CENTERS FOR DISEASE CONTROL

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MORBIDITY AND MORTALITY WEEKLY REPORT

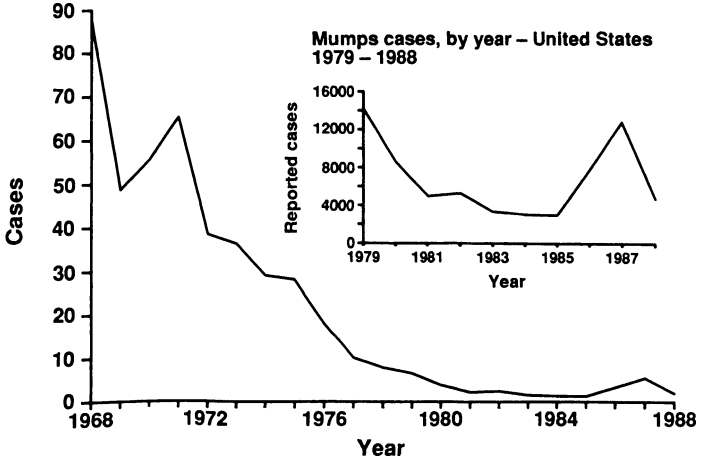
Current Trends

Mumps — United States, 1985–1988

After the introduction of live mumps virus vaccine in 1967 and the recommendation for its routine use in 1977, the incidence rate of reported mumps cases in the United States decreased steadily. In 1985, a record low of 2982 cases occurred, representing a 98.0% decline from the 152,000 cases reported in 1968 (Figure 1). However, from 1985 to 1987, mumps increased; 7790 and 12,848 cases were reported in 1986 and 1987, respectively. During this time, the annual reported incidence rate rose almost fivefold, from 1.1 cases/100,000 population to 5.2 cases/100,000 population (Table 1). However, in 1988, a provisional total of 4730 cases was reported, representing a 63.2% decrease from 1987.

In 1987, of the 48 areas (47 states plus the District of Columbia) that routinely reported mumps cases, at least one mumps case was reported from all but three

FIGURE 1. Reported mumps cases, per 100,000 population, by year — United States, 1968–1988



*Provisional data.

Mumps — Continued

(Delaware, Rhode Island, and Wyoming) of the reporting areas. Similarly, in 1988, all except Maine, North Dakota, and Rhode Island have provisionally reported mumps cases. In 1985, seven states (Illinois, Tennessee, Michigan, Wisconsin, Indiana, Louisiana, and Minnesota) reported more than 500 cases each (case range: 810–2737, incidence range: 18.1–37.7 cases/100,000 population). In addition, in 1985, 680 (22.8%) of the 2982 counties in the 48 reporting areas reported at least one case, compared with 889 (28.3%) of 3138 in 1987. During 1987, 31 (64.6%) of the 48 reporting areas noted more mumps cases than in 1986.

Final age-specific data are available through 1987 (Table 1). Most (55.2%) mumps cases reported in 1987 occurred in school-aged children (5–14 years of age). For comparison, an average of 74.6% of reported cases occurred in this age group between 1967 and 1971 (the first 5-year period postlicensure). However, whereas an annual average of 8.3% of reported cases were among persons ≥15 years of age in 1967–1971, this age group accounted for 38.3% of the reported total in 1987. Although reported mumps incidence increased in all age groups from 1985 to 1987, rates increased most substantially among 10–14-year-olds (almost a sevenfold increase) and 15–19-year-olds (over an eightfold increase) (Table 1). For the first time since mumps became a reportable disease, the reported peak incidence rate shifted for 2 consecutive years from 5–9-year-olds, the age group traditionally associated with the highest risk of disease (*1,2*), to older age groups. The increased occurrence of mumps in susceptible adolescents and young adults has been demonstrated in several recent outbreaks on college campuses (*3*) and in occupational settings (*4*). Nonetheless, despite this age shift in the epidemiology of reported mumps, the overall risk of disease in persons 10–14 and ≥15 years of age is still lower than that in the prevaccine and early postvaccine licensure periods.

Reported incidence rates continue to be affected by school immunization laws (*5*). For example, in the 15 areas (14 states and the District of Columbia) that had

TABLE 1. Age distribution of reported mumps patients and estimated incidence rates — United States, 1985–1987

Age group (yrs)	1985			1986			1987			Incidence rate change 1985–1987 (%)
	No.	(%)	Rate*	No.	(%)	Rate*	No.	(%)	Rate*	
<1	29	(1.1)	0.9	142	(2.0)	4.2	75	(0.6)	2.2	(+144.4)
1–4	339	(13.1)	2.7	569	(8.0)	4.3	729	(5.9)	5.2	(+92.6)
5–9	837	(32.5)	5.7	1768	(24.7)	11.1	2196	(17.9)	13.0	(+128.1)
10–14	649	(25.2)	4.4	2625	(36.7)	17.3	4567	(37.3)	29.0	(+559.1)
15–19	405	(15.7)	2.4	1535	(21.5)	9.0	3455	(28.2)	19.6	(+716.7)
>20	320	(12.4)	0.2	507	(7.1)	0.3	1235	(10.1)	0.8	(+300.0)
Total (known age)	2579	(100.0)	—	7146	(100.0)	—	12,257	(100.0)	—	—
Unknown age	403	—	—	644	—	—	591	—	—	—
Total	**2982**	**—**	**1.1**	**7790**	**—**	**3.0**	**12,848**	**—**	**5.2**	**(372.7)**

*Rates are expressed as cases/100,000 population (projected census data) extrapolated from the age distribution of cases with known age to total cases. Not adjusted for states not reporting mumps: 1985 and 1986—Mississippi, New Mexico, Oklahoma, Oregon; 1987—Mississippi, New Mexico, Oklahoma (part-year), Oregon.

Mumps – Continued

comprehensive (i.e., kindergarten through grade 12 [K–12]) laws requiring proof of immunity against mumps for school attendance, the incidence rate in 1987 was 1.1 mumps cases/100,000 population (Table 2). In contrast, mumps incidence was highest in the 14 states routinely reporting mumps cases in 1987 that had no requirements for mumps vaccination (11.5 cases/100,000 population) and intermediate (6.2 cases/100,000 population) in the 18 states with partial vaccination requirements for school attendance (i.e., those that include some children but do not comprehensively include K–12) that routinely reported cases. All states that had >500 reported cases in 1987 had either no or partial school immunization requirements. Provisional 1988 data suggest this trend is continuing, with incidence rates of 1.4/100,000 in states with K–12 laws in effect at the beginning of that year, 1.9/100,000 in states with partial requirements in effect at the beginning of that year, and 3.2/100,000 in states with no school immunization laws in effect at the beginning of that year.

The shift in age-specific risk noted above occurred only in states without comprehensive K–12 school vaccination requirements. Mumps incidence in 1987 decreased substantially in preschool- and school-aged children, even in the absence of any school laws; however, the reported incidence rates for 10–14-year-olds in states with no laws (65.5 cases/100,000 population) approached 1967–1971 levels (75.5 cases/100,000 population) (Figure 2). For persons ≥15 years of age in such states, the reported rates were equivalent to reported 1967–1971 rates (both at 5.8 cases/100,000 population).

Reported by: Div of Immunization, Center for Prevention Svcs, CDC.

Editorial Note: Through 1987, more than 82.3 million doses of live mumps virus vaccine were distributed in the United States. The principal strategy to control mumps in the United States is to achieve and maintain high immunization levels, primarily among infants and young children. The Immunization Practices Advisory Committee of the Public Health Service recommends that universal mumps immunization routinely should be carried out in physicians' offices and public health clinics in all communities; trivalent measles-mumps-rubella (MMR) vaccine is the vaccine formulation of choice (*6*). This strategy is also cost-effective (*7,8*). Unless otherwise

TABLE 2. Reported mumps incidence among states, by school immunization laws – United States, 1985–1988

	1985		1986		1987		1988*	
Mumps school law status	No. states	Rate†	No. states	Rate†	No. states	Rate†	No. states§	Rate†
No law	16	1.6	15	10.0	14	11.5	15	3.2
Partial law	17	1.5	17	2.0	18	6.2	18	1.9
K–12 law	14¶	0.7	15¶	0.7	15¶	1.1	15¶	1.4

*1988 data represent provisional totals reported through the 52nd week.

†Rates are expressed as cases/100,000 population. Not adjusted for states not reporting mumps: 1985 and 1986—Mississippi, New Mexico, Oklahoma, Oregon; 1987—Mississippi, New Mexico, Oklahoma (part-year), Oregon; 1988—Mississippi, New Mexico, Oregon.

§Represent classifications at the beginning of the year; during 1988, comprehensive K–12 mumps immunization requirements became effective in Wisconsin, which formerly had a K–4 requirement, and in Illinois and Tennessee, which formerly had no school immunization requirements.

¶Includes District of Columbia.

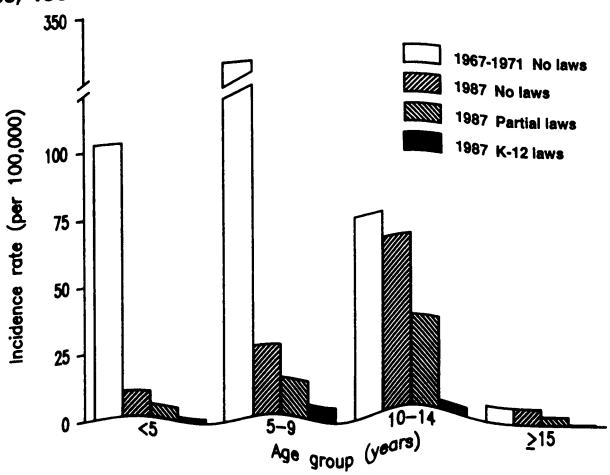
Mumps – Continued

contraindicated, all persons thought to be susceptible should be vaccinated. Susceptible persons include those without documentation of 1) physician-diagnosed mumps, 2) immunization with live mumps virus vaccine at ≥12 months of age, or 3) laboratory evidence of immunity.

Ensuring immunity for adolescents and young adults is especially important, given the recent shift in risk of disease to these age groups. This trend does not appear to be due to waning immunity in persons vaccinated previously and is probably attributable to the relatively underimmunized cohort of children born between 1967 and 1977 (*9*). The evidence that the shift in risk to older persons through 1987 is limited to states without comprehensive mumps immunization school laws provides further evidence that the relative resurgence of mumps in the United States is not due to vaccine failure but to a failure to vaccinate.

Although seroepidemiologic surveys, especially of adolescents and young adults, are needed to better define the magnitude and extent of susceptible cohorts, several actions are necessary to decrease the pool of susceptibles and to ensure that high rates of immunization are maintained. The adoption and enforcement of universal comprehensive vaccination requirements for school attendance are likely to reduce mumps incidence substantially. At the end of 1988, 17 states and the District of Columbia had comprehensive K–12 laws in effect, 18 states had partial vaccination requirements, and 15 states had no requirements for mumps vaccination (Figure 3). Tennessee and Illinois, which together accounted for 57% and 31% of the total number of reported U.S. mumps cases in 1986 and 1987, respectively, have recently enacted comprehensive K–12 requirements. Similar requirements in colleges, as recommended by the American College Health Association (*10*), and selected places of employment should also be considered; selected places of employment where persons in this age cohort are likely to be concentrated or where the consequences of disease spread may be more severe (e.g., medical-care settings) would help focus attention on groups that appear to be at highest risk. More aggressive outbreak

FIGURE 2. Age-specific mumps incidence rates, by school immunization law status – United States, 1967–1971* and 1987†

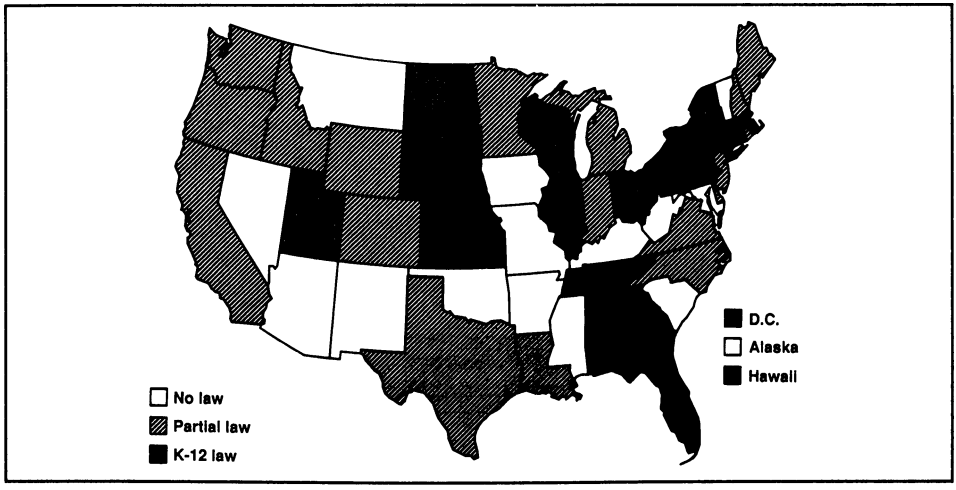


*1967–1971: California, Massachusetts, New York City.
†1987: Total United States.

Mumps — Continued

control, including exclusion of susceptibles from school, is also helpful in eliminating transmission in mumps epidemics.

FIGURE 3. Mumps school immunization laws, by reporting area — United States, December 31, 1988



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Epidemiologic Notes and Reports

Testicular Cancer in Leather Workers — Fulton County, New York

Between 1982 and 1984, three cases of testicular cancer were diagnosed in workers at a leather tannery in Fulton County, New York (*1*). The occurrence of this cluster of cases in association with exposure to suspected etiologic agents prompted an investigation by representatives of the Amalgamated Clothing and Textile Workers

Testicular Cancer — Continued

Union, the Mount Sinai School of Medicine, the New York State Department of Health, and the National Institute for Occupational Safety and Health (NIOSH). The investigation included medical assessment of the three index patients, an environmental assessment of the tannery, and epidemiologic studies of the tannery workforce.

Medical and Occupational Assessment of Index Patients

The first case occurred in 1982, when embryonal cell carcinoma was diagnosed in a 31-year-old worker who had begun work in leather tanning 13 years earlier. A second case of combined seminoma and embryonal carcinoma was diagnosed in 1984 in a 36-year-old worker who had begun work in this industry 19 years earlier. The third case of embryonal cell carcinoma was also diagnosed in 1984 in a 25-year-old worker who had worked in tanning for 8 years. All three employees had worked together on the finishing line during the night shift at the index tannery from

(Continued on page 111)

TABLE I. Summary — cases of specified notifiable diseases, United States

Disease	7th Week Ending			Cumulative, 7th Week Ending		
	Feb. 18, 1989	Feb. 20, 1988	Median 1984-1988	Feb. 18, 1989	Feb. 20, 1988	Median 1984-1988
Acquired Immunodeficiency Syndrome (AIDS)	1,031	U*	179	4,240	3,696	1,556
Aseptic meningitis	74	84	71	514	537	578
Encephalitis: Primary (arthropod-borne & unspec)	13	18	17	65	103	104
Post-infectious	-	-	2	6	8	10
Gonorrhea: Civilian	10,186	11,473	14,686	84,327	93,014	110,016
Military	221	322	430	1,503	1,788	2,315
Hepatitis: Type A	773	584	423	4,164	3,019	3,013
Type B	389	429	453	2,348	2,364	2,982
Non A, Non B	33	37	65	260	267	389
Unspecified	38	49	82	289	270	522
Legionellosis	15	18	11	97	112	90
Leprosy	6	4	4	18	12	29
Malaria	15	26	16	127	79	80
Measles: Total†	18	46	46	244	204	204
Indigenous	9	46	33	214	192	164
Imported	9	-	1	30	12	33
Meningococcal infections	95	63	65	374	446	413
Mumps	140	71	76	683	551	446
Pertussis	22	45	35	235	181	203
Rubella (German measles)	10	1	4	29	25	29
Syphilis (Primary & Secondary): Civilian	595	618	606	5,047	4,643	3,881
Military	3	6	5	40	26	27
Toxic Shock syndrome	5	7	7	29	36	41
Tuberculosis	323	457	381	2,079	2,168	2,168
Tularemia	1	1	1	8	16	10
Typhoid Fever	4	4	4	39	43	33
Typhus fever, tick-borne (RMSF)	-	3	1	17	10	7
Rabies, animal	62	48	83	444	336	493

TABLE II. Notifiable diseases of low frequency, United States

	Cum. 1989		Cum. 1989
Anthrax	-	Leptospirosis (R.I. 1, Hawaii 3)	20
Botulism: Foodborne	-	Plague	-
Infant	1	Poliomyelitis, Paralytic	-
Other	1	Psittacosis (N.C. 1)	12
Brucellosis (Tenn. 1, Calif. 1)	3	Rabies, human	-
Cholera	-	Tetanus	6
Congenital rubella syndrome	-	Trichinosis	1
Congenital syphilis, ages <1 year	-		
Diphtheria	-		

*Because AIDS cases are not received weekly from all reporting areas, comparison of weekly figures may be misleading.
†Eight of the 18 reported cases for this week were imported from a foreign country or can be directly traceable to a known internationally imported case within two generations.

TABLE III. Cases of specified notifiable diseases, United States, weeks ending February 18, 1989 and February 20, 1988 (7th Week)

Reporting Area	AIDS	Aseptic Meningitis	Encephalitis		Gonorrhea (Civilian)		Hepatitis (Viral), by type				Legionellosis	Leprosy
			Primary	Post-infectious			A	B	NA,NB	Unspecified		
	Cum. 1989	Cum. 1989	Cum. 1989	Cum. 1989	Cum. 1989	Cum. 1988	Cum. 1989	Cum. 1989	Cum. 1989	Cum. 1989	Cum. 1989	Cum. 1989
UNITED STATES	4,240	514	65	6	84,327	93,014	4,164	2,348	260	289	97	18
NEW ENGLAND	167	27	2	-	2,503	2,684	88	177	25	12	9	2
Maine	14	1	1	-	36	56	3	9	4	-	2	-
N.H.	5	1	-	-	22	50	18	15	5	1	-	-
Vt.	2	-	-	-	11	24	2	3	2	-	-	-
Mass.	71	12	-	-	1,087	886	35	107	10	10	6	2
R.I.	11	8	-	-	203	208	1	21	2	1	1	-
Conn.	64	5	1	-	1,144	1,460	29	22	2	-	-	-
MID. ATLANTIC	1,340	54	2	-	10,863	13,527	678	374	21	32	29	1
Upstate N.Y.	187	20	1	-	1,750	1,764	155	79	8	2	11	-
N.Y. City	718	9	1	-	3,800	5,700	32	77	3	20	1	-
N.J.	295	-	-	-	1,764	1,919	91	84	5	5	-	-
Pa.	140	25	-	-	3,549	4,144	400	134	5	5	17	1
E.N. CENTRAL	419	66	23	-	15,072	14,594	221	241	20	5	21	-
Ohio	70	24	7	-	3,946	3,198	67	85	4	-	14	-
Ind.	114	10	5	-	782	1,303	8	24	-	1	1	-
Ill.	145	1	-	-	5,001	3,748	71	24	-	1	-	-
Mich.	78	30	9	-	4,753	5,118	60	85	12	3	4	-
Wis.	12	1	2	-	590	1,227	15	23	4	-	2	-
W.N. CENTRAL	115	22	2	-	3,774	3,693	90	59	7	2	3	-
Minn.	27	3	-	-	342	494	8	19	-	2	-	-
Iowa	12	6	1	-	316	299	8	7	3	-	1	-
Mo.	62	7	-	-	2,342	2,141	39	24	2	-	-	-
N. Dak.	1	1	-	-	10	31	-	2	-	-	-	-
S. Dak.	2	-	1	-	37	75	-	2	2	-	-	-
Nebr.	2	2	-	-	280	203	16	-	-	-	2	-
Kans.	9	3	-	-	447	450	19	5	-	-	-	-
S. ATLANTIC	834	121	9	2	24,284	24,928	318	479	35	35	13	-
Del.	25	5	-	-	355	358	10	20	-	-	-	-
Md.	126	14	1	-	1,716	2,072	86	101	6	8	7	-
D.C.	58	1	-	-	1,704	1,490	-	-	-	-	-	-
Va.	31	31	5	-	2,303	1,958	17	46	8	17	1	-
W. Va.	1	2	2	-	210	233	5	7	-	-	-	-
N.C.	1	13	-	1	3,728	3,766	75	160	15	-	4	-
S.C.	38	4	-	-	2,557	2,147	5	48	-	2	-	-
Ga.	159	7	-	-	4,546	5,087	59	40	2	2	1	-
Fla.	395	44	1	1	7,165	7,817	61	57	4	6	-	-
E.S. CENTRAL	103	55	6	-	7,361	7,116	47	197	25	1	5	-
Ky.	12	11	1	-	674	630	18	51	8	-	1	-
Tenn.	43	8	-	-	2,455	2,138	11	100	6	-	2	-
Ala.	37	29	5	-	2,135	2,548	12	43	11	1	2	-
Miss.	11	7	-	-	2,097	1,800	6	3	-	-	-	-
W.S. CENTRAL	346	25	6	-	9,299	11,688	321	134	17	52	5	2
Ark.	16	3	-	-	1,029	887	18	5	1	-	-	-
La.	73	3	1	-	1,647	3,077	16	10	1	-	-	-
Okla.	-	6	3	-	967	880	72	28	6	5	5	-
Tex.	257	13	2	-	5,656	6,844	215	91	9	47	-	2
MOUNTAIN	125	20	2	-	1,701	1,951	715	153	24	37	4	-
Mont.	-	-	-	-	31	51	5	11	-	-	-	-
Idaho	2	-	-	-	32	50	32	12	-	-	-	-
Wyo.	3	-	-	-	15	23	5	1	-	-	-	-
Colo.	36	4	1	-	239	521	94	22	4	18	-	-
N. Mex.	10	4	-	-	150	207	81	34	5	1	-	-
Ariz.	35	8	-	-	656	592	382	39	4	14	4	-
Utah	9	3	1	-	74	96	47	11	6	3	-	-
Nev.	30	1	-	-	504	411	69	23	5	1	-	-
PACIFIC	791	124	13	4	9,470	12,833	1,686	534	86	113	8	13
Wash.	63	-	-	-	622	947	280	61	12	3	-	-
Oreg.	40	-	-	-	410	439	278	45	10	-	-	-
Calif.	685	117	11	4	8,240	11,140	938	419	63	108	8	13
Alaska	2	-	2	-	152	167	166	8	1	2	-	-
Hawaii	1	7	-	-	46	140	24	1	-	-	-	-
Guam	-	-	-	-	-	17	-	-	-	-	-	-
P.R.	188	12	1	-	111	224	4	11	1	2	-	-
V.I.	15	-	-	-	76	48	-	1	-	-	-	-
Amer. Samoa	-	-	-	-	-	9	-	-	-	-	-	-
C.N.M.I.	-	-	-	-	-	5	-	-	-	-	-	-

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

TABLE III. (Cont'd.) Cases of specified notifiable diseases, United States, weeks ending February 18, 1989 and February 20, 1988 (7th Week)

Reporting Area	Malaria	Measles (Rubeola)					Meningococcal Infections	Mumps		Pertussis			Rubella		
		Indigenous		Imported*		Total									
	Cum. 1989	1989	Cum. 1989	1989	Cum. 1989	Cum. 1988	Cum. 1989	1989	Cum. 1989	1989	Cum. 1989	Cum. 1988	1989	Cum. 1989	Cum. 1988
UNITED STATES	127	9	214	9	30	204	374	140	683	22	235	181	10	29	25
NEW ENGLAND	11	-	-	-	-	1	30	4	7	-	11	21	-	-	-
Maine	-	-	-	-	-	-	5	-	-	-	4	1	-	-	-
N.H.	-	-	-	-	-	-	8	2	5	-	5	15	-	-	-
Vt.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mass.	9	-	-	-	-	1	13	1	1	-	-	1	-	-	-
R.I.	2	-	-	-	-	-	1	-	-	-	2	-	-	-	-
Conn.	-	-	-	-	-	-	3	1	1	-	-	4	-	-	-
MID. ATLANTIC	16	-	4	1	13	49	33	3	23	-	21	9	-	1	-
Upstate N.Y.	7	-	-	-	-	-	16	-	1	-	6	4	-	1	-
N.Y. City	6	-	3	1†	12	4	10	-	-	-	-	-	-	-	-
N.J.	-	-	-	-	1	-	-	-	11	-	14	1	-	-	-
Pa.	3	-	1	-	-	45	7	3	11	-	1	4	-	-	-
E.N. CENTRAL	9	-	44	-	2	9	38	19	60	2	11	22	1	1	10
Ohio	3	-	44	-	1	-	24	-	8	-	1	2	-	-	-
Ind.	1	-	-	-	-	-	-	-	3	-	3	4	-	-	-
Ill.	3	-	-	-	-	1	4	13	18	-	-	3	1	1	10
Mich.	-	-	-	-	-	8	7	6	30	1	4	6	-	-	-
Wis.	2	-	-	-	1	-	3	-	1	1	3	7	-	-	-
W.N. CENTRAL	2	-	10	1	1	-	10	61	212	-	5	18	-	-	-
Minn.	1	-	-	-	-	-	2	-	-	-	-	1	-	-	-
Iowa	-	-	-	-	-	-	-	3	7	-	5	6	-	-	-
Mo.	1	-	10	-	-	-	-	1	26	-	-	2	-	-	-
N. Dak.	-	-	-	-	-	-	-	-	-	-	-	6	-	-	-
S. Dak.	-	-	-	-	-	-	2	-	-	-	-	2	-	-	-
Nebr.	-	-	-	-	-	-	5	-	-	-	-	-	-	-	-
Kans.	-	-	-	1§	1	-	1	57	179	-	-	1	-	-	-
S. ATLANTIC	30	-	9	1	3	6	68	20	106	11	14	25	-	-	-
Del.	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-
Md.	9	-	4	-	1	2	11	7	57	-	1	5	-	-	-
D.C.	2	-	-	1†	2	-	5	10	19	-	-	-	-	-	-
Va.	4	-	-	-	-	-	8	-	17	-	1	2	-	-	-
W. Va.	1	-	-	-	-	2	2	-	3	1	1	-	-	-	-
N.C.	9	-	5	-	-	1	12	3	5	9	10	13	-	-	-
S.C.	-	-	-	-	-	-	5	-	3	-	-	-	-	-	-
Ga.	1	-	-	-	-	-	5	-	-	1	1	3	-	-	-
Fla.	3	-	-	-	-	1	20	-	2	-	-	1	-	-	-
E.S. CENTRAL	2	-	1	-	-	-	18	-	25	-	7	5	-	-	-
Ky.	-	-	-	-	-	-	12	-	9	-	-	-	-	-	-
Tenn.	-	-	-	-	-	-	-	-	13	-	2	3	-	-	-
Ala.	2	-	1	-	-	-	5	-	3	-	5	-	-	-	-
Miss.	-	-	-	-	-	-	1	N	N	-	-	2	-	-	-
W.S. CENTRAL	-	9	9	6	8	-	29	21	170	-	3	-	5	6	-
Ark.	-	-	-	-	2	-	1	1	30	-	1	-	-	-	-
La.	-	-	-	-	-	-	5	9	40	-	-	-	-	1	-
Okla.	-	-	-	-	-	-	2	-	44	-	2	-	-	-	-
Tex.	-	9	9	6†	6	-	21	11	56	-	-	-	5	5	-
MOUNTAIN	9	-	13	-	2	86	11	4	20	7	125	37	-	1	1
Mont.	-	-	12	-	1	-	-	-	-	-	-	-	-	-	-
Idaho	2	-	-	-	1	-	-	-	2	-	6	32	-	-	-
Wyo.	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-
Colo.	1	-	-	-	-	86	5	1	3	-	2	1	-	-	-
N. Mex.	1	-	-	-	-	-	-	N	N	-	1	-	-	-	-
Ariz.	1	-	1	-	-	-	6	3	13	7	114	1	-	-	-
Utah	-	-	-	-	-	-	-	-	-	-	1	2	-	-	-
Nev.	3	-	-	-	-	-	-	-	2	-	1	-	-	1	1
PACIFIC	48	-	124	-	1	53	137	8	60	2	38	44	4	20	14
Wash.	1	-	-	-	-	-	8	-	8	-	2	6	-	-	-
Oreg.	2	-	-	-	-	-	9	N	N	-	-	-	-	-	-
Calif.	45	-	124	-	-	52	118	7	48	2	36	27	4	20	12
Alaska	-	-	-	-	-	-	2	-	-	-	-	1	-	-	-
Hawaii	-	-	-	-	1	1	-	1	4	-	-	10	-	-	2
Guam	-	U	-	U	-	1	-	U	-	U	-	-	U	-	1
P.R.	-	28	47	-	-	-	1	-	-	-	-	-	-	-	-
V.I.	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-
Amer. Samoa	-	U	-	U	-	-	-	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 III. (Cont'd.) Cases of specified notifiable diseases, United States, weeks ending February 18, 1989 and February 20, 1988 (7th Week)

Reporting Area	Syphilis (Civilian) (Primary & Secondary)		Toxic-shock Syndrome	Tuberculosis		Tula-remia	Typhoid Fever	Typhus Fever (Tick-borne) (RMSF)	Rabies, Animal
	Cum. 1989	Cum. 1988	Cum. 1989	Cum. 1989	Cum. 1988	Cum. 1989	Cum. 1989	Cum. 1989	Cum. 1989
UNITED STATES	5,047	4,643	29	2,079	2,168	8	39	17	444
NEW ENGLAND	244	123	1	45	33	-	9	-	-
Maine	-	2	1	1	2	-	-	-	-
N.H.	-	2	-	4	-	-	-	-	-
Vt.	-	-	-	1	-	-	-	-	-
Mass.	81	46	-	13	18	-	4	-	-
R.I.	32	3	-	9	4	-	4	-	-
Conn.	131	70	-	17	9	-	1	-	-
MID. ATLANTIC	1,039	940	4	485	516	1	5	2	73
Upstate N.Y.	56	72	1	13	83	-	1	-	-
N.Y. City	618	650	1	355	258	-	3	-	-
N.J.	197	95	-	52	78	-	-	-	-
Pa.	168	123	2	65	97	1	1	2	73
E.N. CENTRAL	182	106	5	233	283	1	1	-	8
Ohio	7	5	4	56	57	-	-	-	-
Ind.	5	15	-	6	17	-	-	-	-
Ill.	96	52	-	87	125	-	-	-	2
Mich.	70	30	1	75	69	-	1	-	1
Wis.	4	4	-	9	15	1	-	-	5
W.N. CENTRAL	46	22	4	57	53	1	2	1	39
Minn.	3	2	2	13	12	-	-	-	14
Iowa	10	2	1	8	4	-	2	1	-
Mo.	24	11	-	15	22	1	-	-	2
N. Dak.	-	1	-	2	1	-	-	-	5
S. Dak.	-	-	1	6	8	-	-	-	12
Nebr.	9	2	-	2	-	-	-	-	3
Kans.	-	4	-	11	6	-	-	-	3
S. ATLANTIC	1,832	1,615	5	402	439	1	1	10	149
Del.	20	21	-	2	3	-	-	-	1
Md.	109	79	-	27	35	-	-	1	28
D.C.	118	78	-	26	18	-	-	-	1
Va.	82	55	-	50	55	1	-	-	32
W. Va.	3	1	-	14	11	-	-	-	11
N.C.	107	97	4	36	33	-	1	9	-
S.C.	102	80	-	54	47	-	-	-	29
Ga.	406	263	-	51	52	-	-	-	27
Fla.	885	941	1	142	185	-	-	-	20
E.S. CENTRAL	304	254	-	145	187	1	-	2	29
Ky.	7	7	-	49	55	1	-	2	10
Tenn.	93	76	-	16	48	-	-	-	4
Ala.	127	94	-	69	60	-	-	-	15
Miss.	77	77	-	11	24	-	-	-	-
W.S. CENTRAL	659	506	-	202	179	1	3	1	70
Ark.	58	17	-	24	9	-	-	-	6
La.	127	85	-	32	35	-	1	-	-
Okla.	10	24	-	8	26	1	-	1	9
Tex.	464	380	-	138	109	-	2	-	55
MOUNTAIN	84	73	3	54	39	-	-	1	20
Mont.	-	2	-	-	-	-	-	-	12
Idaho	-	-	1	1	-	-	-	-	-
Wyo.	1	-	-	-	-	-	-	-	1
Colo.	4	15	-	-	12	-	-	1	-
N. Mex.	1	7	1	8	13	-	-	-	4
Ariz.	27	12	1	34	8	-	-	-	2
Utah	5	5	-	-	-	-	-	-	-
Nev.	46	32	-	11	6	-	-	-	1
PACIFIC	657	1,004	7	456	439	2	18	-	56
Wash.	27	26	-	25	17	-	-	-	-
Oreg.	35	33	-	14	16	-	-	-	-
Calif.	591	941	7	393	379	2	18	-	33
Alaska	-	-	-	5	4	-	-	-	23
Hawaii	4	4	-	19	23	-	-	-	-
Guam	-	-	-	-	-	-	-	-	-
P.R.	53	92	-	16	21	-	-	-	7
V.I.	1	1	-	-	-	-	-	-	-
Amer. Samoa	-	-	-	-	-	-	-	-	-
C.N.M.I.	-	-	-	-	1	-	-	-	-

U: Unavailable

TABLE IV. Deaths in 121 U.S. cities,* week ending February 18, 1989 (7th Week)

Reporting Area	All Causes, By Age (Years)						P&I**
	All Ages	≥65	45-64	25-44	1-24	<1	Total
NEW ENGLAND	638	461	120	28	13	14	61
Boston, Mass.	180	115	43	9	5	7	25
Bridgeport, Conn.§	41	32	6	2	1	-	2
Cambridge, Mass.	23	16	6	1	-	-	2
Fall River, Mass.	26	18	8	-	-	-	-
Hartford, Conn.	52	37	9	2	2	2	-
Lowell, Mass.	29	19	4	3	1	1	2
Lynn, Mass.	12	12	-	-	-	-	-
New Bedford, Mass.	20	17	3	-	-	-	3
New Haven, Conn.	41	26	9	5	-	1	7
Providence, R.I.	45	31	9	-	3	2	3
Somerville, Mass.	10	8	2	-	-	-	1
Springfield, Mass.	54	44	6	3	1	-	4
Waterbury, Conn.	24	18	5	1	-	-	1
Worcester, Mass.	81	68	10	2	-	1	11
MID. ATLANTIC	2,969	1,964	580	300	59	63	177
Albany, N.Y.	48	33	10	2	-	3	1
Allentown, Pa.	24	21	3	-	-	-	-
Buffalo, N.Y.	130	91	25	5	6	-	12
Camden, N.J.	37	23	8	3	1	2	1
Elizabeth, N.J.	39	29	6	4	-	-	1
Erie, Pa.†	52	44	4	2	1	1	3
Jersey City, N.J.	47	30	9	4	1	3	3
N.Y. City, N.Y.	1,573	1,007	307	204	22	33	78
Newark, N.J.	99	49	24	21	4	1	5
Paterson, N.J.	37	23	6	5	2	1	1
Philadelphia, Pa.	390	261	79	26	13	11	28
Pittsburgh, Pa.†	72	49	17	-	2	4	3
Reading, Pa.	56	48	3	2	-	3	9
Rochester, N.Y.	119	75	32	8	4	-	13
Schenectady, N.Y.	19	15	4	-	-	-	2
Scranton, Pa.†	28	25	2	1	-	-	5
Syracuse, N.Y.	86	63	16	4	2	1	4
Trenton, N.J.	51	32	13	5	1	-	4
Utica, N.Y.	23	16	6	1	-	-	1
Yonkers, N.Y.§	39	30	6	3	-	-	3
E.N. CENTRAL	2,422	1,649	473	161	63	75	132
Akron, Ohio	75	52	12	4	2	5	-
Canton, Ohio	38	32	6	-	-	-	7
Chicago, Ill§	564	362	125	45	10	22	16
Cincinnati, Ohio	175	113	43	12	3	4	30
Cleveland, Ohio	164	113	25	11	9	6	3
Columbus, Ohio	163	103	32	11	10	7	-
Dayton, Ohio	115	80	23	7	2	3	7
Detroit, Mich.	262	164	45	34	12	6	16
Evansville, Ind.	58	46	9	2	-	1	4
Fort Wayne, Ind.	58	45	12	-	-	1	4
Gary, Ind.	7	4	2	1	-	-	-
Grand Rapids, Mich.	44	35	6	1	1	1	10
Indianapolis, Ind.	186	131	34	11	3	7	5
Madison, Wis.	40	26	9	2	1	2	3
Milwaukee, Wis.	144	105	28	5	4	2	5
Peoria, Ill.	59	44	13	-	1	1	8
Rockford, Ill.	58	41	11	2	2	2	2
South Bend, Ind.	46	36	6	2	1	1	1
Toledo, Ohio	90	60	16	9	2	3	9
Youngstown, Ohio	76	57	16	2	-	1	2
W.N. CENTRAL	788	570	147	38	16	17	46
Des Moines, Iowa	61	41	13	1	3	3	6
Duluth, Minn.	31	25	4	1	1	-	3
Kansas City, Kans.	41	26	10	2	2	1	3
Kansas City, Mo.	110	72	28	4	2	4	8
Lincoln, Nebr.	48	35	9	2	2	-	2
Minneapolis, Minn.	143	111	20	5	3	4	9
Omaha, Nebr.	105	67	28	7	1	2	6
St. Louis, Mo.	160	136	10	10	2	2	6
St. Paul, Minn.	59	36	18	4	-	1	3
Wichita, Kans.§	30	21	7	2	-	-	-
S. ATLANTIC	1,203	738	246	143	32	39	73
Atlanta, Ga.	187	125	38	22	1	1	11
Baltimore, Md.	168	117	30	15	-	6	11
Charlotte, N.C.	80	44	21	9	3	3	5
Jacksonville, Fla.	89	58	13	11	4	3	5
Miami, Fla.	81	27	19	22	3	6	1
Norfolk, Va.	73	50	15	5	2	1	8
Richmond, Va.	89	51	27	4	4	3	12
Savannah, Ga.	59	45	9	2	-	3	10
St. Petersburg, Fla.	60	47	11	1	-	1	4
Tampa, Fla.	80	40	10	16	10	4	3
Washington, D.C.	198	111	42	35	2	7	3
Wilmington, Del.	39	23	11	1	3	1	-
E.S. CENTRAL	807	550	162	46	21	28	51
Birmingham, Ala.	113	83	21	2	2	5	1
Chattanooga, Tenn.	89	64	18	5	-	2	7
Knoxville, Tenn.	59	40	11	3	-	5	7
Louisville, Ky.	104	68	25	6	1	4	6
Memphis, Tenn.	204	134	41	13	8	8	21
Mobile, Ala.	45	31	5	3	4	2	7
Montgomery, Ala.	73	55	14	3	1	-	-
Nashville, Tenn.	120	75	27	11	5	2	2
W.S. CENTRAL	1,874	1,192	390	170	58	64	96
Austin, Tex.	62	44	9	6	2	1	5
Baton Rouge, La.	29	16	6	3	-	4	2
Corpus Christi, Tex.§	48	37	10	1	-	-	1
Dallas, Tex.	235	146	46	23	11	9	10
El Paso, Tex.	84	55	11	4	5	9	6
Fort Worth, Tex	126	85	26	6	1	8	8
Houston, Tex.§	734	436	169	89	24	16	18
Little Rock, Ark.	59	34	15	4	2	4	5
New Orleans, La.	109	61	31	11	3	3	-
San Antonio, Tex.	233	162	39	17	7	8	19
Shreveport, La.	50	31	12	4	2	1	8
Tulsa, Okla.	105	85	16	2	1	1	14
MOUNTAIN	790	539	139	58	25	27	64
Albuquerque, N. Mex.	77	44	10	11	9	3	4
Colo. Springs, Colo.	39	25	9	2	1	2	6
Denver, Colo.	133	88	22	14	1	8	6
Las Vegas, Nev.	106	67	25	11	1	2	9
Ogden, Utah	23	17	5	-	-	1	3
Phoenix, Ariz.	182	124	28	12	7	9	13
Pueblo, Colo.	36	29	6	1	-	-	2
Salt Lake City, Utah	38	24	11	1	1	1	2
Tucson, Ariz.	156	121	23	6	5	1	19
PACIFIC	2,174	1,446	390	203	65	58	231
Berkeley, Calif.§	21	15	5	1	-	-	-
Fresno, Calif.	96	67	13	8	2	6	9
Glendale, Calif.	22	18	3	-	1	-	2
Honolulu, Hawaii	82	52	17	10	2	1	16
Long Beach, Calif.	82	62	11	7	1	1	19
Los Angeles Calif.	544	319	102	75	24	14	39
Oakland, Calif.§	90	62	17	7	2	2	6
Pasadena, Calif.	48	27	13	2	3	3	9
Portland, Oreg.	157	119	20	8	4	4	12
Sacramento, Calif.	161	110	25	16	3	7	32
San Diego, Calif.	196	151	27	10	6	2	36
San Francisco, Calif.	216	128	50	28	5	5	13
San Jose, Calif.	211	138	47	11	9	6	24
Seattle, Wash.§	147	104	24	12	2	5	5
Spokane, Wash.	56	42	10	3	-	1	1
Tacoma, Wash.	45	32	6	5	1	1	8
TOTAL	13,665††	9,109	2,647	1,147	352	385	931

*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.

§Data not available. Figures are estimates based on average of past available 4 weeks.

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approximately January 1978 to June 1979. The workers had become aware of each other's illnesses in the course of their medical care and subsequently brought the cluster of cases to the attention of investigators.

Environmental Exposure Assessment

The index tannery, in operation since the late 1800s, completes the tanning process for partially processed hides received from domestic and international sources, then finishes the hides by applying dyes and other surface coatings. In the finishing process, hides on a series of conveyors pass under banks of nozzles that spray the hides with coating materials consisting of numerous solvents and pigments. The finish is then dried by gas-fired heaters, and the hides are subsequently dried in a room-sized oven. Hides are transferred to and from conveyors manually. The three index patients worked alongside the first process conveyor directly beyond the spray nozzles; they smoothed the coating materials onto the leather surface with hand-held felt applicators.

NIOSH reviewed descriptions of the tanning process and collected air and bulk samples in the finishing room of the tannery where the three index patients had been employed. The sampling detected a wide range of hydrocarbons, ketones, metals, and alcohols. The compounds detected in the highest concentrations included several glycol ethers known to be testicular toxins (noncarcinogenic agents that cause testicular dysfunction in animals): 2-ethoxyethanol, 0.3–0.5 ppm (Occupational Safety and Health Administration [OSHA] permissible exposure limit [PEL] 200 ppm*); 2-ethoxyethyl acetate, 0.2–1.5 ppm (OSHA PEL 100 ppm*); and 2-butoxyethanol, 0.5–10.9 ppm (OSHA PEL 50 ppm*) (*2*). However, no documented testicular carcinogens were found in the samples.

In addition to air and bulk sampling, the investigation included observation of the current process, review of Material Safety Data Sheets† for previously used materials, and descriptions of past work practices and engineering controls. This procedure determined that the solvent dimethylformamide (DMF) had been used in the finishing line process until recently. The company had discontinued using materials containing DMF because the initial investigators of the cluster had reported potentially substantial exposures to DMF for finishing line workers and had identified reports of other clusters of testicular cancer in association with exposures to DMF (*1*). DMF was not detected by NIOSH in any air or bulk samples taken at the time of this investigation.

Epidemiologic Studies

Case-Referent Study. Many leather-processing operations use the same chemicals, and Fulton County is the focus of this industry in New York. To determine whether there was evidence for an association of testicular cancer with work in the leather industry (and, by extension, with chemical exposures common to that industry), Fulton County was used as the population base for a case-referent study. A case-patient was defined as "any male resident between age 20 and 54 in Fulton County who developed testicular cancer between January 1974 and March 1987." Cases were identified by review of the New York State Cancer Registry. Information on all three index cases was found in this registry, and seven additional cases of

*With "skin notation," indicating the potential for significant skin absorption.

†The Material Safety Data Sheet is a source of information on the ingredients and toxicity of a material or chemical product. It is provided by the supplier or manufacturer and is required, under OSHA regulations, to be made available to any employee exposed to the material.

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testicular cancer were identified. The registry was also used to select a control group, consisting of 129 men of similar age who lived in Fulton County and who developed any other type of cancer between 1974 and March 1987. Usual occupation and industry at the time of diagnosis (as provided by the reporting physician) for both case-patients and controls were determined from registry records and were characterized as being leather- or nonleather-related (according to whether the registry information included "leather" or related terms).

Five of the 10 case-patients and 17 of the 129 controls (for whom occupation could be determined) had been employed in leather-related occupations (odds ratio of 5.8 [95% CI 1.5–22.0]). Follow-up interviews were conducted with nine of these 10 persons with testicular cancer; one person was not interviewed. The occupational histories derived from cancer registry files for the five case-patients with leather-related occupations were confirmed by direct interview. Three of those interviewed had no occupational experience in the leather industry. These interviews also identified a sixth person with testicular cancer who had worked on a leather-finishing line and as a textile dyer, although this information was not included in the above statistical analysis.

Cohort Incidence Study. Because the three index patients all worked on the finishing line at the tannery, a cohort study was conducted of the tannery workforce to determine whether the occurrence of these cases represented an unexpectedly high rate of testicular cancer. Company-provided records identified 80 persons who had worked in the finishing department of the Fulton County tannery at any time between 1975 and 1987. Data on age and first year of employment were used to calculate person-years at risk. The expected number of cases of testicular cancer for this population was determined by multiplying the age- and calendar-year–specific incidence rates for New York State (excluding New York City) (compiled from registry data for 1976–1985) by the person-years at risk. Three cases in this population represent a standardized incidence ratio (observed cases/expected cases) of 40.5 (95% CI 8.1—118.4) (*3*), which indicates an elevated risk for testicular cancer among finishing line workers.

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Editorial Note: Public health agencies are often requested to investigate small clusters of disease among groups of workers. In this report, the detection of a cluster of malignancies prompted a series of investigations and resulted in a response by the New York State Department of Health that was based on prudent public health practice. This investigation illustrates problems commonly encountered in cluster studies: the small number of workers involved and the nature of the potential exposures made it difficult to interpret the results of the investigations and to reach unequivocal conclusions (*4*). Despite these limitations, however, a public health response to the situation was required.

The epidemiologic studies in Fulton County suggested an association of testicular cancer with employment in tanneries. Although these studies did not identify a definite causative exposure, two previous clusters of testicular cancer (*5*) have been linked to occupational exposure to DMF, a substance that had been widely used in the

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index tannery and other tanneries. Animal studies also have shown certain glycol ethers to be testicular toxins but have not shown carcinogenicity (*2*).

Epidemiologic evidence for an association of DMF with testicular cancer is inconsistent. In 1986, a study of three cases of testicular cancer in workers employed in the repair and overhaul of F-4 jet aircraft found that these workers had been exposed to several heavy metals, including cadmium, and to several solvents, including DMF (*5*). Follow-up investigation at two similar facilities revealed four cases at a second F-4 aircraft repair facility where DMF was used but no cases at a facility where F-15 aircraft were refurbished without DMF use (*5*). In contrast, an epidemiologic study of an industrial cohort exposed to DMF in the manufacture of synthetic fibers detected no excess of testicular cancer (*6*).

Several animal studies have not demonstrated that DMF is mutagenic (*7,8*) or carcinogenic (*9,10*), although a malignant testicular tumor was found in one of 18 rats exposed to DMF by intraperitoneal injection (*11*). Further study is needed to assess DMF more fully for carcinogenic and mutagenic potential. DMF is currently in test status in the long-term bioassay program conducted by the National Toxicology Program.

OSHA now regulates DMF at a PEL of 10 ppm (and recommends avoidance of dermal exposure) because of its hepatotoxicity. Based on available process descriptions, exposures to DMF in the index tannery and in aircraft repair facilities (*5*) were probably higher than 10 ppm. Because of concerns generated by the cases reported here, the tannery replaced the DMF-containing dyes with other finishing materials that do not contain DMF. Similar facilities in Fulton County are taking or considering similar action. These actions are consistent with prudent public health practice given the accumulating information on health risks associated with DMF. Because DMF is readily absorbed through the skin, proper work practices and use of protective clothing should be emphasized in programs when other solvents cannot be substituted. Workers should be advised of the chemical composition of solvents to which they are exposed and made aware of possible health hazards.

Approximately 94,000 U.S. workers are potentially exposed to DMF (NIOSH, unpublished data). The risk of testicular cancer in DMF-exposed populations and other tannery workers, and the occupational exposure to DMF and other solvents in other clusters of testicular cancer, requires further evaluation with epidemiologic and toxicologic methods. The New York State Department of Health supports the decision of the index tannery and others in the region to eliminate the use of DMF and urges the improvement of work processes to reduce exposures to all hazardous chemical substances. The department also recommends that tannery workers consult their physicians for medical examinations. NIOSH concurs with the state health department's action.

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Testicular Cancer — Continued

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Erratum: Vol. 38, No. 6

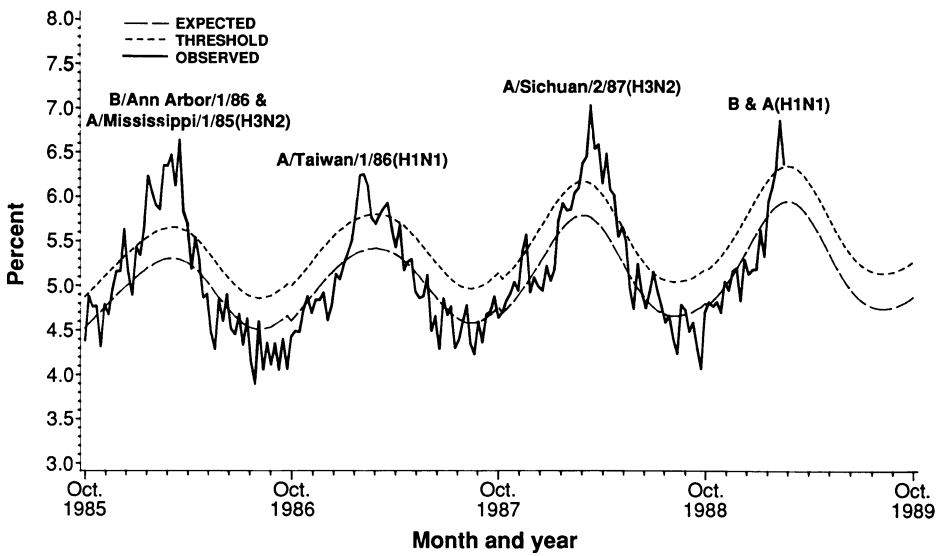
Pneumonia and Influenza Mortality — United States, 1988–89 Season

The pneumonia and influenza (P&I) mortality figure published on February 17, 1989, was incorrect.

The proportion of deaths associated with pneumonia and influenza (P&I) reported from 121 U.S. cities exceeded the epidemic threshold for 3 successive weeks from January 28 through February 11, 1989 (Figure 1). Seventy-eight percent of the P&I deaths reported during these 3 weeks occurred in persons ≥65 years of age.

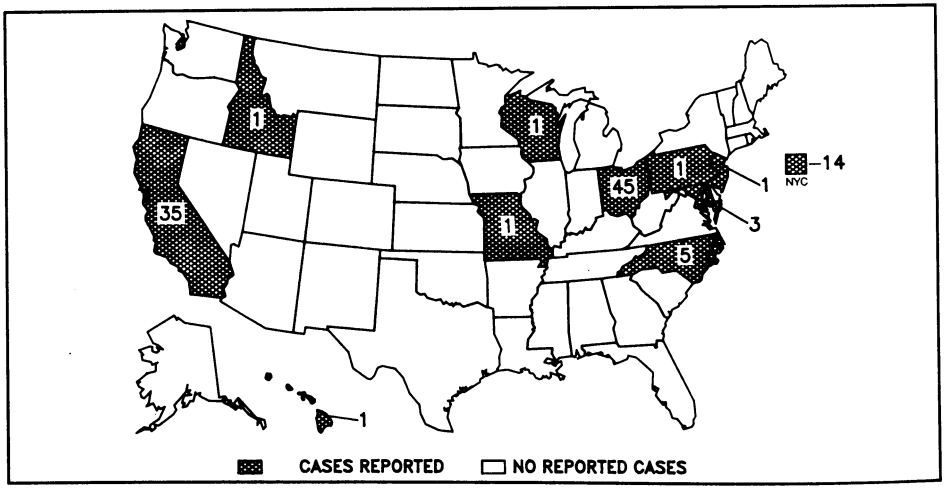
Reported by: Biometrics Activity, Epidemiology Office, and Influenza Br, Div of Viral Diseases, Center for Infectious Diseases; Div of Surveillance and Epidemiologic Studies, Epidemiology Program Office, CDC.

FIGURE 1. Pneumonia and influenza (P&I) deaths as a percentage of total deaths* — United States, October 1985–February 11, 1989



*Reported to CDC from 121 cities. P&I deaths include all deaths for which pneumonia is listed as a primary or underlying cause or for which influenza is listed on the death certificate. The predominant virus type is shown above the peak of mortality for each epidemic season. The epidemic threshold for each influenza season was estimated at 1.645 standard deviations above the values projected on the basis of a periodic regression model applied to observed P&I deaths for the previous 5-year period but excluding the observations during influenza outbreaks.

FIGURE I. Reported measles cases – United States, Weeks 3–6, 1989



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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. The editor welcomes accounts of interesting cases, outbreaks, environmental hazards, or other public health problems of current interest to health officials. Such reports and any other matters pertaining to editorial or other textual considerations should be addressed to: Editor, *Morbidity and Mortality Weekly Report*, Centers for Disease Control, Atlanta, Georgia 30333; telephone (404) 332-4555.

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