health measures were implemented to prevent further outbreaks associated with the contaminated oysters. First, on November 16, LDHH implemented National Shellfish Sanitation Program (NSSP) procedures for shellfish harvesting closures and recall procedures for oysters from the implicated harvest area (*1*). Second, on November 18, public health officials in Maryland, North Carolina, and Virginia initiated investigations to identify, detain, and recall all Grand Pass and Cabbage Reef oysters harvested during November 9–11 that had reached the retail markets in their states. Third, on November 23, FDA issued a statement advising consumers that all oysters harvested before November 16 from the Grand Pass and

FIGURE 1. Cases of gastroenteritis associated with oyster consumption — Maryland, November 13–19, 1993



*****Not laboratory confirmed.

Viral Gastroenteritis — Continued

Cabbage Reef areas should not be consumed. Fourth, on November 24, CDC issued a follow-up memorandum to all state and territorial epidemiologists and public health laboratory directors alerting them to the outbreaks and instructing appropriate handling of laboratory specimens if additional outbreaks are suspected.

The continuing investigation in Louisiana, Maryland, Mississippi, and North Carolina includes efforts to trace contaminated oysters from the implicated harvest area through large distributors to retailers and consumers.

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Editorial Note: Because oysters from the beds implicated in this outbreak were shipped to at least 14 states,[†] public health officials, health-care providers, and the public should be informed of the possibility that consumption of oysters from these beds may be associated with clusters and isolated cases of acute gastroenteritis in their states. The cases of gastrointestinal illnesses identified by this investigation were recognized because they occurred as part of discrete clusters; however, it is likely that many isolated cases occurred but were not recognized or reported. For example, a previous study of persons who attended a national convention in Louisiana determined that the risk for acute gastroenteritis was higher among persons who consumed raw shellfish than among those who did not, even though no "outbreaks" were identified (*2*).

Oysters can be traced to their harvest beds because of the regulation requiring sacks of oysters to carry a tag identifying their harvest date and the bed from which they were harvested (*1*). In this multistate outbreak, these tags facilitated the rapid identification and closing of contaminated beds, provided the link for illness occurring simultaneously in several states, and enabled a product recall.

Investigations of shellfish-associated outbreaks of gastroenteritis have implicated a variety of pathogens, including *Vibrio* species, *Salmonella typhi*, *Campylobacter* species, hepatitis A, and Norwalk-like viruses. For most reported outbreaks, however, an etiologic agent is not identified; these outbreaks may be of viral origin (*3*). Gastrointestinal illness associated with the consumption of virally contaminated oysters characteristically is self-limited and not life-threatening. However, the likelihood of more severe disease may be increased for persons who are immunocompromised or have other chronic problems (e.g., alcoholism; hepatic, gastrointestinal, or hematologic disorders; cancer; diabetes; or kidney disease).

[†] Alabama, California, Florida, Illinois, Louisiana, Maryland, Mississippi, Missouri, New Jersey, North Carolina, South Carolina, Tennessee, Texas, and Virginia.

Viral Gastroenteritis — Continued

The etiology of this multistate outbreak was determined rapidly because specimens were collected and handled appropriately and new PCR-based assays were available (*4,5*). To enable examination of specimens for viral agents in such outbreaks, the following methods are recommended: 1) collection of large-volume stool specimens in clean, dry containers during the first 48 hours of illness and storage at 39 F (4 C) and 2) collection of acute- (within 1 week of onset of illness) and convalescent-phase (3–4 weeks after onset) serum specimens.

FDA, NSSP, and the Interstate Shellfish Sanitation Conference have developed guidelines to protect consumers by controlling the harvesting, handling, and processing of shellfish products (*6*). Additional efforts are required to develop new assays for screening for viral pathogens in these products before distribution to consumers and to evaluate the effectiveness of various food-preparation practices in decreasing the risk for infection associated with the consumption of molluscan shellfish.

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Epidemiologic Notes and Reports

HIV Transmission Between Two Adolescent Brothers With Hemophilia

In July 1992, the National Hemophilia Foundation and CDC received a report from a hemophilia-treatment center of a 19-year-old man with hemophilia (patient 2) who recently had seroconverted for antibody to human immunodeficiency virus (HIV). This report summarizes the findings of an investigation by CDC and state and local public health officials, which determined he was infected with a strain of HIV nearly identical to that in his previously infected older brother (patient 1).*

Case Summaries

Patient 1, who has severe factor VIII deficiency (hemophilia A), before 1985, received factor VIII concentrate made from plasma that was neither screened for HIV antibody nor heat-treated. Review of medical records indicated that in 1983 he had an

*Single copies of this report will be available free until December 17, 1994, from the CDC National AIDS Clearinghouse, P.O. Box 6003, Rockville, MD 20849-6003; telephone (800) 458-5231.

HIV Transmission — Continued

episode of pharyngitis and diffuse lymph node enlargement compatible with an acute retroviral syndrome. In 1985, when first tested, HIV antibody was detected in his serum. His CD4+ T-lymphocyte count ranged from 400 to 550 cells/μL during 1987–1991 but declined to 110 cells/μL in 1992.

Patient 2 also received unscreened factor VIII concentrate before 1985 to treat severe hemophilia A. Since 1985, however, he had received only screened and heat-treated factor concentrate, and beginning in 1988, he received only concentrate that was heat-treated and monoclonally purified. HIV-antibody tests performed annually during November 1985–April 1989 were negative. When his serum was next tested in January 1992, HIV antibody was detected. A stored plasma specimen drawn in April 1991 also contained HIV antibody. His CD4+ T-lymphocyte count was 1102 cells/μL in 1985, 846 cells/μL and 500 cells/μL as measured from the same specimen in two different laboratories in 1987, and 70 cells/μL and 120 cells/μL at two different times in 1992.

The brothers have two uncles with hemophilia and HIV infection; one uncle visited their home daily to weekly but did not live with them. This uncle was HIV-seropositive when first tested in 1985.

Laboratory Findings

Nucleotide sequencing of HIV-1 DNA indicated that the viral strains present in both brothers were genetically similar. Proviral DNA from peripheral blood mononuclear cells obtained from each brother and from the uncle with whom they had frequent contact was amplified by polymerase chain reaction. DNA fragments encompassing 345 nucleotides of the V3 and flanking regions of the gene encoding the HIV-1 envelope glycoprotein (gp120) were sequenced after cloning into M13 vectors. Genetic analysis indicated that two variants, or quasi-species, were present in both brothers. Variant A was the predominant species (15 of 21 clones) in patient 1 and the minor species (one of 20 clones) in patient 2, with an average intravariant nucleotide divergence of 1.8% between the two brothers. Variant B was the minor species in patient 1 (six of 21 clones) and the predominant species in patient 2 (19 of 20 clones), with an average intravariant nucleotide diversity of 3.5% in the B variants between the two brothers. The average nucleotide difference between variants A and B in the two brothers was 6.2%. Only one HIV variant was present in the uncle; that variant differed from variant A by 10.2% and variant B by 10.8%.

Epidemiologic Investigation

Information concerning factor concentrate administration during the period in which patient 2 most likely was infected (October 1988 [6 months before his last negative HIV-antibody test] through April 1991) was obtained by review of medical records and interviews with the two brothers. During this period, patient 1 received factor concentrate infusions at home approximately 10 times per year and patient 2 approximately five times per year. Each brother reported always self-administering infusions and never receiving assistance from anyone else, including the other brother. They reported routinely administering their infusions at different times of the day and in different locations in their home. On the infrequent days when both received infusions on the same day, they reportedly never administered factor concentrates in the same room at the same time and never used each other's infusion equipment. Contami-

HIV Transmission — Continued

nated needles and other infusion equipment used were reportedly kept in one puncture-resistant container.

Both brothers recalled sharing a razor on one occasion, most likely during 1988, when they both cut themselves and bled slightly while shaving. They did not recall which brother used the razor first. Patient 2 was not aware of any other contact with his brother's blood or bloody body fluids. In October 1988, patient 1 had bleeding hemorrhoids; however, his blood reportedly never soaked through his clothing and never contaminated his sheets, toilet seats, or other environmental surfaces.

From October 1988 through April 1991, the two brothers were not hospitalized at the same time and made no visits to the dentist, emergency department, or outpatient clinic on the same day. Neither brother reported receiving tattoos, acupuncture, or injections other than factor concentrates nor recalled having had a needlestick injury or open skin lesions. During this period, the two brothers shared a bedroom and routinely slept in the same bed at night. Their mother and sister also lived in the household; the sister tested negative for HIV antibody, and the mother declined to be tested.

The brothers denied having had sex with any common sex partners or with each other. In 1990, patient 2 had unprotected sexual contact with two women; one tested negative for HIV antibody in 1992, and the other could not be located. During 1989 and 1990, patient 2 had acute gastrointestinal bleeding and received transfusions of six units of red blood cells from seronegative donors later determined not to be infected with HIV.

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Editorial Note: The laboratory and epidemiologic findings from this investigation indicate that patient 2 became infected with an HIV strain that had previously infected his older brother. The presence in each brother of two variants of HIV, each with DNA sequence concordance similar to that reported for other infections known to be epidemiologically related (*1–3*), strongly supports the hypothesis that their infections are related. However, the more than 3-year interval between seroconversion in the two brothers strongly suggests that the brothers were not infected by the same source (e.g., contaminated clotting factor concentrate administered in 1985 or earlier).

Although this investigation was unable to determine precisely how patient 2 became infected with HIV, transmission most likely occurred during the reported blood contact (i.e., the episode of razor-sharing) or other blood contact that went unrecognized or unreported. Factors accounting for an increased likelihood of blood contact included possible bleeding related to hemophilia or its treatment, the presence of used needles in the home, and the close physical contact between the brothers. However, it is also possible that transmission occurred through an exposure, such as sexual contact, that was not identified by the investigation. The limited ability of the brothers to recall events 2–3 years earlier and the inability of the investigators to independently confirm information provided by the brothers made determining the precise mode of transmission difficult.

Seventeen previous studies in the United States and Europe have examined the prevalence of HIV infection among nonsexual, nonneedlesharing household contacts of persons with HIV infection; none of the 1167 contacts who were followed for more

HIV Transmission — Continued

than 1700 person-years in these studies were infected (95% confidence interval for the rate of transmission=0–0.2 infections per 100 person-years) (*4*). However, HIV has been transmitted in households in which opportunities existed for percutaneous, skin, or mucous-membrane contact with HIV-infected blood. This report is the second documented instance of HIV transmission between siblings with hemophilia; the first report documented opportunities for percutaneous blood exposure associated with intravenous infusions (*2*). Cases of HIV transmission also have been reported in households in which needles were shared for medical injections at home (*5*), cutaneous exposure to blood occurred during home health care (*6,7*), and there was presumed but undocumented blood contact between young children (*3*).

The findings in this report re-emphasize the need for precautions to prevent contact with blood in households and other settings—especially those in which health care is provided. Adherence to guidelines for preventing blood exposure in health-care and other settings (*8–10*) may reduce the risk for blood contact and transmission of bloodborne pathogens even in homes and other settings in which the risk is already extremely low.

References

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Current Trends

Resurgence of Pertussis — United States, 1993

From January 3 through December 4, 1993 (weeks 1–48), 5457 pertussis cases were reported to CDC—an 82% increase over the number reported during the same period in 1992 (3004) and the highest annual number of cases reported since 1967 (Figure 1). Compared with 1992, the number of reported pertussis cases increased in 35 states, especially those in the New England, middle-Atlantic, North Central, and Mountain regions (Figure 2). During 1993, large outbreaks have occurred in Chicago and Cincinnati. This report summarizes epidemiologic characteristics of pertussis cases reported through December 4, 1993.

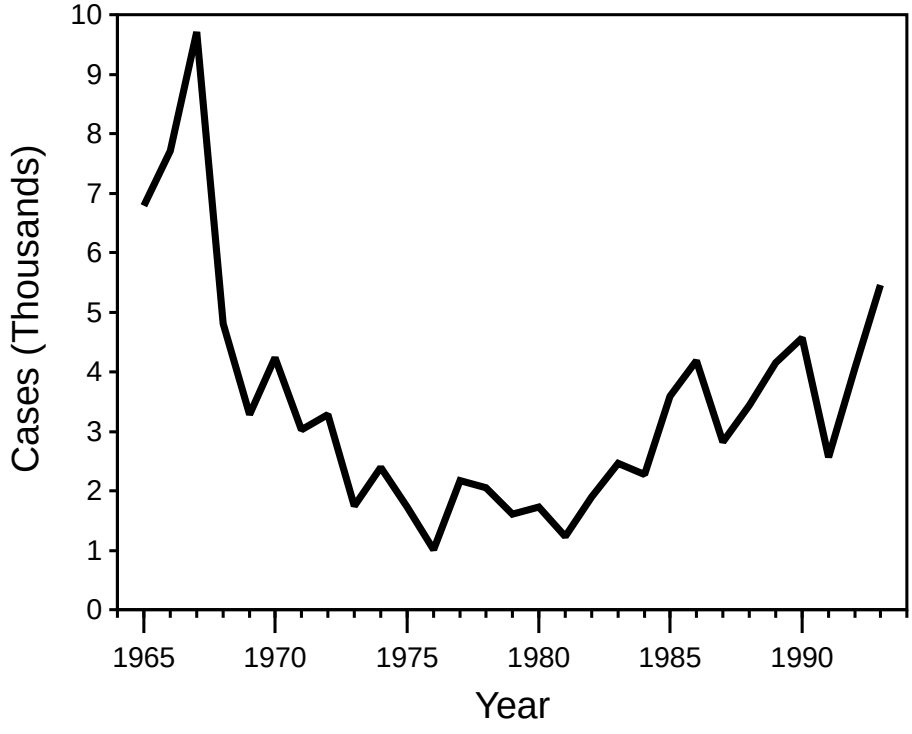
Characteristics

Of 4989 persons with pertussis for whom age was known, 2218 (44.4%) were infants (i.e., aged <1 year); 1031 (20.7%), aged 1–4 years; 563 (11.3%), aged 5–9 years; and 1177 (23.6%), aged ≥10 years. Of 1976 infants for whom age in months was reported, 1555 (78.7%) were aged <6 months and 421 (21.3%), aged 6–11 months.

Vaccination Status and Complications

Supplemental reports about vaccination status and complications were available for 744 (13.6%) cases. Of 596 persons for whom vaccination status was known, 368 (61.7%) had received fewer than three doses of diphtheria and tetanus toxoids and

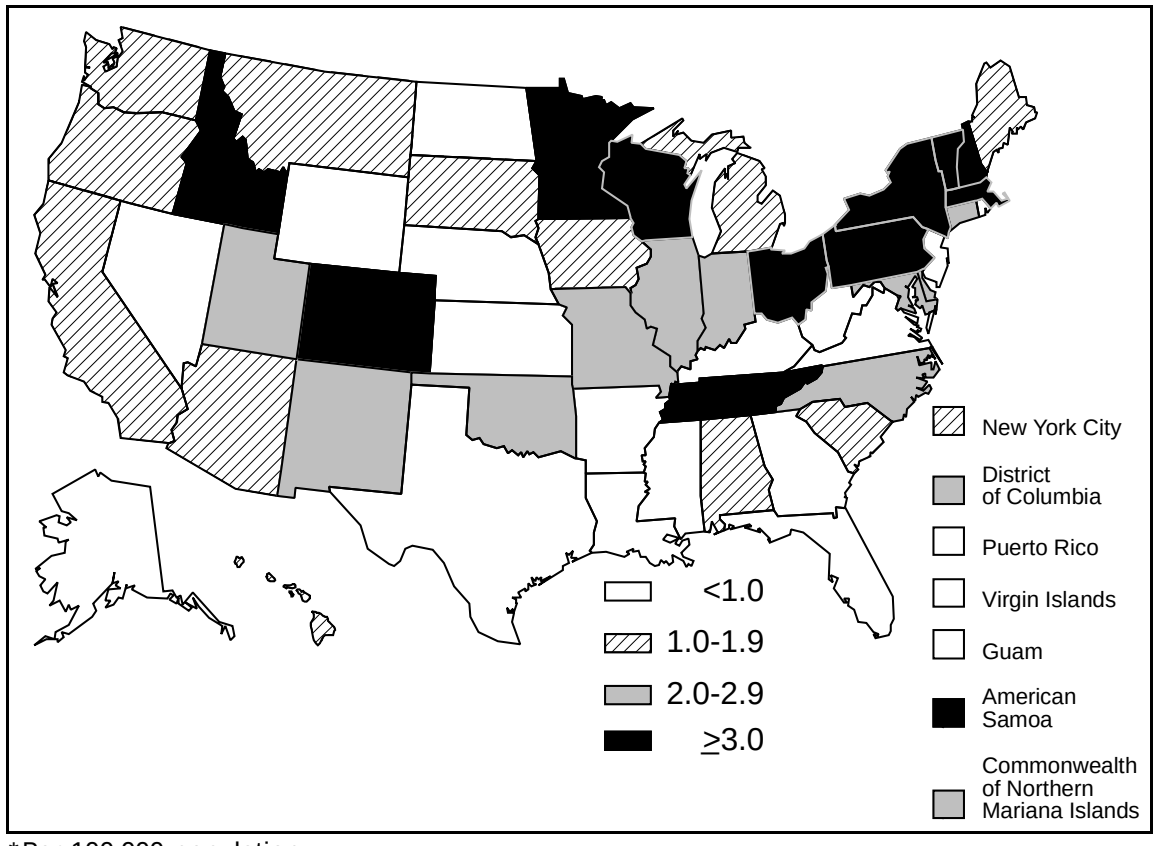
FIGURE 1. Reported cases of pertussis — United States, 1965–1993*



*Data for 1993 are provisional through December 4.

Pertussis — Continued

FIGURE 2. Rate* of reported pertussis — United States and territories, January 3–December 4, 1993



*Per 100,000 population.

pertussis vaccine (DTP)*. Of 207 children aged 7 months–4 years who were "age-eligible" to have received three doses of DTP, 33 (15.9%) had received no doses, and 97 (46.9%) had received fewer than three doses. Of infants with pertussis for whom data on disease severity were available, 212 (65.2%) of 325 had been hospitalized, 45 (15.8%) of 285 had had pneumonia confirmed radiographically, and five (1.6%) of 305 had had seizures resulting from pertussis. Of the 5457 persons with pertussis, seven died.

Outbreaks

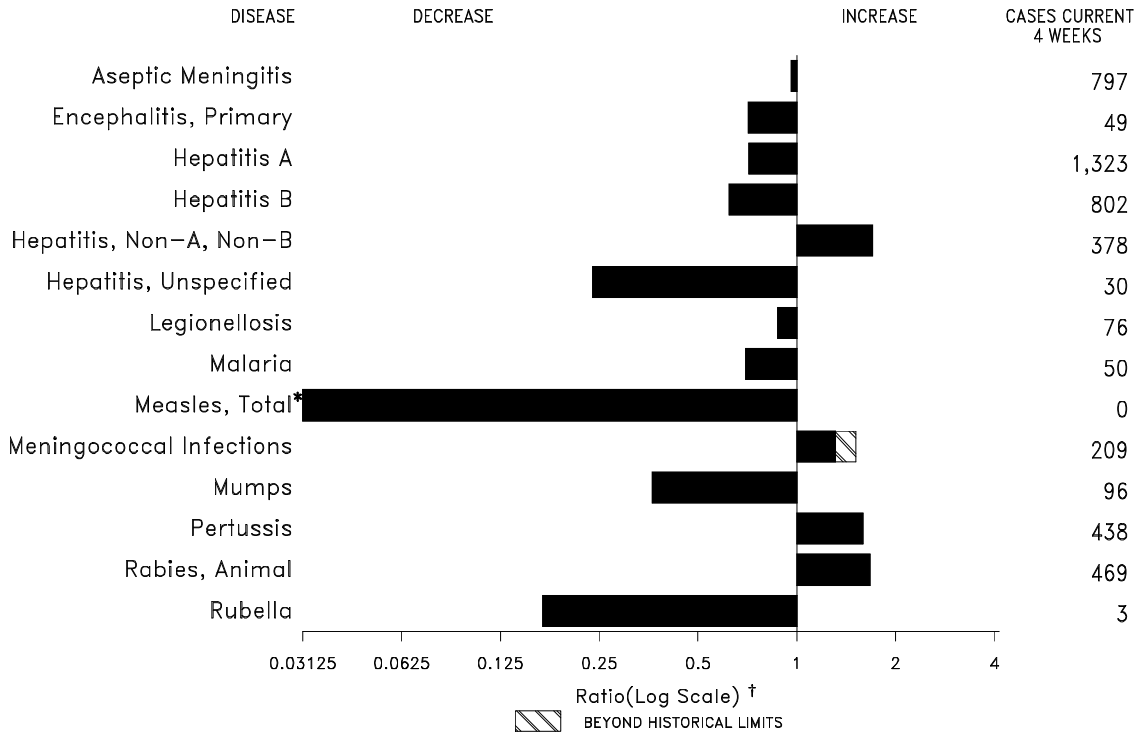
Chicago. From July 1 through October 30, a total of 226 persons with suspected cases of pertussis were reported to the Chicago Department of Health. Of these, 70 (31.0%) persons tested culture-positive for *Bordetella pertussis*; an additional 96 (42.5%) persons met the CDC clinical case definition for pertussis† during outbreaks. Of the remaining 60 cases, 29 (48.3%) did not meet the clinical case definition, and 31 (51.7%) are still under investigation. Of the 166 persons whose illness met the case definition or who had culture-confirmed pertussis, the median age was 9 months (range: <1 month–35 years). Most (127 [76.5%]) of these cases were reported by a

(Continued on page 959)

*Three doses of DTP is the minimum number required for effective protection against pertussis (*1*).

†Cough illness lasting ≥14 days without other apparent cause.

FIGURE I. Notifiable disease reports, comparison of 4-week totals ending December 11, 1993, with historical data — United States



*The large apparent decrease in reported cases of measles(total) reflects dramatic fluctuations in the historical baseline. (Ratio (log scale) for week forty-nine is 0.00000).

† 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 thehatched area begins is based on the mean and two standard deviations of these 4-week totals.

TABLE I. Summary — cases of specified notifiable diseases, United States, cumulative, week ending December 11, 1993 (49th Week)

	Cum. 1993		Cum. 1993
AIDS*	93,282	Measles: imported	56
Anthrax	-	indigenous	221
Botulism: Foodborne	21	Plague	10
Infant	60	Poliomyelitis, Paralytic§	-
Other	5	Psittacosis	49
Brucellosis	85	Rabies, human	2
Cholera	17	Syphilis, primary & secondary	24,680
Congenital rubella syndrome	7	Syphilis, congenital, age < 1 year¶	1,493
Diphtheria	-	Tetanus	40
Encephalitis, post-infectious	150	Toxic shock syndrome	208
Gonorrhea	371,434	Trichinosis	16
Haemophilus influenzae (invasive disease)†	1,180	Tuberculosis	20,777
Hansen Disease	168	Tularemia	120
Leptospirosis	41	Typhoid fever	319
Lyme Disease	7,164	Typhus fever, tickborne (RMSF)	436

*Updated monthly; last update November 27, 1993.
†Of 1126 cases of known age, 366 (33%) were reported among children less than 5 years of age.
§Two (2) cases of suspected poliomyelitis have been reported in 1993; 4 of the 5 suspected cases with onset in 1992 were confirmed; the confirmed cases were vaccine associated.
¶Reports through second quarter of 1993.

TABLE II. Cases of selected notifiable diseases, United States, weeks ending December 11, 1993, and December 5, 1992 (49th Week)

Reporting Area	AIDS*	Aseptic Menin-gitis	Encephalitis		Gonorrhea		Hepatitis (Viral), by type				Legionel-losis	Lyme Disease
			Primary	Post-in-fectious			A	B	NA,NB	Unspeci-fied		
	Cum. 1993	Cum. 1993	Cum. 1993	Cum. 1993	Cum. 1993	Cum. 1992	Cum. 1993	Cum. 1993	Cum. 1993	Cum. 1993	Cum. 1993	Cum. 1993
UNITED STATES	93,282	11,823	862	150	371,434	458,642	20,591	11,380	4,811	568	1,172	7,164
NEW ENGLAND	4,689	411	22	8	7,915	9,622	444	462	530	14	77	1,722
Maine	119	41	2	-	81	88	15	10	4	-	6	11
N.H.	100	52	-	2	73	108	36	118	433	3	6	71
Vt.	68	44	6	-	23	26	8	10	4	-	3	5
Mass.	2,532	167	9	4	2,999	3,401	209	234	77	11	43	177
R.I.	299	107	5	2	397	611	70	21	12	-	19	266
Conn.	1,571	-	-	-	4,342	5,388	106	69	-	-	-	1,192
MID. ATLANTIC	23,757	909	61	11	42,514	53,117	1,009	1,224	373	7	235	3,980
Upstate N.Y.	3,315	535	43	6	8,202	10,877	422	406	251	1	83	2,471
N.Y. City	12,796	104	1	-	11,403	18,819	177	121	1	-	3	3
N.J.	4,982	-	-	-	5,570	7,333	264	371	86	-	33	694
Pa.	2,664	270	17	5	17,339	16,088	146	326	35	6	116	812
E.N. CENTRAL	7,602	2,082	204	29	79,448	87,251	2,312	1,337	550	13	313	103
Ohio	1,490	705	68	4	21,360	25,850	306	180	36	-	156	46
Ind.	846	228	22	11	7,786	8,438	612	225	17	1	56	27
Ill.	2,827	483	49	3	27,759	29,482	795	259	71	5	19	13
Mich.	1,732	611	49	11	16,864	19,414	198	381	385	7	59	17
Wis.	707	55	16	-	5,679	4,067	401	292	41	-	23	-
W.N. CENTRAL	2,783	765	47	11	19,723	24,609	2,189	619	187	16	97	254
Minn.	624	118	18	-	2,441	2,859	436	77	12	4	3	118
Iowa	172	153	5	2	1,508	1,537	58	34	9	4	17	8
Mo.	1,464	225	6	9	11,507	13,942	1,335	428	135	8	29	71
N. Dak.	2	21	4	-	40	69	79	1	3	-	2	2
S. Dak.	29	22	7	-	243	160	16	-	-	-	-	-
Nebr.	168	27	1	-	476	1,618	188	20	12	-	39	5
Kans.	324	199	6	-	3,508	4,424	77	59	16	-	7	50
S. ATLANTIC	19,841	2,484	223	57	94,238	134,586	1,191	2,143	777	86	203	872
Del.	342	77	3	-	1,470	1,648	10	155	163	-	12	419
Md.	2,039	220	23	-	15,670	15,346	147	254	32	4	47	152
D.C.	1,425	34	-	-	4,874	6,362	11	43	2	-	14	2
Va.	1,377	322	39	7	11,604	14,104	143	140	48	41	9	75
W. Va.	94	56	116	-	639	796	27	44	37	-	4	50
N.C.	1,095	253	31	-	23,535	23,647	87	290	70	-	26	83
S.C.	1,366	31	-	-	9,800	10,449	18	50	5	1	19	9
Ga.	2,547	159	1	-	4,660	36,033	100	260	174	1	36	46
Fla.	9,556	1,332	10	50	21,986	26,201	648	907	246	39	36	36
E.S. CENTRAL	2,427	717	42	7	42,021	46,005	311	1,287	967	4	41	35
Ky.	313	308	14	6	4,716	4,467	124	79	16	-	16	12
Tenn.	1,031	160	8	-	12,218	14,673	95	1,101	936	3	17	19
Ala.	689	176	3	-	15,550	15,860	56	101	5	1	2	4
Miss.	394	73	17	1	9,537	11,005	36	6	10	-	6	-
W.S. CENTRAL	9,039	1,340	72	2	43,983	50,841	2,480	1,639	363	158	36	66
Ark.	370	67	2	-	8,814	7,397	51	55	4	2	4	2
La.	1,198	83	7	-	11,367	13,765	85	209	142	4	6	2
Okla.	676	1	8	-	4,015	5,257	212	283	145	9	16	21
Tex.	6,795	1,189	55	2	19,787	24,422	2,132	1,092	72	143	10	41
MOUNTAIN	3,719	679	29	5	10,144	11,706	3,739	651	332	75	67	20
Mont.	30	1	-	1	84	102	74	7	3	-	5	-
Idaho	70	11	-	-	155	115	271	76	-	3	1	2
Wyo.	46	7	-	-	75	57	15	29	104	-	6	9
Colo.	1,245	218	15	-	3,236	4,267	816	69	52	41	9	-
N. Mex.	292	119	4	2	890	889	374	216	107	4	6	2
Ariz.	1,205	172	8	-	3,591	4,011	1,274	81	13	12	14	-
Utah	253	72	1	1	330	303	751	57	34	14	11	2
Nev.	578	79	1	1	1,783	1,962	164	116	19	1	15	5
PACIFIC	19,425	2,436	162	20	31,448	40,905	6,916	2,018	732	195	103	112
Wash.	1,467	-	1	-	3,463	3,727	818	214	177	9	10	8
Oreg.	741	-	-	-	1,105	1,557	91	32	14	1	-	2
Calif.	16,771	2,289	154	20	25,721	34,517	5,217	1,741	528	182	84	101
Alaska	96	21	6	-	588	616	727	12	10	-	-	-
Hawaii	350	126	1	-	571	488	63	19	3	3	9	1
Guam	-	2	-	-	48	51	2	2	-	3	-	-
P.R.	2,985	60	-	-	474	215	78	392	94	2	-	-
V.I.	41	-	-	-	90	101	-	5	-	-	-	-
Amer. Samoa	-	-	-	-	41	49	19	-	-	-	-	-
C.N.M.I.	-	3	1	-	71	74	-	2	-	1	-	-

N: Not notifiable U: Unavailable C.N.M.I.: Commonwealth of Northern Mariana Islands

*Updated monthly; last update November 27, 1993.

TABLE II. (Cont'd.) Cases of selected notifiable diseases, United States, weeks ending December 11, 1993, and December 5, 1992 (49th Week)

Reporting Area	Malaria	Measles (Rubeola)					Menin-gococcal Infections	Mumps		Pertussis			Rubella		
		Indigenous		Imported*		Total									
	Cum. 1993	1993	Cum. 1993	1993	Cum. 1993	Cum. 1992	Cum. 1993	1993	Cum. 1993	1993	Cum. 1993	Cum. 1992	1993	Cum. 1993	Cum. 1992
UNITED STATES	1,128	-	221	-	56	2,208	2,270	29	1,529	158	5,711	3,110	1	187	150
NEW ENGLAND	94	-	58	-	6	65	126	1	11	12	760	260	-	2	6
Maine	6	-	2	-	-	4	13	-	-	-	22	11	-	1	1
N.H.	6	-	2	-	-	13	14	-	-	1	248	89	-	-	-
Vt.	3	-	30	-	1	-	7	-	-	-	87	11	-	-	-
Mass.	45	-	14	-	4	21	65	-	2	-	307	103	-	1	-
R.I.	7	-	1	-	1	21	1	-	2	3	13	6	-	-	4
Conn.	27	-	9	-	-	6	26	1	7	8	83	40	-	-	1
MID. ATLANTIC	213	-	11	-	7	214	265	-	118	13	844	193	-	62	10
Upstate N.Y.	119	-	-	-	2	111	116	-	40	8	332	113	-	17	7
N.Y. City	24	-	5	-	2	61	19	-	2	-	78	22	-	22	-
N.J.	45	-	6	-	3	42	43	-	12	-	64	58	-	17	3
Pa.	25	-	-	-	-	-	87	-	64	5	370	131	-	6	-
E.N. CENTRAL	74	-	21	-	6	61	363	6	237	12	1,343	693	-	8	10
Ohio	15	-	7	-	2	6	102	1	72	8	458	107	-	1	-
Ind.	3	-	1	-	-	20	58	3	8	3	158	52	-	3	-
Ill.	33	-	5	-	-	18	97	-	67	-	312	49	-	1	9
Mich.	18	-	5	-	1	13	61	2	75	1	110	15	-	2	1
Wis.	5	-	3	-	3	4	45	-	15	-	305	470	-	1	-
W.N. CENTRAL	31	-	1	-	2	14	158	-	53	11	546	303	-	1	8
Minn.	9	-	-	-	-	12	19	-	2	10	323	108	-	-	-
Iowa	4	-	-	-	-	1	27	-	10	-	37	10	-	-	3
Mo.	7	-	1	-	-	-	56	-	33	-	136	110	-	1	1
N. Dak.	2	-	-	-	-	-	3	-	5	-	5	15	-	-	-
S. Dak.	2	-	-	-	-	-	6	-	-	-	8	14	-	-	-
Nebr.	4	-	-	-	-	-	14	-	2	-	16	13	-	-	-
Kans.	3	-	-	-	2	1	33	-	1	1	21	33	-	-	4
S. ATLANTIC	292	-	17	-	13	130	400	1	443	48	637	177	-	10	20
Del.	3	-	1	-	-	1	14	-	7	-	16	7	-	2	-
Md.	49	U	-	U	4	16	50	U	79	U	137	36	U	3	5
D.C.	11	-	-	-	-	2	5	-	1	-	13	1	-	-	-
Va.	36	-	-	-	4	16	48	-	36	4	63	15	-	-	-
W. Va.	2	-	-	-	-	-	14	-	22	-	8	9	-	-	1
N.C.	98	-	-	-	-	24	65	-	224	42	194	43	-	-	-
S.C.	7	-	-	-	-	29	31	-	16	-	70	10	-	-	7
Ga.	20	-	-	-	-	3	90	1	17	1	39	17	-	-	-
Fla.	66	-	16	-	5	39	83	-	41	1	97	39	-	5	7
E.S. CENTRAL	28	-	1	-	-	467	137	-	49	3	270	30	1	2	1
Ky.	5	-	-	-	-	450	24	-	-	-	29	1	-	-	-
Tenn.	11	-	-	-	-	-	37	-	14	3	170	8	1	2	1
Ala.	7	-	1	-	-	-	45	-	22	-	60	18	-	-	-
Miss.	5	U	-	U	-	17	31	U	13	U	11	3	U	-	-
W.S. CENTRAL	32	-	7	-	3	1,107	207	11	239	31	203	236	-	18	7
Ark.	3	-	-	-	-	-	20	-	4	-	12	17	-	-	-
La.	6	-	1	-	-	-	38	2	20	-	12	13	-	1	-
Okla.	6	-	-	-	-	12	22	4	15	-	96	49	-	1	-
Tex.	17	-	6	-	3	1,095	127	5	200	31	83	157	-	16	7
MOUNTAIN	34	-	5	-	1	35	167	2	67	2	394	410	-	10	8
Mont.	2	-	-	-	-	-	13	-	-	-	11	9	-	-	-
Idaho	1	-	-	-	-	-	15	-	5	1	119	42	-	2	1
Wyo.	-	-	-	-	-	1	5	2	4	-	1	-	-	-	-
Colo.	20	-	2	-	1	29	35	-	16	1	134	94	-	1	2
N. Mex.	5	-	-	-	-	2	6	N	N	-	39	101	-	-	-
Ariz.	1	-	2	-	-	3	72	-	13	-	48	123	-	2	2
Utah	2	-	-	-	-	-	14	-	5	-	37	39	-	4	1
Nev.	3	-	1	-	-	-	7	-	24	-	5	2	-	1	2
PACIFIC	330	-	100	-	18	115	447	8	312	26	714	808	-	74	80
Wash.	28	-	-	-	-	11	72	-	10	9	82	216	-	-	8
Oreg.	5	-	-	-	-	3	27	N	N	-	37	44	-	3	2
Calif.	287	-	89	-	7	60	325	7	267	15	572	477	-	43	47
Alaska	3	-	-	-	2	9	13	-	11	-	5	15	-	1	-
Hawaii	7	-	11	-	9	32	10	1	24	2	18	56	-	27	23
Guam	1	-	2	-	-	10	2	-	8	-	-	-	-	-	3
P.R.	-	-	282	-	-	463	9	-	4	-	10	12	-	-	1
V.I.	-	-	-	-	-	-	-	-	5	-	-	-	-	-	-
Amer. Samoa	-	-	1	-	-	-	-	-	1	-	2	6	-	-	-
C.N.M.I.	-	17	59	-	1	2	-	-	13	-	1	2	-	-	-

*For measles only, imported cases include both out-of-state and international importations.
N: Not notifiable U: Unavailable † International § Out-of-state

TABLE II. (Cont'd.) Cases of selected notifiable diseases, United States, weeks ending December 11, 1993, and December 5, 1992 (49th Week)

Reporting Area	Syphilis (Primary & Secondary)		Toxic-Shock Syndrome	Tuberculosis		Tula-remia	Typhoid Fever	Typhus Fever (Tick-borne) (RMSF)	Rabies, Animal
	Cum. 1993	Cum. 1992	Cum. 1993	Cum. 1993	Cum. 1992	Cum. 1993	Cum. 1993	Cum. 1993	Cum. 1993
UNITED STATES	24,680	31,635	208	20,777	21,837	120	319	436	8,185
NEW ENGLAND	376	626	16	499	494	-	30	4	1,577
Maine	8	8	3	35	19	-	-	-	-
N.H.	29	37	6	9	17	-	2	-	134
Vt.	1	1	1	5	6	-	-	-	37
Mass.	122	308	5	275	283	-	22	4	668
R.I.	16	38	1	54	35	-	-	-	-
Conn.	200	234	-	121	134	-	6	-	738
MID. ATLANTIC	2,228	4,305	32	4,454	5,116	1	67	27	2,928
Upstate N.Y.	215	329	16	518	679	1	19	7	2,150
N.Y. City	1,116	2,391	1	2,573	2,974	-	26	-	-
N.J.	288	527	-	782	872	-	16	10	436
Pa.	609	1,058	15	581	591	-	6	10	342
E.N. CENTRAL	3,948	4,855	44	2,215	2,109	4	38	14	108
Ohio	1,101	779	11	300	311	-	7	8	6
Ind.	321	265	2	216	189	1	2	1	11
Ill.	1,540	2,234	8	1,163	1,085	2	21	2	23
Mich.	535	885	23	448	438	1	7	2	18
Wis.	451	692	-	88	86	-	1	1	50
W.N. CENTRAL	1,505	1,416	15	481	516	39	2	25	335
Minn.	63	92	3	67	148	-	-	1	44
Iowa	64	54	7	57	42	-	-	7	73
Mo.	1,250	1,084	2	238	223	16	2	11	25
N. Dak.	2	1	-	7	10	-	-	-	60
S. Dak.	2	-	-	14	21	17	-	3	45
Nebr.	10	24	-	18	22	3	-	2	11
Kans.	114	161	3	80	50	3	-	1	77
S. ATLANTIC	6,157	8,493	24	3,956	3,997	4	48	210	1,955
Del.	91	192	1	47	50	-	1	1	132
Md.	350	579	1	366	374	-	8	11	581
D.C.	311	372	-	155	106	-	-	-	18
Va.	644	684	7	415	316	-	6	12	376
W. Va.	13	17	-	71	86	-	-	6	87
N.C.	1,762	2,341	4	534	536	2	3	125	102
S.C.	882	1,159	-	370	381	-	-	11	156
Ga.	1,029	1,642	2	715	825	-	3	37	450
Fla.	1,075	1,507	9	1,283	1,323	2	27	7	53
E.S. CENTRAL	3,767	3,968	11	1,467	1,418	4	7	57	199
Ky.	325	165	3	356	363	1	2	11	19
Tenn.	1,021	1,132	4	424	425	2	2	32	72
Ala.	823	1,321	2	470	384	1	3	4	108
Miss.	1,598	1,350	2	217	246	-	-	10	-
W.S. CENTRAL	5,533	5,880	2	2,245	2,694	48	7	84	581
Ark.	690	848	-	190	207	27	-	9	40
La.	2,439	2,440	-	-	217	-	1	1	9
Okla.	399	432	2	149	152	17	1	69	66
Tex.	2,005	2,160	-	1,906	2,118	4	5	5	466
MOUNTAIN	219	323	14	499	564	14	10	15	167
Mont.	1	7	-	15	-	5	-	2	24
Idaho	-	1	2	13	22	-	-	-	6
Wyo.	8	7	-	6	-	3	-	10	24
Colo.	70	61	2	54	74	1	5	3	26
N. Mex.	24	40	1	59	79	2	2	-	9
Ariz.	93	158	1	234	242	-	2	-	59
Utah	11	8	6	28	65	2	1	-	4
Nev.	12	41	2	90	82	1	-	-	15
PACIFIC	947	1,769	50	4,961	4,929	6	110	-	335
Wash.	55	74	7	255	286	1	7	-	-
Oreg.	39	47	-	96	123	2	1	-	-
Calif.	837	1,636	43	4,327	4,204	3	99	-	312
Alaska	8	4	-	49	58	-	-	-	23
Hawaii	8	8	-	234	258	-	3	-	-
Guam	2	3	-	31	60	-	1	-	-
P.R.	473	314	-	233	225	-	-	-	43
V.I.	39	66	-	2	3	-	-	-	-
Amer. Samoa	-	-	-	2	-	-	1	-	-
C.N.M.I.	7	6	-	40	53	-	-	-	-

U: Unavailable

TABLE III. Deaths in 121 U.S. cities,* week ending December 11, 1993 (49th Week)

Reporting Area	All Causes, By Age (Years)						P&I† Total
	All Ages	≥65	45-64	25-44	1-24	<1	
NEW ENGLAND	595	416	108	45	8	17	60
Boston, Mass.	175	98	44	15	5	12	21
Bridgeport, Conn.	21	12	4	2	-	3	2
Cambridge, Mass.	13	8	3	2	-	-	1
Fall River, Mass.	29	25	3	1	-	-	2
Hartford, Conn.	65	48	9	5	2	1	1
Lowell, Mass.	30	25	4	1	-	-	3
Lynn, Mass.	15	12	1	2	-	-	1
New Bedford, Mass.	22	21	1	-	-	-	-
New Haven, Conn.	22	14	4	4	-	-	2
Providence, R.I.	52	41	7	4	-	-	12
Somerville, Mass.	9	7	1	1	-	-	-
Springfield, Mass.	53	40	9	4	-	-	-
Waterbury, Conn.	34	23	8	2	-	1	5
Worcester, Mass.	55	42	10	2	1	-	10
MID. ATLANTIC	2,612	1,648	526	324	60	54	153
Albany, N.Y.	57	42	7	5	2	1	-
Allentown, Pa.	25	22	3	-	-	-	-
Buffalo, N.Y.	100	76	16	3	3	2	3
Camden, N.J.	55	27	16	6	2	4	2
Elizabeth, N.J.	15	9	6	-	-	-	1
Erie, Pa.§	44	39	4	1	-	-	4
Jersey City, N.J.	27	20	3	3	1	-	-
New York City, N.Y.	1,354	809	280	209	31	25	58
Newark, N.J.	93	36	21	28	4	4	6
Paterson, N.J.	29	12	10	6	-	1	-
Philadelphia, Pa.	309	200	60	33	9	7	27
Pittsburgh, Pa.§	111	76	25	5	2	3	8
Reading, Pa.	16	10	3	2	1	-	3
Rochester, N.Y.	146	107	22	11	3	3	18
Schenectady, N.Y.	23	20	2	-	1	-	3
Scranton, Pa.§	30	18	9	2	1	-	2
Syracuse, N.Y.	115	87	21	5	-	2	17
Trenton, N.J.	43	24	12	5	-	2	1
Utica, N.Y.	20	14	6	-	-	-	-
Yonkers, N.Y.	U	U	U	U	U	U	U
E.N. CENTRAL	1,685	1,124	326	139	42	54	92
Akron, Ohio	92	59	21	6	3	3	-
Canton, Ohio	29	21	6	2	-	-	1
Chicago, Ill.	U	U	U	U	U	U	U
Cincinnati, Ohio	156	99	37	12	5	3	10
Cleveland, Ohio	191	122	32	22	5	10	2
Columbus, Ohio	212	135	54	12	3	8	15
Dayton, Ohio	118	82	19	12	2	3	8
Detroit, Mich.	232	123	51	39	8	11	6
Evansville, Ind.	48	39	8	1	-	-	4
Fort Wayne, Ind.	46	37	6	2	1	-	7
Gary, Ind.	27	16	6	-	4	1	-
Grand Rapids, Mich.	47	31	9	4	1	2	4
Indianapolis, Ind.	U	U	U	U	U	U	U
Madison, Wis.	47	32	7	5	-	3	3
Milwaukee, Wis.	121	91	19	7	1	3	12
Peoria, Ill.	34	28	3	1	-	2	2
Rockford, Ill.	51	36	13	1	1	-	4
South Bend, Ind.	53	44	5	2	-	2	4
Toledo, Ohio	121	83	21	7	8	2	8
Youngstown, Ohio	60	46	9	4	-	1	2
W.N. CENTRAL	759	529	121	67	17	24	36
Des Moines, Iowa	36	28	3	4	-	1	-
Duluth, Minn.	40	33	4	3	-	-	1
Kansas City, Kans.	39	18	11	5	2	2	1
Kansas City, Mo.	96	66	19	8	1	2	5
Lincoln, Nebr.	43	32	4	4	1	2	-
Minneapolis, Minn.	158	104	31	13	3	7	11
Omaha, Nebr.	86	58	9	15	3	1	5
St. Louis, Mo.	130	94	17	8	5	6	10
St. Paul, Minn.	63	49	10	2	-	2	2
Wichita, Kans.	68	47	13	5	2	1	1

Reporting Area	All Causes, By Age (Years)						P&I† Total
	All Ages	≥65	45-64	25-44	1-24	<1	
S. ATLANTIC	1,294	813	252	151	43	32	91
Atlanta, Ga.	219	127	42	32	6	12	15
Baltimore, Md.	182	118	32	23	6	3	19
Charlotte, N.C.	44	22	17	4	1	-	4
Jacksonville, Fla.	113	81	22	5	2	3	9
Miami, Fla.	112	62	18	19	9	4	2
Norfolk, Va.	62	42	11	7	2	-	3
Richmond, Va.	95	61	24	5	2	1	4
Savannah, Ga.	60	40	14	5	-	1	6
St. Petersburg, Fla.	45	37	5	3	-	-	4
Tampa, Fla.	181	129	33	13	2	3	25
Washington, D.C.	161	80	31	32	13	5	-
Wilmington, Del.	20	14	3	3	-	-	-
E.S. CENTRAL	728	470	140	66	28	23	42
Birmingham, Ala.	137	86	25	13	7	6	5
Chattanooga, Tenn.	91	64	18	6	3	-	5
Knoxville, Tenn.	U	U	U	U	U	U	U
Lexington, Ky.	65	41	15	6	2	1	5
Memphis, Tenn.	226	147	42	19	9	8	18
Mobile, Ala.	75	46	13	9	3	4	1
Montgomery, Ala.	47	23	12	8	2	2	-
Nashville, Tenn.	87	63	15	5	2	2	8
W.S. CENTRAL	1,670	1,085	308	179	54	44	123
Austin, Tex.	76	57	6	8	2	3	4
Baton Rouge, La.	60	47	7	4	2	-	2
Corpus Christi, Tex.	U	U	U	U	U	U	U
Dallas, Tex.	258	150	51	45	11	1	9
El Paso, Tex.	100	64	18	6	7	5	7
Ft. Worth, Tex.	133	90	25	11	4	3	13
Houston, Tex.	417	268	82	54	5	8	59
Little Rock, Ark.	69	40	19	3	3	4	1
New Orleans, La.	170	100	37	13	11	9	-
San Antonio, Tex.	227	154	32	27	6	8	16
Shreveport, La.	29	22	4	2	-	1	6
Tulsa, Okla.	131	93	27	6	3	2	6
MOUNTAIN	969	657	167	86	34	24	70
Albuquerque, N.M.	105	68	20	11	2	4	6
Colo. Springs, Colo.	34	19	5	6	2	2	2
Denver, Colo.	136	88	24	17	5	2	14
Las Vegas, Nev.	184	126	36	10	5	7	12
Ogden, Utah	25	16	6	2	1	-	1
Phoenix, Ariz.	186	118	33	20	8	6	21
Pueblo, Colo.	24	19	3	2	-	-	-
Salt Lake City, Utah	106	75	11	10	7	3	4
Tucson, Ariz.	169	128	29	8	4	-	10
PACIFIC	2,150	1,445	393	214	49	42	153
Berkeley, Calif.	27	16	7	4	-	-	8
Fresno, Calif.	91	56	21	7	2	5	5
Glendale, Calif.	25	16	6	3	-	-	1
Honolulu, Hawaii	93	66	9	11	3	4	12
Long Beach, Calif.	101	68	22	8	-	3	12
Los Angeles, Calif.	569	363	109	68	20	3	23
Pasadena, Calif.	26	18	5	-	-	3	3
Portland, Oreg.	161	124	25	9	1	2	8
Sacramento, Calif.	181	130	31	13	4	3	16
San Diego, Calif.	203	131	44	18	5	4	20
San Francisco, Calif.	156	92	29	29	3	3	5
San Jose, Calif.	184	127	27	19	4	7	21
Santa Cruz, Calif.	41	29	8	3	1	-	6
Seattle, Wash.	142	94	23	16	5	4	3
Spokane, Wash.	62	50	7	4	1	-	6
Tacoma, Wash.	88	65	20	2	-	1	4
TOTAL	12,462¶	8,187	2,341	1,271	335	314	820

*Mortality data in this table are voluntarily reported from 121 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 these 3 Pennsylvania cities, these numbers are partial counts for the current week. Complete counts will be available in 4 to 6 weeks.

¶Total includes unknown ages.

U: Unavailable.

Pertussis — Continued

single pediatric teaching hospital, and 70 (42.2%) persons were hospitalized (median hospital stay: 5 days). Of 111 persons aged >2 months with pertussis for whom previous vaccination history was available, 52 (46.8%) were not up-to-date with DTP vaccinations. Of 61 persons with pertussis aged 7 months–4 years, 30 (49.2%) had received fewer than three doses of DTP, and six (10.0%) had received no doses.

Cincinnati. From July 1 through October 30, a total of 285 suspected cases of pertussis were reported to the Cincinnati Health Department: 164 (57.5%) cases were culture-confirmed; 102 (35.8%) occurred in infants. Nearly all (265 [93.0%]) cases were reported by a single large teaching hospital, and 95 (33.3%) persons were hospitalized. Measures to control this epidemic included introduction of an accelerated DTP vaccination schedule (doses given at 1, 2, and 3 months of age) for infants. Investigation of this outbreak is ongoing.

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Editorial Note: Based on the number of pertussis cases reported through December 4, the projected total number of cases for 1993 will be the highest reported since 1967. Since 1976 (when the lowest number of pertussis cases [1010] was reported), the number of reported cases in peak years has steadily increased (Figure 1); in 1990 (the last peak year), 4570 cases were reported. Despite the recent resurgence in pertussis, the number of cases reported in 1993 represents a more than 96% decline from the annual number reported during the prevaccine era (i.e., before 1948).

Complications associated with pertussis may be severe, especially among infants. Rates of complications among infants during 1993 have been similar to those reported during 1980–1989, when 69% were hospitalized, 22% developed pneumonia, 3% had seizures, 1% had pertussis encephalopathy, and 0.6% died (*2*). The two groups currently at greatest risk for severe complications are infants aged <6 months (the age by which children are recommended to have received three doses of DTP) and preschool-aged children who are undervaccinated. The finding that approximately 50% of preschool-aged children with pertussis in 1993 were undervaccinated underscores the importance of timely vaccination of children according to the recommendations of the Advisory Committee on Immunization Practices (ACIP)[§]. During outbreaks involving primarily young infants, introduction of an accelerated DTP vaccination schedule (doses given at ages 6, 10, and 14 weeks) should be considered; for preschool-aged children, receipt of three or more doses is highly protective against severe disease caused by pertussis (*4*).

Pertussis incidence is usually characterized by a cyclical pattern, with peaks occurring at 3- to 4-year intervals; the increase in reported cases in 1993 coincides with the expected cyclical peak. However, the total number of reported cases has increased in each successive peak year since 1977 (Figure 1); reasons for this resurgence of pertussis are unclear. Vaccination coverage with three or more doses of DTP among children

[§]DTP at ages 2, 4, 6, and 15 months, with an additional dose at age 4–6 years (*3*). Diphtheria and tetanus toxoids and acellular pertussis (DTaP) vaccine may be used for the fourth and fifth doses in the series, beginning at 15 months of age.

Pertussis — Continued

aged 2 years has remained relatively stable but low (approximately 70%) since 1962 (CDC, unpublished data). Furthermore, the proportion of reported pertussis cases among children aged 1–4 years has not increased during 1980–1993. These observations suggest that the recent increase in pertussis incidence is related neither to a decrease in vaccination coverage nor to a substantive reduction in DTP vaccine efficacy.

As the incidence of pertussis has increased, the proportion of reported cases among persons aged ≥10 years has increased—from 15.1% during 1977–1979 to 19.8% during 1980–1989 and 26.9% during 1992–1993. Adolescents and young adults play an important role in transmitting pertussis to susceptible infants because vaccination-induced immunity to pertussis wanes with increasing age (beginning approximately 4 years after the last dose) (*5–8*). In addition, pertussis among adolescents and adults is often atypical and is frequently not diagnosed (*9*).

In addition to prevention through vaccination, control of pertussis and interruption of transmission requires prompt recognition of disease by health-care providers and timely administration of effective antimicrobials (i.e., erythromycin or trimethoprim-sulfamethoxazole) to persons with pertussis and their close contacts (*8*). Health-care providers should consider the diagnosis of pertussis in persons of all age groups who develop a cough lasting more than 7 days. Because only 10% of pertussis cases are reported (*10*), surveillance must be enhanced. In addition, all cases should be investigated promptly. In the future, introduction of new acellular pertussis vaccines for use in adolescents or young adults may potentially reduce the disease burden in these age groups and among young children.

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International Notes

Estimates of Future Global Tuberculosis Morbidity and Mortality

Tuberculosis (TB) is the leading cause of death associated with infectious diseases globally. The incidence of TB is expected to increase substantially worldwide during the next 10 years because of the interaction between the TB and human immunodeficiency virus (HIV) epidemics. This report uses TB notification data (i.e., cases reported to the ministries of health and collected by the World Health Organization [WHO]) to estimate the future global public health impact of TB and assesses the present and future contribution of HIV infection to TB.

Morbidity

The incidence of TB in 1990 was calculated for each WHO region by first estimating the incidence in some of the most populated countries in each region for which notification data were considered reliable (i.e., the data were provided by programs with established surveillance systems) (*1*). For countries without reliable notification data, annual risk of infection was used to estimate incidence (*2*). Incidence estimates were then applied to the populations in subregions and then used in calculating regional totals. For projections of future TB incidence, regional age-specific incidence rates for 1990 were first derived by applying regional data on the age distribution of reported cases to the estimated crude incidence rates. Based on the assumption that future age-specific trends will remain stable, trends in regional reporting rates during 1985–1990 were applied to the 1990 regional age-specific incidence rates to derive such rates for 1995, 2000, and 2005. These rates were subsequently applied to regional age-specific population projections (*3,4*).

During 1990, an estimated 7.5 million incident cases of TB occurred worldwide (Table 1). Approximately 4.9 million cases (66%) occurred in the Southeast Asian and Western Pacific regions; India (2.1 million), China (1.3 million), and Indonesia (0.4 million) accounted for the largest number of cases. By 2005, the incidence of TB may increase to 11.9 million cases per year—an increase of 58% over 1990. Demographic factors (e.g., population growth and changes in the age structure of populations) will account for 77% of the predicted increase in incidence; epidemiologic factors (e.g., changes in incidence rates associated with the HIV epidemic) will account for 23%. For example, incidence rates for Africa may increase by 10 additional cases per 100,000 population per year during 1990–2005, primarily because of the HIV epidemic. In the Southeast Asian, Western Pacific, Eastern Mediterranean, and American regions, age-specific incidence rates are expected to decline during 1990–2005; in comparison, age-specific rates in Eastern Europe, Western Europe, and other industrialized countries may remain stable. However, because of population growth, the total number of new cases in these regions will continue to increase.

HIV Infection

The estimated impact of HIV infection on TB incidence was based on reported HIV seroprevalence data among patients with TB (*5*), assumed changes in HIV seroprevalence by region through 2000, and the estimation that 95% of HIV-associated TB cases are attributable to HIV infection (*4*). For 1990, an estimated 4.2% of all incident TB cases were attributable to HIV infection. This proportion may increase to 8.4% in 1995

Tuberculosis — Continued

TABLE 1. Estimated number of tuberculosis cases* and rates† — worldwide, 1990, 1995, 2000, and 2005

	1990		1995		2000		2005	
Region	**Cases**	**Rate**	**Cases**	**Rate**	**Cases**	**Rate**	**Cases**	**Rate**
Southeast Asia	3,106	237	3,499	241	3,952	247	4,454	256
Western Pacific§	1,839	136	2,045	140	2,255	144	2,469	151
Africa	992	191	1,467	242	2,079	293	2,849	345
Eastern Mediterranean	641	165	745	168	870	168	987	170
Americas¶	569	127	606	123	645	120	681	114
Eastern Europe**	194	47	202	47	210	48	218	49
Western Europe and others††	196	23	204	23	211	24	217	24
All regions	**7,537**	**143**	**8,768**	**152**	**10,222**	**163**	**11,875**	**176**
Percentage increase since 1990			*16.3%*		*35.6%*		*57.6%*	

*In thousands.
†Crude incidence rate per 100,000 population.
§Includes all countries of the World Health Organization's (WHO) Western Pacific region except Japan, Australia, and New Zealand.
¶Includes all countries of WHO's American region except the United States and Canada.
**Includes all independent states of the former Union of Soviet Socialist Republics.
††Western Europe and the United States, Canada, Japan, Australia, and New Zealand.

and to 13.8% by 2000, when more than 1.4 million cases will be attributable to HIV infection (*4*). During 1990–1999, an estimated 88.2 million persons will develop TB; 8 million of those cases will be attributable to HIV infection (*4*).

Mortality

Estimates of TB deaths for 1990 were derived using 1) published case-fatality rates of 7% for industrialized countries (*6*), 2) estimated case-fatality rates of 15% for Eastern Europe, 3) an estimated case-fatality rate of 20% for Central and South America, and 4) the assumption that all cases reported to WHO were treated and that 5% of treated cases were not reported for other regions. Based on these considerations, an estimated 40%–50% of new cases were treated in 1990; assuming a case-fatality rate of 55% for persons not receiving treatment and 15% for those receiving treatment, the overall case-fatality rates for other regions ranged from 35% to 40%. In estimating future mortality, the proportion of persons with cases treated was assumed to remain at the 1990 level. The number of TB deaths associated with HIV infection were estimated by applying these same case-fatality rates to the estimates of HIV-attributable cases.

For 1990, an estimated 2.5 million deaths occurred from TB, of which 116,000 were associated with HIV infection (Table 2). In 2000, an estimated 3.5 million TB deaths will occur (39% more than in 1990), and approximately 0.5 million will be associated with HIV infection. Almost half of these HIV-associated deaths will occur in sub-Saharan Africa. During 1990–1999, an estimated 30 million persons will die from TB; approximately 3 million of those deaths will be associated with HIV infection. In Southeast Asia, 12.3 million deaths from TB will occur during the decade, of which approximately 1 million will be associated with HIV infection. Nearly 6 million TB deaths are

Tuberculosis — Continued

TABLE 2. Estimated HIV-attributable and total tuberculosis deaths, assuming regional treatment coverage rates remain at the 1990 level — worldwide, 1990, 1995, and 2000

Region	1990		1995		2000	
	HIV-attributable	Total	HIV-attributable	Total	HIV-attributable	Total
Southeast Asia	23,000	**1,087,000**	88,000	**1,225,000**	200,000	**1,383,000**
Western Pacific*	7,000	**644,000**	11,000	**716,000**	24,000	**789,000**
Africa	77,000	**393,000**	150,000	**581,000**	239,000	**823,000**
Eastern Mediterranean	4,000	**249,000**	6,000	**290,000**	15,000	**338,000**
Americas†	4,000	**114,000**	9,000	**121,000**	19,000	**129,000**
Eastern Europe§	<200	**29,000**	<600	**30,000**	<900	**32,000**
Western Europe and others¶	<500	**14,000**	1,000	**14,000**	2,000	**15,000**
All regions	**116,000**	**2,530,000**	**266,000**	**2,977,000**	**500,000**	**3,509,000**
Percentage HIV-attributable	*4.6%*		*8.9%*		*14.2%*	
Percentage increase since 1990			*17.7%*		*38.7%*	

* Includes all countries of the World Health Organization's (WHO) Western Pacific region except Japan, Australia, and New Zealand.
† Includes all countries of WHO's American region except the United States and Canada.
§ Includes all independent states of the former Union of Soviet Socialist Republics.
¶ Western Europe and the United States, Canada, Japan, Australia, and New Zealand.

projected in sub-Saharan Africa, of which approximately 1.5 million will be associated with HIV infection.

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Editorial Note: The estimates of current TB incidence in this report, which are based primarily on notification data, are similar to those produced by other methods and document the substantial public health burden of TB in developing countries (*7,8*). Moreover, because TB cases are generally underreported, estimates of incidence based on notification data are likely conservative. Similarly, estimates of TB mortality should be considered to be conservative (*8*): earlier estimates used a case-fatality rate of 50% for HIV-associated cases, while the current estimate did not assume that mortality was different between HIV-positive and HIV-negative persons. Because TB mortality is highly related to case finding and treatment, projections beyond 2000 were not made.

The use of short-course therapy in well-managed national TB programs has reduced TB-associated morbidity, even under the most adverse circumstances (e.g., in countries with high prevalences of HIV infection) (*9*). The use of this intervention for persons with smear-positive TB is also among the most cost-effective health interventions available (*10*). The potential benefits of these and other strategies for TB control should be evaluated by those countries most severely affected by TB and by donor countries and organizations that invest in health-care programs in countries with high rates of TB.

Tuberculosis — Continued

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Notice to Readers

Food and Drug Administration Approval of Use of *Haemophilus influenzae* Type b Conjugate Vaccine Reconstituted with Diphtheria-Tetanus-Pertussis Vaccine for Infants and Children

Haemophilus influenzae type b (Hib) conjugate vaccines have been recommended for use in infants since 1990, and their routine use in infant vaccination has contributed to the substantial decline in the incidence of Hib disease in the United States (*1–3*). Vaccines against diphtheria, tetanus, and pertussis during infancy and childhood have been administered routinely in the United States since the late 1940s and have been associated with a more than 90% reduction in morbidity and mortality caused by infection with these organisms. Because of the increasing number of vaccines now routinely recommended for infants, a high priority has been placed on the development of combined vaccines that allow simultaneous administration with fewer separate injections. One product combining Hib conjugate vaccine with diphtheria and tetanus toxoids and whole-cell pertussis vaccine had been licensed by the Food and Drug Administration (FDA) (*4*).

On November 18, 1993, the FDA approved the reconstitution of the previously licensed Hib conjugate vaccine (tetanus toxoid conjugate) (PRP-T), with a previously licensed diphtheria and tetanus toxoids and whole-cell pertussis vaccine (DTP), allowing simultaneous vaccination for Hib disease, diphtheria, tetanus, and pertussis in a single injection. PRP-T, manufactured by Pasteur Merieux Serums and Vaccines and distributed by Connaught Laboratories, Inc. (CLI) (Swiftwater, Pennsylvania) as

Notice to Readers — Continued

ActHIB™ *, and by SmithKline Beecham (Philadelphia) as OmniHIB™, is now licensed to be reconstituted with DTP manufactured by CLI. ActHIB™ is distributed as 10 single-dose vials of lyophilized PRP-T, packaged together with a multidose vial of CLI DTP for reconstitution. *Other licensed formulations of DTP have not been approved by FDA for reconstitution of PRP-T vaccine and may not be used for that purpose.*

PRP-T reconstituted with CLI DTP has been licensed for use in children aged 2 months–5 years for protection against diphtheria, tetanus, pertussis, and Hib disease. Previously unvaccinated younger children should receive doses of the PRP-T-CLI DTP combination at ages 2, 4, 6, and 15–18 months. Based on comparable antibody responses to each of the components of the vaccine, PRP-T reconstituted with CLI DTP is expected to provide protection against Hib disease, as well as diphtheria, tetanus, and pertussis, equivalent to that of already licensed formulations of other DTP and Hib conjugate vaccines.

The Advisory Committee on Immunization Practices (ACIP) recommends that all infants receive a primary series of one of the licensed Hib conjugate vaccines beginning at age 2 months and a booster dose at age 12–15 months (*5*). The ACIP also recommends that all infants receive a four-dose primary series of diphtheria and tetanus toxoids and pertussis vaccine at ages 2, 4, 6, and 15 months and a booster dose at age 4–6 years (*6–8*).

Reported by: Office of Vaccines Research and Review, Center for Biologics Evaluation and Research, Food and Drug Administration. Childhood and Respiratory Diseases Br, Div of Bacterial and Mycotic Diseases, National Center for Infectious Diseases; National Immunization Program, CDC.

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Notice to Readers

Combined Issues of *MMWR*

A December 31, 1993, issue of *MMWR* will not be published. Following that, the next issue will be Volume 42, Numbers 51 and 52, dated January 7, 1994, and will include the figure and tables on notifiable diseases and deaths for the weeks ending December 25, 1993, and January 1, 1994.

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