CDC
CENTERS FOR DISEASE CONTROL AND PREVENTION

August 5, 1994 / Vol. 43 / No. 30

MMWR
MORBIDITY AND MORTALITY WEEKLY REPORT

Current Trends

Blood Lead Levels — United States, 1988–1991

Since the late 1970s, ongoing contamination of the U.S. environment by lead has been substantially reduced as major uses of lead in house paint, gasoline, water-distribution systems, and food cans have been eliminated or reduced (*1*). During the 1980s, blood lead data from both selected populations and convenience samples indicated a continuation of the decline in blood lead levels (BLLs) (*2*) observed during 1976–1980 during the Second National Health and Nutrition Examination Survey (NHANES II) (*3*). However, research during the past two decades has demonstrated adverse health effects at BLLs previously considered to be safe (*1*). This report summarizes estimates of BLLs in the U.S. population from Phase 1 of the Third National Health and Nutrition Examination Survey (NHANES III), compares these estimates to those from NHANES II, and examines demographic patterns of BLLs among children aged 1–5 years (*4,5*).

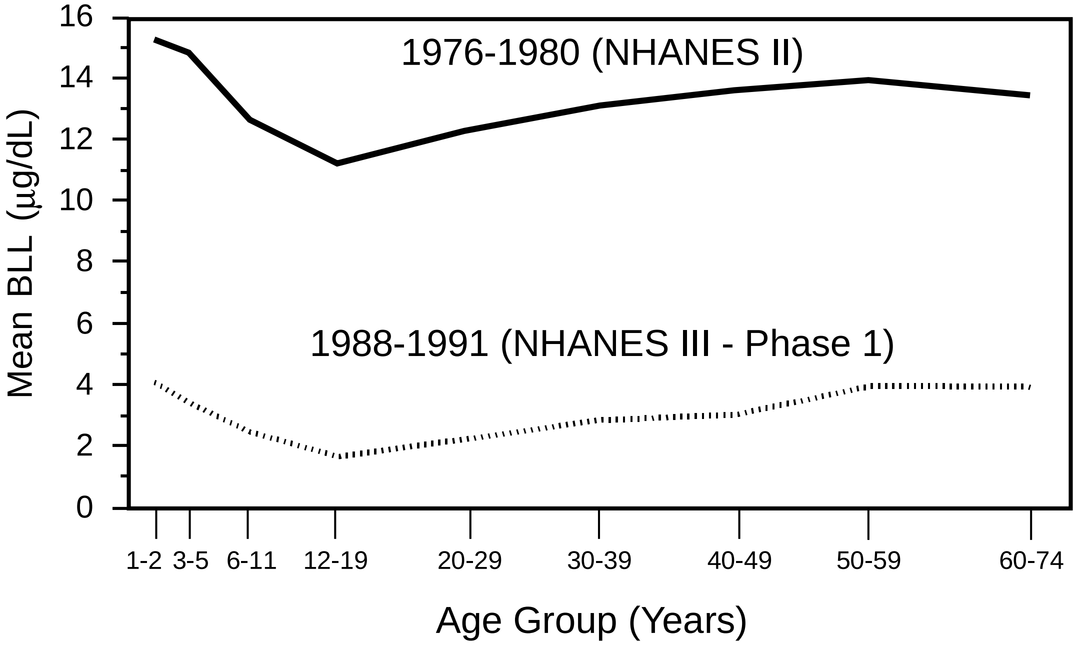
NHANES III is a population-based survey of the health and nutritional status of the civilian, noninstitutionalized U.S. population during 1988–1994. Phase 1 data were collected during October 1988–October 1991. Because blacks and Mexican-Americans* were oversampled, reliable prevalence estimates could be obtained for non-Hispanic black and non-Hispanic white persons and for Mexican-Americans but not for other racial/ethnic groups. Household interviews and physical examinations were conducted in a mobile examination center. A 1 mL sample of whole blood was obtained from each participant aged >1 year. Lead content in whole blood was measured by graphite furnace atomic absorption spectrophotometry at CDC. Lead levels below the limit of detection of 1 µg/dL were assigned a level of 0.5 µg/dL. Software for Survey Data Analysis (SUDAAN) was used to calculate estimated means, prevalences, and standard errors that accounted for the sample weights and complex sample design.

For the U.S. population, the geometric mean (GM) BLL during 1988–1991 was 2.8 µg/dL (95% confidence interval [CI]=2.7–3.0), a 78% decline in the estimated GM BLL since 1976–1980. The decrease in GM BLL was similar across age groups (Figure 1). As a result, the cross-sectional age trend in GM BLLs remained virtually unchanged: the highest GM BLLs were among persons aged 1–2 years (4.1 µg/dL), and

*Persons residing in survey-sample households who reported their national origin or ancestry as Mexican/Mexican-American.

Blood Lead Levels — Continued

FIGURE 1. Geometric mean blood lead levels (BLLs) for persons aged <75 years, by age group — National Health and Nutrition Examination Survey (NHANES) II and III–Phase 1, United States, 1976–1980 and 1988–1991



the lowest were among persons aged 12–19 years (1.6 µg/dL). Among persons aged 20–74 years, GM BLL levels increased gradually with age.

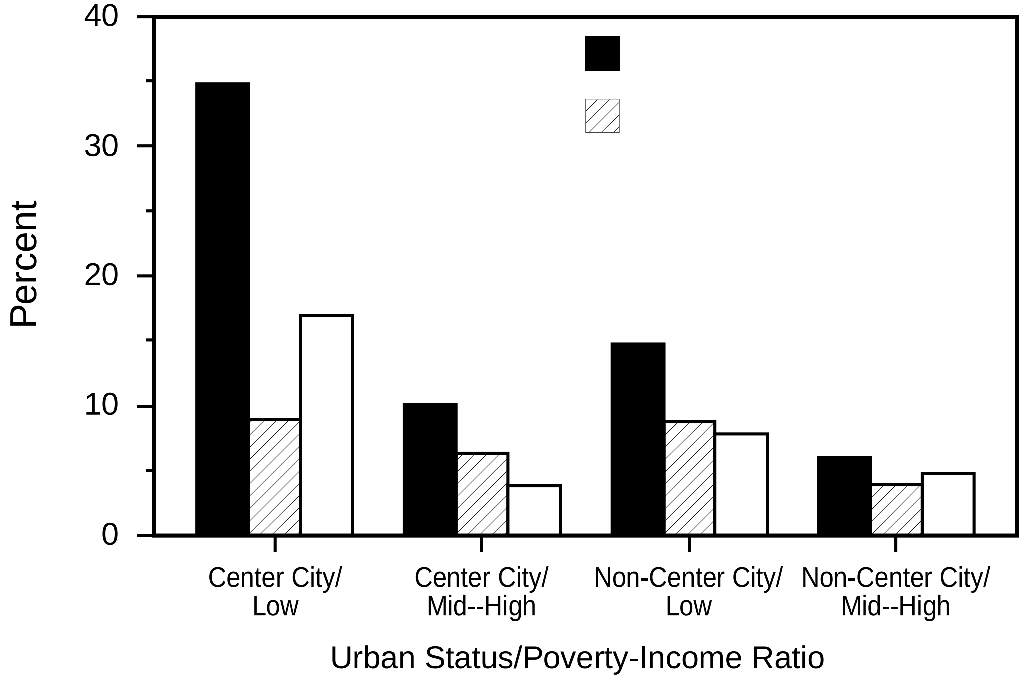
The prevalence of BLLs ≥10 µg/dL among children aged 1–5 years decreased substantially, from 88.2% during NHANES II to 8.9% during NHANES III, Phase 1. The prevalence of elevated BLLs varied by race/ethnicity, income, and residence (Figure 2). For example, an estimated 35% of non-Hispanic black children who were poor (i.e., household income less than 1.3 times the poverty level[†]) and lived in the central city of a standard metropolitan statistical area had BLLs ≥10 µg/dL, compared with 5% of nonpoor, non-Hispanic white children living outside of central cities.

The prevalences of BLLs exceeding higher thresholds among children also decreased. In NHANES II, 53% of children aged 1–5 years had BLLs ≥15 µg/dL, and 9.3% had BLLs ≥25 µg/dL. In NHANES III, the prevalences of children exceeding these same levels decreased to 2.7% (90% CI=1.7%–3.8%) and 0.5% (90% CI=0.1%–0.9%), respectively.

Reported by: Div of Health Examination Statistics, National Center for Health Statistics; Div of Environmental Health Laboratory Sciences and Div of Environmental Hazards and Health Effects, National Center for Environmental Health, CDC.

Editorial Note: The findings in this report indicate that the reduction in lead exposure documented during the late 1970s (*3*) continued during the 1980s. Reduction in at least two exposure sources probably contributed most to this decline. First, the amount of lead used in gasoline declined by 99.8% from 1976 to 1990 (*6*). Second, the

[†]Poverty statistics are based on definitions originated by the Social Security Administration in 1964, subsequently modified by the federal interagency committees in 1969 and 1980, and prescribed by the Office of Management and Budget as the standard to be used by federal agencies for statistical purposes.



percentage of food and soft-drink cans manufactured in the United States that contained lead solder declined from 47% in 1980 to 0.9% in 1990 (*7*); these two source reductions have been associated with a reduction of lead in the typical U.S. diet (*8*). In addition, reduction in leaded gasoline probably has resulted in the reduction of the lead content of dust in and around homes.

Other factors contributing to reduced lead exposure include the ban on leaded paint for residential use, promulgation of a standard for lead exposure in industry, the ban on lead-containing solder in household plumbing, ongoing screening of children and educational efforts, and lead paint abatement programs in some jurisdictions. In addition, the number of occupied dwellings built before 1940, when lead-based paint was commonly used, decreased from 24.2 million (30.3% of dwellings) in 1980 to 20.8 million (22.2% of dwellings) in 1989 (*9,10*). The impact of these changes on BLLs, although substantial for selected persons and subpopulations, is unclear for the population as a whole.

Because the developing nervous system is particularly sensitive to lead toxicity, reducing lead exposure among infants, toddlers, and preschool children is of particular concern. The findings in this report indicate that, despite a dramatic decline in lead exposure among children, approximately 1.7 million children aged 1–5 years still have

Blood Lead Levels — Continued

BLLs at a level (i.e., ≥10 µg/dL) that can affect cognitive development (*1*). Poor, non-Hispanic black children, who reside disproportionately in center cities, are at increased risk for harmful BLLs. The demographic pattern of elevated BLLs in children probably reflects, in part, the distribution of two remaining reservoirs of lead contamination: 1) deteriorated leaded paint in older housing and 2) urban soil and dust contaminated by past emissions of leaded gasoline and by exterior paint on dwellings and other structures (*1*).

Further reduction in BLLs among children will require reducing exposure to lead from these reservoirs, including programs to safely correct lead hazards in housing and to reduce contact with lead-contaminated soil and dust. In addition, continued enforcement of existing standards to reduce lead exposure from other sources (e.g., drinking water and contaminated dust brought home by lead-exposed workers) should continue. Because elimination of remaining lead exposure sources will take many years, ongoing education of the public is needed about sources of lead exposure and how to avoid them. Finally, young children should be screened according to CDC guidelines to identify those children who develop BLLs high enough to require individualized environmental and medical intervention.

References

1. CDC. Preventing lead poisoning in young children: a statement by the Centers for Disease Control. Atlanta: US Department of Health and Human Services, Public Health Service, 1991.
2. Hayes DB, McElvaine MD, Orbach HG, Fernandez AM, Lyne S, Matte TD. Long-term trends in blood lead levels among children in Chicago: relationship to air lead levels. Pediatr 1994;93:195–200.
3. Annest JL, Pirkle JL, Makuc D, Neese JW, Bayse DD, Kovar MG. Chronological trend in blood lead levels between 1976 and 1980. N Engl J Med 1983;308:1373–7.
4. Brody DJ, Pirkle JL, Kramer RA, et al. Blood lead levels in the U.S. population from Phase 1 of the Third National Health and Nutrition Examination Surveys. JAMA 1994;272:277–83.
5. Pirkle JL, Brody DJ, Gunter EW, et al. The decline in blood lead levels in the United States: the National Health and Nutrition Examination Surveys. JAMA 1994;272:284–91.
6. US Environmental Protection Agency. Quarterly summary of lead phasedown reporting data. Washington, DC: US Environmental Protection Agency, Office of Mobile Sources, Office of Air and Radiation, 1991.
7. Can Manufacturers Institute. Food and soft drink can shipments. Washington, DC: Can Manufacturers Institute, 1992.
8. Bolger PM, Carrington CD, Capar SG, Adams MA. Reductions in dietary lead exposure in the United States. Chemical Speciation and Bioavailability 1992;3:31–6.
9. US Department of Commerce/US Department of Housing and Urban Development. Annual housing survey, 1980: part A. General housing characteristics. Washington, DC: US Department of Housing and Urban Development, 1982. (Current housing reports; series H-150-80).
10. US Department of Commerce/US Department of Housing and Urban Development. American housing survey for the United States in 1989. Washington, DC: US Department of Housing and Urban Development, 1991. (Current housing reports; series H-150-89).

Emerging Infectious Diseases

Hantavirus Pulmonary Syndrome — Northeastern United States, 1994

On January 20, 1994, a 22-year-old Rhode Island man died of acute respiratory distress approximately 5 hours after hospitalization. This report summarizes the case investigation.

Hantavirus — Continued

The man had sought care at an emergency department in Rhode Island on January 18 complaining of chills and diffuse myalgias and arthralgias. On evaluation in the emergency department, he had a temperature of 100.8 F (38.2 C). His complete blood count (CBC) showed a normal platelet count of 199,000/mm^3, a hematocrit of 40.5%, and a white blood cell count of 3600/mm^3 with 36% bands. An acute febrile illness with leukopenia was diagnosed, and he was discharged to outpatient follow-up. On January 20, he returned to the emergency department with fever (101.4 F [38.6 C]), increasing shortness of breath, and cyanosis. He was hypotensive and hypoxemic, and bilateral pulmonary infiltrates were present on chest radiograph. His CBC showed thrombocytopenia (61,000/mm^3), elevated hematocrit (50.2%), and a white blood cell count of 17,400/mm^3 with 41% bands. His clinical condition deteriorated rapidly, and he required mechanical ventilation for respiratory distress. He died later that day.

Because a diagnosis was not established and because the death occurred less than 24 hours after admission, the case was reported to the Rhode Island state medical examiner's office. The medical examiner's office forwarded postmortem blood specimens for evaluation for hantavirus infection to CDC. Using an enzyme-linked immunoglobulin M (IgM) capture immunosorbent assay (ELISA), elevated hantavirus IgM titers were found for the Muerto Canyon virus (MCV) (proposed to be renamed Sin Nombre virus). Postmortem tissue samples were positive for hantavirus antigens by immunohistochemistry. An MCV-like viral sequence was amplified from lung, spleen, liver, and heart tissues by reverse transcription and polymerase chain reaction (RT-PCR). A postmortem diagnosis of hantavirus pulmonary syndrome (HPS) was made. An investigation was conducted by state, county, and city health departments in New York and Rhode Island in conjunction with CDC to characterize the illness and identify the site of exposure and the local rodent reservoir for the virus.

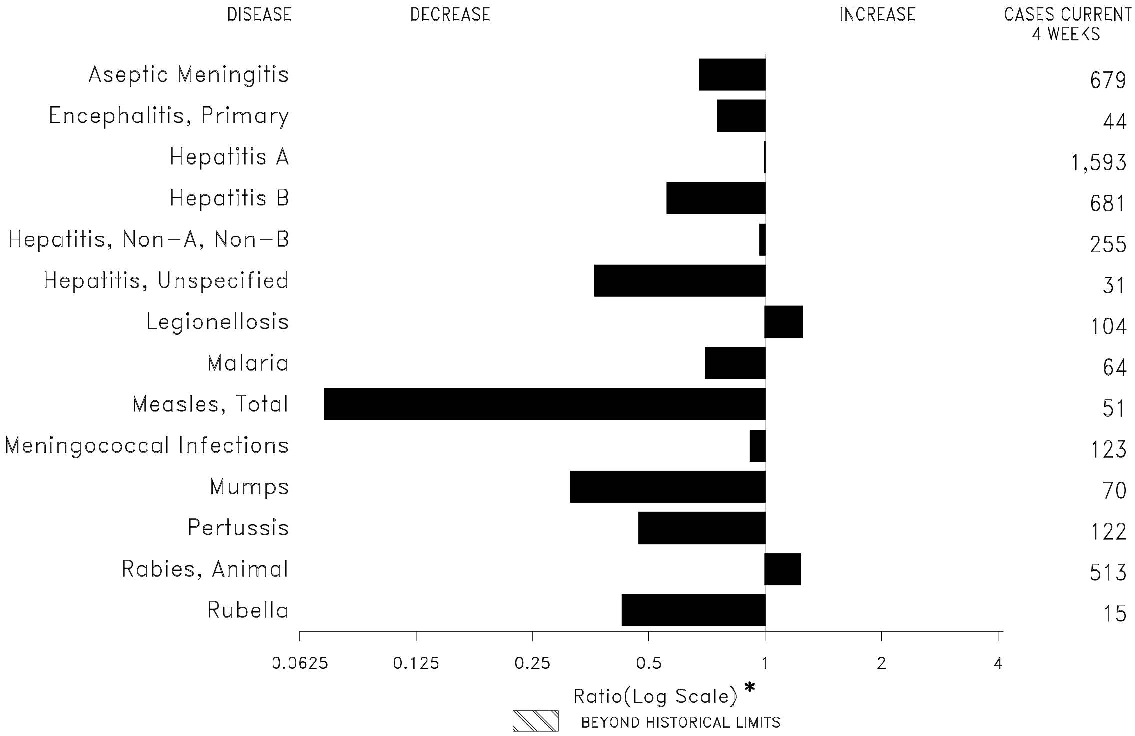
The patient had not traveled outside the Northeast within the 2 months before his death; he had spent December 1993 and January 1994 in New York and Rhode Island. Epidemiologic and environmental investigations identified multiple possible exposure sites, including two warehouses in Queens, New York; a vacation home on Shelter Island (Long Island); and his family's residence on Long Island. These sites had a history of rodent infestation within the past 6 months but had no evidence of current rodent activity. The patient's apartment in Rhode Island had no history or evidence of rodent infestation. He had spent 2 weeks in December 1993 cleaning portions of one of the warehouses in Queens, which had been unused for more than 10 years. No other persons were involved in this activity.

Testing was conducted on serum specimens from 64 persons with exposures similar to that of the patient, including family, co-workers, and factory workers; no additional cases were identified. Rodents were captured at all suspected exposure sites (a total of 19 rodents from all suspected New York sites and 91 from Rhode Island), but none were seropositive for hantavirus. Trapping will be resumed later in 1994.

Reported by: B Mojica, MD, K Henning, MD, E Bell, New York City Dept of Health; A Greenberg, MD, R Edstrom, MD, B Smith, Nassau County Dept of Health, Mineola, Long Island; G Birkhead, MD, S Kondracki, D White, PhD, New York State Dept of Health. U Bandy, MD, E Laposata, MD, M Rittmann, W Combs, PhD, B Matyas, MD, State Epidemiologist, Rhode Island Dept of Health. Div of Vector-Borne Infectious Diseases and Div of Viral and Rickettsial Diseases, National Center for Infectious Diseases; Div of Field Epidemiology, Epidemiology Program Office, CDC.

(Continued on page 555)

FIGURE I. Notifiable disease reports, comparison of 4-week totals ending July 30, 1994, 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 — cases of specified notifiable diseases, United States, cumulative, week ending July 30, 1994 (30th Week)

	Cum. 1994		Cum. 1994
AIDS*	45,801	Measles: imported	150
Anthrax	-	indigenous	627
Botulism: Foodborne	37	Plague	9
Infant	40	Poliomyelitis, Paralytic§	-
Other	7	Psittacosis	23
Brucellosis	53	Rabies, human	-
Cholera	9	Syphilis, primary & secondary	12,307
Congenital rubella syndrome	3	Syphilis, congenital, age < 1 year¶	532
Diphtheria	-	Tetanus	21
Encephalitis, post-infectious	69	Toxic shock syndrome	118
Gonorrhea	212,895	Trichinosis	26
Haemophilus influenzae (invasive disease)†	705	Tuberculosis	12,113
Hansen Disease	64	Tularemia	43
Leptospirosis	16	Typhoid fever	213
Lyme Disease	3,765	Typhus fever, tickborne (RMSF)	187

*Updated monthly; last update July 26, 1994.
†Of 664 cases of known age, 189 (28%) were reported among children less than 5 years of age.
§No cases of suspected poliomyelitis have been reported in 1994; 3 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.
¶Total through first quarter 1994.

TABLE II. Cases of selected notifiable diseases, United States, weeks ending July 30, 1994, and July 31, 1993 (30th 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. 1994	Cum. 1994	Cum. 1994	Cum. 1994	Cum. 1994	Cum. 1993	Cum. 1994	Cum. 1994	Cum. 1994	Cum. 1994	Cum. 1994	Cum. 1994
UNITED STATES	45,801	3,595	325	69	212,895	226,243	12,101	6,542	2,456	256	857	3,765
NEW ENGLAND	1,811	119	9	4	4,599	4,212	183	229	85	15	25	1,227
Maine	70	17	1	-	52	50	17	10	-	-	2	6
N.H.	37	14	-	2	65	39	11	15	7	-	-	12
Vt.	21	10	-	-	16	15	4	-	-	-	-	3
Mass.	934	41	6	1	1,705	1,688	77	153	62	14	17	114
R.I.	146	37	2	1	272	224	14	5	16	1	6	174
Conn.	603	-	-	-	2,489	2,196	60	46	-	-	-	918
MID. ATLANTIC	13,256	265	26	11	23,351	25,604	765	688	275	4	129	1,901
Upstate N.Y.	1,145	130	15	2	5,681	5,271	365	237	137	2	30	1,220
N.Y. City	8,180	20	1	1	7,812	7,880	154	72	-	-	-	9
N.J.	2,786	-	-	-	2,637	3,041	160	201	112	-	15	326
Pa.	1,145	115	10	8	7,221	9,412	86	178	26	2	84	346
E.N. CENTRAL	3,645	541	84	14	41,327	46,521	1,153	681	194	6	254	52
Ohio	649	131	22	1	13,147	12,070	415	102	14	-	119	36
Ind.	389	84	4	1	4,800	4,679	218	117	10	-	56	8
Ill.	1,759	105	28	5	9,842	16,326	266	132	40	3	13	3
Mich.	650	214	26	7	9,837	9,831	154	232	127	3	50	5
Wis.	198	7	4	-	3,701	3,615	100	98	3	-	16	-
W.N. CENTRAL	981	197	19	4	11,157	12,499	576	353	103	8	82	72
Minn.	256	15	2	-	1,821	1,347	120	40	14	1	1	29
Iowa	51	52	-	-	749	1,000	29	17	7	6	25	4
Mo.	431	77	7	3	6,561	7,328	256	259	63	1	38	28
N. Dak.	18	1	2	-	18	30	2	-	-	-	4	-
S. Dak.	10	-	2	-	104	161	17	-	-	-	-	-
Nebr.	57	8	4	1	-	484	80	18	8	-	12	8
Kans.	158	44	2	-	1,904	2,149	72	19	11	-	2	3
S. ATLANTIC	10,074	809	63	23	58,539	58,746	790	1,469	393	25	199	374
Del.	163	15	-	-	853	795	11	4	1	-	-	6
Md.	1,284	103	14	2	10,652	8,924	104	198	21	5	56	175
D.C.	879	24	-	1	4,185	2,777	16	32	-	-	8	3
Va.	725	118	16	5	6,228	6,882	91	71	18	3	5	46
W. Va.	27	13	2	-	416	341	6	23	21	-	1	10
N.C.	719	117	30	1	15,382	14,418	69	166	37	-	13	43
S.C.	665	20	-	-	7,342	6,032	25	22	3	-	9	6
Ga.	1,186	35	1	-	-	4,660	23	503	153	-	75	78
Fla.	4,426	364	-	14	13,481	13,917	445	450	139	17	32	7
E.S. CENTRAL	1,239	248	23	2	25,352	25,514	277	629	464	2	39	24
Ky.	207	74	9	1	2,710	2,668	98	51	15	-	6	13
Tenn.	390	39	10	-	7,747	7,924	105	533	441	1	21	8
Ala.	366	108	4	1	8,904	9,130	51	45	8	1	9	3
Miss.	276	27	-	-	5,991	5,792	23	-	-	-	3	-
W.S. CENTRAL	4,667	415	25	2	27,201	25,298	1,782	798	290	50	25	63
Ark.	160	28	-	-	4,008	3,606	46	14	4	1	5	3
La.	740	19	3	-	7,237	6,726	84	106	82	1	6	-
Okla.	183	-	-	-	2,342	2,654	155	184	170	1	10	32
Tex.	3,584	368	22	2	13,614	12,312	1,497	494	34	47	4	28
MOUNTAIN	1,405	127	6	3	4,924	6,532	2,394	364	258	33	58	6
Mont.	17	1	-	-	44	35	15	18	5	-	14	-
Idaho	30	3	-	-	46	112	190	58	55	1	1	1
Wyo.	13	2	1	2	47	54	14	14	84	-	3	1
Colo.	529	51	1	-	1,576	2,163	311	58	41	10	14	-
N. Mex.	106	6	-	-	541	538	675	126	38	8	2	3
Ariz.	380	38	-	-	1,896	2,489	782	23	8	8	3	-
Utah	93	11	-	1	162	71	267	36	16	1	7	1
Nev.	237	15	4	-	612	1,070	140	31	11	5	14	-
PACIFIC	8,723	874	70	6	16,445	21,317	4,181	1,331	394	113	46	46
Wash.	588	-	-	-	1,595	2,246	222	40	42	1	5	-
Oreg.	386	-	-	-	518	737	242	26	6	1	-	-
Calif.	7,613	785	69	5	13,453	17,697	3,549	1,233	341	109	38	46
Alaska	29	14	1	-	480	306	134	8	-	-	-	-
Hawaii	107	75	-	1	399	331	34	24	5	2	3	-
Guam	1	9	-	-	77	64	16	2	-	4	2	-
P.R.	1,424	21	-	3	301	285	39	194	83	6	-	-
V.I.	34	-	-	-	11	66	-	1	-	-	-	-
Amer. Samoa	-	-	-	-	18	30	4	-	-	-	-	-
C.N.M.I.	-	-	-	-	25	50	3	-	-	-	-	-

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

*Updated monthly; last update July 26, 1994.

TABLE II. (Cont'd.) Cases of selected notifiable diseases, United States, weeks ending July 30, 1994, and July 31, 1993 (30th Week)

Reporting Area	Malaria	Measles (Rubeola)					Menin-gococcal Infections	Mumps		Pertussis			Rubella		
		Indigenous		Imported*		Total									
	Cum. 1994	1994	Cum. 1994	1994	Cum. 1994	Cum. 1993	Cum. 1994	1994	Cum. 1994	1994	Cum. 1994	Cum. 1993	1994	Cum. 1994	Cum. 1993
UNITED STATES	512	1	627	2	150	225	1,694	7	827	28	1,761	2,247	3	206	140
NEW ENGLAND	41	-	12	-	10	57	85	-	14	5	172	436	-	125	1
Maine	2	-	1	-	3	-	13	-	3	-	2	6	-	-	1
N.H.	3	-	1	-	-	-	6	-	4	4	42	109	-	-	-
Vt.	1	-	1	-	1	31	2	-	-	-	27	52	-	-	-
Mass.	18	-	2	-	4	16	34	-	-	-	78	225	-	122	-
R.I.	5	-	4	-	2	1	-	-	1	1	5	4	-	2	-
Conn.	12	-	3	-	-	9	30	-	6	-	18	40	-	1	-
MID. ATLANTIC	72	-	165	-	22	13	163	1	72	1	318	269	-	11	46
Upstate N.Y.	26	-	25	-	3	1	59	1	21	1	125	96	-	8	11
N.Y. City	15	-	14	-	2	4	11	-	5	-	65	21	-	1	16
N.J.	17	-	122	-	14	8	37	-	6	-	8	43	-	2	15
Pa.	14	-	4	-	3	-	56	-	40	-	120	109	-	-	4
E.N. CENTRAL	55	-	59	-	40	21	265	-	137	9	260	529	-	11	3
Ohio	8	-	15	-	-	7	74	-	41	7	98	128	-	-	1
Ind.	11	-	-	-	1	-	44	-	6	-	40	39	-	-	1
Ill.	20	-	17	-	38	9	88	-	55	-	51	162	-	3	-
Mich.	14	-	24	-	1	5	34	-	31	2	25	21	-	8	-
Wis.	2	-	3	-	-	-	25	-	4	-	46	179	-	-	1
W.N. CENTRAL	26	-	116	-	42	3	116	1	39	-	83	146	-	2	1
Minn.	8	-	-	-	-	-	10	-	4	-	39	64	-	-	-
Iowa	4	-	6	-	1	-	13	-	10	-	6	1	-	-	-
Mo.	10	-	108	-	40	1	57	1	21	-	21	57	-	2	1
N. Dak.	1	-	-	-	-	-	1	-	2	-	4	3	-	-	-
S. Dak.	-	-	-	-	-	-	7	-	-	-	1	3	-	-	-
Nebr.	2	-	1	-	1	-	8	-	2	-	5	7	-	-	-
Kans.	1	-	1	-	-	2	20	-	-	-	7	11	-	-	-
S. ATLANTIC	103	-	45	-	4	22	291	-	131	2	190	210	-	9	6
Del.	3	-	-	-	-	-	4	-	-	-	1	4	-	-	-
Md.	47	-	1	-	2	4	24	-	35	-	58	70	-	-	2
D.C.	8	-	-	-	-	-	3	-	-	-	4	2	-	-	-
Va.	12	-	1	-	1	1	50	-	29	-	17	24	-	-	-
W. Va.	-	-	36	-	-	-	11	-	3	-	2	5	-	-	-
N.C.	2	-	2	-	1	-	42	-	35	2	52	35	-	-	-
S.C.	2	-	-	-	-	-	12	-	6	-	10	8	-	-	-
Ga.	13	-	2	-	-	-	58	-	8	-	14	19	-	-	-
Fla.	16	-	3	-	-	17	87	-	15	-	32	43	-	9	4
E.S. CENTRAL	19	-	28	-	-	1	111	-	15	5	94	101	-	-	-
Ky.	6	-	-	-	-	-	29	-	-	-	52	15	-	-	-
Tenn.	7	-	28	-	-	-	25	-	6	1	18	43	-	-	-
Ala.	5	-	-	-	-	1	51	-	3	4	20	35	-	-	-
Miss.	1	-	-	-	-	-	6	-	6	-	4	8	-	-	-
W.S. CENTRAL	24	-	9	-	7	5	220	-	177	-	66	55	-	12	16
Ark.	2	-	-	-	1	-	35	-	1	-	12	3	-	-	-
La.	4	-	-	-	1	1	26	-	20	-	9	6	-	-	1
Okla.	2	-	-	-	-	-	22	-	23	-	21	27	-	4	1
Tex.	16	-	9	-	5	4	137	-	133	-	24	19	-	8	14
MOUNTAIN	21	-	144	2	17	2	114	1	54	3	193	171	-	6	6
Mont.	-	-	-	-	-	-	4	-	-	-	3	1	-	-	-
Idaho	2	U	-	U	-	-	15	U	7	U	23	36	U	1	1
Wyo.	1	-	-	-	-	-	5	-	1	-	-	1	-	-	-
Colo.	9	-	16	-	3	2	22	-	1	-	106	64	-	-	1
N. Mex.	3	-	-	-	-	-	11	N	N	3	15	23	-	1	-
Ariz.	1	-	-	-	1	-	39	-	24	-	34	30	-	-	-
Utah	4	-	128	2†	2	-	13	1	11	-	10	16	-	3	3
Nev.	1	-	-	-	11	-	5	-	9	-	2	-	-	1	1
PACIFIC	151	1	49	-	8	101	329	4	188	3	385	330	3	30	61
Wash.	5	-	-	-	-	-	23	-	6	-	17	25	-	-	-
Oreg.	7	-	-	-	-	2	51	N	N	-	28	20	-	-	2
Calif.	127	1	46	-	6	83	247	4	170	1	329	278	2	26	35
Alaska	-	-	3	-	-	-	2	-	2	-	-	3	-	1	1
Hawaii	12	-	-	-	2	16	6	-	10	2	11	4	1	3	23
Guam	2	U	211	U	-	2	1	U	4	U	-	-	U	1	-
P.R.	2	-	13	-	-	311	6	-	2	-	1	1	-	-	-
V.I.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Amer. Samoa	-	U	-	U	-	1	-	U	1	U	1	2	U	-	-
C.N.M.I.	1	U	26	U	-	1	-	U	2	U	-	-	U	-	-

*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 July 30, 1994, and July 31, 1993 (30th Week)

Reporting Area	Syphilis (Primary & Secondary)		Toxic-Shock Syndrome	Tuberculosis		Tula-remia	Typhoid Fever	Typhus Fever (Tick-borne) (RMSF)	Rabies, Animal
	Cum. 1994	Cum. 1993	Cum. 1994	Cum. 1994	Cum. 1993	Cum. 1994	Cum. 1994	Cum. 1994	Cum. 1994
UNITED STATES	12,307	15,415	118	12,113	12,356	43	213	187	3,496
NEW ENGLAND	133	212	2	264	270	-	16	9	1,058
Maine	4	3	-	-	5	-	-	-	-
N.H.	3	21	-	14	15	-	-	-	100
Vt.	-	1	1	3	3	-	-	-	92
Mass.	54	94	1	134	148	-	12	7	405
R.I.	11	8	-	31	36	-	1	-	5
Conn.	61	85	-	82	63	-	3	2	456
MID. ATLANTIC	781	1,474	21	2,203	2,672	1	51	3	349
Upstate N.Y.	92	133	11	112	399	1	6	1	79
N.Y. City	346	773	-	1,461	1,579	-	31	-	-
N.J.	120	202	-	441	293	-	14	-	166
Pa.	223	366	10	189	401	-	-	2	104
E.N. CENTRAL	1,607	2,582	24	1,213	1,304	4	39	26	26
Ohio	670	689	8	189	179	1	5	15	-
Ind.	142	219	2	98	129	1	4	3	7
Ill.	442	1,012	5	620	694	-	19	6	4
Mich.	173	374	9	270	248	1	4	2	9
Wis.	180	288	-	36	54	1	7	-	6
W.N. CENTRAL	695	1,000	17	307	255	16	1	14	120
Minn.	28	42	1	65	31	1	-	-	13
Iowa	33	47	7	28	37	-	-	1	53
Mo.	604	802	5	141	126	10	1	6	10
N. Dak.	-	2	-	5	5	-	-	-	5
S. Dak.	-	2	-	16	10	1	-	6	14
Nebr.	-	10	2	10	15	1	-	1	-
Kans.	30	95	2	42	31	3	-	-	25
S. ATLANTIC	3,523	4,023	6	2,272	2,343	1	34	90	1,204
Del.	13	78	-	-	25	-	1	-	29
Md.	139	230	-	174	218	-	5	8	330
D.C.	142	218	-	67	95	-	1	-	2
Va.	394	361	1	203	267	-	5	8	224
W. Va.	8	7	-	50	47	-	-	2	46
N.C.	1,011	1,128	1	259	286	-	-	32	101
S.C.	442	604	-	217	246	-	-	5	109
Ga.	879	684	-	515	437	1	2	32	233
Fla.	495	713	4	787	722	-	20	3	130
E.S. CENTRAL	2,163	2,223	2	747	884	-	2	14	111
Ky.	124	187	1	194	217	-	1	4	8
Tenn.	563	637	1	207	250	-	1	7	34
Ala.	397	492	-	244	275	-	-	1	69
Miss.	1,079	907	-	102	142	-	-	2	-
W.S. CENTRAL	2,814	2,965	1	1,611	1,308	13	9	21	432
Ark.	300	332	-	167	104	12	-	4	15
La.	1,041	1,426	-	14	88	-	3	-	47
Okla.	91	200	1	165	92	1	1	14	24
Tex.	1,382	1,007	-	1,265	1,024	-	5	3	346
MOUNTAIN	164	141	5	287	310	7	8	10	63
Mont.	3	1	-	9	13	3	-	4	-
Idaho	1	-	1	10	8	-	-	-	2
Wyo.	-	5	-	5	2	-	-	2	14
Colo.	85	39	2	21	52	1	3	3	7
N. Mex.	15	21	-	43	35	1	-	-	2
Ariz.	31	60	-	132	126	-	1	1	29
Utah	6	1	2	23	14	1	2	-	6
Nev.	23	14	-	44	60	1	2	-	3
PACIFIC	427	795	40	3,209	3,010	1	53	-	133
Wash.	36	34	-	165	149	-	3	-	-
Oreg.	20	32	-	92	-	1	1	-	-
Calif.	367	722	37	2,756	2,667	-	47	-	104
Alaska	3	5	-	33	36	-	-	-	29
Hawaii	1	2	3	163	158	-	2	-	-
Guam	4	2	-	58	34	-	1	-	-
P.R.	178	323	-	73	132	-	-	-	49
V.I.	22	31	-	-	2	-	-	-	-
Amer. Samoa	1	-	-	3	2	-	1	-	-
C.N.M.I.	1	3	-	22	19	-	1	-	-

U: Unavailable

TABLE III. Deaths in 121 U.S. cities,* week ending July 30, 1994 (30th Week)

Reporting Area	All Causes, By Age (Years)						P&I† Total
	All Ages	≥65	45-64	25-44	1-24	<1	
NEW ENGLAND	597	424	91	52	11	18	37
Boston, Mass.	179	113	30	21	4	11	16
Bridgeport, Conn.	24	19	3	1	-	1	3
Cambridge, Mass.	28	21	4	2	-	-	3
Fall River, Mass.	22	20	2	-	-	-	-
Hartford, Conn.	45	32	5	5	1	2	-
Lowell, Mass.	38	21	13	4	-	-	1
Lynn, Mass.	16	14	1	1	-	-	2
New Bedford, Mass.	33	27	4	2	-	-	3
New Haven, Conn.	33	24	4	3	1	1	1
Providence, R.I.	44	32	10	1	1	-	1
Somerville, Mass.	6	6	-	-	-	-	-
Springfield, Mass.	34	27	2	4	-	1	-
Waterbury, Conn.	28	23	1	4	-	-	1
Worcester, Mass.	67	45	12	4	4	2	6
MID. ATLANTIC	2,495	1,620	452	306	69	48	92
Albany, N.Y.	41	26	10	1	1	3	2
Allentown, Pa.	26	18	4	4	-	-	-
Buffalo, N.Y.	101	74	18	4	4	1	1
Camden, N.J.	22	13	2	4	2	1	-
Elizabeth, N.J.	20	14	3	1	2	-	1
Erie, Pa.§	40	25	8	7	-	-	1
Jersey City, N.J.	46	29	8	6	2	1	1
New York City, N.Y.	1,308	817	237	195	38	21	34
Newark, N.J.	45	21	8	12	4	-	2
Paterson, N.J.	12	5	5	2	-	-	-
Philadelphia, Pa.	399	260	77	44	7	11	32
Pittsburgh, Pa.§	65	38	13	7	4	3	2
Reading, Pa.	17	13	3	-	1	-	1
Rochester, N.Y.	130	92	25	10	2	1	8
Schenectady, N.Y.	28	24	2	2	-	-	2
Scranton, Pa.§	31	25	6	-	-	-	-
Syracuse, N.Y.	94	72	16	2	1	3	3
Trenton, N.J.	30	20	4	3	-	3	-
Utica, N.Y.	19	16	1	1	1	-	-
Yonkers, N.Y.	21	18	2	1	-	-	2
E.N. CENTRAL	2,108	1,245	434	217	139	73	103
Akron, Ohio	60	38	14	4	2	2	-
Canton, Ohio	37	29	5	3	-	-	1
Chicago, Ill.	446	147	93	95	98	13	24
Cincinnati, Ohio	174	113	36	6	3	16	8
Cleveland, Ohio	140	86	33	10	6	5	1
Columbus, Ohio	149	111	25	7	3	3	19
Dayton, Ohio	104	64	26	8	3	3	3
Detroit, Mich.	220	118	58	27	10	7	7
Evansville, Ind.	63	37	8	15	-	3	2
Fort Wayne, Ind.	56	44	6	5	1	-	4
Gary, Ind.	20	7	9	2	1	1	-
Grand Rapids, Mich.	58	43	10	1	2	2	7
Indianapolis, Ind.	166	109	36	12	4	5	6
Madison, Wis.	47	27	13	4	-	3	2
Milwaukee, Wis.	111	85	16	4	2	4	11
Peoria, Ill.	35	24	7	2	-	2	3
Rockford, Ill.	51	33	12	3	2	1	2
South Bend, Ind.	29	22	4	2	-	1	1
Toledo, Ohio	94	72	14	5	2	1	2
Youngstown, Ohio	48	36	9	2	-	1	-
W.N. CENTRAL	774	551	119	63	24	17	30
Des Moines, Iowa	43	32	8	3	-	-	3
Duluth, Minn.	35	26	3	2	1	3	3
Kansas City, Kans.	21	14	2	4	1	-	-
Kansas City, Mo.	112	80	23	3	4	2	5
Lincoln, Nebr.	39	25	6	5	3	-	3
Minneapolis, Minn.	204	145	31	22	5	1	7
Omaha, Nebr.	77	59	6	8	3	1	4
St. Louis, Mo.	134	93	23	6	5	7	2
St. Paul, Minn.	56	40	9	4	1	2	1
Wichita, Kans.	53	37	8	6	1	1	2
S. ATLANTIC	1,109	661	242	129	46	30	46
Atlanta, Ga.	151	88	28	24	7	4	-
Baltimore, Md.	117	70	23	15	4	5	9
Charlotte, N.C.	54	30	12	4	4	3	-
Jacksonville, Fla.	98	67	21	8	2	-	4
Miami, Fla.	102	60	23	12	4	3	1
Norfolk, Va.	61	28	16	10	5	2	8
Richmond, Va.	72	46	15	6	3	2	1
Savannah, Ga.	48	29	12	1	2	4	3
St. Petersburg, Fla.	54	37	10	3	1	3	3
Tampa, Fla.	172	101	47	18	5	1	12
Washington, D.C.	168	95	34	27	9	3	5
Wilmington, Del.	12	10	1	1	-	-	-
E.S. CENTRAL	701	469	135	48	27	22	27
Birmingham, Ala.	100	64	18	8	5	5	6
Chattanooga, Tenn.	78	59	14	1	3	1	3
Knoxville, Tenn.	72	46	17	8	1	-	4
Lexington, Ky.	47	29	10	4	4	-	1
Memphis, Tenn.	137	97	26	9	4	1	5
Mobile, Ala.	72	42	15	7	5	3	2
Montgomery, Ala.	61	45	7	4	1	4	2
Nashville, Tenn.	134	87	28	7	4	8	4
W.S. CENTRAL	1,360	832	269	164	44	48	64
Austin, Tex.	92	54	21	14	2	1	3
Baton Rouge, La.	33	25	2	6	-	-	2
Corpus Christi, Tex.	U	U	U	U	U	U	U
Dallas, Tex.	215	141	36	24	9	5	5
El Paso, Tex.	90	63	11	5	6	5	6
Ft. Worth, Tex.	120	74	16	17	6	7	5
Houston, Tex.	387	218	95	49	12	13	27
Little Rock, Ark.	74	45	19	7	1	2	6
New Orleans, La.	154	83	25	27	5	11	-
San Antonio, Tex.	U	U	U	U	U	U	U
Shreveport, La.	75	55	16	2	1	1	5
Tulsa, Okla.	120	74	28	13	2	3	5
MOUNTAIN	790	546	128	59	35	21	53
Albuquerque, N.M.	86	51	18	6	5	6	1
Colo. Springs, Colo.	53	37	9	4	3	-	4
Denver, Colo.	83	56	17	4	4	2	6
Las Vegas, Nev.	134	89	26	11	6	2	10
Ogden, Utah	22	17	5	-	-	-	4
Phoenix, Ariz.	183	137	11	15	9	10	13
Pueblo, Colo.	18	17	1	-	-	-	5
Salt Lake City, Utah	95	60	20	10	5	-	3
Tucson, Ariz.	116	82	21	9	3	1	7
PACIFIC	2,293	1,489	417	253	75	49	163
Berkeley, Calif.	16	11	4	1	-	-	4
Fresno, Calif.	97	75	7	8	1	6	12
Glendale, Calif.	40	23	11	5	1	-	1
Honolulu, Hawaii	93	65	18	4	3	3	8
Long Beach, Calif.	54	34	8	10	1	1	7
Los Angeles, Calif.	628	391	118	79	24	8	25
Pasadena, Calif.	33	23	7	3	-	-	3
Portland, Oreg.	143	97	31	12	3	-	2
Sacramento, Calif.	169	112	36	14	5	2	19
San Diego, Calif.	402	270	55	50	13	13	37
San Francisco, Calif.	128	54	32	29	6	7	9
San Jose, Calif.	174	111	39	13	7	3	9
Santa Cruz, Calif.	27	20	3	3	1	-	1
Seattle, Wash.	144	101	23	12	5	3	5
Spokane, Wash.	62	40	12	5	3	2	11
Tacoma, Wash.	83	62	13	5	2	1	10
TOTAL	12,227¶	7,837	2,287	1,291	470	326	615

*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.

Hantavirus — Continued

Editorial Note: As of July 28, 1994, a total of 83 cases of HPS have been identified in the United States; 45 (54%) of these patients have died. Ninety-six percent of these cases have been identified west of the Mississippi River, where *Peromyscus maniculatus* (deer mouse) is the primary reservoir of MCV (*1–3*). The range of *P. maniculatus* includes all of the United States, except the southeast and the Atlantic seaboard. Infected rodents have no signs of infection; however, they shed virus in their saliva, urine, and feces. Humans exposed to infected rodent excreta can develop HPS. The patient in Rhode Island had a history of exposure to a previously closed space with rodent infestation; such exposures have been associated with HPS (*1*). The small number of rodents caught at suspected exposure sites in New York probably was attributed to excessively cold weather.

Four cases of HPS have been identified outside the range of *P. maniculatus*, one each in eastern Texas, Louisiana, Florida, and Rhode Island. In Florida, a new but related virus (recently named Black Creek Canal virus [BCCV]) isolated from *Sigmodon hispidus* (cotton rat) is genetically distinct from MCV (*4*) and from sequences demonstrated by RT-PCR in lung tissues from a person who died of HPS in Louisiana (*5*). Initial serologic testing at CDC of an acute-phase serum sample from the Florida patient demonstrated the presence of only immunoglobulin G to MCV by direct ELISA, although IgM to MCV was detected by the Western blot assay performed at the University of New Mexico (S. Jenison and B. Hjelle, University of New Mexico, Albuquerque, personal communication, 1994) (*6*). However, repeat serologic testing at CDC using BCCV antigens showed IgM antibodies. Sequence analysis of the RT-PCR fragment from lung tissue of the patient in this report suggests the presence of a variant of MCV or a new, related virus. Taxonomic assessment of the infecting agent probably will require identification of the reservoir host and additional sequence information from viruses in the northeastern United States.

Although the overall incidence of HPS is unknown, the syndrome appears to be widespread geographically. Recognition of HPS during its early stages is difficult because of the nonspecificity of symptoms; later in the syndrome, tachypnea, hemoconcentration, thrombocytopenia, leukocytosis with a high proportion of bands, and other features are suggestive of HPS (*7,8*). Prompt control of hypoxia (which can rapidly worsen), avoidance of excessive fluid administration, and the early use of inotropic and pressor drugs appear particularly important in treating HPS (*7,8*).

CDC has provided intravenous ribavirin for investigational open-label use in treating HPS since June 1993. On July 19 and 20, 1994, eight experts from outside of CDC reviewed the results of the open-label ribavirin protocol. Ribavirin was generally well tolerated in patients with HPS but had no clearly positive influence on outcome. As a result, enrollment under this protocol will close September 1, 1994. No controlled studies of this agent have been conducted in patients with HPS.

Clinicians and public health officials should remain alert for persons who have unexplained febrile illness with bilateral interstitial infiltrates, and appropriate specimens should be collected for serologic and tissue diagnostic assays. Suspected cases of HPS should be reported to CDC through state health departments.

References

1. CDC. Hantavirus infection—southwestern United States: interim recommendations for risk reduction. MMWR 1993;42(no. RR-11).
2. CDC. Hantavirus pulmonary syndrome—United States, 1993. MMWR 1994;43:45–8.

Hantavirus — Continued

3. Childs JE, Ksiazek TG, Spiropoulou CF, et al. Serologic and genetic identification of *Peromyscus maniculatus* as the primary rodent reservoir for a new hantavirus in the Southwestern United States. J Infect Dis 1994;169:1271–80.
4. CDC. Newly identified hantavirus—Florida, 1994. MMWR 1994;43:99,105.
5. CDC. Update: hantavirus disease—United States, 1993. MMWR 1993;42:612–4.
6. Jenison S, Yamada T, Morris C, et al. Characterization of human antibody responses to Four Corners hantavirus infections among patients with hantavirus pulmonary syndrome. J Virol 1994;68:3000–6.
7. CDC. Update: hantavirus pulmonary syndrome—United States, 1993. MMWR 1993;42:816–20.
8. Duchin JS, Koster FT, Peters CJ, et al. Hantavirus pulmonary syndrome: a clinical description of 17 patients with a newly recognized disease. New Engl J Med 1994;330:949–55.

Current Trends

Vaccination Coverage of 2-Year-Old Children — United States, Third Quarter, 1993

In 1993, the Childhood Immunization Initiative (CII) was instituted to increase vaccination coverage among 2-year-old children to at least 90% by 1996 for four of the five vaccines routinely recommended for children* and to at least 70% for three doses of hepatitis B vaccine (*1*). To monitor progress toward these goals, national estimates of vaccination coverage are needed. This report presents national estimates of vaccination coverage among 2-year-old children derived from provisional data from the National Health Interview Survey (NHIS) for the third quarter of 1993 and describes the trend in vaccination coverage since 1992, the baseline year.

The NHIS, a probability sample of the civilian, noninstitutionalized U.S. population, provides quarterly data to calculate these national estimates (*2*). From July through September 1993, the NHIS collected vaccination data from a random sample (n=483) of survey respondents during household interviews. Vaccination records were available for the children of 33.7% of respondents; for 61.1% of respondents, such records were unavailable and data were based on parental recall. Children's vaccination history was obtained from both sources by 4.4% of respondents and was unknown or refused by 0.8%. For data measurement, 2-year-old children were defined as persons aged 19–35 months at the time of the survey. The children for whom data were collected were a mean age of 27 months, were born during August 1990–February 1992, and had ranged in age from 2 to 15 months (the recommended ages for vaccination) sometime during October 1990–May 1993. Data were weighted to provide national estimates. Confidence intervals were calculated using standard errors generated by the Software for Survey Data Analysis (SUDAAN) (*3*).

Compared with 1992 baseline data from the NHIS, data for the third quarter of 1993 indicate that coverage levels for the individual vaccinations recommended routinely for children and the combined series† of vaccinations increased among 2-year-olds

*At least three doses of diphtheria and tetanus toxoids and pertussis vaccine (DTP), polio vaccine, and *Haemophilus influenzae* type b vaccine (Hib), and one dose of measles-containing vaccine (MCV) (either measles-mumps-rubella, measles-rubella, or measles vaccine).

†There are two combined series of vaccinations: the 4:3:1 schedule—four or more doses of DTP/DT, three or more doses of polio vaccine, and one dose of MCV; and the 3:3:1 schedule—three doses of DTP/DT, three or more doses of polio vaccine, and one dose of MCV.

Vaccination Coverage — Continued

(Table 1) (*4*). Coverage with three or more doses of vaccine increased for diphtheria and tetanus toxoids and pertussis vaccine (DTP)/DT (from 83.0% to 89.9%), for polio vaccine (from 72.4% to 80.4%), for *Haemophilus influenzae* type b vaccine (Hib) (from 28.2% to 60.3%), for any measles-containing vaccine (MCV) (from 82.5% to 85.9%), and for the 4:3:1 combined series (from 55.3% to 71.6%). Baseline data for hepatitis B vaccine were not available. The increases are statistically significant ($p<0.05$) for all vaccines (except MCVs) and the 4:3:1 combined series.

Reported by: Assessment Br, Data Management Div, National Immunization Program; Div of Health Interview Statistics, National Center for Health Statistics, CDC.

Editorial Note: The findings in this report document an increasing trend in the level of vaccination coverage in the United States from 1992 through the third quarter of 1993 and demonstrate continuing progress toward the 1996 vaccination coverage goal of the CII. During this period, vaccination levels for DTP, polio vaccine, and MCVs were the highest ever reported among 2-year-olds in the United States. However, these levels remain below the CII's 1996 goal of at least 90% coverage. Specifically, an estimated 500,000 U.S. children aged 19–35 months lack at least three doses of DTP; 1 million need one or more doses of polio vaccine, and 750,000 need one or more doses of an MCV. Overall, only an estimated 72% of children received the complete 4:3:1 combined series; therefore, an estimated 1.5 million children need one or more doses to be fully vaccinated.

The findings in this report are subject to at least one limitation. Because a substantial proportion of the NHIS data was based on parental recall, the data may be subject

TABLE 1. Vaccination coverage levels among 2-year-olds* with vaccines routinely recommended for children, by vaccination and period — United States, 1992–third quarter, 1993

	1992		First and second quarters, 1993†		Third quarter, 1993†	
Vaccination	**%**	**(95% CI§)**	**%**	**(95% CI)**	**%**	**(95% CI)**
Individual						
DTP/DT¶						
≥3 doses	83.0%	(80.8%–85.2%)	87.2%	(84.3%–90.4%)	89.9%	(86.9%–93.0%)
≥4 doses	59.0%	(56.1%–61.9%)	71.1%	(67.1%–75.1%)	74.8%	(69.9%–79.7%)
Polio						
≥3 doses	72.4%	(70.1%–74.7%)	78.4%	(74.8%–82.0%)	80.4%	(75.8%–84.9%)
Hib**						
≥3 doses	28.2%	(25.6%–30.9%)	49.6%	(45.4%–53.8%)	60.3%	(55.0%–65.7%)
MCV††	82.5%	(80.2%–84.8%)	80.8%	(77.2%–84.4%)	85.9%	(82.0%–89.8%)
Hepatitis B						
≥3 doses	—	—	12.7%	(9.4%–16.0%)	15.7%	(12.1%–19.2%)
Combined series						
3 DTP/3 polio/ 1 MCV	68.7%	(66.2%–71.2%)	72.0%	(68.1%–75.9%)	78.7%	(74.2%–83.2%)
4 DTP/3 polio/ 1 MCV	55.3%	(52.5%–58.1%)	64.8%	(60.6%–68.9%)	71.6%	(66.7%–76.4%)

*Persons aged 19–35 months.
†Provisional data.
§Confidence interval.
¶Diphtheria and tetanus toxoids and pertussis vaccine or diphtheria and tetanus toxoids.
***Haemophilus influenzae* type b.
††Measles-containing vaccine.

Vaccination Coverage — Continued

to recall bias or other reporting errors. Beginning with the 1994 survey, all vaccination histories will be verified by reviewing provider records.

Although vaccination levels increased for Hib from 1992 through the third quarter 1993 and for hepatitis B vaccine through the first three quarters of 1993, coverage with these vaccines remained substantially low compared with levels for DTP, polio, and MCV. Two factors may account for the low level of coverage with three doses of Hib. First, most of the NHIS data in this report were for children who were born after promulgation of the recommendations for universal administration of Hib in October 1990 (*5*). Because nationwide implementation of recommendations does not occur immediately among providers, the anticipated increase in vaccination coverage levels often occurs several months to several years after implementation. Although universal vaccination with Hib has been fully implemented in the United States, the expected increase in Hib coverage levels will be adequately reflected only in future reports. This report documents an increase of 32 percentage points in Hib coverage from 1992 through third quarter 1993. Second, catch-up of children in need of Hib can be accomplished with fewer than three doses. For example, a 15-month-old child who never received a dose of Hib needs only one dose. One factor may account for the low level of hepatitis B coverage. Most of the NHIS data in this report were for children born before the recommendations for universal hepatitis B vaccination were promulgated in November 1991 (*6*). Consequently, most of these children did not receive this vaccine when they were the recommended ages for vaccination. To compensate for the time required to fully implement universal vaccination, the 1996 CII vaccination coverage goal for hepatitis B vaccine is 70% rather than 90%.

The reasons for the overall increase in vaccination coverage levels from 1992 through the third quarter of 1993 are unclear. One possible explanation is associated with the recent measles epidemic in the United States during 1989–1991. During and immediately after the epidemic, a substantial number of the children for whom the NHIS data in this report were provided were the recommended ages for routine vaccination. The immediate risk for measles, the heightened awareness that preschool children needed vaccinations, and the media's focus on the severity and complications of vaccine-preventable diseases may have established vaccination as a high priority among parents and providers (*7*). As a result, parents may have intensified efforts to seek vaccinations for their children and providers may have more consistently sought to vaccinate children at the earliest recommended ages. However, the effects of efforts aimed at increasing vaccination coverage during and/or after an outbreak of vaccine-preventable disease may be temporary.

The substantial number of undervaccinated children in the United States and the possibly temporary increases in vaccination coverage after the recent measles resurgence underscore the importance of fully implementing the CII, which focuses on 1) improving delivery, 2) reducing vaccine cost for parents (e.g., Vaccines for Children program), 3) raising public and provider awareness, 4) monitoring coverage and disease, and 5) improving vaccines and their use. Implementation of this initiative will assist in further increasing coverage to meet the 1996 goals and establishing a vaccination-delivery system that can maintain high coverage levels.

References

1. CDC. Reported vaccine-preventable diseases—United States, 1993, and the Childhood Immunization Initiative. MMWR 1994;43:57–60.

Vaccination Coverage — Continued

2. Massey JT, Moore TF, Parsons VL, et al. Design and estimation for the National Health Interview Survey, 1985–94. Hyattsville, Maryland: US Department of Health and Human Services, Public Health Service, CDC, 1989. (Vital and health statistics; series 2, no. 11).
3. Shah BV. Software for Survey Data Analysis (SUDAAN) version 5.5 [Software documentation]. Research Triangle Park, North Carolina: Research Triangle Institute, 1991.
4. CDC. Vaccination coverage of 2-year-old children—United States, 1992–1993. MMWR 1994; 43:282–3.
5. ACIP. Haemophilus B conjugate vaccines for prevention of *Haemophilus influenzae* type B disease among infants and children two months of age and older: recommendations of the Immunization Practices Advisory Committee (ACIP). MMWR 1991;40(no. RR-1).
6. ACIP. Hepatitis B virus: a comprehensive strategy for eliminating transmission in the United States through universal childhood vaccination—recommendations of the Immunization Practices Advisory Committee (ACIP). MMWR 1991;40(no. RR-13).
7. CDC. Public-sector vaccination efforts in response to the resurgence of measles among preschool-aged children—United States, 1989–1991. MMWR 1992;41:522–5.

Monthly Immunization Table

To track progress toward achieving the goals of the Childhood Immunization Initiative (CII), CDC publishes monthly a tabular summary of the number of cases of all diseases preventable by routine childhood vaccination reported during the previous month and year-to-date (provisional data). In addition, the table compares provisional data with final data for the previous year and highlights the number of reported cases among children aged ≤5 years, who are the primary focus of CII. Data in the table are derived from CDC's National Notifiable Diseases Surveillance System.

Number of reported cases of diseases preventable by routine childhood vaccination — United States, June 1994 and 1993–1994*

Disease	No. cases, June 1994	Total cases 1993	Total cases 1994	No. cases among children aged <5 years† 1993	No. cases among children aged <5 years† 1994
Congenital rubella syndrome (CRS)	0	**6**	**3**	3	3
Diphtheria	0	**0**	**0**	0	0
Haemophilus influenzae§	68	**668**	**595**	208	164
Hepatitis B¶	829	**5,696**	**5,559**	58	62
Measles	95	**195**	**710**	68	160
Mumps	123	**923**	**714**	156	93
Pertussis	226	**1,478**	**1,538**	862	862
Poliomyelitis, paralytic**	—	**—**	**—**	—	—
Rubella	26	**109**	**179**	19	14
Tetanus	4	**16**	**19**	0	1

*Data for 1993 and 1994 are provisional.
†For 1993 and 1994, age data were available for 88% or more cases, except for 1993 age data for CRS, which were available for 50% of cases.
§Invasive disease; *H. influenzae* serotype is not routinely reported to the National Notifiable Diseases Surveillance System.
¶Because most hepatitis B virus infections among infants and children aged <5 years are asymptomatic (although likely to become chronic), acute disease surveillance does not reflect the incidence of this problem in this age group or the effectiveness of hepatitis B vaccination in infants.
**No cases of suspected poliomyelitis have been reported in 1994; three cases of suspected poliomyelitis have been reported in 1993. Four of the five suspected cases with onset in 1992 were confirmed; the confirmed cases were vaccine associated.

The *Morbidity and Mortality Weekly Report (MMWR)* Series is prepared by the Centers for Disease Control and Prevention (CDC) and is available on a paid subscription basis from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402; telephone (202) 783-3238.

The data in the weekly *MMWR* are provisional, based on weekly reports to CDC by state health departments. The reporting week concludes at close of business on Friday; compiled data on a national basis are officially released to the public on the succeeding Friday. Inquiries about the *MMWR* Series, including material to be considered for publication, should be directed to: Editor, *MMWR* Series, Mailstop C-08, Centers for Disease Control and Prevention, Atlanta, GA 30333; telephone (404) 332-4555.

☆**U.S. Government Printing Office: 1994-533-178/05021 Region IV**