CENTERS FOR DISEASE CONTROL

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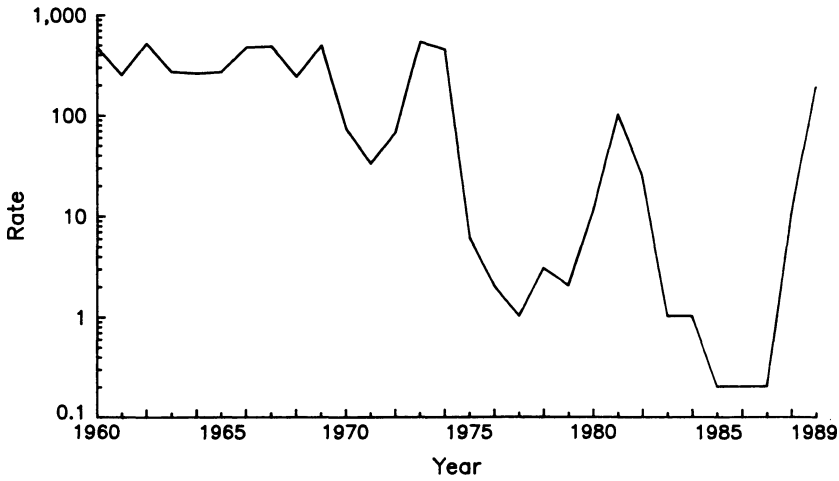
International Notes

Measles – Hungary

Between December 1, 1988, and May 14, 1989, 19,080 measles cases in residents of Hungary were reported to Hungary's National Institute of Hygiene; in the previous 3 years, fewer than 25 cases were reported annually (Figure 1) (*1*). The overall incidence rate in this epidemic was 186 cases per 100,000 population. Budapest and all 19 counties in Hungary were affected, with county-specific attack rates ranging from 51 to 358 cases per 100,000 population. Six measles-associated deaths occurred (case-fatality rate: 0.03%).

FIGURE 1. Annual measles incidence rates per 100,000 population – Hungary, 1960–1989*



Source: National Institute of Hygiene, Hungary.
*Through May 14, 1989.

Measles – Continued

Age data were available for 11,475 reported case-patients. Seventy-five percent of patients were 16–22 years of age. The highest age-specific attack rates (1723 and 1273 per 100,000) occurred in 17- and 18-year-olds, respectively (Figure 2). Attack rates for persons 2–15 years of age ranged from 35 to 165 per 100,000. The attack rate for infants <1 year of age was 351 per 100,000.

Preliminary information on vaccine status indicates that an estimated 77% of 17–21-year-olds with measles had previously received live measles vaccine. Based on approximately 93% vaccine coverage, vaccine efficacy for persons in this age group (most of whom were vaccinated from 1969 through 1971) was an estimated 83% (*2*).

Control measures implemented during the epidemic included mass revaccination of persons 16–22 years of age regardless of previous vaccination history. During February and March 1989, 650,000 doses of vaccine were administered to this target group; reported cases subsequently declined (Figure 3).

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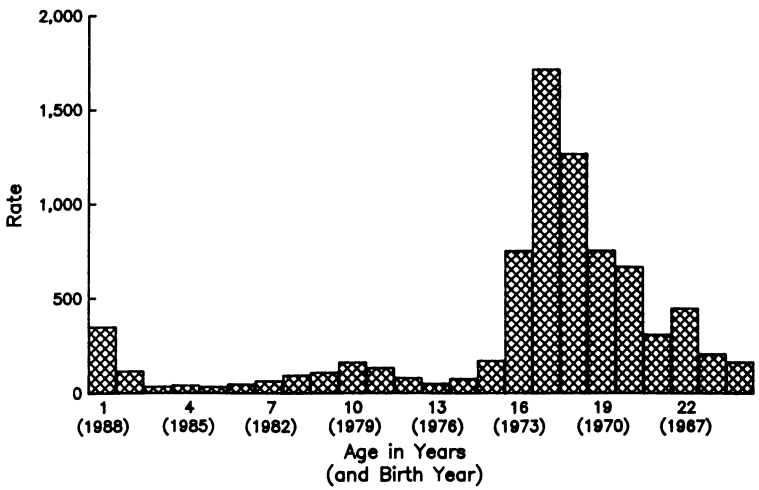
Editorial Note: In 1969, Hungary began measles vaccination efforts using the live, attenuated Leningrad-16 strain produced in the Soviet Union. From 1969 to 1974, a single dose of vaccine was administered in mass campaigns to persons 9–27 months of age. However, in 1974, mass campaigns were discontinued, and vaccine was administered during routine health care. The recommended age for vaccination was 10 months until 1978, when it was changed to 14 months. Coverage rates of targeted persons during the campaigns ranged from 93% to 99% and have been at least 98% since routine administration began in 1974 (*3*).

FIGURE 2. Measles attack rates per 100,000 population, by age in years and birth cohort – Hungary, 1988–1989*



Source: National Institute of Hygiene, Hungary.
*Through March 15, 1989.

Measles — Continued

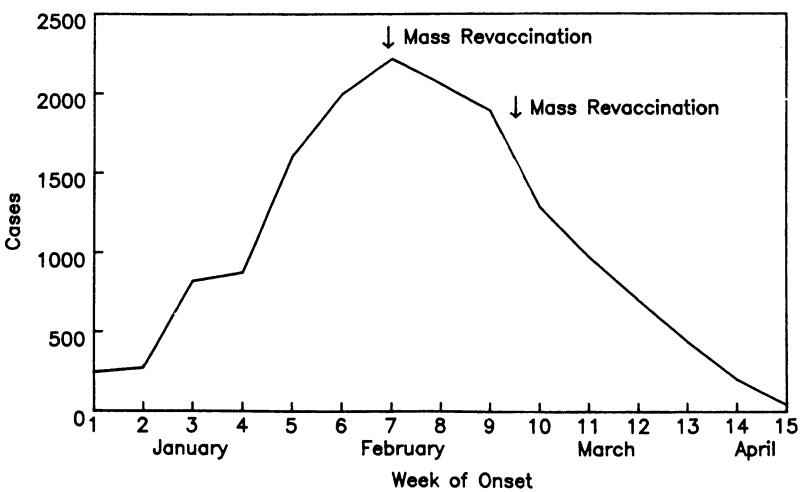
The vaccination program has had a major impact on the epidemiology and annual incidence of measles in Hungary (Figure 1). After vaccination was implemented, the incidence rate decreased until 1973–74, when large epidemics occurred primarily in unvaccinated 6–9-year-olds. The annual incidence rate then decreased until 1980–81, when another epidemic occurred, primarily in 7–10-year-olds. After the epidemic, persons born between 1973 and 1977, who would have received vaccine when the recommended age was 10 months, were revaccinated. Subsequently, the annual incidence rate for measles decreased until 1988 (*3,4*).

Investigation of this epidemic has prompted concern about the roles of primary vaccine failure (unsuccessful initial vaccination) and secondary vaccine failure (loss of immunity after successful vaccination). The 1988–89 epidemic mainly affected persons 17–21 years of age, who had been targeted to receive vaccine during mass campaigns in the first years of the vaccination program in Hungary. The high age-specific attack rates in this age group, in which vaccine coverage was at least 93%, suggest that vaccine failure played a major role in this epidemic.

Primary vaccine failure may have occurred as a result of poor vaccine handling practices during the early campaigns, vaccination at about 10 months of age when maternal antibody could interfere with successful vaccination, or thermolability of the vaccine used at that time. Secondary vaccine failure has been suspected because persons most affected in this epidemic were vaccinated in the more distant past. Assessing waning immunity may be difficult because virtually all persons 17–21 years of age were vaccinated approximately the same number of years before the epidemic. Few persons 11–16 years of age were single-dose recipients, since they were revaccinated after the 1981 epidemic.

Epidemiologic studies are under way to further assess the epidemic, determine risk factors for vaccine failure, and more accurately determine vaccine efficacy. Data gathered may be of interest to all countries with measles-control programs and elimination goals.

FIGURE 3. Reported measles cases, by week of onset — Hungary, 1989



Source: National Institute of Hygiene, Hungary.

Measles — Continued

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Current Trends

Lyme Disease — United States, 1987 and 1988

In 1987 and 1988, CDC surveyed state health departments for reported cases of Lyme disease (LD [Lyme borreliosis]); in 1987, 2368 cases meeting the case definition* of their respective states were reported, and in 1988, 4572 cases were reported. Demographic data were available for 54% of reported cases: 92% were white, 4% Hispanic, 2% black, and 2% Asian; 51% of cases occurred in females. Age-specific incidence rates were highest for children <15 years of age and for persons 25–44 years of age (0.2 per 100,000 population). In the Northeast and North Central regions, 64% of LD patients had onset of illness from May through August; in comparison, in the Pacific region, where 33% of patients had onset in these months, more cases occurred from January through May.

In 1987 and 1988, cases were reported from all states; however, in nine states, infection was thought to have been acquired out of state (Figure 1). Indigenous cases now have been reported in all states except Alaska, Arizona, Hawaii, Montana, Nebraska, New Mexico, and Wyoming. (Missouri and Nevada did not report indigenous cases in 1987 or 1988 but had done so previously.) In 1987 and 1988, 94% of U.S. cases were reported from nine states: New York, New Jersey, Wisconsin, Connecticut, Pennsylvania, Rhode Island, California, Massachusetts, and Minnesota; the six states in the upper northeast accounted for 80% of all cases. In 1988, New York state reported 56% of all cases, and two suburban counties of New York City (Westchester and Suffolk) reported 44% of U.S. cases. LD remains rare in the Mountain region, where, in 1987 and 1988, five cases were reported, and nine cases have been reported since 1980.

Estimates of regional incidence (per 100,000 persons) varied approximately 100-fold: 6.1 in the Mid-Atlantic region, 3.7 in New England, 0.7 in the North Central states, 0.6 in the Pacific states (1987 data only), 0.2 in 16 Southeast and Southwest states, and <0.1 in the Mountain region (*2*).

Reported by: State and local health departments. Div of Vector-Borne Infectious Diseases, Center for Infectious Diseases, CDC.

*The surveillance case definition for LD varies among states and between states and CDC. Some states use the CDC case definition adopted in 1988, i.e., physician-diagnosed erythema migrans (EM) in a person who acquired infection in a county with endemic LD or, for persons who acquired infection in a county without endemic LD, laboratory evidence of infection in addition to the presence of EM. Other states (e.g., New York, Wisconsin, Connecticut) use a previous, more inclusive, CDC case definition for LD, which counts as cases persons with appropriate systemic manifestations and laboratory evidence of infection (*1*). Differences in the case definitions used by states must be considered when state and regional incidences are compared.

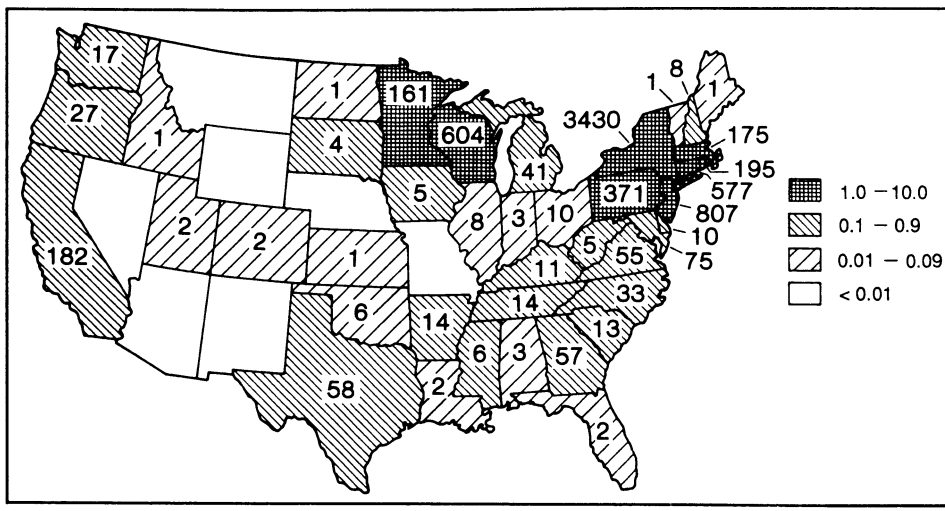
Lyme Disease: United States — Continued

Editorial Note: National surveillance for LD relies on states for reports. Since 1982, when national surveillance began, state surveillance systems for LD have changed considerably. LD has been made a reportable disease in 31 states and the District of Columbia, and surveillance for LD has intensified, especially in areas where the disease is endemic.

Since 1982, 13,825 cases of LD have been reported. From 1982 through 1987, the number of cases increased nearly fivefold from 492 to 2368; in 1988, reported cases doubled (4572 cases) (Figure 2). LD is the most commonly reported vectorborne disease in the United States (Figure 3). From 1983 through 1987, LD accounted for 50% of the vectorborne infections reported to CDC. Tickborne diseases (e.g., LD, Rocky Mountain spotted fever [RMSF]) accounted for 95% of these infections; fleaborne typhus and plague and mosquitoborne arboviral infections accounted for the remaining 5%.

The increased incidence of reported LD probably is due to improved awareness and recognition of the disease, as well as to an actual increase in incidence and geographic spread. Other factors may also contribute to the increase. For example, because the clinical and laboratory diagnosis of LD may be imprecise (*3*), other conditions possibly may be misdiagnosed and reported as LD. In addition to differences in clinical interpretation of erythema migrans (EM), misdiagnosis may also result from the lack of standardization of serologic testing and from cross-reactivity with *Treponema* and with other *Borrelia* (*3*). In areas with endemic LD, persons with illnesses other than LD—but who previously have been infected with *B. burgdorferi* (the causative agent for LD)—also may be misdiagnosed (*4*). Conversely, several factors may be responsible for failure of a case of LD to be diagnosed and/or to meet the case definition. These include early treatment of symptoms resulting in abrogation of the specific antibody response (*3*), the low sensitivity of

FIGURE 1. Number and average annual incidence rates of reported Lyme disease cases, per 100,000 population — United States, 1987–1988*



*Data for Oregon and California are for 1987 only.

Lyme Disease: United States — Continued

serologic tests in early LD (*3*), and the failure of approximately 25% of LD patients to manifest EM (*4,5*). The extent of underreporting of LD is unknown.

Until more sensitive and specific laboratory diagnostic tests become available, diagnosis of LD relies predominantly on clinical features. Serologic testing may be of greatest diagnostic utility in patients who have symptoms compatible with late-stage LD. The validity of serologic test results depends largely on the experience of the diagnostic laboratory and its quality-control procedures. No published data exist on the diagnostic utility of antigen-detection assays in the laboratory diagnosis of LD. A comparative study of licensed LD diagnostic kits is planned by the Association of State and Public Health Laboratory Directors.

FIGURE 2. Reported cases of Lyme disease, by year — United States, 1982–1988

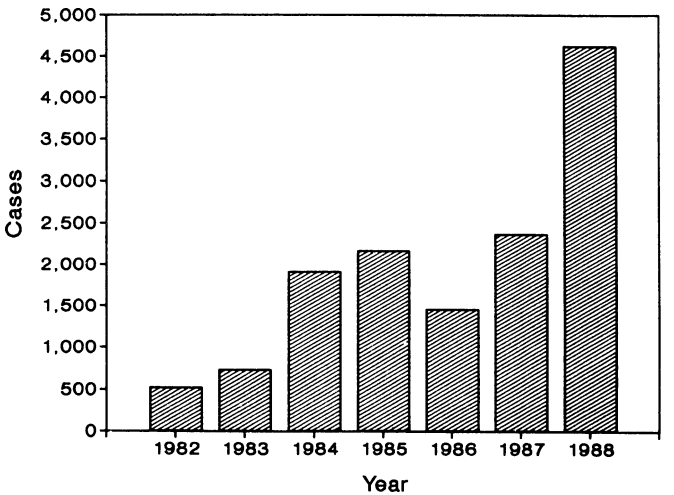
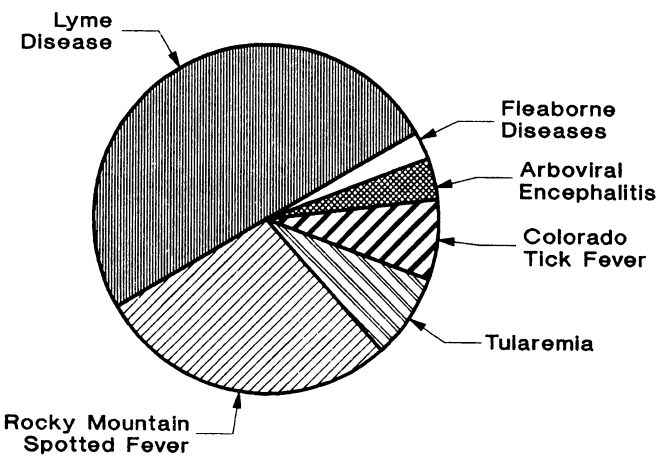


FIGURE 3. Reported cases of vectorborne diseases — United States, 1983–1987



Lyme Disease: United States — Continued

State- and community-based epidemiologic studies have documented an increase in human cases and an expansion of affected areas (*5–8*). Entomologic surveys have detected local increases of *Ixodes dammini*, the principal tick vector in northeastern and central states, and its spread to new areas (*7–10*). However, because the risk for acquiring LD varies widely by locality, the disease appears to be of public health consequence only in certain regions—specifically, coastal counties on both seaboards and in certain counties in the upper Midwest. In the southeastern, southwestern, and Mountain states, RMSF remains the leading vectorborne disease: from 1983 through 1987, 3160 RMSF and 658 LD cases were reported from the Southeast and Southwest, and 37 RMSF and seven LD cases were reported from the Mountain states.

Data concerning risk factors for acquiring LD are limited. In suburban areas where LD is endemic, infection may be acquired principally around patients' residences (*11,12*), and risk of exposure may be continuous during the transmission season. Under these circumstances, certain personal protection measures (e.g., the daily application of repellents) may not be practical. Further efforts are needed to evaluate the effectiveness of environmental modifications and focal application of acaricides (chemicals effective against ticks) for the control of vector ticks in these circumstances. Where LD is transmitted sporadically through occasional or brief exposures during recreation or work, personal protection measures are most appropriate for prevention.

Measures recommended to reduce exposure to ticks include avoiding areas endemic for LD; using repellents; wearing long-sleeved shirts and long pants, and tucking pants into the top of socks; wearing light-colored clothing; and inspecting clothing and skin frequently for ticks. Animal studies suggest that *I. dammini* may not efficiently transmit infection until after 48 hours of attachment and that prompt removal of attached ticks may limit transmission (*13*). However, it is unknown how long a tick must attach to human hosts before infection occurs.

N,N-diethyl-m-toluamide (DEET) is effective in repelling *I. dammini* and other vector ticks. In view of the possible risk for toxicity (*14*), the use of DEET-containing repellents solely to prevent LD may be inappropriate in areas without endemic LD. Permethrin (0.5%) sprayed onto clothing also is effective in reducing the numbers of adherent ticks, including *I. dammini* and others (*15,16*). However, permethrin aerosols are available only in certain states that have obtained Environmental Protection Agency approval for their distribution.

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Lyme Disease: United States — Continued

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

Disease	39th Week Ending			Cumulative, 39th Week Ending		
	Sep. 30, 1989	Oct. 1, 1988	Median 1984-1988	Sep. 30, 1989	Oct. 1, 1988	Median 1984-1988
Acquired Immunodeficiency Syndrome (AIDS)	630	U*	135	26,007	23,376	9,690
Aseptic meningitis	376	252	316	6,494	4,752	6,993
Encephalitis: Primary (arthropod-borne & unspec)	32	23	35	573	629	867
Post-infectious	-	2	2	65	99	90
Gonorrhea: Civilian	11,576	15,489	19,095	493,644	517,888	621,849
Military	275	147	378	8,173	8,933	12,436
Hepatitis: Type A	619	688	505	25,606	18,947	16,619
Type B	424	476	476	16,874	16,874	19,100
Non A, Non B	33	42	54	1,753	1,956	2,674
Unspecified	67	61	69	1,758	1,608	3,331
Legionellosis	25	15	24	768	739	554
Leprosy	1	5	5	123	120	176
Malaria	24	38	19	942	757	757
Measles: Total†	160	50	37	11,609	2,329	2,508
Indigenous	150	48	33	11,071	2,094	2,094
Imported	10	2	2	538	235	282
Meningococcal infections	32	44	36	2,037	2,210	2,113
Mumps	52	79	79	4,193	3,645	3,643
Pertussis	74	78	91	2,464	2,084	2,084
Rubella (German measles)	-	10	7	357	177	447
Syphilis (Primary & Secondary): Civilian	893	990	714	29,485	30,356	20,976
Military	7	5	4	185	124	129
Toxic Shock syndrome	8	11	11	278	273	273
Tuberculosis	437	540	459	15,600	15,860	15,903
Tularemia	1	2	4	120	153	153
Typhoid Fever	10	10	10	362	284	256
Typhus fever, tick-borne (RMSF)	32	21	16	524	519	583
Rabies, animal	78	135	135	3,576	3,284	4,074

TABLE II. Notifiable diseases of low frequency, United States

	Cum. 1989		Cum. 1989
Anthrax	-	Leptospirosis (Hawaii 1)	69
Botulism: Foodborne	18	Plague	3
Infant (Ala. 1)	11	Poliomyelitis, Paralytic	-
Other	4	Psittacosis (R.I. 1, Pa. 1, Wash. 1)	80
Brucellosis (Calif. 1)	64	Rabies, human	1
Cholera	-	Tetanus (Okla. 1, Puerto Rico 1)	33
Congenital rubella syndrome	3	Trichinosis	13
Congenital syphilis, ages < 1 year	158		
Diphtheria	3		

*Because AIDS cases are not received weekly from all reporting areas, comparison of weekly figures may be misleading.
†One of the 160 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 September 30, 1989 and October 1, 1988 (39th 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	26,007	6,494	573	65	493,644	517,888	25,606	16,874	1,753	1,758	768	123
NEW ENGLAND	1,079	352	20	2	15,043	16,202	545	820	59	64	52	8
Maine	46	19	5	-	215	314	19	47	5	1	5	-
N.H.	35	34	-	-	116	201	53	48	8	4	2	-
Vt.	11	34	4	-	49	94	29	64	5	-	1	-
Mass.	584	114	6	2	5,763	5,540	155	467	25	48	34	6
R.I.	59	63	-	-	1,094	1,462	33	55	4	4	10	1
Conn.	344	88	5	-	7,806	8,591	256	139	12	7	-	1
MID. ATLANTIC	7,562	792	25	5	60,161	83,396	2,990	2,483	168	203	192	19
Upstate N.Y.	1,041	367	20	4	11,898	11,315	675	501	63	10	61	3
N.Y. City	3,890	114	2	1	25,023	36,814	316	904	32	168	27	14
N.J.	1,766	-	3	-	11,527	11,659	357	476	25	5	36	1
Pa.	865	311	-	-	11,713	23,608	1,642	602	48	20	68	1
E.N. CENTRAL	1,994	1,216	207	6	92,940	87,007	1,481	2,036	199	77	211	3
Ohio	376	375	76	2	24,328	19,549	319	368	32	18	97	-
Ind.	272	171	34	3	6,891	6,513	167	330	24	28	40	1
Ill.	873	225	41	1	30,349	25,607	669	544	80	20	14	2
Mich.	380	367	38	-	24,246	27,826	208	494	40	11	35	-
Wis.	93	78	18	-	7,126	7,512	118	300	23	-	25	-
W.N. CENTRAL	654	312	27	3	23,763	21,898	961	724	83	24	29	1
Minn.	141	13	-	1	2,613	2,923	107	82	16	4	2	-
Iowa	46	54	10	-	2,006	1,624	82	26	13	5	5	-
Mo.	326	152	3	-	14,532	12,447	536	509	31	9	12	-
N. Dak.	6	12	1	-	107	138	4	19	4	2	1	-
S. Dak.	4	8	4	-	193	388	10	7	6	-	2	-
Nebr.	27	8	5	-	1,072	1,231	67	19	2	2	2	1
Kans.	104	65	4	2	3,240	3,147	155	62	11	2	5	-
S. ATLANTIC	5,409	1,278	119	23	140,140	146,623	2,510	3,290	266	298	97	1
Del.	68	60	1	-	2,422	2,242	38	112	5	8	8	-
Md.	474	166	15	2	16,359	15,111	696	573	23	27	25	-
D.C.	395	13	-	-	8,599	11,048	5	19	2	-	-	-
Va.	362	254	33	3	12,050	10,625	229	237	59	179	7	-
W. Va.	34	60	58	-	1,062	1,035	19	81	9	7	-	-
N.C.	352	144	7	2	21,087	20,659	334	800	68	-	25	1
S.C.	241	31	-	-	12,785	11,422	55	455	3	10	5	-
Ga.	861	94	1	1	26,973	28,078	288	308	10	8	17	-
Fla.	2,622	456	4	15	38,803	46,403	846	705	87	59	10	-
E.S. CENTRAL	572	529	29	2	41,502	40,698	325	1,242	124	10	44	-
Ky.	90	154	9	1	4,061	4,168	92	307	38	5	9	-
Tenn.	200	97	4	-	14,017	13,690	126	650	27	-	24	-
Ala.	163	196	15	-	13,129	12,549	69	181	52	1	10	-
Miss.	119	82	1	1	10,295	10,291	38	104	7	4	1	-
W.S. CENTRAL	2,143	703	54	5	54,318	55,976	2,850	1,683	114	398	39	19
Ark.	62	29	6	-	6,199	5,627	178	57	12	6	1	-
La.	368	59	11	-	11,764	11,148	209	294	14	1	6	-
Okla.	101	61	10	3	4,719	5,331	350	155	26	29	23	-
Tex.	1,612	554	27	2	31,636	33,870	2,113	1,177	62	362	9	19
MOUNTAIN	850	237	9	3	10,982	11,207	3,763	1,129	161	120	44	3
Mont.	13	5	-	-	145	333	69	39	6	3	2	1
Idaho	20	2	-	1	138	279	132	97	12	3	-	-
Wyo.	14	5	-	-	77	155	38	5	2	-	-	-
Colo.	315	117	1	1	2,289	2,428	401	135	43	50	5	-
N. Mex.	75	9	1	-	1,006	1,103	495	155	27	3	4	1
Ariz.	211	75	3	-	4,437	4,082	1,945	426	38	51	20	1
Utah	55	16	1	1	360	416	393	87	21	4	7	-
Nev.	147	8	3	-	2,530	2,411	290	185	12	6	6	-
PACIFIC	5,744	1,075	83	16	54,795	54,881	10,181	3,467	579	564	60	69
Wash.	400	-	2	1	4,776	5,347	2,456	754	157	45	22	6
Oreg.	180	-	-	-	2,355	2,417	1,830	382	62	12	2	1
Calif.	5,023	972	68	15	46,502	45,869	5,213	2,210	347	494	33	54
Alaska	12	25	10	-	749	763	536	49	5	3	1	-
Hawaii	129	78	3	-	413	485	146	72	8	10	2	8
Guam	1	-	-	-	-	122	-	-	-	-	-	-
P.R.	1,065	67	2	1	790	984	151	184	16	18	-	8
V.I.	26	-	-	-	497	346	-	7	-	-	-	-
Amer. Samoa	-	-	-	-	-	65	-	-	-	-	-	-
C.N.M.I.	-	-	-	-	-	39	-	-	-	-	-	-

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 September 30, 1989 and October 1, 1988 (39th Week)

Reporting Area	Malaria	Measles (Rubeola)					Menin-gococcal 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	942	150	11,071	10	538	2,329	2,037	52	4,193	74	2,464	2,084	-	357	177
NEW ENGLAND	61	-	285	-	36	108	146	-	72	-	290	227	-	6	8
Maine	-	-	-	-	1	7	13	-	-	-	17	11	-	-	-
N.H.	2	-	10	-	5	87	15	-	13	-	6	34	-	4	4
Vt.	2	-	1	-	2	-	6	-	3	-	6	3	-	1	-
Mass.	34	-	28	-	21	3	80	-	48	-	234	151	-	1	3
R.I.	12	-	38	-	3	-	1	-	-	-	11	10	-	-	1
Conn.	11	-	208	-	4	11	31	-	8	-	16	18	-	-	-
MID. ATLANTIC	176	5	657	-	171	865	286	3	382	1	173	134	-	77	14
Upstate N.Y.	26	-	42	-	98	37	101	3	140	1	78	82	-	62	2
N.Y. City	65	5	92	-	15	49	36	-	18	-	5	4	-	15	7
N.J.	50	-	318	-	-	242	63	-	167	-	24	8	-	-	3
Pa.	35	-	205	-	58	537	86	-	57	-	66	40	-	-	2
E.N. CENTRAL	71	111	3,151	-	94	180	260	2	447	2	268	242	-	24	26
Ohio	12	111	1,209	-	35	25	94	-	118	-	45	42	-	3	1
Ind.	10	-	78	-	-	57	28	-	40	-	19	64	-	-	-
Ill.	28	-	1,387	-	1	71	70	-	144	-	88	39	-	19	21
Mich.	13	-	306	-	15	23	49	2	112	2	37	33	-	1	4
Wis.	8	-	171	-	43	4	19	-	33	-	79	64	-	1	-
W.N. CENTRAL	27	1	635	-	11	13	64	2	383	-	160	109	-	6	2
Minn.	8	-	17	-	-	11	13	-	2	-	43	48	-	-	-
Iowa	3	1	9	-	1	-	2	2	39	-	14	21	-	1	-
Mo.	9	-	369	-	-	2	13	-	55	-	92	17	-	4	-
N. Dak.	1	-	-	-	-	-	-	-	-	-	2	11	-	-	-
S. Dak.	1	-	-	-	-	-	7	-	-	-	1	5	-	-	-
Nebr.	2	-	108	-	2	-	18	-	5	-	5	-	-	-	-
Kans.	3	-	132	-	8	-	11	-	282	-	3	7	-	1	2
S. ATLANTIC	158	14	567	3	54	354	356	23	741	34	263	207	-	9	17
Del.	7	-	67	-	1	-	2	-	1	-	1	7	-	-	-
Md.	26	-	55	-	34	14	63	12	377	15	52	32	-	2	1
D.C.	8	-	34	-	4	-	15	-	120	-	-	1	-	-	-
Va.	30	-	20	-	3	170	42	7	109	2	30	21	-	-	11
W. Va.	2	2	53	-	-	6	12	1	13	1	25	8	-	-	-
N.C.	19	12	184	3†§	3	4	48	1	29	7	55	59	-	1	-
S.C.	8	-	3	-	-	-	24	1	28	-	-	1	-	-	-
Ga.	9	-	1	-	1	-	60	-	29	4	37	31	-	-	2
Fla.	49	-	150	-	8	160	90	1	35	5	63	47	-	6	3
E.S. CENTRAL	13	-	235	1	4	69	68	6	202	5	113	86	-	3	2
Ky.	-	-	37	1§	4	35	39	-	9	-	1	12	-	-	-
Tenn.	4	-	147	-	-	-	6	5	59	4	47	26	-	2	2
Ala.	6	-	50	-	-	-	18	-	27	1	60	44	-	1	-
Miss.	3	-	1	-	-	34	5	N	N	-	5	4	-	-	-
W.S. CENTRAL	49	1	3,103	4	64	17	147	13	1,341	1	265	125	-	36	10
Ark.	-	-	-	4§	19	1	9	6	134	-	21	21	-	-	3
La.	2	-	11	-	-	-	38	5	577	1	16	17	-	5	-
Okla.	7	1	123	-	-	8	22	-	187	-	46	60	-	1	1
Tex.	40	-	2,969	-	45	8	78	2	443	-	182	27	-	30	6
MOUNTAIN	25	17	369	2	42	140	63	-	167	22	548	581	-	35	6
Mont.	1	-	12	-	1	24	1	-	4	-	33	2	-	1	-
Idaho	2	4	4	-	2	1	2	-	15	-	58	302	-	32	-
Wyo.	1	-	-	-	-	-	-	-	8	-	-	1	-	1	-
Colo.	6	13	77	2§	17	115	20	-	26	17	50	20	-	-	2
N. Mex.	4	-	16	-	15	-	2	N	N	-	24	45	-	-	-
Ariz.	8	-	141	-	4	-	25	-	98	5	362	183	-	-	-
Utah	-	-	118	-	-	-	5	-	10	-	20	27	-	-	3
Nev.	3	-	1	-	3	-	8	-	6	-	1	1	-	1	1
PACIFIC	362	1	2,069	-	62	583	647	3	458	9	384	373	-	161	92
Wash.	27	-	28	-	13	7	68	2	38	3	154	91	-	-	-
Oreg.	19	-	9	-	19	4	44	N	N	-	10	29	-	3	-
Calif.	306	-	2,012	-	21	559	526	-	402	3	199	190	-	134	62
Alaska	4	-	1	-	-	1	7	-	2	-	1	8	-	-	-
Hawaii	6	1	19	-	9	12	2	1	16	3	20	55	-	24	30
Guam	-	U	-	U	-	1	-	U	-	U	-	-	U	-	1
P.R.	1	13	503	-	-	190	5	-	8	-	4	14	-	8	2
V.I.	-	-	4	-	-	-	-	-	15	-	-	-	-	-	-
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 September 30, 1989 and October 1, 1988 (39th 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	29,485	30,356	278	15,600	15,860	120	362	524	3,576
NEW ENGLAND	1,291	852	14	439	393	2	30	7	8
Maine	11	12	3	12	17	-	-	-	2
N.H.	10	6	2	19	8	-	-	-	1
Vt.	1	3	-	8	4	-	-	-	-
Mass.	389	321	4	234	224	2	20	4	2
R.I.	26	26	2	47	32	-	5	1	-
Conn.	854	484	3	119	108	-	5	2	3
MID. ATLANTIC	5,259	7,567	44	3,104	3,133	2	110	57	595
Upstate N.Y.	688	435	8	244	416	1	28	13	48
N.Y. City	2,630	5,414	3	1,725	1,703	-	49	3	-
N.J.	1,057	714	11	611	515	-	25	21	18
Pa.	884	1,004	22	524	499	1	8	20	529
E.N. CENTRAL	1,361	877	45	1,611	1,728	3	42	57	101
Ohio	112	81	14	285	331	-	9	30	9
Ind.	49	43	7	114	177	1	3	19	2
Ill.	584	385	9	744	742	-	20	6	26
Mich.	505	326	15	376	398	1	6	2	21
Wis.	111	42	-	92	80	1	4	-	43
W.N. CENTRAL	251	177	34	402	409	47	6	77	453
Minn.	39	17	8	72	67	-	1	-	98
Iowa	29	17	5	43	43	-	2	2	110
Mo.	131	110	9	187	205	34	2	59	48
N. Dak.	2	2	-	12	14	-	-	1	46
S. Dak.	1	-	4	21	26	6	-	4	71
Nebr.	21	25	5	18	12	3	-	1	40
Kans.	28	6	3	49	42	4	1	10	40
S. ATLANTIC	10,594	10,602	23	3,366	3,388	6	32	180	1,065
Del.	147	81	1	31	30	-	2	1	27
Md.	587	556	1	292	330	2	7	15	292
D.C.	622	527	1	139	150	-	2	-	2
Va.	431	317	4	265	302	4	7	13	200
W. Va.	14	34	-	59	59	-	-	2	44
N.C.	796	583	6	424	362	-	2	98	7
S.C.	628	551	4	371	363	-	2	32	171
Ga.	1,955	1,854	3	526	555	-	3	16	182
Fla.	5,414	6,099	3	1,259	1,237	-	7	3	140
E.S. CENTRAL	2,173	1,505	7	1,224	1,365	7	2	58	292
Ky.	42	50	2	303	301	1	1	14	118
Tenn.	921	652	3	361	416	5	-	29	72
Ala.	686	445	1	355	409	-	1	6	99
Miss.	524	358	1	205	239	1	-	9	3
W.S. CENTRAL	4,426	3,216	22	1,903	1,987	34	13	63	492
Ark.	272	183	1	191	218	24	-	15	65
La.	1,075	626	-	249	229	-	1	-	11
Okla.	84	120	12	173	185	10	1	41	80
Tex.	2,995	2,287	9	1,290	1,355	-	11	7	336
MOUNTAIN	612	646	41	328	451	13	7	21	221
Mont.	1	3	-	11	15	1	-	14	69
Idaho	1	2	3	22	18	-	-	2	9
Wyo.	6	1	2	-	5	2	-	2	71
Colo.	58	84	8	19	74	2	2	3	20
N. Mex.	25	43	5	65	82	2	-	-	20
Ariz.	239	125	10	148	193	-	4	-	23
Utah	13	14	9	27	18	5	1	-	2
Nev.	269	374	4	36	46	1	-	-	7
PACIFIC	3,518	4,914	48	3,223	3,006	6	120	4	349
Wash.	252	178	3	187	166	-	7	-	-
Oreg.	184	221	-	106	117	4	5	1	-
Calif.	3,067	4,480	44	2,760	2,575	2	99	3	285
Alaska	5	10	-	37	31	-	-	-	64
Hawaii	10	25	1	133	117	-	9	-	-
Guam	-	3	-	-	21	-	-	-	-
P.R.	415	502	-	217	181	-	6	-	53
V.I.	8	1	-	4	6	-	1	-	-
Amer. Samoa	-	-	-	-	3	-	-	-	-
C.N.M.I.	-	1	-	-	17	-	-	-	-

U: Unavailable

TABLE IV. Deaths in 121 U.S. cities,* week ending September 30, 1989 (39th Week)

Reporting Area	All Causes, By Age (Years)						P&I**
	All Ages	≥65	45-64	25-44	1-24	<1	Total
NEW ENGLAND	568	384	106	50	8	20	52
Boston, Mass.	167	101	33	21	2	10	18
Bridgeport, Conn.	38	25	9	1	2	1	1
Cambridge, Mass.	19	16	2	1	-	-	3
Fall River, Mass.	21	14	5	2	-	-	1
Hartford, Conn.	57	35	12	7	-	3	6
Lowell, Mass.	23	20	1	-	-	2	2
Lynn, Mass.	16	11	3	1	1	-	-
New Bedford, Mass.	22	17	4	-	1	-	1
New Haven, Conn.	42	28	9	5	-	-	6
Providence, R.I.§	47	38	5	4	-	-	2
Somerville, Mass.	3	2	-	1	-	-	-
Springfield, Mass.	35	23	7	3	1	1	3
Waterbury, Conn.	22	18	3	1	-	-	2
Worcester, Mass.	56	36	13	3	1	3	7
MID. ATLANTIC	3,083	1,949	628	349	74	82	141
Albany, N.Y.	48	39	4	3	-	2	2
Allentown, Pa.§	20	17	3	-	-	-	-
Buffalo, N.Y.	101	73	17	6	2	3	6
Camden, N.J.	42	28	8	3	1	2	1
Elizabeth, N.J.	15	12	2	1	-	-	2
Erie, Pa.†	37	31	1	3	1	1	1
Jersey City, N.J.	58	34	10	11	1	2	5
N.Y. City, N.Y.	1,388	834	289	200	32	33	42
Newark, N.J.	63	26	17	14	-	5	6
Paterson, N.J.	24	14	4	5	-	1	2
Philadelphia, Pa.	862	523	209	81	27	22	44
Pittsburgh, Pa.†	71	52	10	4	1	4	3
Reading, Pa.§	34	28	5	1	-	-	3
Rochester, N.Y.	102	72	19	5	4	2	12
Schenectady, N.Y.	29	18	7	2	2	-	2
Scranton, Pa.†	27	24	2	1	-	-	1
Syracuse, N.Y.	90	69	12	3	1	5	5
Trenton, N.J.	15	10	4	1	-	-	-
Utica, N.Y.	20	15	2	1	2	-	-
Yonkers, N.Y.	37	30	3	4	-	-	4
E.N. CENTRAL	2,130	1,392	440	169	49	80	90
Akron, Ohio	66	48	11	6	-	1	-
Canton, Ohio	38	27	7	4	-	-	3
Chicago, Ill.§	564	362	125	45	10	22	16
Cincinnati, Ohio	103	64	25	8	2	4	10
Cleveland, Ohio	142	86	30	12	7	7	4
Columbus, Ohio	97	60	21	10	1	5	-
Dayton, Ohio	116	79	23	7	3	4	4
Detroit, Mich.	221	117	53	29	8	14	6
Evansville, Ind.	44	36	7	1	-	-	-
Fort Wayne, Ind.	43	29	10	3	1	-	2
Gary, Ind.	13	8	2	2	-	1	2
Grand Rapids, Mich.	56	38	13	4	1	-	4
Indianapolis, Ind.	168	109	37	9	4	9	2
Madison, Wis.	33	23	8	1	-	1	1
Milwaukee, Wis.	118	84	24	5	4	1	3
Peoria, Ill.	62	44	10	4	1	3	4
Rockford, Ill.	42	27	5	5	-	5	5
South Bend, Ind.	45	35	7	3	-	-	4
Toledo, Ohio	105	77	15	7	5	1	10
Youngstown, Ohio	54	39	7	4	2	2	10
W.N. CENTRAL	881	607	176	49	20	29	38
Des Moines, Iowa	75	52	16	3	2	2	5
Duluth, Minn.	29	23	6	-	-	-	3
Kansas City, Kans.§	109	68	23	10	4	4	2
Kansas City, Mo.	109	68	23	10	4	4	2
Lincoln, Nebr.	26	17	6	2	-	1	1
Minneapolis, Minn.	179	135	30	9	1	4	14
Omaha, Nebr.	94	64	20	5	2	3	5
St. Louis, Mo.	141	95	27	7	4	8	4
St. Paul, Minn.	52	39	7	2	1	3	1
Wichita, Kans.	67	46	18	1	2	-	1
S. ATLANTIC	1,411	784	344	168	55	57	53
Atlanta, Ga.	164	82	40	22	6	14	4
Baltimore, Md.	252	132	69	34	9	8	11
Charlotte, N.C.§	76	46	20	8	1	1	6
Jacksonville, Fla.	119	66	34	8	9	2	6
Miami, Fla.	87	48	20	17	1	1	-
Norfolk, Va.	72	43	15	10	2	2	5
Richmond, Va.	80	40	25	7	4	2	4
Savannah, Ga.	46	33	9	1	3	-	5
St. Petersburg, Fla.	96	68	18	4	1	5	3
Tampa, Fla.	74	48	14	7	2	2	3
Washington, D.C.	312	155	74	47	16	20	6
Wilmington, Del.	33	23	6	3	1	-	-
E.S. CENTRAL	786	509	172	64	17	24	39
Birmingham, Ala.	115	74	16	16	5	4	2
Chattanooga, Tenn.	60	44	11	2	1	2	4
Knoxville, Tenn.	80	48	23	7	-	2	4
Louisville, Ky.	97	64	25	2	2	4	3
Memphis, Tenn.	133	76	36	18	3	-	14
Mobile, Ala.	98	62	24	8	2	2	1
Montgomery, Ala.	62	48	7	3	1	3	2
Nashville, Tenn.	141	93	30	8	3	7	9
W.S. CENTRAL	1,754	1,074	365	183	76	56	53
Austin, Tex.	52	37	5	4	2	4	4
Baton Rouge, La.	55	36	10	5	2	2	2
Corpus Christi, Tex.	62	39	10	4	9	-	4
Dallas, Tex.	219	124	43	30	10	12	4
El Paso, Tex.	51	25	15	5	5	1	1
Fort Worth, Tex	81	42	18	3	8	10	2
Houston, Tex.§	734	436	169	89	24	16	18
Little Rock, Ark.	69	37	19	5	5	3	1
New Orleans, La.	134	90	25	10	6	3	-
San Antonio, Tex.	172	115	35	17	3	2	8
Shreveport, La.	45	30	6	5	1	3	4
Tulsa, Okla.	80	63	10	6	1	-	5
MOUNTAIN	619	403	108	54	28	26	34
Albuquerque, N. Mex.	90	59	9	11	11	-	7
Colo. Springs, Colo.	35	21	5	5	2	2	3
Denver, Colo.	112	69	24	11	3	5	2
Las Vegas, Nev.	68	44	13	7	1	3	4
Ogden, Utah	17	11	5	-	-	1	-
Phoenix, Ariz.	142	93	28	12	4	5	4
Pueblo, Colo.	21	16	3	-	2	-	2
Salt Lake City, Utah	46	24	9	4	3	6	3
Tucson, Ariz.	88	66	12	4	2	4	9
PACIFIC	2,019	1,270	389	213	68	68	99
Berkeley, Calif.	27	19	2	2	1	3	-
Fresno, Calif.	75	49	11	5	6	4	3
Glendale, Calif.	28	19	5	2	2	-	2
Honolulu, Hawaii	64	43	14	3	3	1	3
Long Beach, Calif.	79	49	13	9	6	2	7
Los Angeles Calif.	610	347	136	82	27	10	18
Oakland, Calif.§	87	52	20	10	3	2	4
Pasadena, Calif.	36	22	7	2	-	5	3
Portland, Oreg.	136	106	14	13	1	2	6
Sacramento, Calif.§	143	92	29	13	3	6	12
San Diego, Calif.	150	93	34	15	3	5	14
San Francisco, Calif.	151	80	32	21	5	10	4
San Jose, Calif.	163	104	36	12	2	9	10
Seattle, Wash.	161	110	23	17	6	5	4
Spokane, Wash.	57	45	7	4	-	1	3
Tacoma, Wash.	52	40	6	3	-	3	6
TOTAL	13,251††	8,372	2,728	1,299	395	442	599

*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.

International Notes

Lyme Disease — Canada

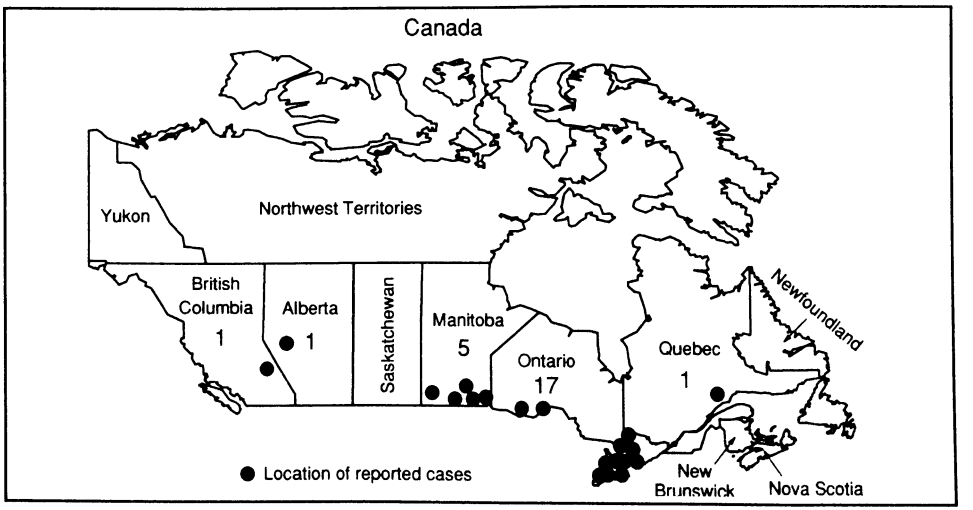
From 1977 through May 1989, 30 cases of Lyme disease (LD [Lyme borreliosis]) were reported to Canada's Laboratory Centre for Disease Control (LCDC). Ontario is the only province in which LD is a reportable condition; however, active laboratory surveillance for LD is conducted in other provinces. In Ontario, the diagnosis of LD is based on recognition of erythema migrans (EM), with involvement of at least two of the three organ systems usually affected by LD (joints, nervous system, and cardiovascular system), or EM and an indirect immunofluorescence antibody titer ≥1:128 or an enzyme-linked immunosorbent assay optical density ≥0.40, or EM and isolation of *Borrelia burgdorferi*. Without EM, diagnosis is based on involvement of at least one organ system and positive serology or isolation (C. LeBer, Ontario Ministry of Health, personal communication, 1989).

For 25 (83%) of the 30 cases, exposure probably occurred in Canada. Four patients had a documented history of tick bite during travel to the southeastern United States before onset of symptoms; one case was acquired in Germany. Seventeen (68%) of the 25 indigenous cases were reported in Ontario, and five (20%), in Manitoba (Figure 1). The areas in Canada with the highest number of cases border on the American states with the highest reported incidence of LD.

Sixteen (53%) of the 30 cases occurred in 1988. Of the 25 cases for which month of onset was reported, cases occurred most commonly in July (28%) and June (16%). The mean age of LD patients was 40 years (range: 18 months to 70 years). Males accounted for 53% of all cases.

A tick bite was documented for 47% of the patients; the remainder had either no history of a bite or no available information. For 48% of LD patients, EM was documented. The most frequently documented presenting symptom was rash (38%),

FIGURE 1. Distribution of indigenous Lyme disease cases, by province — Canada, 1977–1989



Lyme Disease: Canada — Continued

followed by arthralgia/arthritis (28%) and influenza-like illness (13%). Most had multiple symptoms; five patients had neurologic involvement. Five (17%) of the 30 LD patients were hospitalized.

Comment: In several provinces, studies are being planned to determine the prevalence of infected vectors in Canada. The Department of Entomology, University of Manitoba, identified, and the Smithsonian Institution in Washington, D.C., confirmed, two female *Ixodes dammini* ticks collected in Gunton and Winnipeg, Manitoba, in May and June 1989. These are the first reports of this vector species in Manitoba. The only other Canadian reports are from Long Point, Ontario. Intensive sampling efforts for *I. dammini* in other regions of Manitoba in 1989 found only *Dermacentor variabilis* (American dog tick).

To acquire more complete incidence data for Canada, LCDC is interested in receiving reports of any additional cases through provincial/ territorial epidemiologists.

Adapted from: Canada Diseases Weekly Report *1989;15:135–7 and 1989;15:185, as reported by: MJ Todd, MHSc, AO Carter, MD, Disease Surveillance, Bureau of Communicable Disease Epidemiology, Laboratory Centre for Disease Control, Ottawa, Ontario; TD Galloway, PhD, Dept of Entomology, Univ of Manitoba, Winnipeg.*

Epidemiologic Notes and Reports

Seizures Temporally Associated with Use of DEET Insect Repellent — New York and Connecticut

In August 1989, epidemiologists from the New York State Department of Health (NYSDH) investigated five reports of generalized seizures temporally associated with topical use of N,N-diethyl-m-toluamide (DEET). Three of the case-patients, one from New York and two from Connecticut, were reported by a pediatric neurologist who practices in both states. One case was reported initially to an entomologist in New York, and one was reported directly to the NYSDH. The cases occurred in June through August 1989.

The patients, four boys aged 3–7 years and one 29-year-old man, had few prodromal symptoms and recovered quickly. All five had unremarkable medical histories, and none had had a previous seizure or neurologic event. All had normal nonfocal neurologic examinations after their seizures, and four had normal complete laboratory examinations and normal computerized tomography and/or magnetic resonance imaging examinations. Each had had topical cutaneous exposure to varying concentrations of DEET; four had had fewer than three applications. The interval between last use of DEET and onset of seizures ranged from 8 to 48 hours. One patient developed urticaria before his seizure; he was one of two patients who developed an urticarial reaction to phenytoin administered to control seizures.

While reinforcing the importance of DEET in preventing Lyme disease (LD [Lyme borreliosis]), health officials in New York, Connecticut, and New Jersey issued a health alert on August 22 advising caution in the use of DEET-containing repellents. The NYSDH is planning to conduct epidemiologic studies to evaluate the association between DEET and neurologic events.

DEET — Continued

Reported by: S Oransky, MD, Hudson Valley Poison Control Center, Nyack; B Roseman, MD, Pediatric Neurologic Associates, White Plains; D Fish, PhD, Medical Entomology Laboratory, New York Medical College, Valhalla; T Gentile, MS, Center for Environmental Health, J Melius, MD, State Environmental Epidemiologist, New York State Dept of Health. ML Cartter, MD, JL Hadler, MD, State Epidemiologist, Connecticut State Dept of Health Svcs. Div of Environmental Hazards and Health Effects, Center for Environmental Health and Injury Control; Div of Vector-Borne Infectious Diseases, Center for Infectious Diseases; Div of Field Svcs, Epidemiology Program Office, CDC.

Editorial Note: For health officials in New York and Connecticut, two of the states where LD is of growing concern, inquiries about the potential adverse effects of insect repellents have increased. Recent anecdotal reports of seizures temporally associated with the use of DEET have heightened public awareness of DEET's potential adverse effects.

DEET has been marketed in the United States since 1956 and is used by an estimated 50–100 million persons each year. Since 1961, at least six cases of toxic systemic reactions from repeated cutaneous exposure to DEET have been reported (*1–6*). Six girls, ranging in age from 17 months to 8 years, developed behavioral changes, ataxia, encephalopathy, seizures, and/or coma after repeated cutaneous exposure to DEET; three died. Another six systemic toxic reactions have been reported following ingestion of DEET (*7*). Additionally, episodes of confusion, irritability, and insomnia have been reported by Everglades National Park employees following repeated and prolonged use of DEET (*8*).

DEET is partially absorbed through the skin and has been used to enhance dermal delivery of other drugs (*9*). Adverse reactions include allergic responses, direct neurotoxicity, and dermatitis. One of the girls who died after dermal exposure was partially deficient in the enzyme ornithine carbamoyltransferase (*3*); DEET may interfere with the urea cycle metabolic pathway (*10*).

Anecdotal reports of seizures are difficult to interpret. None of the recent cases in New York and Connecticut have been clearly established as DEET toxicity. In contrast to cases described in the medical literature, the New York and Connecticut patients were all male, DEET exposure was less intense, few prodromal symptoms or encephalopathy were seen, and recovery was more rapid and complete. With the dramatic increase in the prevalence of DEET use in areas with endemic LD, the reported cases of seizures temporally related to DEET use may be coincidental. However, these cases may represent a different, previously unreported spectrum of toxic reactions. Careful toxicologic and epidemiologic studies must be conducted, including adequate documentation of DEET levels in affected and unaffected persons.

Clinicians evaluating patients with unexplained seizures should consider the possibility of exposure to DEET. However, since the exact circumstances under which DEET-related neurotoxicity may occur are unclear, DEET should not be accepted as the cause of a seizure until appropriate evaluation has reliably excluded other possible etiologies.

The optimal concentration of DEET for prevention of tick bites is unknown. However, repellents containing 20%–30% DEET applied to clothing are approximately 90% effective in preventing tick attachment (*11*). To minimize the possibility of adverse reactions to DEET, the following precautions are suggested:

- Apply repellent sparingly only to exposed skin or clothing.
- Avoid applying high-concentration products to the skin, particularly of children.

DEET – Continued

- Do not inhale or ingest repellents or get them into the eyes.
- Wear long sleeves and long pants, when possible, and apply repellent to clothing to reduce exposure to DEET.
- Avoid applying repellents to portions of children's hands that are likely to have contact with eyes or mouth.
- Never use repellents on wounds or irritated skin.
- Use repellent sparingly; one application will last 4–8 hours. Saturation does not increase efficacy.
- Wash repellent-treated skin after coming indoors.
- If a suspected reaction to insect repellents occurs, wash treated skin, and call a physician. Take the repellent can to the physician.

Specific medical information about the active ingredients in insect repellents is available from the National Pesticide Telecommunications Network, telephone (800) 858-7378.

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Deaths Associated with Hurricane Hugo – Puerto Rico

At 9 a.m. eastern daylight time on Monday, September 18, 1989, the eye of Hugo, the North Caribbean's strongest hurricane (a category four on a scale of five) in a decade, struck the northeast corner of Puerto Rico. Hugo's path extended from the Lesser Antilles and the Virgin Islands (where it struck on September 17) to South Carolina and areas of North Carolina (where it came ashore during the late evening and early morning of September 21–22). Wind velocities in San Juan were measured at up to 100 mph; wind gusts elsewhere measured as high as 140 mph. These winds

Hurricane-Related Deaths — Continued

damaged nearly 25% of homes on Puerto Rico, left approximately 75% of the island without power, and created 30-foot swells off the east coast. Heavy rains accompanying the hurricane caused some flash flooding.

From September 18 to September 29, the medical examiner in Puerto Rico investigated nine deaths considered to be related to the hurricane. One death (case 1) occurred before the storm (preimpact phase); two (cases 2 and 3), during the storm (impact phase); and six (cases 4–9), after the storm (postimpact). The medical examiner categorized the manner of death for all cases as "accident."*

Case 1. A 57-year-old man was electrocuted while trying to remove an outside television antenna before the storm.

Case 2. A 94-year-old woman drowned while waiting out the storm in her home.

Case 3. A 60-year-old man drowned on his boat during the storm.

Cases 4–8. Five electric company workmen, ages 28, 30, 35, 37, and 42 years, were electrocuted in five separate incidents while attempting to repair downed power lines after the storm.

Case 9. A 35-year-old man was electrocuted when he contacted an electric cable lying on the ground where he was chopping a tree.

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Editorial Note: In the past, hurricane-related mortality has occurred primarily as a result of drownings during the impact phase. Most of these drownings have been associated with storm surges rather than heavy rains (*1*). For most parts of the world, however, this pattern may be changing. This decrease in impact-phase drownings may be a consequence of improved forecasting and early warnings about approaching hurricanes, as well as increased compliance of persons potentially at risk with effective evacuation programs.

The principal public health response to Hurricane Hugo was early warning and a coordinated evacuation plan. By the evening of Sunday, September 17, Puerto Rican officials had evacuated >18,000 persons who were residing in low-lying, flood-prone areas. Cases 2 and 3 were the only impact-phase deaths in Puerto Rico. Despite repeated pleas from government authorities, these persons refused to leave their property and move to temporary shelters.

The contribution to mortality of causes other than impact-phase drownings was highlighted by Tropical Storm Isabelle, which struck Puerto Rico in 1985. Of the 95 deaths investigated by the medical examiner, 21 (22%) resulted from drowning; the rest resulted from other traumatic injuries, primarily associated with a landslide and collapsed bridges (CDC, unpublished data, 1987).

Public health officials and health-care providers must recognize that the mortality and morbidity risks associated with hurricanes extend beyond the impact phase. Efforts to minimize injury and other health risks for both disaster-relief workers and the general population are crucial. These risks include electric hazards, floodwaters, lacerations from storm debris and unfamiliar equipment (e.g., chain saws), operation

*"Manner of death" and "accident" are medicolegal terms used on death certificates that refer to the circumstances under which a death occurs; "cause of death" refers to the injury or illness responsible for the death. When a death occurs under "accidental" circumstances, the preferred term within the public health community for the cause of death is "unintentional injury."

Hurricane-Related Deaths — Continued

of motorized vehicles, use of sump pumps and generators in confined spaces, and exacerbation of existing or unknown medical conditions as a result of fatigue, stress, or unavailable medical support.

CDC and other Public Health Service agencies are providing assistance to the Virgin Islands, Puerto Rico, South Carolina, and other areas affected by Hurricane Hugo. At least five of the seven electrocutions reported here were work-related. A Fatal Accident Circumstance and Epidemiology (FACE) team from the National Institute for Occupational Safety and Health, CDC, has arrived in Puerto Rico to assist local health officials in the investigation of the occupational fatalities that occurred during the postimpact phase.

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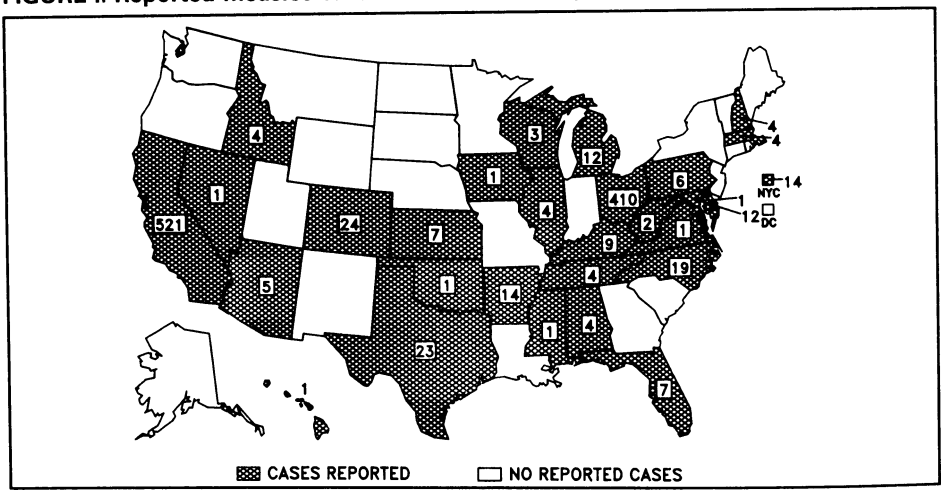
FIGURE I. Reported measles cases — United States, weeks 35–38, 1989



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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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