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Epidemiologic Notes and Reports

Serum 2,3,7,8-Tetrachlorodibenzo-*p*-dioxin Levels in Air Force Health Study Participants — Preliminary Report

In 1978, the United States Air Force responded to a congressional mandate to initiate an epidemiologic study of the possible health effects of exposure to herbicides and their 2,3,7,8-tetrachlorodibenzo-*p*-dioxin (TCDD) contaminants in Air Force veterans who served in the Ranch Hand defoliation operation during the Vietnam conflict. Accordingly, the Air Force conducted a nonconcurrent prospective study, the Air Force Health Study, of all 1,267 members of the Ranch Hand unit and a series of matched controls (*1*).

The controls were selected from the Air Force veterans who served in air cargo units stationed in Southeast Asia (but not in Vietnam) during the same period as the Ranch Hand unit and were individually matched to the Ranch Hand personnel by date of birth, rank (officer, enlisted), and occupation. Investigators assumed that the controls had not been exposed to herbicides or TCDD during the war. Both groups were given physical examinations in 1982 (*2*), 1985 (*3*), and 1987–1988. They will be examined again in 1992, 1997, and, finally, during the concluding year, 2002.

Recently, CDC scientists developed a method for measuring TCDD in human serum (*4*). This lipid-based measurement, which is highly correlated with paired measurements of TCDD in adipose tissue ($r = 0.98$) (*5*), has been applied to U.S. Army veterans (*6*) as well as to participants in the phase of the Air Force Health Study reported here.

This phase of the Air Force study focused on measuring serum TCDD levels in 150 Ranch Hand veterans and 50 controls. All participants were enlisted men; the Ranch Hand veterans had been either herbicide loaders or herbicide specialists in Vietnam. Serum samples from all 200 participants were collected at four Red Cross Centers (Atlanta, Cleveland, Los Angeles, and Tulsa) according to a standardized protocol. One hundred forty-seven of the specimens obtained from Ranch Hand personnel and 49 of those from controls yielded serum TCDD levels that met the quality control criteria (*4*).

The demographic and health characteristics of Ranch Hand personnel and controls were similar (Table 1); however, their serum TCDD levels differed markedly (Figure 1). The mean serum level of the 147 Ranch Hand personnel was 49 parts per trillion (ppt) (median, 26 ppt); 62% had TCDD levels above 20 ppt, which is considered the upper limit for U.S. residents without known TCDD exposure (*7*). The mean serum

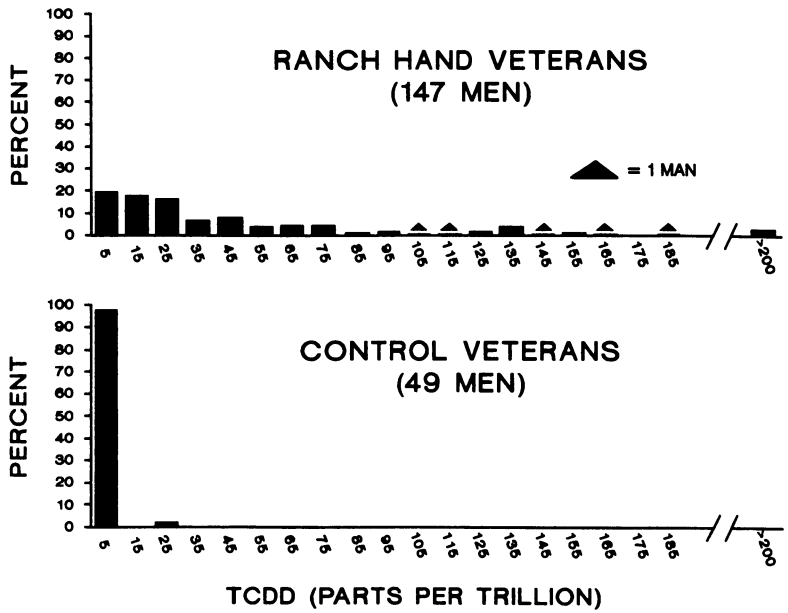
TCDD — Continued

TABLE 1. Selected characteristics of 200 Air Force Health Study participants, by group, 1987

	Ranch Hand Veterans (n=150)	Control Veterans (n=50)
Demographic Characteristics		
Age (Mean)	46	49
Race (Black)	5%	6%
Mean Tour Length (Months) in Southeast Asia	12	25*
Self-Reported Herbicide Exposure†		
Military	93%	8%
Leisure	15%	4%
Civilian Occupation	5%	4%
Health Characteristics		
Current Smoking (Cigarettes)	51%	37%
Smoking History (Pack Years§)	14	12
Current Alcohol Use	80%	78%
Alcohol History (Drink Years¶)	29	30
Percent Body Fat (Mean)	21%	22%

*Controls were based outside of Vietnam and had tours of 2 to 3 years.
†From questionnaire.
§Defined as the equivalent of smoking one pack of cigarettes per day for 1 year.
¶Defined as the equivalent of drinking 1.5 ounces of an 80-proof alcoholic beverage per day for 1 year.

FIGURE 1. Serum TCDD* levels of Ranch Hand and control veterans participating in the TCDD-measurement phase of the Air Force Health Study, 1987



*2,3,7,8-tetrachlorodibenzo-*p*-dioxin.

TCDD – Continued

level of the 49 controls was 5 ppt (median, 5 ppt); 2% (1 person) had a level above 20 ppt. Additionally, 79% of the Ranch Hand personnel and 2% of the controls had TCDD levels at or above 10 ppt (chi-square test, $p<0.0001$).

The five highest TCDD levels in the Ranch Hand group were 201, 210, 211, 303, and 313 ppt. The one control who had a level greater than 20 ppt (21.3 ppt) reported exposure to industrial chemicals since 1980 in a steel foundry in Indiana.

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Editorial Note: The serum TCDD measurement provides a direct assessment of exposure. The distribution of TCDD levels in this phase of the Air Force Health Study indicates that some Ranch Hand personnel had unusually heavy TCDD exposure. The one control who had a TCDD level above background level had been exposed to industrial chemicals in the recent past. No threshold level has been determined as yet for the health effects of TCDD in humans.

The half-life of TCDD in humans has been calculated as approximately 7 years (*8*) on the basis of TCDD levels in serum samples taken in 1982 and 1987 from 36 of the Ranch Hand personnel who had TCDD levels above 10 ppt in 1987. A half-life of 7 years suggests that only about two to four TCDD half-lives have elapsed since potential exposure of Ranch Hand personnel in Vietnam and that serum TCDD can serve as a biological marker for previous TCDD exposure of Air Force Health Study participants.

A report on the entire 1987–1988 Air Force Health Study will be published after TCDD measurements have been completed for all participants and after the report has been reviewed by the Agent Orange Working Group of the Domestic Policy Council (Executive Branch). The result of the half-life study will be reported in a separate publication.

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International Notes

Cave-Associated Histoplasmosis — Costa Rica

An outbreak of histoplasmosis occurred among a group of university students who entered a cave in Santa Rosa National Park, Guanacaste Province, Costa Rica, on January 4, 1988. The cave was inhabited by about 500 bats, including three species of fruit bats (*Glossophaga soricina, Carollia perspicillata,* and *Carollia subrufra*) and one species of vampire bats (*Desmodus rotundus*). The cave consisted of two entrances to a single chamber 20 x 75 x 5 feet in size. Bat guano covered the floor of the cave, and the ground was noted to be exceptionally dry for the season.

Seventeen students (mean age, 24 years; range, 20–40 years) entered the cave to observe the bats and photograph a small boa constrictor feeding on them. The students were in the cave an average of 26 minutes (range, 3–90 minutes). Fifteen (88%) of the 17 students became acutely ill within 9–24 days (mean, 14.4 days);* 12 remained ill 14 days after onset of symptoms. One student, who did not enter the cave, did not become ill. Signs and symptoms among the 15 ill persons included fever (93%), headache (87%), cough (80%), dyspnea (80%), chest pain (73%); and myalgia (53%). Two patients were hospitalized, but all recovered without antifungal treatment.

Chest x-rays were obtained for 12 of the 15 patients; 10 had bilateral diffuse fluffy nodular parenchymal infiltrates. Late acute-phase and early convalescent-phase serum specimens (3 and 5 weeks after exposure to the cave) and urine specimens (5 weeks after exposure) were obtained from all 15 patients. Twelve of the 15 patients had evidence of histoplasmosis by complement fixation test, immunodiffusion test, or urinary antigen detection test (*1,2*).

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Editorial Note: Histoplasmosis is caused by inhalation of spores of *Histoplasma capsulatum* from its natural soil habitat. Growth of *H. capsulatum* requires moderate temperatures, high humidity, and a source of nitrates, often from decomposing feces of bats or birds. *H. capsulatum* has been isolated from both bat caves and bird roosts, and human infection has been associated with exposure to both sources (*3*).

This outbreak is typical of bat-cave-associated histoplasmosis (*4*). The high attack rate (88%) could be explained by the relatively young age of the persons entering the cave or by exposure to a large inoculum of *H. capsulatum* spores. The extraordinarily dry ground in the cave also may have increased the dispersion of spores in the cave. *H. capsulatum* has been more readily isolated from caves under dry conditions than after flooding (*5*).

Cave-acquired histoplasmosis differs in several respects from histoplasmosis associated with bird roosts. Bats, unlike avian species, may become infected with *H. capsulatum* (*6*). Therefore, formaldehyde spraying, a useful control measure for

*A tour member who experienced any two of the following symptoms within 30 days after returning to the United States was considered to have histoplasmosis: fever, headache, cough, dyspnea, or chest pain.

Histoplasmosis — Continued

avian-associated sources of histoplasmosis (*7*), may be ineffective in reducing the risk of infection in a bat cave because bats can recontaminate the cave. Furthermore, skin test surveys have shown that persons living near contaminated caves have a lower prevalence of reactivity to histoplasmin than spelunkers living in the same area (*3*). This finding suggests that *H. capsulatum* infection occurs only in persons who enter contaminated caves. In contrast, airborne dispersal of organisms from bird roosts can cause outbreaks involving at least several square kilometers (*8*).

Much of Santa Rosa National Park consists of mature deciduous dry forest in the relatively dry climate of northwest Costa Rica. During the rainy season (June–November), a seasonal river usually floods the cave that was associated with this outbreak and washes out the bat guano. However, flooding had not occurred because of extraordinarily low rainfall during this year's rainy season. Measured rainfall since 1978 has averaged 160 cm per year, but only 50–70 cm were recorded during 1987. The cave is accessible from a hiking trail and is commonly included on tours of the park led by local field biologists. No illness was reported among groups from the same university who entered the cave in January 1983 and January 1986. Officials of Santa Rosa National Park and field biologists in the area have been notified of the outbreak, and warning signs have been posted outside the cave.

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Progress in Chronic Disease Prevention

State- and Sex-Specific Premature Mortality Due to Ischemic Heart Disease — 1985

Heart disease is the leading cause of death in the United States and the third leading cause of years of potential life lost before the age of 65. Ischemic heart disease (IHD)* accounts for 71% of all deaths due to heart disease and 27% of all mortality (*1*).

Data from the National Center for Health Statistics' mortality public-use data tapes for 1985 were used to analyze the incidence of premature mortality due to IHD.

*International Classification of Diseases, 9th Revision, codes 410–414.

Premature Mortality — Continued

Deaths from IHD were stratified by gender for each of the 50 states and the District of Columbia. Age-adjusted IHD death rates for all ages combined were computed from state population estimates for 1984, the latest year for which age- and gender-specific estimates are available (*2*). In addition, rates of premature mortality due to IHD per 100,000 persons aged 35–64 were computed for each gender and state (Table 1, see page 320). To facilitate interpretation, the states were grouped relative to the national rate (<90%, 90%–110%, and >110% of the national rate).

Age-adjusted IHD death rates for 1985 show similar geographic patterns for both men and women. States experiencing age-adjusted rates more than 10% above the national mean were located in the Northeast and Midwest. States with age-adjusted rates at least 10% below the national mean were around Chesapeake Bay; in the Rocky Mountain, Northwest, and Southwest regions of the country; and in Alaska and Hawaii.

(Continued on page 320)

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

Disease	20th Week Ending			Cumulative, 20th Week Ending		
	May 21, 1988	May 23, 1987	Median 1983-1987	May 21, 1988	May 23, 1987	Median 1983-1987
Acquired Immunodeficiency Syndrome (AIDS)	543	U *	188	11,728	7,000	2,651
Aseptic meningitis	87	128	70	1,457	1,811	1,594
Encephalitis: Primary (arthropod-borne & unspec)	7	15	13	235	328	328
Post-infectious	2	4	2	35	33	40
Gonorrhea: Civilian	11,747	14,086	16,066	253,727	305,967	317,183
Military	161	215	455	4,690	6,572	7,854
Hepatitis: Type A	407	525	377	9,121	9,603	8,490
Type B	430	520	475	7,950	9,701	9,512
Non A, Non B	44	59	72	939	1,209	1,333
Unspecified	33	80	103	809	1,265	1,899
Legionellosis	18	10	11	289	330	237
Leprosy	1	3	3	71	79	105
Malaria	10	26	21	244	283	281
Measles: Total†	149	156	95	1,177	1,940	1,332
Indigenous	146	124	93	1,057	1,688	1,193
Imported	3	32	9	120	252	139
Meningococcal infections	60	47	59	1,403	1,435	1,343
Mumps	93	511	107	2,288	7,934	1,585
Pertussis	67	26	37	828	657	682
Rubella (German measles)	6	17	17	82	156	203
Syphilis (Primary & Secondary): Civilian	704	749	524	14,315	12,913	10,803
Military	2	-	3	75	72	84
Toxic Shock syndrome	4	7	7	113	122	153
Tuberculosis	468	545	459	7,266	7,701	7,701
Tularemia	3	1	2	36	44	39
Typhoid Fever	1	3	3	133	112	112
Typhus fever, tick-borne (RMSF)	21	10	20	51	47	79
Rabies, animal	52	101	131	1,517	1,929	1,935

TABLE II. Notifiable diseases of low frequency, United States

	Cum. 1988		Cum. 1988
Anthrax	-	Leptospirosis (N.C. 1)	11
Botulism: Foodborne (Calif. 1)	5	Plague	1
Infant	15	Poliomyelitis, Paralytic	-
Other	2	Psittacosis (Minn. 1)	28
Brucellosis (Ohio 1, Calif. 1)	22	Rabies, human	-
Cholera	-	Tetanus (Miss. 1)	17
Congenital rubella syndrome	3	Trichinosis	8
Congenital syphilis, ages < 1 year	-		
Diphtheria	-		

*Because AIDS cases are not received weekly from all reporting areas, comparison of weekly figures may be misleading.
†Three of the 149 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 May 21, 1988 and May 23, 1987 (20th Week)

Reporting Area	AIDS	Aseptic Meningitis	Encephalitis		Gonorrhea (Civilian)		Hepatitis (Viral), by type				Legionellosis	Leprosy
			Primary	Post-infectious			A	B	NA,NB	Unspecified		
	Cum. 1988	Cum. 1988	Cum. 1988	Cum. 1988	Cum. 1988	Cum. 1987	Cum. 1988	Cum. 1988	Cum. 1988	Cum. 1988	Cum. 1988	Cum. 1988
UNITED STATES	11,728	1,457	235	35	253,727	305,967	9,121	7,950	939	809	289	71
NEW ENGLAND	477	66	10	-	7,715	10,115	329	480	75	45	14	10
Maine	16	5	1	-	170	311	13	21	3	1	2	-
N.H.	13	10	-	-	117	174	26	26	4	3	1	-
Vt.	4	4	3	-	60	74	4	14	5	-	1	-
Mass.	264	27	5	-	2,766	3,790	168	304	51	36	8	9
R.I.	22	16	-	-	711	798	43	51	8	-	2	1
Conn.	158	4	1	-	3,891	4,968	75	64	4	5	-	-
MID. ATLANTIC	4,161	170	28	-	39,300	48,349	553	1,022	61	84	62	6
Upstate N.Y.	623	94	18	-	5,208	6,409	337	285	33	8	31	-
N.Y. City	2,367	29	5	-	17,125	25,479	99	465	6	59	10	5
N.J.	824	47	5	-	5,740	6,064	109	261	22	17	-	1
Pa.	347	-	-	-	11,227	10,397	8	11	-	-	21	-
E.N. CENTRAL	860	179	45	2	40,323	43,776	474	796	49	44	71	-
Ohio	182	72	18	2	9,539	9,023	134	209	15	7	25	-
Ind.	62	29	8	-	3,166	3,508	57	124	5	15	5	-
Ill.	397	6	-	-	11,593	13,547	59	63	-	4	-	-
Mich.	178	64	14	-	13,113	13,723	158	308	19	18	31	-
Wis.	41	8	5	-	2,912	3,975	66	92	10	-	10	-
W.N. CENTRAL	254	69	16	4	10,090	12,338	553	393	40	14	30	-
Minn.	52	14	2	1	1,412	1,996	27	57	5	3	1	-
Iowa	13	13	7	-	772	1,160	30	38	7	-	8	-
Mo.	132	22	-	-	5,675	6,246	315	236	20	6	4	-
N. Dak.	-	-	-	-	60	128	2	3	1	3	1	-
S. Dak.	3	5	-	1	199	246	-	1	2	-	10	-
Nebr.	16	3	2	2	578	732	18	19	-	-	4	-
Kans.	38	12	5	-	1,394	1,830	161	39	5	2	2	-
S. ATLANTIC	1,766	328	33	14	72,289	80,099	794	1,650	133	119	58	1
Del.	18	9	2	-	1,029	1,180	14	44	4	1	6	-
Md.	182	33	4	3	7,563	8,926	112	255	12	6	9	1
D.C.	206	8	-	1	4,940	5,464	8	21	3	1	-	-
Va.	145	39	14	2	4,946	6,060	160	109	31	80	5	-
W. Va.	6	7	1	-	554	599	6	26	2	3	-	-
N.C.	109	56	9	-	11,758	12,172	153	300	30	-	16	-
S.C.	60	5	-	1	5,375	6,565	25	234	6	3	10	-
Ga.	241	38	1	-	14,346	13,676	143	259	7	2	6	-
Fla.	799	133	2	7	21,778	25,457	173	402	38	23	6	-
E.S. CENTRAL	313	103	21	5	19,541	22,416	354	501	67	6	9	1
Ky.	37	35	6	1	1,642	2,292	310	91	29	2	4	-
Tenn.	144	11	5	-	6,462	7,844	25	249	17	-	2	-
Ala.	80	46	10	2	6,541	7,180	7	127	16	4	2	1
Miss.	52	11	-	2	4,896	5,100	12	34	5	-	1	-
W.S. CENTRAL	880	149	15	-	28,607	34,707	924	599	75	193	9	12
Ark.	38	3	2	-	2,635	3,330	116	35	1	4	2	-
La.	154	29	2	-	5,801	6,496	54	138	11	9	3	-
Okla.	35	14	4	-	2,586	3,831	220	70	19	17	4	-
Tex.	653	103	7	-	17,585	21,050	534	356	44	163	-	12
MOUNTAIN	390	65	18	1	5,328	8,120	1,318	653	98	89	15	-
Mont.	7	2	-	-	165	200	21	24	6	3	-	-
Idaho	3	1	-	-	157	291	62	40	2	1	-	-
Wyo.	1	1	-	-	91	157	1	5	3	-	1	-
Colo.	149	23	3	-	1,137	1,729	92	85	17	43	4	-
N. Mex.	19	4	1	-	524	866	220	81	6	1	-	-
Ariz.	129	19	5	-	1,866	2,895	681	268	38	25	7	-
Utah	32	8	4	1	236	252	148	58	18	12	2	-
Nev.	50	7	5	-	1,152	1,730	93	92	8	4	1	-
PACIFIC	2,627	328	49	9	30,534	46,047	3,822	1,856	341	215	21	41
Wash.	144	-	2	4	2,266	3,331	847	254	62	20	6	2
Oreg.	77	-	-	-	1,157	1,725	658	250	35	11	-	1
Calif.	2,358	294	45	5	26,429	39,896	2,202	1,298	240	178	13	34
Alaska	10	7	1	-	416	716	111	36	3	3	-	1
Hawaii	38	27	1	-	266	379	4	18	1	3	2	3
Guam	-	-	-	-	51	77	3	3	-	2	1	3
P.R.	496	13	2	-	587	887	14	106	20	20	-	-
V.I.	9	-	-	-	152	96	1	3	2	-	-	-
Amer. Samoa	-	-	-	-	15	38	-	1	-	-	-	-
C.N.M.I.	-	-	-	-	16	-	1	2	-	4	-	-

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 May 21, 1988 and May 23, 1987 (20th Week)

Reporting Area	Malaria	Measles (Rubeola)					Menin-gococcal Infections	Mumps		Pertussis			Rubella		
		Indigenous		Imported*		Total									
	Cum. 1988	1988	Cum. 1988	1988	Cum. 1988	Cum. 1987	Cum. 1988	1988	Cum. 1988	1988	Cum. 1988	Cum. 1987	1988	Cum. 1988	Cum. 1987
UNITED STATES	244	146	1,057	3	120	1,940	1,403	93	2,288	67	828	657	6	82	156
NEW ENGLAND	22	-	19	-	46	173	114	-	31	1	78	17	-	1	1
Maine	2	-	-	-	-	3	3	-	-	-	11	1	-	-	1
N.H.	-	-	13	-	44	140	14	-	27	-	22	2	-	-	-
Vt.	-	-	-	-	-	12	5	-	1	1	2	3	-	-	-
Mass.	15	-	1	-	-	5	48	-	3	-	33	4	-	-	-
R.I.	3	-	-	-	-	1	19	-	-	-	1	-	-	1	-
Conn.	2	-	5	-	2	12	25	-	-	-	9	7	-	-	-
MID. ATLANTIC	29	59	328	-	14	335	135	-	206	-	36	89	1	8	7
Upstate N.Y.	13	-	4	-	2	19	64	-	40	-	21	68	-	1	5
N.Y. City	9	1	24	-	1	270	25	-	75	-	1	-	1	5	1
N.J.	5	-	2	-	11	9	45	-	25	-	4	4	-	1	1
Pa.	2	58	298	-	-	37	1	-	66	-	10	17	-	1	-
E.N. CENTRAL	11	26	69	3	16	247	150	18	518	12	95	87	-	21	19
Ohio	2	-	-	-	3	5	59	-	68	-	21	26	-	-	-
Ind.	-	19	19	-	-	-	18	3	42	12	50	1	-	-	-
Ill.	-	6	37	-	9	96	6	6	192	-	2	5	-	17	18
Mich.	8	1	13	3§	4	23	47	8	147	-	16	25	-	4	1
Wis.	1	-	-	-	-	123	20	1	69	-	6	30	-	-	-
W.N. CENTRAL	6	20	20	-	-	114	56	7	106	2	37	39	-	-	1
Minn.	2	20	20	-	-	11	14	-	-	2	7	8	-	-	-
Iowa	-	-	-	-	-	-	-	1	26	-	14	6	-	-	1
Mo.	3	-	-	-	-	101	21	1	27	-	5	13	-	-	-
N. Dak.	-	-	-	-	-	1	-	-	-	-	6	2	-	-	-
S. Dak.	-	-	-	-	-	-	2	-	-	-	2	2	-	-	-
Nebr.	-	-	-	-	-	-	6	-	11	-	-	-	-	-	-
Kans.	1	-	-	-	-	1	13	5	42	-	3	8	-	-	-
S. ATLANTIC	38	16	223	-	11	53	245	23	277	5	71	130	-	3	11
Del.	-	-	-	-	-	4	1	-	-	-	3	-	-	-	1
Md.	3	-	2	-	2	-	23	-	21	-	17	2	-	-	2
D.C.	5	-	-	-	-	1	7	8	101	-	-	-	-	-	-
Va.	8	16	129	-	2	-	28	-	81	-	7	33	-	-	1
W. Va.	-	-	6	-	-	-	2	1	6	-	-	19	-	-	-
N.C.	8	-	-	-	1	2	42	4	27	1	25	58	-	-	-
S.C.	3	-	-	-	-	-	29	1	4	-	-	-	-	-	-
Ga.	3	-	-	-	-	-	36	7	19	3	17	13	-	-	1
Fla.	8	-	86	-	6	46	77	2	18	1	2	5	-	3	6
E.S. CENTRAL	4	10	42	-	-	2	137	20	322	-	12	9	-	-	2
Ky.	-	9	32	-	-	-	27	18	140	-	-	1	-	-	2
Tenn.	-	-	-	-	-	-	82	2	173	-	8	1	-	-	-
Ala.	3	-	-	-	-	-	19	-	6	-	3	5	-	-	-
Miss.	1	1	10	-	-	2	9	N	N	-	1	2	-	-	-
W.S. CENTRAL	23	-	9	-	-	136	92	8	442	28	63	41	3	7	2
Ark.	-	-	-	-	-	-	11	-	78	-	5	2	-	3	1
La.	3	-	-	-	-	-	29	4	150	1	7	9	-	-	-
Okla.	5	-	8	-	-	1	8	-	115	-	24	30	-	1	-
Tex.	15	-	1	-	-	135	44	4	99	27	27	-	3	3	1
MOUNTAIN	12	-	116	-	1	353	40	3	119	17	300	68	1	4	15
Mont.	1	-	-	-	-	61	-	-	2	-	1	2	-	-	-
Idaho	-	-	-	-	1	-	3	-	1	4	237	26	-	-	1
Wyo.	-	-	-	-	-	2	-	-	2	-	1	2	-	-	1
Colo.	6	-	116	-	-	5	10	1	24	1	9	17	-	2	-
N. Mex.	1	-	-	-	-	282	9	N	N	-	1	3	-	-	-
Ariz.	2	-	-	-	-	2	10	2	78	12	31	17	-	-	4
Utah	1	-	-	-	-	-	7	-	3	-	19	1	1	1	9
Nev.	1	-	-	-	-	1	1	-	9	-	1	-	-	1	-
PACIFIC	99	15	231	-	32	527	434	14	267	2	136	177	1	38	98
Wash.	7	1	1	-	-	1	36	-	14	1	30	26	-	-	-
Oreg.	6	-	1	-	-	35	23	N	N	-	3	14	-	-	1
Calif.	84	14	228	-	29	487	357	14	245	1	81	74	1	34	69
Alaska	2	-	-	-	-	-	5	-	5	-	3	3	-	-	-
Hawaii	-	-	1	-	3	4	13	-	3	-	19	60	-	4	28
Guam	-	-	-	-	1	2	-	-	2	-	-	-	-	1	1
P.R.	1	-	159	-	-	407	6	-	5	-	6	11	1	1	1
V.I.	-	-	-	-	-	-	-	-	11	-	-	-	-	-	-
Amer. Samoa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C.N.M.I.	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-

*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 May 21, 1988 and May 23, 1987 (20th Week)

Reporting Area	Syphilis (Civilian) (Primary & Secondary)		Toxic-shock Syndrome	Tuberculosis		Tula-remia	Typhoid Fever	Typhus Fever (Tick-borne) (RMSF)	Rabies, Animal
	Cum. 1988	Cum. 1987	Cum. 1988	Cum. 1988	Cum. 1987	Cum. 1988	Cum. 1988	Cum. 1988	Cum. 1988
UNITED STATES	14,315	12,913	113	7,266	7,701	36	133	51	1,517
NEW ENGLAND	380	204	9	137	234	1	9	-	3
Maine	5	1	1	3	15	-	-	-	1
N.H.	4	2	3	-	5	-	-	-	2
Vt.	-	1	2	1	4	-	-	-	-
Mass.	163	101	3	88	120	1	7	-	-
R.I.	12	5	-	11	23	-	-	-	-
Conn.	196	94	-	34	67	-	2	-	-
MID. ATLANTIC	2,948	2,304	18	1,348	1,382	-	19	2	151
Upstate N.Y.	196	87	8	215	222	-	2	1	1
N.Y. City	1,931	1,619	2	628	663	-	8	1	-
N.J.	320	247	3	240	241	-	9	-	-
Pa.	501	351	5	265	256	-	-	-	150
E.N. CENTRAL	437	369	18	858	887	1	14	-	37
Ohio	44	39	14	156	179	-	4	-	-
Ind.	21	20	-	86	94	-	2	-	10
Ill.	229	212	-	347	352	-	6	-	6
Mich.	129	65	4	219	229	1	1	-	4
Wis.	14	33	-	50	33	-	1	-	17
W.N. CENTRAL	91	58	13	187	215	16	4	8	190
Minn.	8	6	-	31	56	-	2	-	67
Iowa	10	9	2	14	10	-	-	-	13
Mo.	49	27	6	93	110	13	2	6	5
N. Dak.	1	-	-	3	3	-	-	-	36
S. Dak.	5	5	1	17	9	-	-	-	54
Nebr.	12	7	2	7	11	2	-	-	5
Kans.	6	4	2	22	16	1	-	2	10
S. ATLANTIC	5,086	4,423	10	1,633	1,541	4	16	18	512
Del.	53	36	1	17	17	1	-	-	18
Md.	289	238	1	178	128	-	1	3	128
D.C.	223	135	-	73	45	-	-	-	4
Va.	159	100	-	183	154	2	7	1	167
W. Va.	2	5	-	32	44	-	-	1	39
N.C.	295	244	5	119	157	-	1	11	-
S.C.	221	285	-	163	144	-	-	2	27
Ga.	825	613	-	247	233	1	2	-	92
Fla.	3,019	2,767	3	621	619	-	5	-	37
E.S. CENTRAL	798	789	12	571	667	4	2	7	120
Ky.	26	6	5	161	165	3	1	1	56
Tenn.	344	343	4	145	219	-	-	4	32
Ala.	229	200	3	184	198	-	1	2	32
Miss.	199	240	-	81	85	1	-	-	-
W.S. CENTRAL	1,531	1,599	12	895	863	6	6	13	224
Ark.	70	82	-	91	90	1	-	-	38
La.	288	283	-	122	104	-	2	-	-
Okla.	63	66	4	82	86	5	-	12	16
Tex.	1,110	1,168	8	600	583	-	4	1	170
MOUNTAIN	251	262	11	157	233	4	6	2	129
Mont.	2	8	-	-	8	-	1	1	101
Idaho	-	3	2	2	16	-	-	1	-
Wyo.	1	1	-	1	1	-	-	-	11
Colo.	33	42	1	16	47	3	3	-	2
N. Mex.	19	21	-	36	38	1	1	-	4
Ariz.	73	127	4	82	107	-	1	-	10
Utah	9	9	4	-	6	-	-	-	1
Nev.	114	51	-	20	10	-	-	-	-
PACIFIC	2,793	2,905	10	1,480	1,679	-	57	1	151
Wash.	73	57	2	84	87	-	3	-	-
Oreg.	114	101	-	48	43	-	5	-	-
Calif.	2,586	2,740	8	1,275	1,448	-	47	1	145
Alaska	6	2	-	15	25	-	-	-	6
Hawaii	14	5	-	58	76	-	2	-	-
Guam	-	2	-	7	4	-	-	-	-
P.R.	257	389	-	86	95	-	2	-	29
V.I.	1	3	-	3	2	-	-	-	-
Amer. Samoa	-	2	-	-	-	-	-	-	-
C.N.M.I.	1	-	-	2	-	-	-	-	-

U: Unavailable

TABLE IV. Deaths in 121 U.S. cities,* week ending May 21, 1988 (20th Week)

Reporting Area	All Causes, By Age (Years)						P&I**
	All Ages	≥65	45-64	25-44	1-24	<1	Total
NEW ENGLAND	631	427	122	43	18	21	38
Boston, Mass.	188	106	52	16	7	7	20
Bridgeport, Conn.	36	27	5	1	2	1	1
Cambridge, Mass.	22	16	4	1	-	1	1
Fall River, Mass.	31	26	3	2	-	-	2
Hartford, Conn.	59	39	9	3	5	3	-
Lowell, Mass.	25	21	3	1	-	-	-
Lynn, Mass.	16	13	3	-	-	-	2
New Bedford, Mass.	24	21	3	-	-	-	1
New Haven, Conn.	45	26	9	6	-	4	3
Providence, R.I.	40	27	8	4	-	1	1
Somerville, Mass.	8	6	1	1	-	-	-
Springfield, Mass.	43	30	9	2	-	2	2
Waterbury, Conn.	35	25	6	3	1	-	1
Worcester, Mass.	59	44	7	3	3	2	4
MID. ATLANTIC	2,724	1,729	574	270	73	77	130
Albany, N.Y.	52	32	13	2	3	2	1
Allentown, Pa.	21	16	2	2	1	-	-
Buffalo, N.Y.	120	73	31	8	3	5	11
Camden, N.J.	34	21	7	4	1	1	1
Elizabeth, N.J.	17	10	5	1	-	1	-
Erie, Pa.†	46	31	13	1	-	1	3
Jersey City, N.J.	83	59	13	10	1	-	1
N.Y. City, N.Y.	1,447	889	306	171	39	42	59
Newark, N.J.	59	23	16	10	5	5	-
Paterson, N.J.	26	14	5	5	1	1	-
Philadelphia, Pa.	395	256	87	30	14	7	22
Pittsburgh, Pa.†	67	35	20	5	2	5	-
Reading, Pa.	24	21	2	1	-	-	2
Rochester, N.Y.	107	87	12	4	2	2	14
Schenectady, N.Y.	21	19	-	1	1	-	2
Scranton, Pa.†	31	24	6	-	-	1	-
Syracuse, N.Y.	82	53	16	10	-	3	9
Trenton, N.J.	50	33	13	3	-	1	2
Utica, N.Y.	10	7	2	1	-	-	2
Yonkers, N.Y.	32	26	5	1	-	-	1
E.N. CENTRAL	2,299	1,509	488	173	52	77	98
Akron, Ohio	57	35	19	1	-	2	-
Canton, Ohio	49	37	10	2	-	-	4
Chicago, Ill.§	564	362	125	45	10	22	16
Cincinnati, Ohio	144	91	36	7	4	6	14
Cleveland, Ohio	165	93	37	24	5	6	5
Columbus, Ohio	123	78	34	7	2	2	2
Dayton, Ohio	93	67	19	4	1	2	2
Detroit, Mich.	236	126	51	36	10	13	4
Evansville, Ind.	37	28	8	-	1	-	2
Fort Wayne, Ind.	68	47	14	4	2	1	3
Gary, Ind.	23	17	3	3	-	-	-
Grand Rapids, Mich.	76	53	15	2	2	4	11
Indianapolis, Ind.	164	107	36	11	4	6	1
Madison, Wis.	43	28	10	3	2	-	3
Milwaukee, Wis.	148	110	21	8	4	5	7
Peoria, Ill.	45	34	7	2	-	2	4
Rockford, Ill.	52	33	12	4	2	1	3
South Bend, Ind.	56	48	5	2	-	1	4
Toledo, Ohio	100	75	17	6	-	2	12
Youngstown, Ohio	56	40	9	2	3	2	1
W.N. CENTRAL	795	562	135	53	21	24	41
Des Moines, Iowa	60	41	11	3	1	4	1
Duluth, Minn.	22	21	-	-	-	1	5
Kansas City, Kans.	43	29	7	3	2	2	1
Kansas City, Mo.	118	86	26	5	1	-	-
Lincoln, Nebr.	39	26	4	4	2	3	4
Minneapolis, Minn.	146	99	29	11	6	1	16
Omaha, Nebr.	100	67	15	9	4	5	7
St. Louis, Mo.	142	101	29	5	4	3	4
St. Paul, Minn.	60	49	4	6	-	1	1
Wichita, Kans.	65	43	10	7	1	4	2
S. ATLANTIC	1,181	713	260	114	45	48	42
Atlanta, Ga.	143	74	45	17	4	3	3
Baltimore, Md.	169	112	29	12	5	11	7
Charlotte, N.C.	60	31	18	6	3	2	2
Jacksonville, Fla.	116	74	16	16	7	3	-
Miami, Fla.	121	80	25	13	1	1	2
Norfolk, Va.	54	33	9	6	4	2	4
Richmond, Va.	94	53	23	7	5	6	9
Savannah, Ga.	57	32	13	7	3	2	7
St. Petersburg, Fla.	70	58	9	2	1	-	3
Tampa, Fla.	62	36	9	9	-	8	2
Washington, D.C.	208	111	57	19	11	10	3
Wilmington, Del.	27	19	7	-	1	-	-
E.S. CENTRAL	747	480	166	50	18	33	50
Birmingham, Ala.	100	59	25	6	5	5	3
Chattanooga, Tenn.	64	48	11	3	2	-	7
Knoxville, Tenn.	89	65	14	6	3	1	12
Louisville, Ky.	98	67	21	6	2	2	5
Memphis, Tenn.	161	102	38	8	3	10	9
Mobile, Ala.	48	27	13	3	2	3	4
Montgomery, Ala.	52	33	13	3	-	3	3
Nashville, Tenn.	135	79	31	15	1	9	7
W.S. CENTRAL	1,313	809	286	115	59	43	49
Austin, Tex.	60	37	11	8	2	2	4
Baton Rouge, La.	29	21	5	1	-	2	1
Corpus Christi, Tex.§	48	37	11	-	-	-	2
Dallas, Tex.	177	97	38	21	9	12	1
El Paso, Tex.	57	39	9	2	5	2	2
Fort Worth, Tex	84	52	15	9	7	1	3
Houston, Tex.§	308	176	74	34	13	11	7
Little Rock, Ark.	76	45	15	7	4	4	4
New Orleans, La.	122	83	28	4	6	1	-
San Antonio, Tex.	172	99	43	16	11	3	12
Shreveport, La.	68	48	13	4	-	3	5
Tulsa, Okla.	112	75	24	9	2	2	8
MOUNTAIN	685	431	145	61	21	27	33
Albuquerque, N. Mex.	74	46	12	12	2	2	2
Colo. Springs, Colo.	46	30	8	1	5	2	4
Denver, Colo.	124	84	23	9	2	6	9
Las Vegas, Nev.	116	70	31	10	2	3	3
Ogden, Utah	17	9	6	1	-	1	3
Phoenix, Ariz.	124	70	27	18	3	6	4
Pueblo, Colo.	34	24	8	1	1	-	5
Salt Lake City, Utah	52	32	12	2	4	2	1
Tucson, Ariz.	98	66	18	7	2	5	2
PACIFIC	1,822	1,186	344	168	66	50	101
Berkeley, Calif.	11	7	3	1	-	-	1
Fresno, Calif.	60	42	11	4	3	-	3
Glendale, Calif.	14	10	2	1	-	-	1
Honolulu, Hawaii	79	60	17	-	2	-	11
Long Beach, Calif.	90	56	17	13	2	2	9
Los Angeles Calif.	397	253	73	47	14	4	10
Oakland, Calif.	88	52	15	10	7	4	5
Pasadena, Calif.	29	24	1	3	1	-	4
Portland, Oreg.	147	104	24	7	8	4	4
Sacramento, Calif.	154	95	35	8	10	6	18
San Diego, Calif.	153	109	25	10	5	3	15
San Francisco, Calif.	173	94	38	33	3	5	3
San Jose, Calif.	186	129	41	10	4	2	13
Seattle, Wash.	154	89	29	17	2	17	2
Spokane, Wash.	42	33	5	2	1	1	1
Tacoma, Wash.	45	29	8	2	4	2	1
TOTAL	12,197††	7,846	2,520	1,047	373	400	582

*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.

TABLE V. Estimated years of potential life lost (YPLL) before age 65* and cause-specific mortality, by cause of death — United States, 1986

Cause of Mortality (ICD, 9th Revision)	YPLL for Persons Dying in 1986	Cause-Specific Mortality, 1986† (Rate/100,000)
All Causes (Total)	12,054,242	870.8
Unintentional Injuries§ (E800–E949)	2,371,024	39.7
Malignant Neoplasms (140–208)	1,821,682	193.3
Diseases of the Heart (390–398,402,404–429)	1,294,807	318.7
Suicide/Homicide (E950–E978)	1,342,693	22.0
Congenital Anomalies (740–759)	651,523	5.1
Prematurity¶ (765–769)	438,351	2.8
Sudden Infant Death Syndrome (798)	313,555	2.0
Acquired Immunodeficiency Syndrome**	246,823	3.6
Cerebrovascular Disease (430–438)	232,583	61.3
Chronic Liver Diseases and Cirrhosis (571)	225,028	10.9
Pneumonia and Influenza (480–487)	166,389	29.2
Chronic Obstructive Pulmonary Diseases (490–496)	127,889	31.3
Diabetes Mellitus (250)	126,652	15.1

*For details of calculation, see footnotes to Table V, *MMWR* 1988;37:45.
†Cause-specific mortality rates as reported in the National Center for Health Statistics' *Monthly Vital Statistics Report* are compiled from a 10% sample of all deaths.
§Equivalent to accidents and adverse effects.
¶Category derived from disorders relating to short gestation and respiratory distress syndrome.
**Reflects CDC surveillance data.

Premature Mortality — Continued

TABLE 1. Sex-specific death rates* due to ischemic heart disease,† by state — United States, 1985

	Males				Females			
	For All Ages Combined		35- to 64-Year Age Group		For All Ages Combined		35- to 64-Year Age Group	
	Rate	(Rank)	Rate	(Rank)	Rate	(Rank)	Rate	(Rank)
Alabama	234	(32)	213	(19)	185	(28)	68	(20)
Alaska	201	(46)	149	(46)	148	(48)	33	(49)
Arizona	213	(40)	193	(30)	169	(38)	48	(41)
Arkansas	223	(37)	199	(27)	174	(34)	68	(22)
California	224	(36)	159	(43)	194	(21)	49	(40)
Colorado	209	(42)	162	(41)	161	(41)	44	(45)
Connecticut	232	(34)	180	(34)	200	(17)	55	(34)
Delaware	221	(38)	171	(39)	178	(32)	83	(5)
District of Columbia	143	(51)	151	(45)	124	(51)	58	(30)
Florida	231	(35)	210	(23)	189	(23)	60	(29)
Georgia	252	(18)	223	(16)	188	(24)	70	(17)
Hawaii	147	(50)	119	(49)	125	(50)	44	(44)
Idaho	205	(43)	162	(42)	155	(44)	41	(48)
Illinois	257	(14)	191	(33)	236	(4)	68	(19)
Indiana	268	(6)	219	(18)	214	(9)	75	(11)
Iowa	244	(24)	199	(28)	182	(29)	61	(27)
Kansas	239	(28)	192	(31)	177	(33)	64	(26)
Kentucky	266	(11)	242	(5)	210	(12)	76	(10)
Louisiana	250	(19)	228	(11)	202	(15)	81	(8)
Maine	266	(9)	226	(15)	218	(8)	71	(16)
Maryland	188	(48)	144	(47)	154	(45)	53	(37)
Massachusetts	266	(10)	226	(13)	210	(11)	66	(23)
Michigan	278	(4)	222	(17)	238	(3)	74	(12)
Minnesota	221	(39)	179	(35)	163	(39)	45	(43)
Mississippi	239	(29)	231	(10)	188	(25)	83	(4)
Missouri	245	(22)	212	(20)	208	(13)	71	(15)
Montana	202	(45)	142	(48)	154	(46)	57	(32)
Nebraska	239	(27)	173	(38)	171	(37)	51	(38)
Nevada	240	(25)	204	(26)	186	(27)	66	(25)
New Hampshire	244	(23)	211	(21)	198	(19)	55	(35)
New Jersey	287	(2)	237	(7)	244	(2)	68	(21)
New Mexico	151	(49)	108	(51)	130	(49)	32	(50)
New York	320	(1)	254	(1)	293	(1)	92	(1)
North Carolina	267	(8)	249	(3)	192	(22)	70	(18)
North Dakota	239	(26)	176	(36)	172	(36)	45	(42)
Ohio	274	(5)	235	(8)	228	(6)	81	(7)
Oklahoma	268	(7)	226	(14)	198	(20)	72	(14)
Oregon	248	(20)	194	(29)	187	(26)	58	(31)
Pennsylvania	253	(16)	227	(12)	218	(7)	77	(9)
Rhode Island	284	(3)	244	(4)	232	(5)	82	(6)
South Carolina	263	(13)	238	(6)	199	(18)	84	(3)
South Dakota	237	(30)	207	(24)	173	(35)	50	(39)
Tennessee	253	(17)	233	(9)	201	(16)	74	(13)
Texas	204	(44)	165	(40)	163	(40)	53	(36)
Utah	189	(47)	115	(50)	150	(47)	31	(51)
Vermont	236	(31)	206	(25)	181	(31)	60	(28)
Virginia	246	(21)	210	(22)	182	(30)	66	(24)
Washington	212	(41)	156	(44)	158	(43)	43	(46)
West Virginia	263	(12)	253	(2)	212	(10)	87	(2)
Wisconsin	256	(15)	192	(32)	206	(14)	55	(33)
Wyoming	233	(33)	174	(37)	159	(42)	43	(47)
United States	**249**		**204**		**206**		**66**	

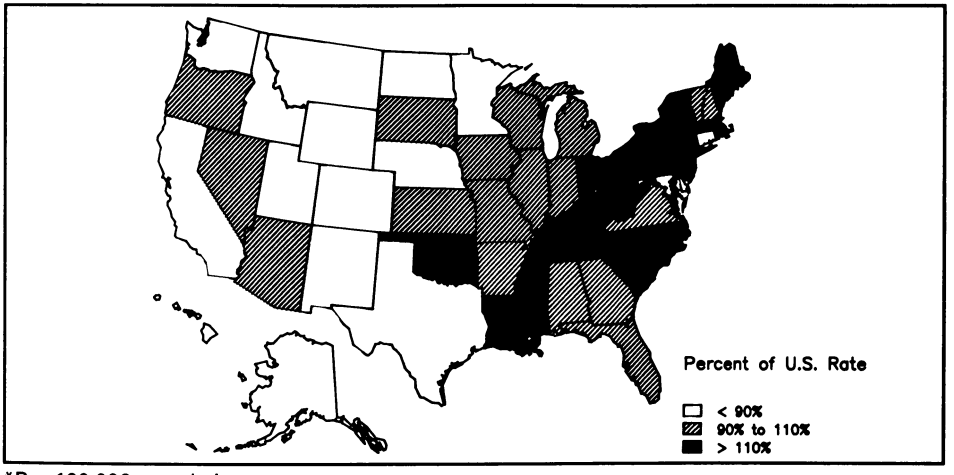
*Per 100,000 population. The rates for all ages combined are age-adjusted to the 1984 U.S. population estimates prepared by the U.S. Bureau of the Census. The rates for persons 35–64 years of age are not age-adjusted.

†International Classification of Diseases, 9th Revision, codes 410–414.

Premature Mortality — Continued

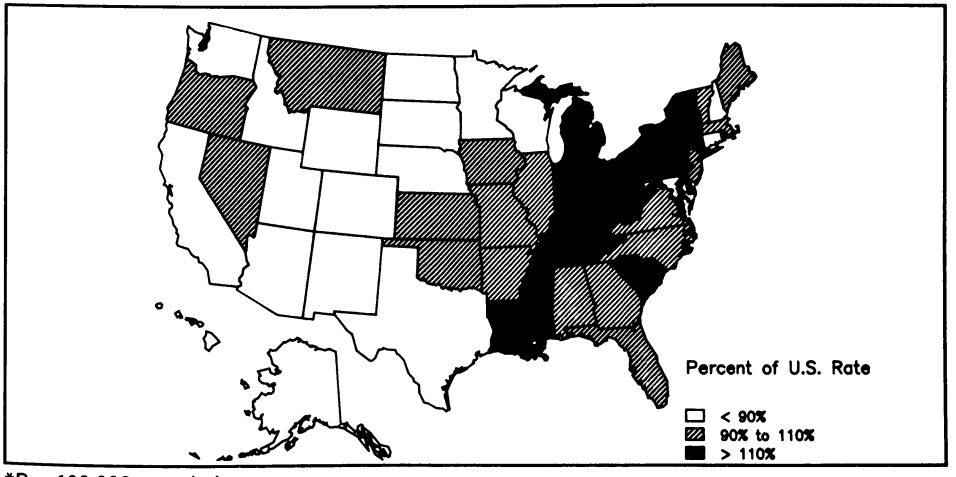
Rates of premature mortality due to IHD in 1985 were also high in the parts of the Northeast and Midwest that experienced higher rates of age-adjusted IHD deaths (Figures 1 and 2). Additionally, several states in the Southeast and Appalachian regions experienced premature mortality from IHD that was more than 10% above the

FIGURE 1. State-specific death rates* due to ischemic heart disease† for men 35–64 years of age, presented as a percentage of the U.S. rate, 1985



*Per 100,000 population.
†International Classification of Diseases, 9th Revision, codes 410–414.

FIGURE 2. State-specific death rates* due to ischemic heart disease† for women 35–64 years of age, presented as a percentage of the U.S. rate, 1985



*Per 100,000 population.
†International Classification of Diseases, 9th Revision, codes 410–414.

Premature Mortality — Continued

national mean. With the addition of California and Connecticut, areas with IHD premature mortality rates at least 10% below the national mean were similar to those with low age-adjusted IHD deaths.

Reported by: Epidemiology Br, Div of Nutrition, Center for Health Promotion and Education, CDC.

Editorial Note: Current geographic variations in premature IHD rates are probably associated with long-term trends in overall IHD deaths (*3–8*). Although each age, sex, racial, and geographic group has experienced significant declines in deaths from IHD, significant differences exist. In 1950, the West Coast ranked as high as the East Coast states, but in the 1960s, the rate in the west began to decline (*6*). By 1978, the highest rates clustered in the Appalachian and Northeastern regions. These regional trends in premature mortality due to IHD were similar for men and women as well as for blacks and whites.

Some of the current differences in state-specific IHD premature mortality rates may result from sociodemographic differences or population shifts over time. Blacks have higher rates of premature IHD (*9*). In addition, although blacks and whites had similar rates of decline in IHD deaths from 1968–1975, the rate of decline among white females and blacks of both genders from 1975 to 1985 has been half that of white men (*10*).

Finally, variations among states in IHD premature mortality rates may reflect geographic differences in the availability or effectiveness of interventions against IHD or in the prevalence of risk factors, such as cigarette smoking, high levels of serum cholesterol, high blood pressure, overweight, and low levels of physical activity. A review of available evidence suggests that reductions in serum cholesterol and in cigarette smoking are responsible for over half of the decline in overall IHD death rates over the last 2 decades (*11*).

Geographic variations in premature IHD, rather than age-adjusted IHD deaths for all ages combined, should direct epidemiologists and public-health practitioners in examining regional or state-specific patterns of risk factors known to contribute to premature mortality due to IHD. Furthermore, an examination of the environmental, behavioral, and social factors underlying these differences in risk factors might be beneficial. These investigations may provide insight into the most promising prevention strategies.

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Premature Mortality — Continued

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Errata: Vol. 37, No. 12

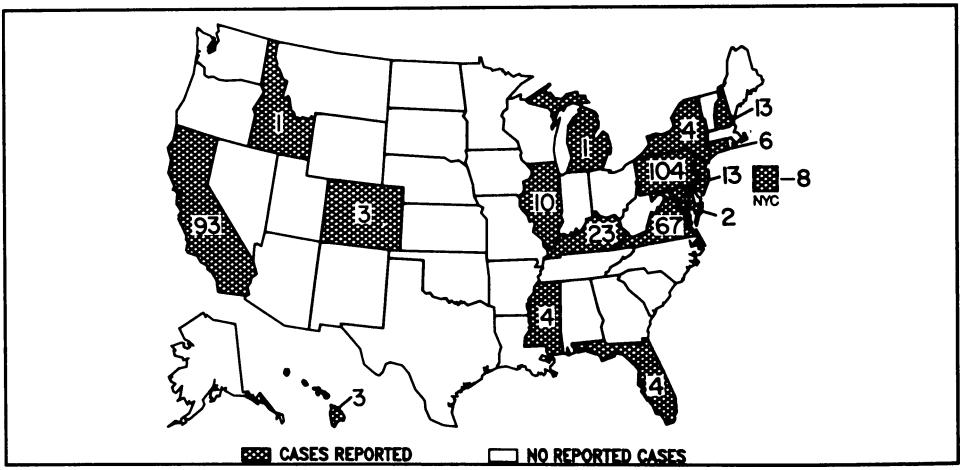
p. 182 The first two sentences of the first paragraph should read: "Immune globulin (IG) (16.5 gm% protein) can be used to prevent or modify measles infection in HIV-infected persons if administered within 6 days of exposure. IG is especially indicated for measles-susceptible household contacts with asymptomatic HIV infection, particularly for those under 1 year of age, and for measles-susceptible pregnant women."

Vol. 37, Supplement No. S-4

p. 16 In Addendum 2, reference number 5 should read:

5. CDC. Acquired immune deficiency syndrome (AIDS): precautions for clinical and laboratory staffs. MMWR 1982;31:577-80.

FIGURE I. Reported measles cases — United States, Weeks 16–19, 1988



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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.

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