CDC
CENTERS FOR DISEASE CONTROL

June 14, 1991 / Vol. 40 / No. 23

MMWR
MORBIDITY AND MORTALITY WEEKLY REPORT

Epidemiologic Notes and Reports

Update: Transmission of HIV Infection During Invasive Dental Procedures – Florida

Previous reports from an epidemiologic investigation in Florida strongly suggested that three patients (patients A, B, and C) became infected with human immunodeficiency virus (HIV) while receiving dental care from a dentist with acquired immunodeficiency syndrome (AIDS) (*1,2*). This report describes findings that suggest HIV was transmitted to two additional patients (patients E and G). These two patients had no other confirmed exposures to HIV, had invasive procedures performed by the dentist, and are infected with HIV strains that are closely related genetically to the strains from the three previously reported patients and from the dentist (Table 1). In addition, this report describes the epidemiologic and laboratory investigation of another HIV-infected patient of the dentist (patient F).

Patient E

Patient E, a young woman, contacted CDC after the initial report of a possible transmission of HIV in this dental practice (*1,2*). She denied a history of transfusion, receipt of blood products, or injecting drug use. She did not report a history of an illness compatible with an acute retroviral syndrome. She was seropositive for antibody to HIV when first tested in October 1988; in January 1991, she was asymptomatic, with >500 CD4 lymphocytes per mm^3; serologic tests for syphilis and hepatitis B virus infection were negative.

Patient E's known former sex partners since 1981 were tested for HIV antibody (except one, who died from non-HIV–related causes in 1982 and was not known to be at high risk for HIV infection); one was positive. This man (patient F) was also a patient of the dentist. Patient E reported infrequent sexual contact with patient F; the last contact was in the fall of 1988.

Patient F

Patient F had tested negative for HIV antibody in October 1988 (when patient E tested seropositive) and December 1988 but tested positive in December 1990. Review of his medical records indicated that, in September 1989, he sought medical

HIV Infection — Continued

care for a 1-week history of sore throat, loose stools, and headache; other symptoms included decreased appetite, fatigue, myalgias, and an earache. On examination, he was febrile (100.5 F [38.1 C]) and had tender anterior cervical adenopathy; his white blood cell count was 3300/mm^3 (normal: >4000 cells/mm^3) with a lymphocyte count of 693/mm^3 (normal: >1000/mm^3). He was diagnosed as having tonsillitis; throat culture yielded "normal respiratory flora." No HIV-antibody test was performed at the time, nor is there any indication that an acute retroviral syndrome was considered. This illness occurred approximately 1 year after patient F's last reported dental appointment and his last sexual contact with patient E and 9 months after his last negative test for HIV antibody.

On interview, patient F denied a history of having had sex with men and injecting drug use. He had no history of blood transfusions or receipt of blood products. Review of medical and other records, however, indicated behavioral risk factors for HIV infection unacknowledged at the time of interview. In January 1991, his CD4 lymphocyte count was 253 cells/mm^3, and serologic tests for syphilis and hepatitis B were negative.

Patient G

Patient G is a young man who contacted CDC after he tested positive for HIV antibody. In November 1990, he was first determined to be HIV seropositive when screened for plasma donation. He denied a history of having had sex with men, injecting drug use since 1977, blood transfusions, or receipt of blood products. He did not report a history of an illness compatible with an acute retroviral syndrome. Records indicate that when he donated blood in 1986 he was seronegative for syphilis, hepatitis B, and HIV. He reported having two female sex partners since 1986; both were seronegative for HIV antibody when tested in March and April 1991. In May 1991, his CD4 lymphocyte count was 400 cells/mm^3, and serologic tests for syphilis and hepatitis B were negative.

Additional Information from Patient Interviews

Patients E and F were interviewed under circumstances that included the presence of other persons. Despite these circumstances, patients E and F, as well as patient G,

TABLE 1. Characteristics of an HIV-infected dentist and patients in a dental practice — Florida

HIV-infected person	Sex	HIV risk factor	DNA sequences closely related to sequences of dentist's virus	Amino acid signature pattern*
Dentist	Male	Yes	Not applicable	Yes
Patient				
A	Female	No	Yes	Yes
B	Female	No	Yes	Yes
C	Male	U†	Yes	Yes
E	Female	No	Yes	Yes
G	Male	No	Yes	Yes
D§	Male	Yes	No	No
F	Male	Yes	No	No

*A unique pattern of eight amino acids in the HIV V3 peptide.
†Unconfirmed.
§See reference 2.

HIV Infection — Continued

reported nonparenteral use of illicit drugs. None, however, reported needlesharing or injecting illicit drugs. All of the patients denied sexual contact with the dentist.

Dental History of Patients

Patient records from the dental practice for patients E, F, and G could not be located. However, patient billing information was available for some of the reported patient visits.

Billing information indicated that patient E made at least 10 visits to the dentist for examination, prophylaxis, fluoride treatment, restorative fillings and crowns, and root canal therapy from June through December 1988. She received local anesthetic, stated that the dentist wore gloves and a mask, and did not recall any specific incidents that would have exposed her to the dentist's blood (i.e., an injury to the dentist, such as a needlestick or cut with a sharp instrument).

Patient F reported having made five or six visits to the dentist during July and August 1988 for examination and radiographs, prophylaxis, extraction, restorative fillings, and root canal therapy. However, only one visit could be documented by billing records.

Medical records and billing information indicate that patient G made two visits to the dentist in July 1988 for root canal therapy and one restorative filling under local anesthetic. He could not recall whether the dentist wore gloves and a mask during the visits or any specific incidents that would have exposed him to the dentist's blood.

Laboratory Investigation

This investigation previously included sequencing of HIV proviral DNA in the lymphocyte samples obtained from the dentist, patients A, B, and C, and seven Florida control patients (*1,2*). Proviral DNA obtained from the lymphocytes from patients E, F, and G and from 24 additional control patients in Florida was performed using previously described methods (*2,3*) or a modification of these methods.* The sequences of 240 nucleotides from the V3 region of the gene encoding the viral external envelope glycoprotein, gp120, were then analyzed at Los Alamos National Laboratory.

Based on this analysis, the viral nucleotide sequences from patients E and G were determined to be closely related to those of the dentist, with average differences of 2.5% and 4.6%, respectively. The sequences from patients E and G were distinct from all sequences of the 31 local controls, with average differences of 9.4% and 11.2%, respectively. In addition, the HIV V3 peptides of the dentist and patients A, B, C, E, and G shared a unique pattern of eight noncontiguous amino acids (signature pattern) that has not been found in any other HIV sequence published or included in the HIV

*In the initial sequencing of the HIV proviral DNA from patients E, F, and G, proviral DNA that had been amplified by the polymerase chain reaction (PCR) was molecularly cloned before it was sequenced. Unique sequences were included in the PCR primers used for amplification to distinguish the amplified product of each patient's specimen. To verify these results, additional blood samples obtained from patients F and G and a second aliquot of the initial blood sample from patient E were reanalyzed. In this reanalysis, amplified HIV DNA was sequenced directly, without molecular cloning. In each case, consensus sequences from the reanalysis were virtually identical to the initial sequence results. Sequencing of amplified proviral DNA from 24 control patients was also done directly. None of the proviral sequences from the dentist, patients A–G, and the 31 local controls were identical, indicating that the specimens had not been cross-contaminated. In addition, the proviral sequences from the dentist and the seven patients were reproduced in repeat analyses, providing further evidence of absence of cross-contamination.

HIV Infection — Continued

sequence database at Los Alamos National Laboratory. Sequence analysis indicated that the virus from patient F was not closely related to that of the dentist (average difference of 9.2%) nor to those of patients A, B, C, E, or G and lacked the unique pattern of amino acids identified in the viruses of the other patients and the dentist.

Reported by: JJ Witte, MD, Florida Dept of Health and Rehabilitative Svcs. KR Wilcox Jr, MD, State Epidemiologist, Michigan Dept of Public Health. Div of HIV/AIDS and Hospital Infections Program, Center for Infectious Diseases; Dental Disease Prevention Activity, Center for Prevention Svcs; National Institute for Occupational Safety and Health, CDC.

Editorial Note: This investigation strongly suggests that five patients (patients A, B, C, E, and G) became infected with HIV while receiving care from a dentist with AIDS. None of the five patients had other confirmed exposures to HIV, all had invasive procedures performed by the dentist, and all were infected with HIV strains that were closely related to each other and to the strain infecting the dentist but distinct from viruses obtained from control patients living in the same geographic area as the dental practice. In addition, patient G was known to have been HIV seronegative before being treated by the dentist.

Based on the following considerations, patient F does not appear to have been infected in the dental practice or through sexual contact with patient E: 1) he is infected with a strain of HIV that is not closely related genetically to that of the dentist and the other patients, including patient E; 2) he had other behavioral risk factors for HIV infection; and 3) he had an illness compatible with an acute retroviral syndrome approximately 1 year after his last reported dental visit and his last reported sexual contact with patient E.

The dentist's practice opened in 1981; although his first reported positive HIV test was documented in late 1986, the date of onset of his HIV infection is unknown (*2*). Each of the five patients (patients A, B, C, E, and G) had invasive procedures performed after the dentist had been diagnosed with AIDS in September 1987; four of the five made visits exclusively during a 21-month period (from November 1987 through July 1989). Patients E and G appear to have been infected in the summer of 1988. Therefore, transmission occurred relatively late in the course of the dentist's infection.

This is the only investigation in which transmission of HIV from an infected health-care worker to patients during invasive procedures has been strongly suggested. Neither the precise mode of HIV transmission to these patients nor the reasons for transmission to multiple patients in a single practice are known. However, hepatitis B virus, a bloodborne pathogen that is transmitted by routes similar to those of HIV, also has been transmitted to multiple patients in the practices of individual infected health-care workers during invasive procedures (*4–6*). Factors that may be associated with transmission of bloodborne pathogens from infected health-care workers to patients may reflect variations in the procedures performed and techniques used by the health-care worker, infection-control precautions used, and the titer of the infecting agent.

References

1. CDC. Possible transmission of human immunodeficiency virus to a patient during an invasive dental procedure. MMWR 1990;39:489–93.
2. CDC. Update: transmission of HIV infection during an invasive dental procedure—Florida. MMWR 1991;40:21–7,33.
3. Ou CY, Kwok S, Mitchell SW, et al. DNA amplification for direct detection of HIV-1 in DNA of peripheral mononuclear cells. Science 1988;239:295–7.
4. Grob P, Bischof B, Naeff R. Cluster of hepatitis B transmitted by a physician. Lancet 1981; 2:1218–20.

HIV Infection — Continued

5. Rimland D, Parkin WE, Miller GB, et al. Hepatitis B outbreak traced to an oral surgeon. N Engl J Med 1977;296:953–8.
6. Ahtone J, Goodman RA. Hepatitis B and dental personnel: transmission to patients and prevention issues. J Am Dent Assoc 1983;106:219–22.

Current Trends

Trends in Fertility and Infant and Maternal Health — United States, 1980–1988

Infants born to teenaged mothers and to unmarried mothers are particularly at risk for low birth weight (LBW), which in turn increases their risk for serious morbidity, permanent disability, and death. In the United States, data from birth certificates are the primary source for monitoring trends in reproductive patterns and maternal and infant health. This report uses information from U.S. birth certificates for 1980 and for 1985–1988 to characterize trends in fertility among teenagers (aged 15–19 years) and unmarried women, use of prenatal care, and the incidence of LBW.

Birth rates for teenagers changed little from 1980 through 1985 (*1*) (Table 1). However, from 1986 through 1988, the overall rate for women aged 15–19 years increased 6%, from 50.6 to 53.6 births per 1000, and for women aged 15–17 years, 10%.

In 1988, more than 1 million infants were born to unmarried mothers, accounting for 26% of all infants (Table 2) (18% of white infants, 63% of black infants, and 34% of Hispanic infants); these percentages reflected increasing trends for 1980–1988. For unmarried women aged 15–44 years, the birth rate was 38.6 per 1000. Although rates of childbearing among unmarried women remained highest among black women, during the 1980s the increases were greater for white women—from 1980 through 1988, a 51% increase for white women (from 17.6 to 26.6 per 1000, respectively) compared with 7% for black women (from 82.9 to 88.9 per 1000, respectively).

From 1980 through 1988, the proportion of all mothers who received prenatal care during the first trimester of pregnancy remained constant (76%) (Table 3). For white mothers, increases in early prenatal care occurred for both married and unmarried women, although the increase was more prominent for unmarried mothers (Table 3).

TABLE 1. Birth rates* for women aged 15–19 years, by race of infant — United States, 1980 and 1985–1988

	Rate, by age of mother								
	15–17 yrs			18–19 yrs			Total		
Year	All races†	White	Black	All races†	White	Black	All races†	White	Black
1980	32.5	25.2	73.6	82.1	72.1	138.8	53.0	44.7	100.0
1985	31.1	24.0	69.8	80.8	70.1	137.1	51.3	42.8	97.4
1986	30.6	23.4	70.0	81.0	69.8	141.0	50.6	41.8	98.1
1987	31.8	24.1	72.9	80.2	68.6	142.2	51.1	41.9	100.3
1988	33.8	25.5	76.6	81.7	69.2	150.5	53.6	43.7	105.9

*Per 1000 women in specified group.
†Includes races other than white and black.

TABLE 2. Birth rates* for unmarried women, by age of mother and race of infant, and number and percentage of births to unmarried women, by race of infant — United States, 1980 and 1985–1988

Race/ Year of birth	No. births	% of births to unmarried women	Rate, by age of mother (yrs)								
			15–17	18–19	Total 15–19	20–24	25–29	30–34	35–39	40–44†	Total 15–44§
White											
1980	320,063	11.0	11.8	23.6	**(16.2)**	24.4	20.7	13.6	6.8	1.8	**17.6**
1985	432,969	14.5	14.2	30.9	**(20.5)**	30.9	27.3	17.5	8.6	1.9	**21.8**
1986	466,774	15.7	14.6	33.2	**(21.5)**	33.5	29.2	19.2	9.3	2.1	**23.2**
1987	498,645	16.7	15.8	34.2	**(22.8)**	35.8	30.7	21.2	10.3	2.3	**24.6**
1988	539,696	17.7	17.1	36.4	**(24.8)**	38.3	33.8	22.9	11.5	2.6	**26.6**
Black											
1980	325,737	55.3	69.6	120.2	**(89.2)**	115.1	83.9	48.2	19.6	5.6	**82.9**
1985	365,527	60.1	67.0	121.1	**(88.8)**	116.1	81.4	48.8	21.3	4.5	**78.8**
1986	380,261	61.2	67.4	125.0	**(89.9)**	121.4	86.7	51.1	21.6	4.7	**80.9**
1987	399,144	62.2	70.4	127.5	**(92.6)**	129.9	93.6	54.2	23.5	5.1	**84.7**
1988	426,665	63.5	74.1	136.1	**(98.3)**	138.2	99.2	58.7	25.3	5.3	**88.9**
All races¶											
1980	665,747	18.4	20.6	39.0	**(27.6)**	40.9	34.0	21.1	9.7	2.6	**29.4**
1985	828,174	22.0	22.5	46.6	**(31.6)**	46.8	39.8	25.0	11.6	2.5	**32.8**
1986	878,477	23.4	22.9	48.9	**(32.6)**	49.7	42.0	26.9	12.2	2.7	**34.3**
1987	933,013	24.5	24.5	49.9	**(34.1)**	53.1	44.3	29.3	13.5	2.9	**36.1**
1988	1,005,299	25.7	26.5	52.7	**(36.8)**	56.7	48.1	31.7	14.9	3.2	**38.6**

*Per 1000 women in specified group.
†Rate computed by using births to women aged ≥40 years as numerator and unmarried women aged 40–44 years as denominator.
§Rate computed by using total births, regardless of age of mother, as numerator and unmarried women aged 15–44 years as denominator.
¶Includes races other than white and black.

Fertility Trends — Continued

Since 1980, however, the proportions of mothers who did not receive prenatal care until the third trimester or who received no prenatal care increased for both white and black women (*1,2*).

The receipt of early prenatal care was associated with a decreased risk for LBW infants (<5 lbs 8 oz [2500 g]) (*3,4*). From 1980 through 1988, the percentage of LBW infants was essentially stable. In 1988, for white mothers who had full-term infants, the percentage of LBW infants was 2.2% for women who initiated care in the first trimester; 3.4%, the second trimester; 3.9%, the third trimester; and 7.8%, for those who received no prenatal care. In comparison, for black mothers who had full-term infants, the proportions of LBW infants were 5.2% for women who initiated care in the first trimester; 6.3%, the second trimester; 6.6%, the third trimester; and 13.3%, for those who received no prenatal care.

From 1981 through 1988, the proportion of preterm births increased from 9.4% to 10.2%. In 1988, nearly 40% of preterm infants had LBW, compared with 2%–3% for

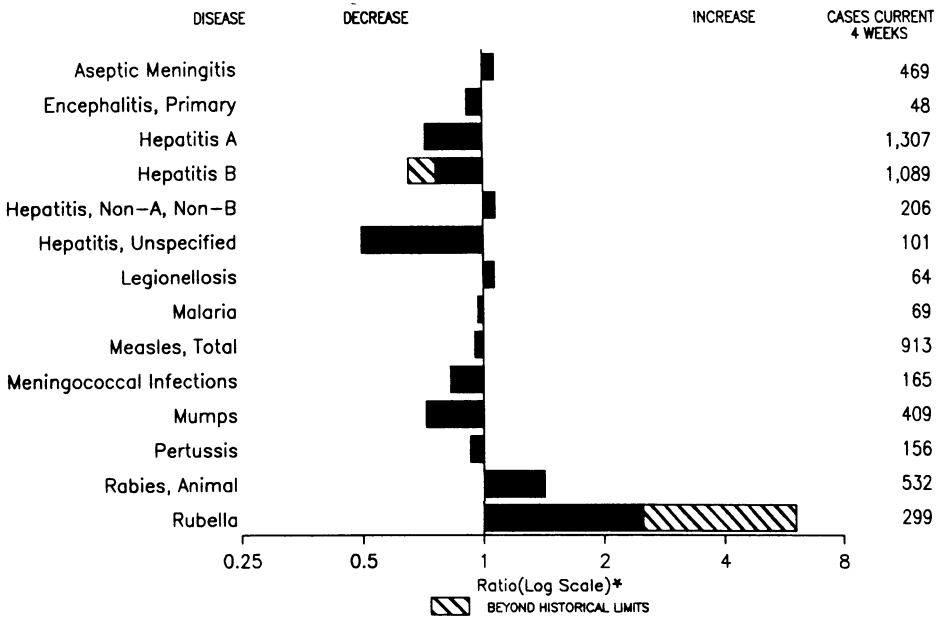
(Continued on page 389)

TABLE 3. Percentage distribution of live births, by trimester that prenatal care began, race of infant, and marital status of mother — United States, 1980 and 1988

Race of infant/ Marital status of mother/Year	No. births	Trimester of pregnancy prenatal care began			No prenatal care
		1st	2nd	3rd	
White					
Married					
1980	2,578,669	82.6	14.3	2.5	0.7
1988	2,506,466	84.1	12.5	2.5	0.9
Unmarried					
1980	320,063	52.9	33.7	9.5	3.9
1988	539,696	57.1	30.2	8.5	4.2
All					
1980	2,898,732	79.3	16.4	3.2	1.0
1988	3,046,162	79.4	15.6	3.5	1.5
Black					
Married					
1980	263,879	72.3	22.0	4.2	1.5
1988	245,311	74.0	20.2	4.1	1.7
Unmarried					
1980	325,737	54.9	33.8	7.6	3.7
1988	426,665	53.5	32.6	8.4	5.5
All					
1980	589,616	62.7	28.5	6.1	2.7
1988	671,976	61.1	28.0	6.8	4.1
All races*					
Married					
1980	2,946,511	81.3	15.2	2.7	0.8
1988	2,904,211	82.9	13.4	2.7	1.0
Unmarried					
1980	665,747	53.8	33.7	8.7	3.8
1988	1,005,299	55.4	31.3	8.5	4.7
All					
1980	3,612,258	76.3	18.6	3.8	1.3
1988	3,909,510	75.9	18.0	4.2	1.9

*Includes races other than white and black.

FIGURE I. Notifiable disease reports, comparison of 4-week totals ending June 8, 1991, with historical data — United States



*Ratio of current 4-week total to the 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 June 8, 1991 (23rd Week)

	Cum. 1991		Cum. 1991
AIDS	18,398	Measles: imported	89
Anthrax	-	indigenous	5,843
Botulism: Foodborne	9	Plague	-
Infant	19	Poliomyelitis, Paralytic*	-
Other	4	Psittacosis	44
Brucellosis	22	Rabies, human	-
Cholera	11	Syphilis, primary & secondary	18,645
Congenital rubella syndrome	11	Syphilis, congenital, age < 1 year	12
Diphtheria	1	Tetanus	11
Encephalitis, post-infectious	33	Toxic shock syndrome	141
Gonorrhea	247,241	Trichinosis	8
Haemophilus influenzae (invasive disease)	1,573	Tuberculosis	9,182
Hansen Disease	59	Tularemia	33
Leptospirosis	32	Typhoid fever	133
Lyme Disease	2,246	Typhus fever, tickborne (RMSF)	92

*No cases of suspected poliomyelitis have been reported in 1991; none of the 6 suspected cases in 1990 have been confirmed to date. Five of the 13 suspected cases in 1989 were confirmed and all were vaccine associated.

TABLE II. Cases of selected notifiable diseases, United States, weeks ending June 8, 1991, and June 9, 1990 (23rd Week)

Reporting Area	AIDS	Aseptic Meningitis	Encephalitis		Gonorrhea		Hepatitis (Viral), by type				Legionellosis	Lyme Disease
			Primary	Post-infectious			A	B	NA,NB	Unspecified		
	Cum. 1991	Cum. 1991	Cum. 1991	Cum. 1991	Cum. 1991	Cum. 1990	Cum. 1991	Cum. 1991	Cum. 1991	Cum. 1991	Cum. 1991	Cum. 1991
UNITED STATES	18,398	2,339	267	33	247,241	298,472	11,010	7,174	1,296	627	486	2,246
NEW ENGLAND	801	126	13	-	6,241	7,822	260	378	46	27	38	80
Maine	31	7	3	-	60	104	11	14	2	-	-	-
N.H.	20	8	-	-	144	91	18	13	4	-	2	6
Vt.	8	38	1	-	17	27	14	4	4	-	1	1
Mass.	446	36	7	-	2,561	3,025	134	284	27	25	33	43
R.I.	37	30	-	-	511	461	49	13	7	2	2	23
Conn.	259	7	2	-	2,948	4,114	34	50	2	-	-	7
MID. ATLANTIC	5,115	272	21	10	30,339	41,838	958	655	132	13	138	1,666
Upstate N.Y.	683	135	9	6	5,640	5,937	465	273	80	7	44	1,157
N.Y. City	2,810	42	-	-	11,561	18,244	207	61	4	-	14	-
N.J.	1,112	-	-	-	4,528	6,619	140	164	27	-	17	271
Pa.	510	95	12	4	8,610	11,038	146	157	21	6	63	238
E.N. CENTRAL	1,252	408	76	6	45,430	56,839	1,300	853	188	28	98	87
Ohio	243	120	23	2	14,593	17,243	180	205	101	11	51	50
Ind.	109	51	10	1	4,806	4,685	191	98	1	1	10	4
Ill.	581	68	17	3	13,341	17,712	539	118	22	1	4	-
Mich.	219	156	23	-	10,137	13,429	158	279	56	15	23	33
Wis.	100	13	3	-	2,553	3,770	232	153	8	-	10	-
W.N. CENTRAL	466	159	10	3	12,602	15,585	1,173	314	160	12	21	86
Minn.	108	29	5	-	1,277	1,948	159	32	10	2	4	6
Iowa	40	35	-	1	841	1,164	31	19	6	2	3	6
Mo.	244	62	3	2	7,671	9,125	299	211	140	5	8	72
N. Dak.	4	1	-	-	23	64	25	3	2	1	-	-
S. Dak.	1	4	2	-	152	95	466	2	-	-	3	-
Nebr.	28	10	-	-	872	780	151	20	1	-	3	-
Kans.	41	18	-	-	1,766	2,409	42	27	1	2	-	2
S. ATLANTIC	4,407	560	50	10	74,300	83,968	765	1,529	193	132	78	110
Del.	34	8	1	-	1,046	1,340	6	22	3	3	2	13
Md.	442	55	7	-	7,564	8,522	152	212	35	12	15	48
D.C.	267	14	-	-	4,385	5,427	44	55	1	1	-	-
Va.	354	87	13	1	7,314	7,650	78	93	10	91	7	19
W. Va.	17	3	1	-	525	600	10	31	1	6	-	5
N.C.	220	65	18	-	13,848	14,181	86	259	80	-	11	13
S.C.	163	14	-	-	5,425	6,778	24	325	16	3	8	1
Ga.	595	48	6	1	18,982	18,719	82	209	19	-	8	6
Fla.	2,315	266	4	8	15,211	20,751	283	323	28	16	27	5
E.S. CENTRAL	476	145	15	-	22,809	24,156	106	602	163	3	25	55
Ky.	78	39	3	-	2,340	2,923	14	71	5	2	11	20
Tenn.	148	26	8	-	8,731	7,418	67	460	149	-	7	26
Ala.	156	58	4	-	5,848	7,954	24	68	9	1	7	9
Miss.	94	22	-	-	5,890	5,861	1	3	-	-	-	-
W.S. CENTRAL	1,916	234	27	1	28,218	31,673	1,559	866	41	95	18	31
Ark.	71	29	3	-	3,141	3,927	154	51	1	3	3	10
La.	321	33	6	-	6,779	5,937	71	127	4	4	5	-
Okla.	91	1	3	-	2,859	2,795	153	106	17	8	4	20
Tex.	1,433	171	15	1	15,439	19,014	1,181	582	19	80	6	1
MOUNTAIN	500	74	10	1	5,077	6,316	1,860	440	69	91	39	5
Mont.	14	2	-	-	48	79	53	33	3	5	1	-
Idaho	9	-	-	-	69	48	43	34	-	-	3	-
Wyo.	6	-	-	-	49	86	75	5	-	-	-	3
Colo.	192	25	2	1	1,360	1,733	256	60	22	14	7	-
N. Mex.	46	9	-	-	489	540	536	96	7	26	1	-
Ariz.	90	19	8	-	1,926	2,411	598	93	12	38	14	-
Utah	48	8	-	-	151	187	134	24	10	8	4	-
Nev.	95	11	-	-	985	1,232	165	95	15	-	9	2
PACIFIC	3,465	361	45	2	22,225	30,275	3,029	1,537	304	226	31	126
Wash.	232	-	4	-	1,889	2,803	280	221	77	12	1	-
Oreg.	94	-	-	-	899	1,127	179	151	57	5	1	-
Calif.	3,051	327	39	2	18,789	25,513	2,479	1,124	158	208	27	126
Alaska	9	9	2	-	351	544	76	17	10	1	-	-
Hawaii	79	25	-	-	297	288	15	24	2	-	2	-
Guam	1	-	-	-	-	116	-	-	-	-	-	-
P.R.	726	128	-	1	297	413	50	191	59	25	-	-
V.I.	4	-	-	-	222	199	-	4	-	-	-	-
Amer. Samoa	-	-	-	-	-	48	-	-	-	-	-	-
C.N.M.I.	-	-	-	-	-	92	-	-	-	-	-	-

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

TABLE II. (Cont'd.) Cases of selected notifiable diseases, United States, weeks ending June 8, 1991, and June 9, 1990 (23rd Week)

Reporting Area	Malaria	Measles (Rubeola)					Menin-gococcal Infections	Mumps		Pertussis			Rubella		
		Indigenous		Imported*		Total									
	Cum. 1991	1991	Cum. 1991	1991	Cum. 1991	Cum. 1990	Cum. 1991	1991	Cum. 1991	1991	Cum. 1991	Cum. 1990	1991	Cum. 1991	Cum. 1990
UNITED STATES	430	137	5,843	-	89	11,044	1,097	85	2,301	28	902	1,349	5	869	499
NEW ENGLAND	28	4	34	-	10	200	77	3	20	7	162	154	-	2	5
Maine	1	-	-	-	-	27	6	-	-	-	42	5	-	-	-
N.H.	2	-	-	-	-	8	7	-	3	-	12	10	-	1	1
Vt.	1	-	5	-	-	1	10	-	2	-	3	6	-	-	-
Mass.	15	-	9	-	8	5	41	-	-	5	94	123	-	1	-
R.I.	5	-	2	-	-	30	-	-	3	-	-	-	-	-	1
Conn.	4	4	18	-	2	129	13	3	12	2	11	10	-	-	3
MID. ATLANTIC	61	63	3,095	-	2	826	114	9	179	2	85	295	2	456	2
Upstate N.Y.	16	16	18	-	-	258	61	5	70	2	58	236	1	437	1
N.Y. City	20	-	1,250	-	-	134	7	-	-	-	-	-	-	-	-
N.J.	20	-	353	-	1	132	21	-	49	-	1	16	-	-	-
Pa.	5	47	1,474	-	1	302	25	4	60	-	26	43	1	19	1
E.N. CENTRAL	38	1	65	-	6	2,972	152	8	216	4	156	333	-	162	28
Ohio	8	-	-	-	1	210	52	3	49	2	65	67	-	147	-
Ind.	2	-	-	-	1	368	8	1	6	1	37	41	-	1	-
Ill.	14	-	24	-	-	1,214	45	-	81	-	23	119	-	3	17
Mich.	12	1	39	-	-	436	37	4	68	1	21	35	-	11	9
Wis.	2	-	2	-	4	744	10	-	12	-	10	71	-	-	2
W.N. CENTRAL	16	-	24	-	2	533	66	2	63	2	56	45	1	15	5
Minn.	5	-	6	-	2	160	12	-	6	2	18	7	1	6	1
Iowa	3	-	15	-	-	23	7	-	14	-	6	4	-	5	3
Mo.	4	-	-	-	-	68	26	1	19	-	20	28	-	4	-
N. Dak.	1	-	-	-	-	-	1	-	-	-	1	1	-	-	1
S. Dak.	-	-	-	-	-	22	2	-	-	-	1	1	-	-	-
Nebr.	-	-	-	-	-	101	4	1	4	-	4	1	-	-	-
Kans.	3	-	3	-	-	159	14	-	20	-	6	3	-	-	-
S. ATLANTIC	82	29	391	-	15	658	203	23	850	2	69	125	-	10	12
Del.	1	-	21	-	-	11	1	-	6	-	-	2	-	-	-
Md.	26	20	162	-	-	105	22	8	166	2	13	34	-	6	1
D.C.	4	-	-	-	-	16	6	-	20	-	-	14	-	1	1
Va.	12	-	19	-	3	67	16	-	34	-	11	12	-	-	-
W. Va.	1	-	-	-	-	6	10	-	15	-	6	9	-	-	-
N.C.	3	-	29	-	2	12	43	-	153	-	12	24	-	-	-
S.C.	5	-	12	-	-	3	23	14	294	-	-	5	-	-	-
Ga.	11	-	10	-	4	19	41	-	19	-	16	13	-	-	-
Fla.	19	9	138	-	6	419	41	1	143	-	11	12	-	3	10
E.S. CENTRAL	7	-	5	-	-	82	77	4	139	1	28	64	-	83	1
Ky.	2	-	-	-	-	15	29	-	-	-	-	-	-	-	-
Tenn.	2	-	5	-	-	32	23	1	114	1	14	28	-	83	1
Ala.	3	-	-	-	-	9	25	2	7	-	14	31	-	-	-
Miss.	-	-	-	-	-	26	-	1	18	-	-	5	-	-	-
W.S. CENTRAL	23	-	26	-	12	1,830	78	18	254	-	21	22	-	1	1
Ark.	3	-	-	-	5	29	14	-	36	-	2	1	-	1	1
La.	4	-	-	-	-	10	19	1	15	-	8	5	-	-	-
Okla.	1	-	-	-	-	141	9	-	6	-	11	16	-	-	-
Tex.	15	-	26	-	7	1,650	36	17	197	-	-	-	-	-	-
MOUNTAIN	15	37	536	-	15	531	46	3	201	6	121	112	-	4	81
Mont.	1	-	-	-	-	1	5	-	-	-	-	5	-	-	13
Idaho	1	26	155	-	2	20	7	-	6	1	19	25	-	2	44
Wyo.	-	-	-	-	-	11	1	-	3	-	3	-	-	-	-
Colo.	5	-	1	-	4	77	10	3	70	2	61	52	-	-	3
N. Mex.	1	1	107	-	5	90	6	N	N	-	15	7	-	-	-
Ariz.	5	-	222	-	-	134	13	-	100	-	8	13	-	-	19
Utah	1	9	35	-	4	44	-	-	12	3	13	6	-	-	1
Nev.	1	1	16	-	-	154	4	-	10	-	2	4	-	2	1
PACIFIC	160	3	1,667	-	27	3,412	284	15	379	4	204	199	2	136	364
Wash.	13	-	1	-	3	226	35	-	83	1	53	54	-	-	-
Oreg.	3	-	28	-	12	177	36	N	N	2	31	17	-	1	1
Calif.	140	3	1,636	-	9	2,925	206	15	277	1	88	110	2	133	356
Alaska	-	-	-	-	1	80	6	-	7	-	5	-	-	-	-
Hawaii	4	-	2	-	2	4	1	-	12	-	27	18	-	2	7
Guam	-	U	-	U	-	1	-	U	-	U	-	-	U	-	-
P.R.	1	-	62	-	1	914	15	-	8	-	14	5	-	1	-
V.I.	-	U	-	U	-	8	-	U	5	U	-	-	U	-	-
Amer. Samoa	-	U	-	U	-	24	-	U	-	U	-	-	U	-	-
C.N.M.I.	-	U	-	U	-	-	-	U	-	U	-	-	U	-	-

*For measles only, imported cases includes 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 June 8, 1991, and June 9, 1990 (23rd Week)

Reporting Area	Syphilis (Primary & Secondary)		Toxic-shock Syndrome	Tuberculosis		Tula-remia	Typhoid Fever	Typhus Fever (Tick-borne) (RMSF)	Rabies, Animal
	Cum. 1991	Cum. 1990	Cum. 1991	Cum. 1991	Cum. 1990	Cum. 1991	Cum. 1991	Cum. 1991	Cum. 1991
UNITED STATES	18,645	21,704	141	9,182	9,483	33	133	92	2,512
NEW ENGLAND	498	835	6	239	205	-	12	2	11
Maine	-	5	3	9	-	-	1	-	-
N.H.	12	39	1	-	3	-	-	-	1
Vt.	1	1	-	3	2	-	-	-	-
Mass.	242	308	2	126	106	-	10	1	-
R.I.	22	6	-	27	31	-	-	-	-
Conn.	221	476	-	74	63	-	1	1	10
MID. ATLANTIC	3,297	4,811	25	2,139	2,257	-	25	-	783
Upstate N.Y.	103	372	11	145	201	-	6	-	292
N.Y. City	1,598	2,101	1	1,306	1,354	-	10	-	-
N.J.	684	757	-	383	386	-	7	-	354
Pa.	912	1,581	13	305	316	-	2	-	137
E.N. CENTRAL	1,966	1,412	26	944	870	1	13	4	43
Ohio	271	236	16	133	129	-	2	3	6
Ind.	60	23	-	62	69	-	-	1	2
Ill.	887	513	4	508	448	-	3	-	8
Mich.	543	459	6	201	191	1	7	-	6
Wis.	205	181	-	40	33	-	1	-	21
W.N. CENTRAL	309	200	29	232	238	10	2	6	374
Minn.	38	43	7	43	40	-	2	-	133
Iowa	27	26	6	30	31	-	-	-	75
Mo.	201	97	7	109	114	10	-	4	6
N. Dak.	-	1	-	2	10	-	-	-	34
S. Dak.	1	1	1	17	6	-	-	-	97
Nebr.	7	6	1	8	13	-	-	-	8
Kans.	35	26	7	23	24	-	-	2	21
S. ATLANTIC	5,564	6,876	13	1,662	1,752	3	24	38	616
Del.	69	85	1	14	24	-	-	-	68
Md.	465	512	-	152	149	-	6	4	229
D.C.	343	412	-	85	68	-	1	-	5
Va.	458	401	3	163	152	-	4	1	128
W. Va.	14	7	-	37	33	-	1	-	28
N.C.	840	810	7	195	203	1	-	20	-
S.C.	668	413	-	177	208	-	-	7	48
Ga.	1,358	1,693	-	312	274	1	4	6	93
Fla.	1,349	2,543	2	527	641	1	8	-	17
E.S. CENTRAL	2,060	1,798	6	670	716	4	1	15	79
Ky.	37	32	3	125	183	1	1	4	21
Tenn.	742	680	3	226	178	3	-	6	18
Ala.	723	596	-	171	227	-	-	5	40
Miss.	558	490	-	148	128	-	-	-	-
W.S. CENTRAL	3,430	3,429	4	1,029	1,156	10	5	25	347
Ark.	289	235	2	96	114	6	-	3	17
La.	1,100	1,056	-	68	166	-	1	-	4
Okla.	79	107	2	67	90	4	-	22	99
Tex.	1,962	2,031	-	798	786	-	4	-	227
MOUNTAIN	252	409	17	225	195	4	5	1	74
Mont.	2	-	-	-	10	3	-	1	13
Idaho	3	6	-	3	5	-	-	-	1
Wyo.	3	1	-	2	3	1	-	-	44
Colo.	39	26	2	6	6	-	1	-	-
N. Mex.	14	20	5	21	40	-	-	-	1
Ariz.	171	287	4	132	96	-	3	-	13
Utah	4	4	6	25	12	-	-	-	-
Nev.	16	65	-	36	23	-	1	-	2
PACIFIC	1,269	1,934	15	2,042	2,094	1	46	1	185
Wash.	76	215	1	132	120	1	-	-	-
Oreg.	32	63	-	46	59	-	2	1	1
Calif.	1,154	1,635	14	1,751	1,800	-	43	-	180
Alaska	3	7	-	25	22	-	-	-	3
Hawaii	4	14	-	88	93	-	1	-	1
Guam	-	1	-	-	22	-	-	-	-
P.R.	217	168	-	71	51	-	5	-	19
V.I.	52	1	-	1	4	-	-	-	-
Amer. Samoa	-	-	-	-	11	-	-	-	-
C.N.M.I.	-	1	-	-	23	-	-	-	-

U: Unavailable

TABLE III. Deaths in 121 U.S. cities,* week ending June 8, 1991 (23rd Week)

Reporting Area	All Causes, By Age (Years)						P&I**
	All Ages	≥65	45-64	25-44	1-24	<1	Total
NEW ENGLAND	569	401	90	44	20	14	35
Boston, Mass.	157	94	22	23	9	9	12
Bridgeport, Conn.	28	19	5	2	1	1	2
Cambridge, Mass.	18	13	4	1	-	-	2
Fall River, Mass.	31	24	7	-	-	-	-
Hartford, Conn.	46	27	12	2	5	-	-
Lowell, Mass.	21	19	1	1	-	-	-
Lynn, Mass.	11	8	3	-	-	-	-
New Bedford, Mass.	22	17	3	2	-	-	-
New Haven, Conn.	51	35	9	2	3	2	3
Providence, R.I.	45	36	5	3	-	1	5
Somerville, Mass.	4	3	1	-	-	-	1
Springfield, Mass.	50	34	12	3	1	-	1
Waterbury, Conn.	30	27	1	2	-	-	1
Worcester, Mass.	55	45	5	3	1	1	8
MID. ATLANTIC	2,730	1,753	523	309	74	71	156
Albany, N.Y.	49	37	9	3	-	-	5
Allentown, Pa.	21	14	3	4	-	-	-
Buffalo, N.Y.	94	61	24	4	1	4	2
Camden, N.J.	45	23	12	5	3	2	1
Elizabeth, N.J.	24	18	3	2	1	-	2
Erie, Pa.†	53	43	7	1	2	-	6
Jersey City, N.J.	64	38	13	4	-	9	-
New York City, N.Y.	1,484	919	278	211	44	32	75
Newark, N.J.	83	39	18	20	3	3	12
Paterson, N.J.	29	19	5	4	-	1	2
Philadelphia, Pa.	328	210	71	27	9	11	23
Pittsburgh, Pa.†	61	39	16	4	-	2	2
Reading, Pa.	40	27	10	3	-	-	6
Rochester, N.Y.	111	79	18	6	6	2	8
Schenectady, N.Y.	25	21	3	1	-	-	-
Scranton, Pa.†	30	23	5	1	1	-	-
Syracuse, N.Y.	110	81	18	5	3	3	7
Trenton, N.J.	29	21	5	1	1	1	2
Utica, N.Y.	25	20	2	2	-	1	-
Yonkers, N.Y.	25	21	3	1	-	-	3
E.N. CENTRAL	2,336	1,446	427	242	131	90	96
Akron, Ohio	58	44	10	2	1	1	-
Canton, Ohio	44	29	7	5	1	2	3
Chicago, Ill.	501	194	103	103	79	22	7
Cincinnati, Ohio	103	75	10	11	2	5	11
Cleveland, Ohio	140	77	33	16	9	5	1
Columbus, Ohio	169	105	34	18	7	5	6
Dayton, Ohio	143	103	25	6	5	4	6
Detroit, Mich.	224	117	55	30	4	18	3
Evansville, Ind.	52	40	9	1	1	1	4
Fort Wayne, Ind.	63	47	8	4	4	-	2
Gary, Ind.	24	11	7	4	1	1	2
Grand Rapids, Mich.	64	43	13	5	1	2	4
Indianapolis, Ind.	299	233	33	21	7	5	15
Madison, Wis.§	U	U	U	U	U	U	U
Milwaukee, Wis.	148	97	33	6	3	9	12
Peoria, Ill.	39	31	6	1	-	1	3
Rockford, Ill.	40	27	8	1	1	3	-
South Bend, Ind.	50	40	8	-	1	1	5
Toledo, Ohio	133	100	18	6	4	5	9
Youngstown, Ohio	42	33	7	2	-	-	3
W.N. CENTRAL	708	483	116	59	22	28	28
Des Moines, Iowa	54	42	6	5	-	1	5
Duluth, Minn.	35	27	6	1	1	-	-
Kansas City, Kans.	16	10	3	3	-	-	-
Kansas City, Mo.	98	65	20	8	1	4	2
Lincoln, Nebr.	41	33	5	1	1	1	2
Minneapolis, Minn.	158	110	21	15	7	5	8
Omaha, Nebr.	70	45	12	4	2	7	2
St. Louis, Mo.	141	79	29	16	7	10	4
St. Paul, Minn.	49	38	7	3	1	-	3

Reporting Area	All Causes, By Age (Years)						P&I**
	All Ages	≥65	45-64	25-44	1-24	<1	Total
S. ATLANTIC	1,265	794	253	137	47	33	44
Atlanta, Ga.	184	96	40	31	8	9	7
Baltimore, Md.	194	120	39	25	5	5	13
Charlotte, N.C.	117	70	27	12	5	3	1
Jacksonville, Fla.	105	65	25	9	5	1	5
Miami, Fla.	102	58	20	18	3	3	-
Norfolk, Va.	58	37	12	3	3	3	1
Richmond, Va.	75	52	13	6	3	1	4
Savannah, Ga.	57	42	7	5	2	1	-
St. Petersburg, Fla.	78	54	15	7	-	2	1
Tampa, Fla.	202	141	32	15	8	5	11
Washington, D.C.	72	45	17	5	5	-	1
Wilmington, Del.	21	14	6	1	-	-	-
E.S. CENTRAL	846	515	176	78	36	41	48
Birmingham, Ala.	126	70	27	15	6	8	1
Chattanooga, Tenn.	72	46	14	5	3	4	4
Knoxville, Tenn.	62	35	17	7	2	1	7
Louisville, Ky.	120	72	31	8	5	4	9
Memphis, Tenn.	180	97	32	24	11	16	10
Mobile, Ala.	107	73	25	6	1	2	5
Montgomery, Ala.	41	29	9	1	1	1	1
Nashville, Tenn.	138	93	21	12	7	5	11
W.S. CENTRAL	1,318	808	269	144	59	38	64
Austin, Tex.	64	37	11	9	2	5	4
Baton Rouge, La.	45	34	8	3	-	-	1
Corpus Christi, Tex.	33	25	5	2	1	-	1
Dallas, Tex.	229	123	50	38	9	9	5
El Paso, Tex.	90	55	15	8	9	3	2
Ft. Worth, Tex.	96	56	22	10	4	4	6
Houston, Tex.	344	202	70	42	22	8	25
Little Rock, Ark.	64	43	17	3	1	-	1
New Orleans, La.§	U	U	U	U	U	U	U
San Antonio, Tex.	198	130	36	20	4	8	7
Shreveport, La.	32	22	5	3	2	-	6
Tulsa, Okla.	123	81	30	6	5	1	6
MOUNTAIN	779	509	156	71	28	15	50
Albuquerque, N.M.	109	62	27	12	6	2	6
Colo. Springs, Colo.	54	37	10	5	1	1	5
Denver, Colo.	107	68	23	11	1	4	13
Las Vegas, Nev.	146	84	38	16	6	2	9
Ogden, Utah	22	17	4	1	-	-	2
Phoenix, Ariz.	140	100	22	10	5	3	4
Pueblo, Colo.	38	32	3	2	1	-	3
Salt Lake City, Utah	43	22	10	8	2	1	1
Tucson, Ariz.	120	87	19	6	6	2	7
PACIFIC	2,002	1,271	400	219	60	49	119
Berkeley, Calif.	26	17	6	2	1	-	3
Fresno, Calif.	57	39	9	1	5	3	3
Glendale, Calif.	20	17	3	-	-	-	-
Honolulu, Hawaii	98	64	21	5	4	4	10
Long Beach, Calif.	82	51	13	9	5	4	6
Los Angeles, Calif.	515	316	104	70	17	6	18
Oakland, Calif.§	U	U	U	U	U	U	U
Pasadena, Calif.	34	25	6	2	-	1	3
Portland, Oreg.	131	87	21	12	6	5	5
Sacramento, Calif.	207	131	35	28	4	9	23
San Diego, Calif.	169	107	34	22	4	2	9
San Francisco, Calif.	179	105	40	30	3	1	6
San Jose, Calif.	187	115	44	19	3	5	13
Seattle, Wash.	153	102	31	11	6	3	6
Spokane, Wash.	61	43	10	2	1	5	5
Tacoma, Wash.	83	52	23	6	1	1	9
TOTAL	12,553††	7,980	2,410	1,303	477	379	640

*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.

§Report for this week is unavailable (U).

Fertility Trends — Continued

full-term and postterm infants. Black mothers were more likely to have a preterm infant than were white mothers (18.3% vs. 8.5%).

Reported by: Div of Vital Statistics, National Center for Health Statistics, CDC.

Editorial Note: The findings in this report indicate an increase in birth rates for teenagers during the 1980s, which may reflect either an increase in their pregnancy rate or a decline in the abortion rate. However, a previous report indicated that during the 1980s the abortion rate for teenagers changed minimally (*5*), suggesting that the increased birth rate from 1986 through 1988 represented an increase in the pregnancy rate. Data from the National Survey of Family Growth, conducted by CDC's National Center for Health Statistics, indicate that during the 1980s the proportion of teenaged women who had had sexual intercourse increased substantially. For those aged 15–19 years, the proportion increased from 42% in 1980 to 52% in 1988 (*6*), and increases were greater among younger teenagers.

The increase in births to unmarried women during the 1980s reflected the substantial growth in the population of unmarried women of childbearing age and in birth rates for unmarried women. Although increased rates occurred for women in all age groups, they were greatest for women aged 25–39 years, the age group characterized by the greatest population increases (*7*). In 1988, women ≥25 years of age accounted for nearly 33% of all births to unmarried women. However, the absolute birth rates continued to be highest for women aged 18–24 years (Table 2). Infants born to teenagers and to unmarried mothers (many of whom are teenagers) are at high risk for poor outcomes because of factors affecting maternal health, including low socioeconomic status, inadequate nutrition, and poor access to health care.

The increasing difference in LBW infants born to white and black women has been attributed, in part, to the increasing proportion of black mothers in groups at high risk for LBW (i.e., women <20 years of age, with <12 years of education, or with late or no prenatal care) (*4*). The increased number of LBW infants also reflects the increasing number of births to unmarried white and black mothers and to mothers receiving late or no prenatal care.

The findings in this report underscore the need to focus prenatal-care programs on women least likely to receive timely prenatal care and those at greatest risk for having a LBW infant. Providing prenatal care services to these mothers should substantially reduce the social and economic costs of caring for LBW infants at greatest risk for illness, long-term disability, and death (*4,8,9*).

References

1. NCHS. Advance report of final natality statistics, 1988. Hyattsville, Maryland: US Department of Health and Human Services, Public Health Service, CDC, 1990. (Monthly vital statistics report; vol 39, no. 4, suppl).
2. NCHS. Advance report of final natality statistics, 1987. Hyattsville, Maryland: US Department of Health and Human Services, Public Health Service, CDC 1989. (Monthly vital statistics report; vol 38, no. 3, suppl).
3. Taffel SM, NCHS. Trends in low birth weight: United States, 1975–85. Hyattsville, Maryland: US Department of Health and Human Services, Public Health Service, CDC, 1989. (Vital health statistics; vol 21, no. 48).
4. Institute of Medicine. Preventing low birthweight. Washington, DC: National Academy Press, 1985.
5. Henshaw SM, Koonin LM, Smith JC. Characteristics of U.S. women having abortions, 1987. Fam Plann Perspect 1991;23(2).
6. CDC. Premarital sexual experience among adolescent women—United States, 1970–1988. MMWR 1991;39:929–32.

Fertility Trends — Continued

7. Bureau of the Census. United States population estimates, by age, sex, race, and Hispanic origin, 1980 to 1988. Washington, DC: US Department of Commerce, Bureau of the Census, 1990.
8. Hughes D, Johnson K, Rosenbaum S, et al. The health of America's children: maternal and child health data book. Washington, DC: Children's Defense Fund, 1988.
9. Miller CA. Fine A, Adams-Taylor S. Monitoring children's health: key indicators. 2nd ed. Washington, DC: American Public Health Association, 1989.

Effectiveness in Disease and Injury Prevention

Program to Increase the Accessibility of Screening Mammography — Rhode Island, 1987–1988

The Rhode Island Department of Health's (RIDH) Breast Cancer Screening Program (RIBCSP) was initiated in 1987; it includes a broad promotional effort targeting women and physicians, a strong quality-assurance program, reductions in the cost of the breast cancer screening examination, and a telephone appointment and tracking system for screening examinations and follow-up care. This report describes and summarizes an evaluation of the RIBCSP.

Although the program is designed to increase the use of mammography among all Rhode Island women, the telephone appointment and tracking system was implemented specifically to meet the needs of three target groups: women whose primary-care providers do not recommend mammography, women who do not have a primary-care provider, and women of low income. The system serves as a referral for mammography, schedules appointments for screening mammograms, and links women who have abnormal mammography results with a primary-care physician.

To be eligible, participants must be at least 40 years of age, be neither pregnant nor breastfeeding, have no breast symptoms (e.g., pain, a palpable mass, or nipple discharge), not have had a mammogram within the preceding 12 months, and agree to provide informed consent and permit clinical follow-up. Mammograms obtained through the appointment system cost $50; for low-income women, they are provided at lower or no cost. Print and broadcast media have been used to publicize the system throughout the state.

To evaluate the program, the RIDH conducted two telephone surveys. First, in September 1987, random-digit–dialing was used to identify a representative sample of 852 women ≥40 years of age to establish baseline data about knowledge, attitudes, and behavior regarding breast cancer screening in Rhode Island and to characterize women in the three target populations. Second, in October 1988, 350 women who had telephoned (i.e., "callers") the appointment system were interviewed about their experiences in the system and with breast cancer screening.

Compared with the representative sample of Rhode Island women aged ≥40 years, callers were more likely to have received a provider's recommendation for screening mammography (54% vs. 44%), have no primary-care provider (24% vs. 19%), and have a family income 200% or more of the federal poverty level (71% vs. 57%).

Among women who had never received a provider's recommendation for screening mammography, callers were younger, more affluent, and better educated than women in the statewide survey (Table 1). In addition, callers were less likely to be married and more likely to have ever had a mammogram (39% vs. 29%). Among

Screening Mammography – Continued

women without a primary-care provider, callers were better educated and more affluent than women in the statewide sample and, although they were similar with respect to ever having had a mammogram (49% vs. 46%), callers were less likely to have had a mammogram recently.* Compared with other low-income women in the statewide sample, low-income callers were more likely to be older, to have a high

*Recent mammography was defined as: a mammogram within 2 years of the survey for women aged 40–49 years and a mammogram within 1 year of the survey for women aged ≥50 years. Not recent mammography was defined as: a mammogram >2 years before the survey for women aged 40–49 years and a mammogram >1 year before the survey for women aged ≥50 years.

TABLE 1. Percentage* of women ≥40 years of age in selected sociodemographic and mammography use categories, by target population† and survey – Rhode Island, 1987–1988

	Target population					
	Never received provider's recommendation for screening mammography		No primary-care provider		Family income <200% of federal poverty level	
Sociodemographic/ Mammography use categories	Baseline survey§ (n=471)	Callers¶ (n=157)	Baseline survey (n=160)	Callers (n=82)	Baseline survey (n=337)	Callers (n=86)
Age (yrs)						
40–49	25	32	32	31	18	9
50–59	21	30	27	26	15	13
≥60	54	38	41	43	67	78
Education						
Less than high school	39	10	33	15	52	22
High school diploma	34	36	34	41	33	52
More than high school	27	54	33	44	15	26
Family income						
<200% of poverty level	53	19	44	31	–	–
≥200% of poverty level	47	81	56	69	–	–
Marital status						
Currently married	48	31	58	62	44	63
Not currently married	52	69	42	38	56	37
Mammography use						
Recent**	14	13	23	13	32	7
Not recent††	15	26	23	36	15	32
Never received	71	61	54	51	53	61

*95% Confidence intervals = 3%–11%.

†Target populations overlap.

§Random-digit–dialing was used before program initiation to identify a representative sample of 852 women ≥40 years of age to establish baseline data about knowledge, attitudes, and behavior regarding breast cancer screening and to characterize women in the three target populations.

¶350 Women who had telephoned the appointment system were interviewed about their experiences in the system and with breast cancer screening.

**For women aged 40–49 years, within 2 years of survey; for women aged ≥50 years, within 1 year of survey.

††For women aged 40–49 years, >2 years before the survey; for women aged ≥50 years, >1 year before survey.

Screening Mammography – Continued

school diploma, and to be currently married. Low-income callers were less likely ever to have had a mammogram, and far less likely than their counterparts in the state to have had a mammogram recently.

In each of the three target groups, a minimum of 93% of callers participated in screening, including 97% of those without primary-care providers. In each group, 1%–4% of women missed initial appointments made through the system but were generally screened within 30 days. Two percent to 4% had not been screened by the time of the survey. Of those women screened, 13% had abnormal results. In each of the three target populations, 86%–93% of women with abnormal results had contacted a provider after being notified about the need for additional testing or treatment. However, women in low-income groups were less likely (86%) to have done so than women in other target groups (92%–93%). All women with abnormal findings received intensive follow-up by the RIBCSP and eventually were evaluated by a physician.

Reported by: JP Fulton, PhD, EF Donnelly, MPH, JP Feldman, MD, DF DiOrio, MEd, JS Buechner, PhD, HD Scott, MD, BA DeBuono, MD, State Epidemiologist, Rhode Island Dept of Health. Cancer Prevention and Control Br, Div of Chronic Disease Control and Community Intervention, Center for Chronic Disease Prevention and Health Promotion, CDC.

Editorial Note: Breast cancer is a leading cause of death from cancer among women in the United States (*1*). Although early detection with mammography reduces breast cancer mortality, many women do not receive mammograms according to current guidelines for at least three reasons (*2*). First, the use of mammography is strongly influenced by providers' recommendations (*3,4*). Second, many radiologists will not accept patients for mammography if they have not been referred by a physician because of the need for follow-up when results are abnormal (*5*). Third, the cost of a mammographic examination may limit access for women of low income (*6–8*).

Because physicians in Rhode Island and other states are actively promoting screening mammography (*9,10*), the RIDH is modifying the telephone appointment system to focus more on low-income women, especially those with no health insurance. In addition, the system's original publicity strategy has been supplanted by such methods as peer recruitment among low-income women, regular reminders to women who use neighborhood health centers for primary health care, and a multifaceted media campaign (e.g., posters, selected radio stations, and community newspapers). Mammograms provided by this system continue to cost ≤$50.

In Rhode Island, the telephone appointment system has been successful in providing screening mammography for callers and ensuring follow-up for women who have abnormal mammography results. As a growing proportion of Rhode Island women begin to participate in breast cancer screening and as providers become more active in referring women for mammography, the RIBCSP is placing greater emphasis on meeting the screening needs of low-income women. Clerical procedures are being modified to improve the cost-effectiveness of client tracking.

References

1. Gloeckler-Ries LA, Hankey BF, Edwards BK, eds. Cancer statistics review, 1973–1987. Bethesda, Maryland: US Department of Health and Human Services, Public Health Service, National Institutes of Health, National Cancer Institute, 1990; NIH publication no. 90-2789.
2. Dawson DA, NCHS. Breast cancer risk factors and screening: United States, 1987. Hyattsville, Maryland: US Department of Health and Human Services, Public Health Service, CDC, 1990; DHHS publication no. 90-1500. (Data from the National Health Interview Survey; series 10, no. 172).
3. Fox SA, Klos DS, Tsau CV. Underuse of screening mammography by family physicians. Radiology 1988;166:431–4.

Screening Mammography — Continued

4. NCI Breast Cancer Screening Consortium. Screening mammography—a missed clinical opportunity? Results of the NCI Breast Cancer Screening Consortium and National Health Interview Survey studies. JAMA 1990;264:54–8.
5. Sickles EA. Mammography screening and the self-referred woman. Radiology 1988;166: 271–3.
6. Destouet JM, Monsees B. Low-cost breast screening program takes to the road in St. Louis. Diagnostic Imaging 1987;35:81–9.
7. Burack RC, Liang J. The early detection of cancer in the primary care setting: factors associated with the acceptance and completion of recommended procedures. Prev Med 1987;16:739–51.
8. National Cancer Institute. Mammography screening: state level activities and a review of the literature. Bethesda, Maryland: US Department of Health and Human Services, Public Health Service, National Institutes of Health, 1989.
9. CDC. Trends in breast cancer screening—Rhode Island, 1987–1989. MMWR 1989;38:569–71.
10. American Cancer Society. Survey of physicians' attitudes and practices in early cancer detection. CA 1990;402:77–99.

Current Trends

Acute and Chronic Poisoning from Residential Exposures to Elemental Mercury — Michigan, 1989–1990

From May 1989 through November 1990, eight episodes of elemental mercury exposure in private residences or schools in the United States were reported to the Agency for Toxic Substances and Disease Registry (ATSDR). The case studies in this report document two of these episodes (both in Michigan) of residential mercury poisoning—one involving acute mercury exposure, and the other, chronic exposure to elemental mercury. These episodes illustrate the differing clinical and toxicologic manifestations of acute and chronic mercury poisoning.

Episode 1. On August 7, 1989, four adult occupants (two men and two women ranging in age from 40 to 88 years) of a private home were hospitalized for evaluation of nausea, diarrhea, shortness of breath, and nonspecific chest pain. During hospitalization, the patients experienced progressive dyspnea and pulmonary insufficiency. On August 11, investigators learned that one of the patients had been smelting dental amalgam in a casting furnace in the basement of the home in an attempt to recover silver from the amalgam. Mercury fumes released during the operation apparently had entered air ducts in the basement and had circulated throughout the house.

Because of this mercury vapor exposure, chelation therapy with dimercaprol was initiated in the patients. On August 12, urine mercury concentrations from three of the patients ranged from 94 to 423 μg/L; serum mercury concentrations from two patients were 127 and 161 μg/L.

Despite chelation therapy and vigorous ventilatory support treatment, the condition of the patients continued to deteriorate. All of the patients died within 11–24 days after exposure to the mercury vapor. The cause of death was considered to be mercury poisoning, which resulted in adult respiratory distress syndrome and subsequent respiratory failure. Postmortem mercury concentrations in organs from the four patients were 300–2100 μg/g (kidney), 3–2400 μg/g (liver), <1–100 μg/g (brain), and 1–150 μg/g (lung); concentrations in blood ranged from 58 μg/L to 369 μg/L.

Mercury Exposures — Continued

Measurements of ambient indoor air concentrations of mercury taken 11–18 days after the exposure were as high as 786 $\mu g/m^3$ in the basement and 912 $\mu g/m^3$ on the first floor. The house was extensively cleaned to reduce the mercury contamination; however, decontamination efforts did not reduce indoor air mercury concentrations to an acceptable level, and the house was subsequently demolished.

Episode 2. On August 21, 1989, a young girl was admitted to the hospital because of impaired gait. She was diagnosed as having a postinfectious viral syndrome and was discharged on August 23. On September 11, she was readmitted to the hospital when she could no longer walk. On September 19, an older sister of the patient was admitted to the hospital with similar symptoms. Clinical evaluation of both girls revealed numbness in the fingers and toes, absence of deep tendon reflexes, elevated blood pressure, and an elevated level of protein in the cerebrospinal fluid. Mercury poisoning was diagnosed, and chelation therapy was started in the two children. Subsequently, on October 3, their asymptomatic brother was hospitalized for a chelation challenge, which detected a substantial mercury load.

After chelation therapy, the brother remained asymptomatic, and the older sister improved and was discharged from rehabilitation therapy. The index patient had numerous residual neurologic abnormalities, including visual field defects, mild upper and lower extremity weakness, and some emotional lability.

Subsequent investigations revealed that earlier that summer about 20 cm^3 of liquid mercury had been spilled in the boy's bedroom. Examination of the house using a mercury vapor analyzer detected indoor air mercury concentrations of 10–40 $\mu g/m^3$. Clean-up efforts included removing carpet from several areas in the house, replacing the carpet and wooden subfloor in the bedroom where the spill occurred, and commercially cleaning all other carpet and furniture.

Reported by: C Taueg, MPH, Wayne County Health Dept; DJ Sanfilippo, MD, Grand Rapids; B Rowens, MD, Detroit; J Szejda, Ottawa County Human Svcs, Holland; JL Hesse, MS, Michigan Dept of Public Health. Div of Health Assessment and Consultation, Agency for Toxic Substances and Disease Registry.

Editorial Note: Although the toxic properties of elemental mercury have been recognized since at least the 1500s, occupational and residential exposures to mercury remain a source of poisoning.

Although death is an infrequent outcome of acute exposure to mercury, the first episode described in this report illustrates the clinical progression following exposure. Patients are usually asymptomatic during the first 1–4 hours following acute exposure to high air concentrations of mercury vapor. Symptoms start abruptly and may include fever, chills, nausea, general malaise, and respiratory difficulties (shortness of breath, pain and tightness in the chest, and paroxysmal coughing). In severe cases, pulmonary edema may cause death within a few days (*1,2*).

After inhalation, elemental mercury is readily absorbed through the alveolar membranes and transported by blood to the brain and other tissues of the nervous system. Mercury is rapidly converted by the blood to mercuric ions, which are then excreted in the urine and feces. Diagnosis of mercury toxicity is aided by the detection of elevated concentrations of mercury in blood or urine samples. Background urine concentrations of mercury in persons with no unusual exposure to mercury range from 1 to 25 $\mu g/L$; 95% of such urine samples contain <20 $\mu g/L$ (*1*). Although urine mercury concentrations correlate poorly with manifestations of mercury poisoning, symptoms may appear when the urine mercury concentrations exceed 300 $\mu g/L$ (*3*).

Mercury Exposures — Continued

In unexposed persons, blood mercury concentrations are usually <3 μg/L, but may be substantially higher in persons with a high dietary intake of fish (*1*).

Residential and occupational cases of mercury poisoning more commonly result from chronic exposures, as illustrated by the second episode described in this report. Spilled mercury gravitates to cracks in the floor and into the pile of carpets. Even though it may not be visible, the mercury can slowly volatilize indoors and may lead to chronic mercury poisoning through inhalation exposure. Vacuuming a contaminated area may facilitate the spread of mercury vapor throughout the house.

The potential for indoor mercury exposure is increased when indoor air exchange is reduced (e.g., when doors and windows are kept closed). Warm air from heating ducts and vents may enhance volatilization when circulated over spilled mercury. Mercury vapor concentration is likely to be higher near the floor, and children may be exposed to higher concentrations of mercury than adults.

The vagueness of the early clinical signs of central nervous system (CNS) toxicity characteristic of mercury poisoning often result in misdiagnosis. If exposure to mercury continues, the severity of symptoms may progress as a function of mercury concentration, length of exposure, and individual sensitivity. The CNS toxicity of mercury is both neurologic and psychologic. Fine tremors in the fingers, eyelids, and lips are early signs of mercury toxicity. Tremors in the hands and arms may interfere with precision movements and impair skills such as handwriting. Common psychopathologic symptoms include depression, irritability, exaggerated response to stimuli, excessive shyness, insomnia, and emotional instability (*1,2*).

Potential sources of elemental mercury in the home include mercury switches and mercury-containing devices such as thermostats, thermometers, and barometers. Family members may also bring into the home elemental mercury obtained from laboratories, dental offices, or other industrial sources.

In the *ATSDR Toxicological Profile for Mercury*, the minimal risk level (MRL) for chronic inhalation exposure to elemental mercury was determined to be 0.3 $\mu g/m^3$ (*1*). An MRL is an estimate of the daily human exposure to a chemical that is likely to be without an appreciable risk of deleterious (noncarcinogenic) effects during a specified period of exposure. Chronic inhalation exposure to elemental mercury concentrations below the MRL would not be expected to result in adverse health effects (*1*).

References

1. Agency for Toxic Substances and Disease Registry. Toxicological profile for mercury. Atlanta: US Department of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry, 1989; publication no. ATSDR/TP-89/16.
2. Gerstner HB, Huff JE. Clinical toxicology of mercury. J Toxicol Environ Health 1977; 2:491–526.
3. Knight AL. Mercury and its compounds. In: Zenz C, ed. Occupational medicine: principles and practices. 2nd ed. Chicago: Year Book Medical Publishers, 1988:590–6.
4. Occupational Safety and Health Administration. Air contaminants: final rule. Federal Register 1989;54:2415–6.

Erratum: Vol. 40, No. 22

In the article, "Update: Acquired Immunodeficiency Syndrome—United States, 1981–1990," the first sentence of the second full paragraph on page 359 should read: "Based on year of report, the number of AIDS cases increased *from* 35,230 to 43,339 (23%) from 1989 to 1990 . . . ."

The *Morbidity and Mortality Weekly Report* is prepared by the Centers for Disease Control, Atlanta, Georgia, and is available on a paid subscription basis from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, (202) 783-3238.

The data in this report 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. Accounts of interesting cases, outbreaks, environmental hazards, or other public health problems of current interest to health officials, as well as matters pertaining to editorial or other textual considerations should be addressed to: Editor, *Morbidity and Mortality Weekly Report*, Mailstop C-08, Centers for Disease Control, Atlanta, Georgia 30333; telephone (404) 332-4555.

☆U.S. Government Printing Office: 1991-531-130/42010 Region IV

HHS Publication No. (CDC) 91-8017