WoRLD Report

WORK-RELATED LUNG DISEASE SURVEILLANCE REPORT 1994

Division of Respiratory Disease Studies
National Institute for Occupational Safety and Health

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Centers for Disease Control and Prevention

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PREFACE

The 1994 Work-Related Lung Disease Surveillance Report is the third in a series of major surveillance reports compiled by the Division of Respiratory Disease Studies (DRDS), National Institute for Occupational Safety and Health (NIOSH), Centers for Disease Control and Prevention. The purpose of this report is to provide a summary of surveillance data for various occupational respiratory diseases, from a variety of sources, in a readily available format. The majority of the data in this report is for the time period 1968-1990. However, the time period covered varies for some of the data sources. A portion of the data originate from programs and activities administered by DRDS, e.g., information from the Coal Workers' X-ray Surveillance Program (CWXSP), the National Occupational Health Survey of Mining (NOHSM), and the Sentinel Event Notification System for Occupational Risks (SENSOR). Other data were obtained from publications, reports, and analysis of data provided by the National Center for Health Statistics (NCHS), the Department of Labor (DOL), the Social Security Administration (SSA), the Mine Safety and Health Administration (MSHA), the Occupational Safety and Health Administration (OSHA), the Bureau of Mines (BOM), and the Association of Occupational and Environmental Clinics (AOEC).

The organization of this edition of the Work-Related Lung Disease Surveillance Report differs from earlier editions. It is divided into 11 major sections. The first ten sections present data on specific occupational lung diseases or conditions, summarizing mortality and morbidity data, and other available information, such as occupational exposures or numbers of workers at risk. The remaining section provides data from the AOEC database. Most segments contain an initial section of figures, followed by tables. The appendices contain a description of each major data source, and methods used for computation of specific statistics.

The 1994 Work-Related Lung Disease Surveillance Report contains major additions, both in the addition of previously unreported data such as that from the National Health Interview Survey (NHIS) and AOEC, and in supplementing the data with selected statistical measures, such as proportional mortality ratios, both crude and age-adjusted rates at national and state levels, and years of potential life lost to age 65 and to life expectancy.

Surveillance information including that contained in this report derives from various sources which differ in completeness of reporting, case definitions, and populations of interest. Nevertheless, surveillance information is useful for establishing priorities, for investigation and intervention, and for tracking progress toward elimination of preventable disease.

Comments and suggestions from users of earlier editions of the report have been incorporated into this 1994 edition. In order to increase the utility of future editions, we continue to encourage comments on the current report as well as descriptions of how the data are used. Please return the tear out card enclosed or send comments and suggestions directly to:

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ACKNOWLEDGEMENTS

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Dennis W. Groce and Janet M. Roman, Environmental Investigations Branch, DRDS, contributed graphs and tables concerning exposures.

John E. Parker, Karen L. Hilling and Mitzi L. Martin, Examinations Processing Branch, DRDS, contributed information on the Coal Workers' X-ray Surveillance Program.

ASBESTOSIS

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OTHER LUNG CONDITIONS

ASSOCIATION OF OCCUPATIONAL AND ENVIRONMENTAL CLINICS OCCUPATIONAL DISEASE SURVEILLANCE DATABASE

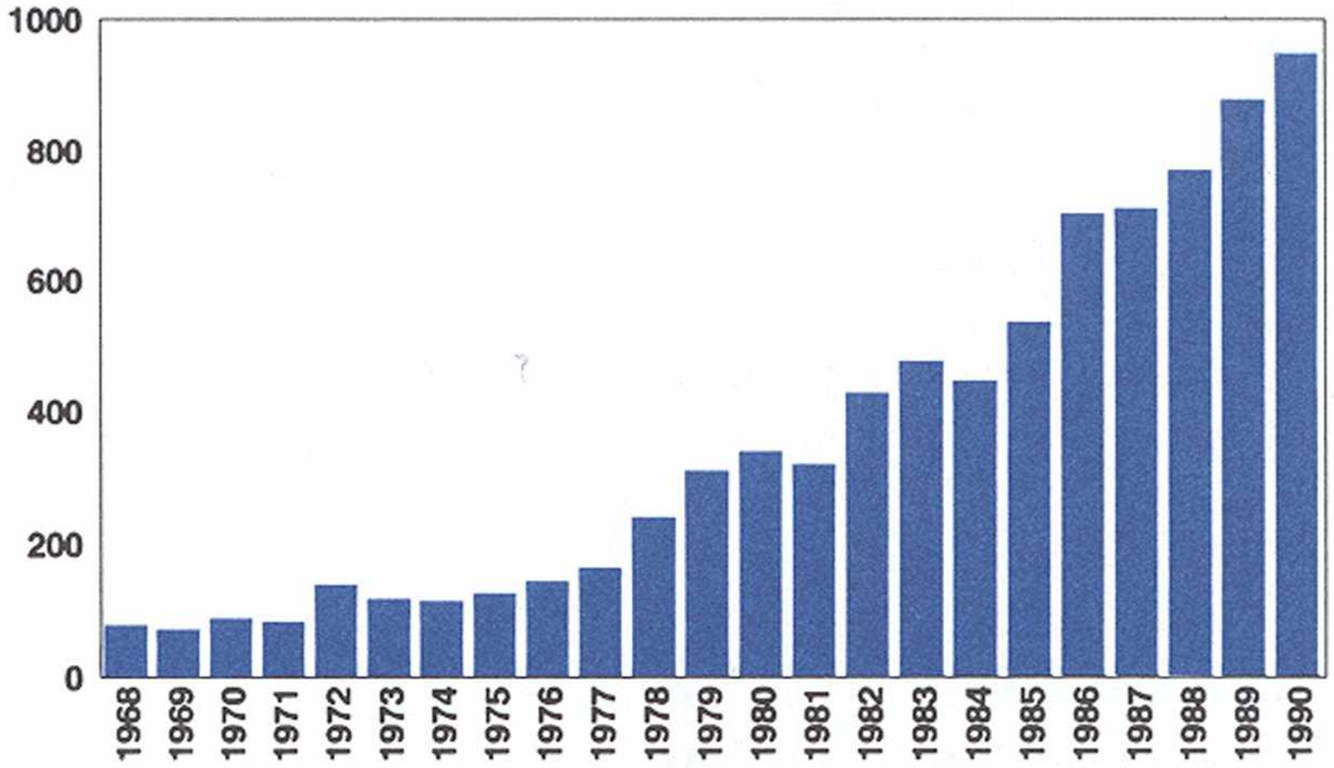
Asbestosis includes ICD-8 code 515.2 (asbestosis) for 1968-1978 and ICD-9 code 501 (asbestosis) for 1979-1990.

- The total number of deaths with mention of asbestosis between 1968 and 1990 was 8,215. No deaths occurred before age 25. The annual number of deaths increased from 77 in 1968 to 948 in 1990. Racial distribution was 93% whites, 6% blacks, and less than 1% for other races. Over 95% of deaths with asbestosis occurred in males.

- See Tables 1-3, 1-4, and 1-5 for data.

- See Appendix A for information about multiple cause of death data.

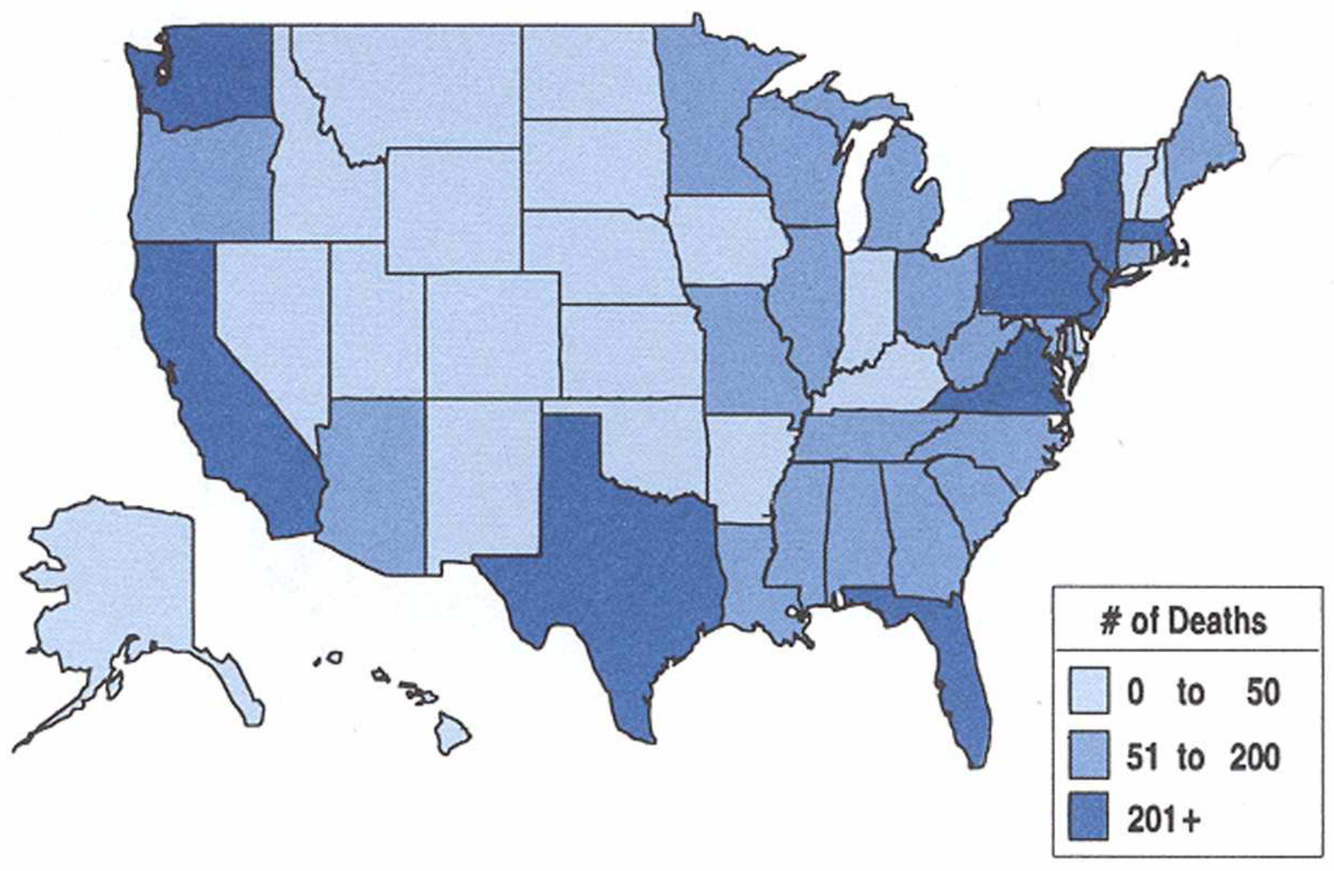
Figure 1-1. Asbestosis: number of deaths, U.S. residents age 15 and over, 1968-1990



- The geographic distribution of deaths with asbestosis is generally coastal. The state with the largest number of deaths with asbestosis occurring over this period was California (n = 954).

- See Table 1-5 for data.

Figure 1-2. Asbestosis: number of deaths, U.S. residents age 15 and over, by state, 1979-1990



ASBESTOSIS

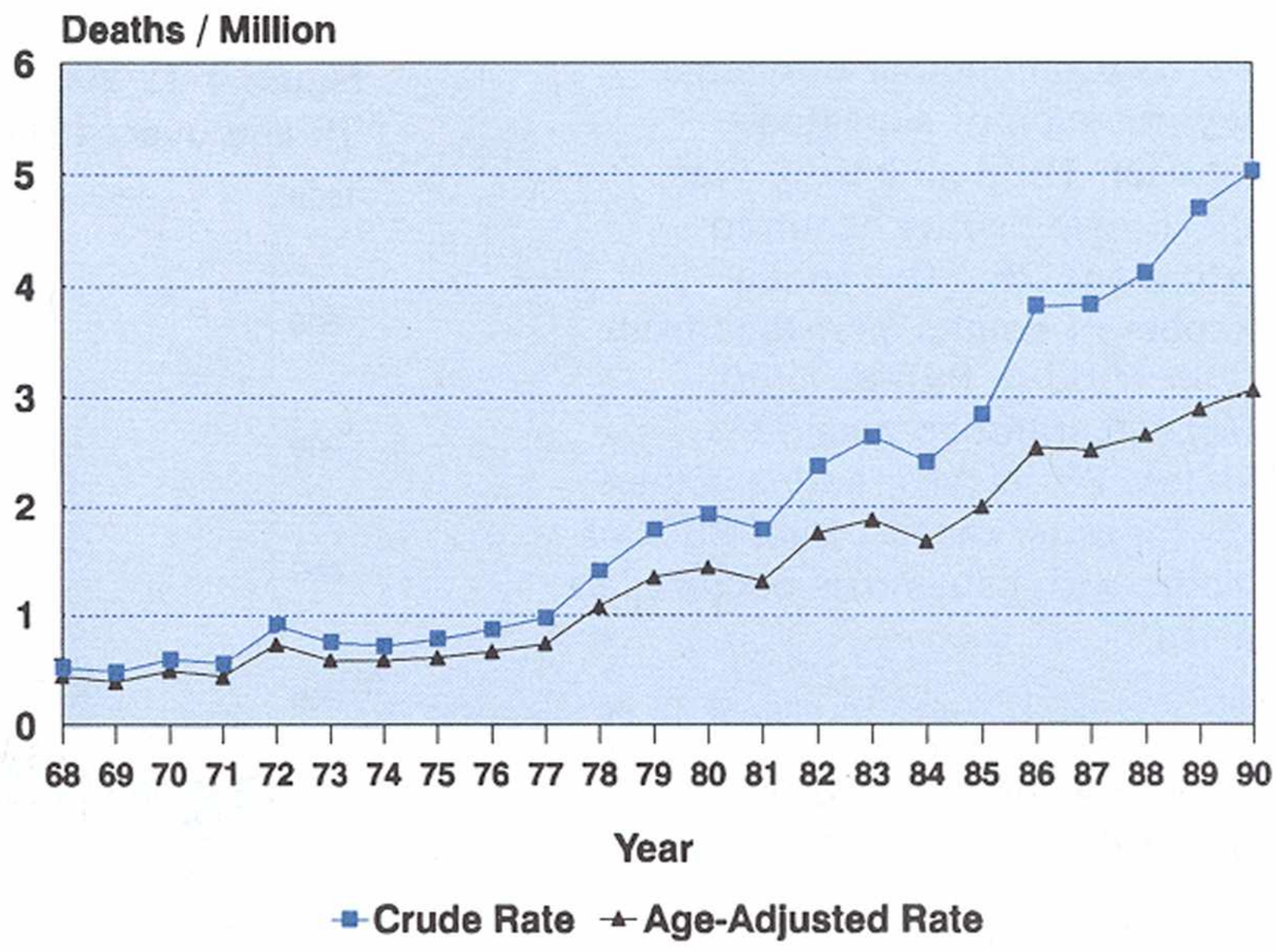
Mortality

- The crude mortality rate increased by 850% between 1968 and 1990; 846% for white males and 1,774% for black males. The age-adjusted mortality rate increased by nearly 600% between 1968 and 1990; 642% for white males and 1664% for black males. The age-adjusted mortality rate for white females increased by 257% between 1968 and 1990 compared to 150% increase for black females between 1978 and 1990.

- See Tables 1-6 and 1-7 for data.

- See Appendix B for methods.

Figure 1-3. Asbestosis: crude and age-adjusted mortality rates, U.S. residents age 15 and over, 1968-1990



- The state with the highest crude mortality rate for this time period was Delaware. Other states which ranked in the top 20 were all coastal, except for Montana, Idaho, and West Virginia.

- See Table 1-10 for data.

Figure 1-4. Asbestosis: crude mortality rates, U.S. residents age 15 and over, by state, 1989-1990

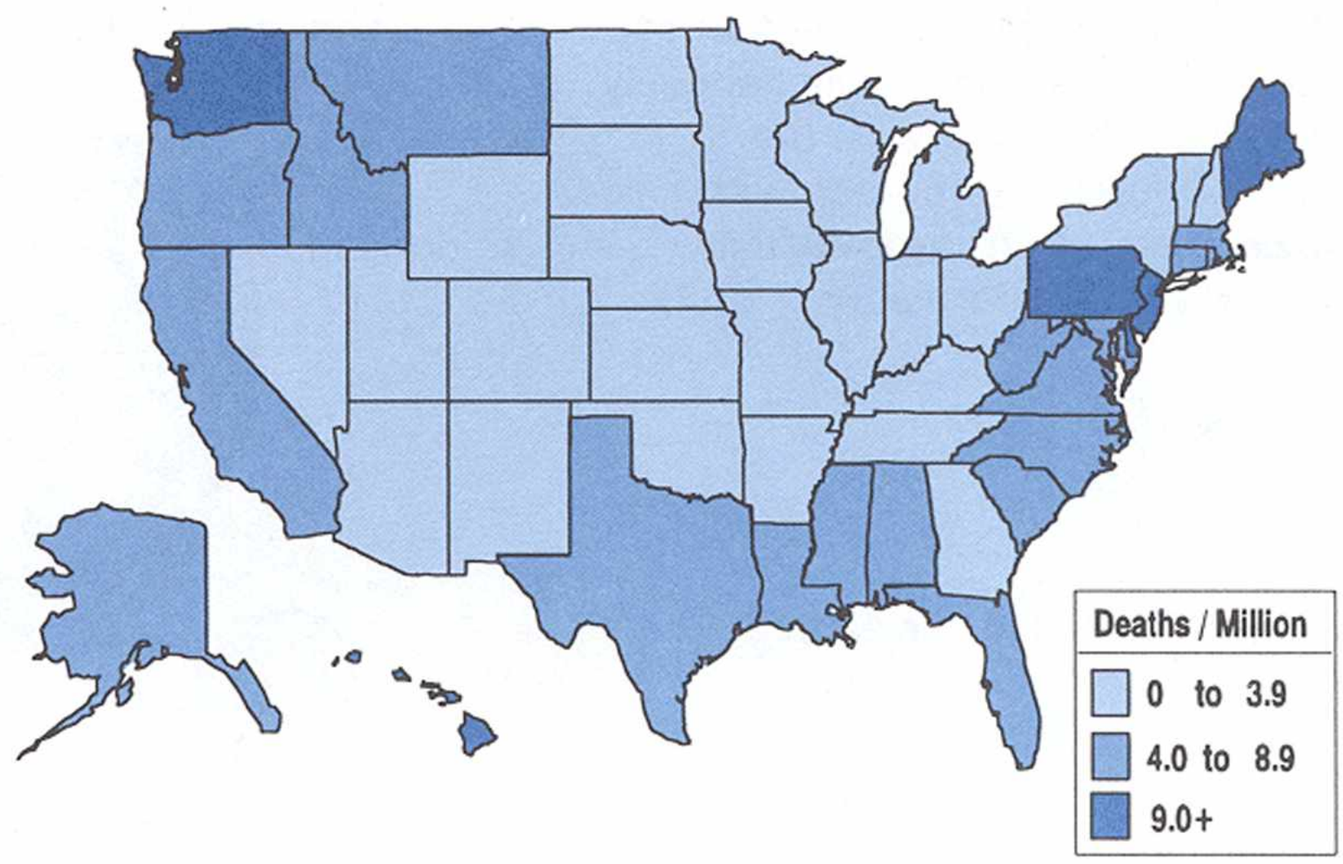


Table 1-1. Asbestosis: most frequently recorded occupations on death certificate, U.S. residents age 15 and over, selected states and years, 1985-1990

COC	Occupation	Number	Percent
585	Plumbers, pipefitters and steamfitters	107	9.8
593	Insulation workers	81	7.4
019	Managers and administrators, n.e.c.	44	4.0
575	Electricians	43	3.9
637	Machinists	34	3.1
889	Laborers, except construction	32	2.9
643	Boilermakers	30	2.7
633	Supervisors in production operations	29	2.6
453	Janitors and cleaners	28	2.6
567	Carpenters	26	2.4
	All other occupations	598	54.6
	Occupation not reported	44	4.0
	TOTAL	**1,096**	**100.0**

COC - 1980 Census Occupation Code n.e.c. - not elsewhere classified

NOTE: See Appendix C for list of 25 states reporting usual occupation and years reporting.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.

Table 1-2. Asbestosis: most frequently recorded industries on death certificate, U.S. residents age 15 and over, selected states and years, 1985-1990

CIC	Industry	Number	Percent
060	Construction	286	26.1
360	Ship and boat building and repairing	114	10.4
392	Not specified manufacturing industries	34	3.1
019	Industrial and miscellaneous chemicals	31	2.8
262	Miscellaneous nonmetallic mineral and stone products	31	2.8
400	Railroads	29	2.6
961	Homemaker, student, unemployed, volunteer	27	2.5
282	Fabricated structural metal products	24	2.2
460	Utility services - electric light and power	18	1.6
901	General government, n.e.c.	17	1.6
942	Military	15	1.4
	All other industries	419	38.2
	Industry not reported	51	4.7
	TOTAL	**1,096**	**100.0**

CIC - 1980 Census Industry Code n.e.c. - not elsewhere classified

NOTE: See Appendix C for list of 25 states reporting usual industry and years reporting.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.

Table 1-3. Asbestosis: number of deaths, U.S. residents age 15 and over, by age, race, and sex, 1968-1990

Years		1968-1978		1979-1990		1989-1990	
Total Deaths		1,359	%	6,856	%	1,826	%
Sex	Male	1,298	95.5	6,564	95.7	1,750	95.8
	Female	61	4.5	292	4.3	76	4.2
Race	White	1,295	95.3	6,366	92.9	1,671	91.5
	Black	62	4.6	451	6.6	140	7.7
	Other	2	0.1	39	0.6	15	0.8
Race/Sex	White Male	1,235	90.9	6,087	88.8	1,602	87.7
	White Female	60	4.4	279	4.1	69	3.8
	Black Male	61	4.5	439	6.4	134	7.3
	Black Female	1	0.1	12	0.2	6	0.3
	Other Male	2	0.1	38	0.5	14	0.8
	Other Female	0	0.0	1	0.0	1	0.1
Age	Years						
	15-24	0	0.0	0	0.0	0	0.0
	25-34	1	0.1	2	0.0	0	0.0
	35-44	10	0.7	33	0.5	8	0.4
	45-54	154	11.3	248	3.6	36	2.0
	55-64	501	36.9	1,375	20.1	258	14.1
	65-74	464	34.1	2,773	40.4	723	39.6
	75-84	202	14.9	1,999	29.2	643	35.2
	85 and Over	27	2.0	426	6.2	158	8.7
	Mean	65.1		70.8		72.9	
	Range	27-92		31-99		35-96	

NOTE: See Appendix B for methods. Percentages may not total to 100% due to rounding.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.

Table 1-4. Asbestosis: number of deaths, U.S. residents age 15 and over, by state, 1968-1978

State	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	TOTAL
Alabama	-	-	-	-	-	-	1	1	-	2	2	**6**
Alaska	1	-	-	-	-	-	-	1	1	-	-	**3**
Arizona	-	-	1	-	6	1	1	3	3	2	3	**20**
Arkansas	-	-	-	-	-	-	-	-	-	-	1	**1**
California	6	10	5	11	8	17	9	11	23	24	33	**157**
Colorado	1	-	-	-	-	-	-	-	-	2	2	**5**
Connecticut	-	1	1	2	4	2	2	4	-	2	4	**22**
Delaware	-	-	-	-	-	-	-	2	1	-	1	**4**
District of Columbia	-	1	-	-	-	1	-	-	-	-	-	**2**
Florida	2	2	2	-	2	3	3	2	4	2	15	**37**
Georgia	3	-	1	-	2	3	3	1	1	-	2	**16**
Hawaii	-	-	-	-	-	-	-	-	-	-	1	**1**
Idaho	-	-	-	-	-	1	1	-	1	-	-	**3**
Illinois	3	1	5	3	6	1	5	2	3	6	5	**40**
Indiana	1	-	1	1	-	-	1	1	-	-	4	**9**
Iowa	1	-	-	-	-	-	1	1	1	1	-	**5**
Kansas	-	-	-	-	-	-	-	1	-	-	-	**1**
Kentucky	-	-	1	-	-	-	-	-	-	-	1	**2**
Louisiana	1	1	-	1	2	2	-	-	3	1	2	**13**
Maine	-	1	1	1	-	1	1	1	2	-	1	**9**
Maryland	-	1	-	2	-	4	1	-	5	4	2	**19**
Massachusetts	4	6	4	3	16	11	8	14	10	13	15	**104**
Michigan	1	-	2	1	-	2	-	2	3	4	4	**19**
Minnesota	1	-	2	1	-	1	2	-	1	1	2	**11**
Mississippi	-	-	-	-	-	-	-	-	1	-	1	**2**
Missouri	-	1	-	1	2	-	3	4	5	2	5	**23**
Montana	-	-	-	-	-	-	2	1	-	-	-	**3**
Nebraska	-	-	-	-	2	-	-	-	-	-	-	**2**
Nevada	-	1	-	1	-	-	-	-	-	1	-	**3**
New Hampshire	-	-	-	1	-	-	-	-	1	2	1	**5**
New Jersey	18	18	17	16	28	14	24	18	21	26	33	**232**
New Mexico	-	-	-	-	-	1	-	-	-	-	3	**4**
New York	8	4	7	14	4	8	6	9	11	6	14	**91**
North Carolina	2	4	5	1	-	3	3	1	2	1	2	**24**
North Dakota	-	-	-	-	-	-	-	-	-	-	-	-
Ohio	2	-	5	3	6	1	1	3	1	4	6	**32**
Oklahoma	-	-	-	-	-	-	-	1	-	-	2	**3**
Oregon	1	-	2	1	2	2	1	2	3	4	7	**25**
Pennsylvania	6	9	11	11	22	20	17	18	11	15	25	**165**
Rhode Island	-	-	-	1	-	-	1	-	-	2	1	**5**
South Carolina	3	5	3	1	2	2	3	3	2	5	8	**37**
South Dakota	-	-	-	-	-	-	-	-	-	-	1	**1**
Tennessee	1	-	-	-	4	-	-	1	-	5	1	**12**
Texas	2	2	2	-	6	1	4	3	6	4	4	**34**
Utah	-	-	-	-	-	-	-	-	-	-	1	**1**
Vermont	-	2	-	-	-	-	-	-	-	-	-	**2**
Virginia	2	1	4	1	2	2	2	5	3	9	8	**39**
Washington	6	-	4	6	8	10	7	8	12	10	10	**81**
West Virginia	-	-	1	-	-	-	1	1	-	1	2	**6**
Wisconsin	1	-	-	-	2	3	-	1	2	2	5	**16**
Wyoming	-	-	-	-	2	-	-	-	-	-	-	**2**
TOTAL	**77**	**71**	**87**	**83**	**138**	**117**	**114**	**126**	**143**	**163**	**240**	**1,359**

NOTE: See Appendix B for methods.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.

- indicates quantity zero.

Table 1-5. Asbestosis: number of deaths, U.S. residents age 15 and over, by state, 1979-1990

State	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	TOTAL
Alabama	2	2	-	5	4	4	7	9	6	10	22	21	**92**
Alaska	-	-	-	-	-	-	-	1	-	-	2	1	**4**
Arizona	5	2	2	6	3	7	10	5	8	7	3	6	**64**
Arkansas	-	1	2	2	1	3	-	7	10	4	1	4	**35**
California	63	59	57	86	67	77	83	112	80	81	87	102	**954**
Colorado	-	-	-	-	6	7	3	6	3	6	3	4	**38**
Connecticut	3	3	4	2	11	7	8	12	9	10	14	11	**94**
Delaware	-	-	-	-	3	-	1	3	3	8	13	6	**37**
District of Columbia	1	-	1	-	1	-	-	2	1	-	-	-	**6**
Florida	17	10	9	12	20	19	27	35	41	59	56	43	**348**
Georgia	3	4	2	8	5	2	4	11	12	8	6	13	**78**
Hawaii	2	-	1	3	1	2	5	2	3	3	6	3	**31**
Idaho	2	-	-	4	1	2	2	3	6	4	5	4	**33**
Illinois	6	8	13	4	11	11	14	15	10	11	26	18	**147**
Indiana	3	4	2	6	3	4	3	3	3	5	5	8	**49**
Iowa	1	-	1	-	1	1	3	4	6	2	2	4	**25**
Kansas	1	-	-	1	1	-	2	3	5	3	5	2	**23**
Kentucky	1	-	6	2	-	2	4	4	3	4	4	1	**31**
Louisiana	2	3	5	9	9	4	11	11	7	12	20	20	**113**
Maine	3	6	11	3	8	3	7	11	9	12	8	17	**98**
Maryland	8	2	7	11	12	9	13	16	18	16	24	36	**172**
Massachusetts	21	33	14	26	29	16	24	37	31	30	43	36	**340**
Michigan	3	4	4	5	8	3	6	6	11	7	11	17	**85**
Minnesota	5	6	2	4	9	8	1	5	4	11	5	8	**68**
Mississippi	2	2	5	10	4	1	5	8	12	15	17	16	**97**
Missouri	5	2	5	8	6	3	9	12	7	11	7	9	**84**
Montana	-	-	2	2	2	2	3	2	1	2	8	6	**30**
Nebraska	3	-	-	-	-	1	-	4	5	2	2	3	**20**
Nevada	-	1	2	1	1	1	3	4	3	1	-	2	**19**
New Hampshire	1	8	5	3	5	1	1	9	6	8	2	2	**48**
New Jersey	34	46	43	52	51	49	63	82	80	83	102	115	**800**
New Mexico	-	1	1	1	1	-	1	1	4	2	5	2	**19**
New York	12	13	12	16	25	24	10	25	30	29	32	44	**272**
North Carolina	4	8	4	6	9	10	15	13	17	12	17	25	**140**
North Dakota	-	2	-	2	1	-	-	-	-	-	1	-	**6**
Ohio	7	9	8	10	9	10	17	14	21	12	23	27	**167**
Oklahoma	1	-	-	4	6	-	2	2	5	5	8	6	**39**
Oregon	5	6	9	8	13	13	10	12	18	21	17	12	**144**
Pennsylvania	24	35	32	33	36	60	54	54	65	79	101	67	**640**
Rhode Island	2	1	6	4	4	3	2	3	-	11	5	7	**48**
South Carolina	7	4	2	4	8	6	9	9	8	14	18	11	**100**
South Dakota	-	-	-	-	1	-	1	-	-	-	-	-	**2**
Tennessee	5	3	-	10	5	5	8	10	4	12	5	6	**73**
Texas	12	8	6	12	19	12	26	25	48	46	49	91	**354**
Utah	-	1	2	1	1	1	-	2	2	1	2	3	**16**
Vermont	2	-	-	1	1	1	1	1	2	1	-	1	**11**
Virginia	13	14	11	11	18	14	27	24	22	35	35	47	**271**
Washington	16	23	18	20	24	28	21	47	40	34	37	34	**342**
West Virginia	2	4	-	4	6	3	5	11	15	15	6	17	**88**
Wisconsin	-	4	2	6	6	6	3	5	4	4	7	9	**56**
Wyoming	-	-	-	-	-	-	-	-	2	1	1	1	**5**
TOTAL	**309**	**339**	**318**	**428**	**476**	**445**	**534**	**702**	**710**	**769**	**878**	**948**	**6,856**

NOTE: See Appendix B for methods.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.

- indicates quantity zero.

Table 1-6. Asbestosis: crude mortality rates (per 1,000,000 population), U.S. residents age 15 and over, by race and sex, 1968-1990

		White		Black	
Year	Overall rate	Males	Females	Males	Females
1968	0.53	1.08	0.09	0.39	-
1969	0.49	1.03	0.07	0.13	-
1970	0.60	1.30	0.03	0.52	-
1971	0.56	1.15	0.07	0.63	-
1972	0.91	2.04	0.03	0.49	-
1973	0.75	1.67	0.06	0.35	-
1974	0.72	1.51	0.11	0.57	-
1975	0.78	1.62	0.15	0.55	-
1976	0.87	1.89	0.04	0.96	-
1977	0.98	2.15	0.05	0.83	-
1978	1.41	3.01	0.13	1.41	0.09
1979	1.78	3.90	0.12	1.47	-
1980	1.93	4.09	0.19	2.17	-
1981	1.79	3.67	0.31	1.74	-
1982	2.37	5.03	0.25	2.41	-
1983	2.64	5.54	0.33	2.63	-
1984	2.41	5.20	0.18	2.53	0.07
1985	2.84	6.05	0.26	3.18	-
1986	3.82	7.94	0.32	4.88	0.09
1987	3.83	8.24	0.31	3.00	0.09
1988	4.12	8.72	0.28	4.43	0.25
1989	4.70	9.83	0.29	5.67	0.34
1990	5.02	10.22	0.51	7.31	0.16

NOTE: See Appendix B for methods.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.
U.S. Bureau of the Census: 1970-1990 population estimates of the U.S.

- indicates no deaths listed.

Table 1-7. Asbestosis: age-adjusted mortality rates (per 1,000,000 population), U.S. residents age 15 and over, by race and sex, 1968-1990

		White		Black	
Year	Overall rate	Males	Females	Males	Females
1968	0.44	0.92	0.07	0.39	-
1969	0.39	0.85	0.05	0.13	-
1970	0.49	1.09	0.02	0.58	-
1971	0.44	0.94	0.06	0.62	-
1972	0.73	1.69	0.03	0.49	-
1973	0.58	1.37	0.03	0.37	-
1974	0.58	1.26	0.09	0.61	-
1975	0.61	1.33	0.10	0.54	-
1976	0.66	1.53	0.02	1.02	-
1977	0.74	1.73	0.03	0.86	-
1978	1.08	2.42	0.08	1.60	0.06
1979	1.34	3.09	0.08	1.63	-
1980	1.43	3.24	0.12	2.31	-
1981	1.30	2.88	0.20	1.78	-
1982	1.75	3.94	0.15	2.67	-
1983	1.88	4.26	0.19	2.57	-
1984	1.67	3.86	0.12	2.71	0.07
1985	1.99	4.61	0.14	3.23	-
1986	2.54	5.72	0.18	4.82	0.08
1987	2.52	5.88	0.17	2.96	0.05
1988	2.65	6.13	0.14	4.30	0.24
1989	2.89	6.63	0.14	5.35	0.20
1990	3.06	6.83	0.25	6.88	0.15

NOTE: See Appendix B for methods.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.
U.S. Bureau of the Census: 1970-1990 population estimates of the U.S.

- indicates no deaths listed.

Table 1-8. Asbestosis: years of potential life lost to age 65, U.S. residents age 15 and over, by race and sex, 1968-1990

		White		Black	
Year	Total	Males	Females	Males	Females
1968	510	450	30	15	-
1969	245	225	10	5	-
1970	475	395	0	80	-
1971	305	260	30	15	-
1972	570	520	30	20	-
1973	380	355	5	20	-
1974	515	445	35	35	-
1975	450	410	30	10	-
1976	430	380	5	45	-
1977	485	460	5	20	-
1978	735	615	20	100	0
1979	860	705	20	130	-
1980	875	790	30	55	-
1981	760	670	55	35	-
1982	1,035	905	25	95	-
1983	1,050	890	50	95	-
1984	740	650	30	60	0
1985	880	795	10	60	-
1986	1,140	990	35	95	0
1987	1,090	980	30	80	0
1988	1,030	935	30	60	5
1989	950	840	5	80	15
1990	1,080	930	25	90	25

NOTE: See Appendix B for methods.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.

- indicates no deaths listed.

Table 1-9. Asbestosis: years of potential life lost to life expectancy, U.S. residents age 15 and over, by race and sex, 1968-1990

		White		Black	
Year	Total	Males	Females	Males	Females
1968	1,382	1,072	115	44	-
1969	1,107	886	80	15	-
1970	1,511	1,201	27	101	-
1971	1,296	991	94	66	-
1972	2,245	1,849	59	62	-
1973	1,743	1,436	43	45	-
1974	1,905	1,465	150	82	-
1975	2,001	1,536	179	61	-
1976	2,171	1,699	43	140	-
1977	2,471	1,975	61	109	-
1978	3,727	2,840	164	240	12
1979	4,774	3,680	147	266	-
1980	5,025	3,878	234	288	-
1981	4,677	3,528	392	198	-
1982	6,496	4,932	299	371	-
1983	6,833	5,196	384	372	-
1984	6,051	4,667	240	359	14
1985	7,366	5,681	288	424	-
1986	9,430	7,269	376	539	14
1987	9,455	7,545	355	358	9
1988	9,992	7,900	303	471	48
1989	11,120	8,658	316	626	50
1990	11,956	9,045	555	795	51

NOTE: See Appendix B for methods.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.

- indicates no deaths listed.

Table 1-10. Asbestosis: number of deaths, crude and age-adjusted mortality rates (per 1,000,000 population), total years of potential life lost (YPLL), U.S. residents age 15 and over, by state, 1989-1990

State	Deaths	Rank	Crude mortality Rate	Rank	Age-adjusted mortality Rate	Rank	YPLL to age 65 Years	Rank	YPLL to life expectancy Years	Rank
Alabama	43	13	6.97	14	4.46	13	45	14	574	12
Alaska	3	45	4.51	22	9.05	5	5	37	49	45
Arizona	9	33	1.69	40	1.00	40	10	29	111	36
Arkansas	5	40	1.39	44	0.72	46	5	37	60	42
California	189	2	4.47	23	2.94	21	195	2	2,292	2
Colorado	7	36	1.39	44	1.17	37	40	17	123	33
Connecticut	25	20	4.82	20	2.32	24	5	37	260	24
Delaware	19	23	18.28	1	12.95	2	40	17	272	22
District of Columbia	-	50	-	50	-	50	-	50	-	50
Florida	99	5	4.78	21	2.10	25	90	6	1,197	5
Georgia	19	23	1.93	38	1.53	33	45	14	286	21
Hawaii	9	33	15.86	3	14.19	1	10	29	114	34
Idaho	9	33	6.21	17	3.90	17	5	37	113	35
Illinois	44	12	2.53	30	1.54	32	50	13	545	14
Indiana	13	29	1.53	41	0.90	43	10	29	157	30
Iowa	6	39	1.40	43	0.80	44	0	45	78	39
Kansas	7	36	1.86	39	1.14	38	25	19	100	37
Kentucky	5	40	0.88	49	0.70	47	20	22	86	38
Louisiana	40	15	6.40	16	4.12	16	25	19	486	15
Maine	25	20	13.10	4	6.31	7	10	29	263	23
Maryland	60	10	8.14	12	5.86	8	65	10	796	9
Massachusetts	79	7	8.30	10	4.22	14	65	10	884	8
Michigan	28	19	1.98	36	1.53	33	90	6	470	16
Minnesota	13	29	1.97	37	1.27	36	15	26	169	28
Mississippi	33	16	8.67	8	5.00	10	20	22	389	17
Missouri	16	25	2.02	35	1.00	40	10	29	176	27
Montana	14	27	12.06	5	9.36	4	45	14	228	25
Nebraska	5	40	2.08	34	1.01	39	0	45	53	43
Nevada	2	46	1.08	47	0.74	45	0	45	28	47
New Hampshire	4	44	2.32	31	1.59	31	5	37	51	44
New Jersey	217	1	18.14	2	10.49	3	230	1	2,740	1
New Mexico	7	36	3.50	25	2.03	27	5	37	78	39
New York	76	8	2.74	29	1.66	30	140	5	1,006	7
North Carolina	42	14	4.08	24	2.70	23	55	12	563	13
North Dakota	1	48	1.06	48	0.69	48	0	45	14	48
Ohio	50	11	2.98	28	2.05	26	80	8	730	11
Oklahoma	14	27	3.10	26	1.70	29	10	29	162	29
Oregon	29	17	6.74	15	3.28	20	15	26	307	19
Pennsylvania	168	3	8.93	7	4.95	11	195	2	2,242	3
Rhode Island	12	31	7.58	13	3.75	18	20	22	143	32
South Carolina	29	17	5.43	19	3.53	19	10	29	340	18
South Dakota	-	50	-	50	-	50	-	50	-	50
Tennessee	11	32	1.45	42	0.97	42	10	29	150	31
Texas	140	4	5.57	18	4.19	15	160	4	1,808	4
Utah	5	40	2.20	32	1.81	28	5	37	65	41
Vermont	1	48	1.14	46	0.50	49	0	45	8	49
Virginia	82	6	8.66	9	6.42	6	80	8	1,029	6
Washington	71	9	9.91	6	5.51	9	25	19	758	10
West Virginia	23	22	8.24	11	4.56	12	15	26	288	20
Wisconsin	16	25	2.14	33	1.33	35	20	22	209	26
Wyoming	2	46	3.02	27	2.88	22	5	37	29	46

NOTE: See Appendix B for methods.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.
U.S. Bureau of the Census: 1989-1990 population estimates of the U.S.

- indicates no deaths listed.

Table 1-11. Asbestosis: proportionate mortality ratios (PMR), based on underlying cause of death, by usual occupation for selected states, 1985-1990

COC	Occupation	Number of deaths	PMR	95% confidence interval LCL	UCL
593	Insulation workers	29	339.83	228.07	488.26
646	Lay-out workers	4	61.10	16.65	156.27
643	Boilermakers	9	43.51	19.96	82.56
585	Plumbers, pipefitters, steamfitters	31	17.61	11.90	25.16
653	Sheet metal workers	8	13.45	5.80	26.49
756	Mixing, blending machine operators	3	10.43	2.15	30.50
595	Roofers	3	10.02	2.07	29.31
575	Electricians	18	9.10	5.39	14.38
516	Heavy equipment mechanics	3	6.50	1.34	18.99
547	Specified mechanics/repairers, n.e.c.	3	5.86	1.21	17.15
057	Mechanical engineer	3	5.22	1.08	15.27
783	Welders and cutters	8	4.55	1.96	8.96
696	Stationary engineers	4	4.07	1.11	10.41
637	Machinists	13	3.40	1.81	5.81
633	Supervisors, production occupations	14	3.17	1.73	5.33
563	Brickmasons and stonemasons	3	3.15	0.65	9.22
779	Machine operators, not specified	11	3.13	1.56	5.60
558	Supervisors; construction, n.e.c.	4	2.43	0.66	6.23
777	Miscellaneous machine operators, n.e.c.	5	2.30	0.74	5.38
869	Construction laborers	9	2.27	1.04	4.31
844	Operating engineers	3	2.14	0.44	6.27
579	Painters, construction and maintenance	3	1.71	0.35	4.99
796	Production inspectors, checkers, examiners	3	1.55	0.32	4.53
567	Carpenters	7	1.40	0.56	2.89
913	Retired; with no other occupation listed	5	1.16	0.37	2.71
505	Automobile mechanics	3	1.14	0.24	3.34
019	Managers, administrators, n.e.c.	16	1.12	0.64	1.82
453	Janitors and cleaners	7	1.08	0.43	2.23

COC - 1980 Census Occupation Code n.e.c. - not elsewhere classified

LCL - lower confidence limit UCL - upper confidence limit

NOTE: See Appendix B for methods and Appendix C for list of selected states.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.

Table 1-12. Asbestosis: estimated number of discharges from short-stay nonfederal hospitals, 1970-1991

Year	Number of cases
1970	300
1971	400
1972	100
1973	2,000
1974	1,000
1975	1,000
1976	1,000
1977	1,000
1978	3,000
1979	3,000
1980	4,000
1981	—
1982	2,000
1983	4,000
1984	6,000
1985	6,000
1986	6,000
1987	11,000
1988	8,000
1989	8,000
1990	—
1991	7,000

NOTE: Estimates have been rounded. No estimates are available for 1981 and 1990. NCHS recommends that in statistical comparison, estimates of less than 5,000 not be used and that estimates of 5,000 to 10,000 be used with caution.

SOURCE: National Center for Health Statistics National Hospital Discharge Survey.

ASBESTOSIS

Exposure

- The total number of asbestos samples reported by MSHA inspectors for non-coal mines has not exceeded 75 in any single year. The percentage of samples greater than the permissible exposure limit (PEL) fluctuated between 0 and 8%.

- See Table 1-13 for data.

Figure 1-5. Asbestos: total number of samples reported by MSHA inspectors and percent above PEL, U.S. non-coal mines, 1982-1991

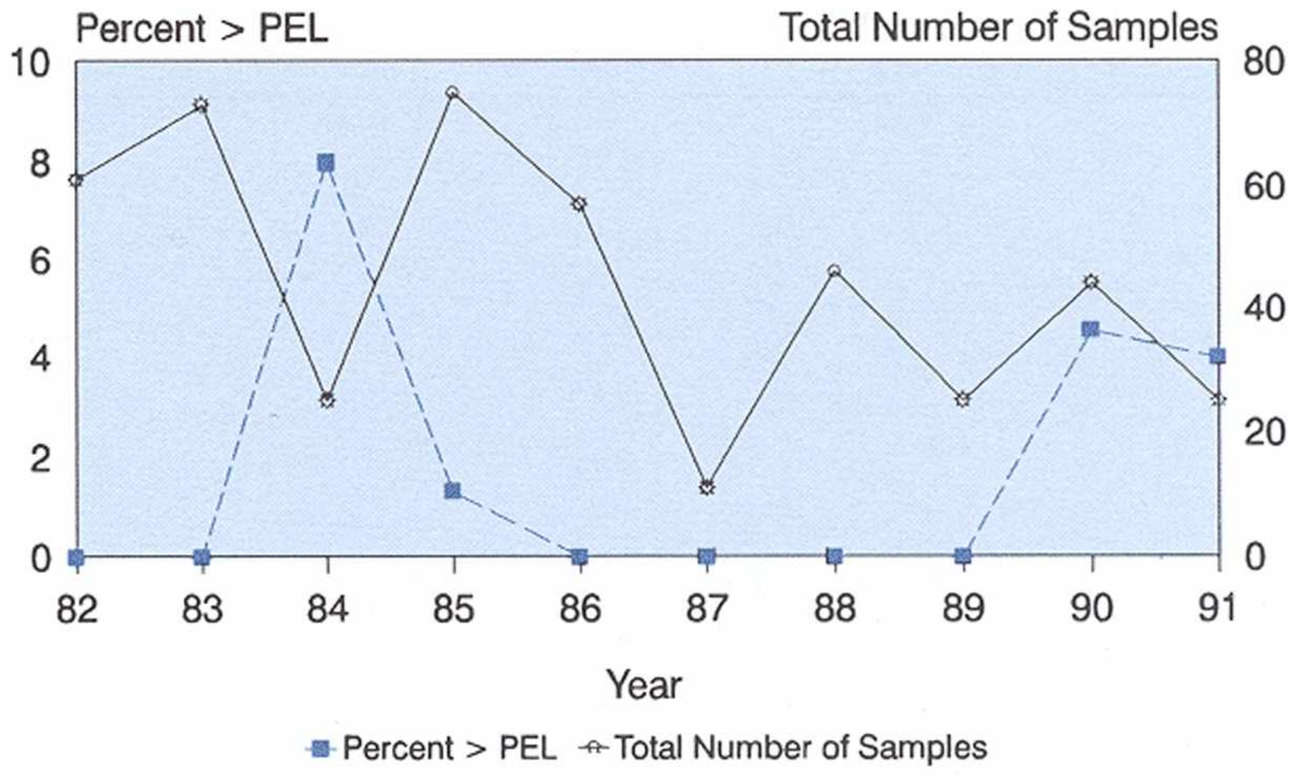


Table 1-13. Asbestos: number of samples reported by MSHA inspectors and percent exceeding various levels, U.S. non-coal mines, 1982-1991

Year	Number of active mines	Total number of samples	Samples > PEL	Percent of samples > PEL	Samples > 2x PEL	Percent of samples > 2x PEL
1982	11,298	61	0	0.00	0	0.00
1983	11,290	73	0	0.00	0	0.00
1984	11,294	25	2	8.00	1	4.00
1985	11,832	75	1	1.33	0	0.00
1986	11,741	57	0	0.00	0	0.00
1987	11,614	11	0	0.00	0	0.00
1988	11,808	46	0	0.00	0	0.00
1989	11,765	25	0	0.00	0	0.00
1990	11,838	44	2	4.55	1	2.27
1991	11,596	25	1	4.00	0	0.00

NOTE: The PEL is 2 fibers/cc (8 hours) and 10 fibers/cc (1 hour) for MSHA non-coal mine asbestos samples. MSHA does not routinely report data to MIDAS for samples with less than 2 fibers/cc.

SOURCE: Bureau of Mines (BOM), Mine Inspection Data Analysis System (MIDAS).

- The total number of asbestos samples collected by OSHA inspectors has ranged from a maximum of 490 in 1984 to 88 in 1991. The percentage of samples greater than the PEL has ranged between 6 and 26%.

- See Table 1-14 for data.

Figure 1-6. Asbestos: total number of samples collected by OSHA inspectors and percent above PEL, U.S. general industry, 1984-1991

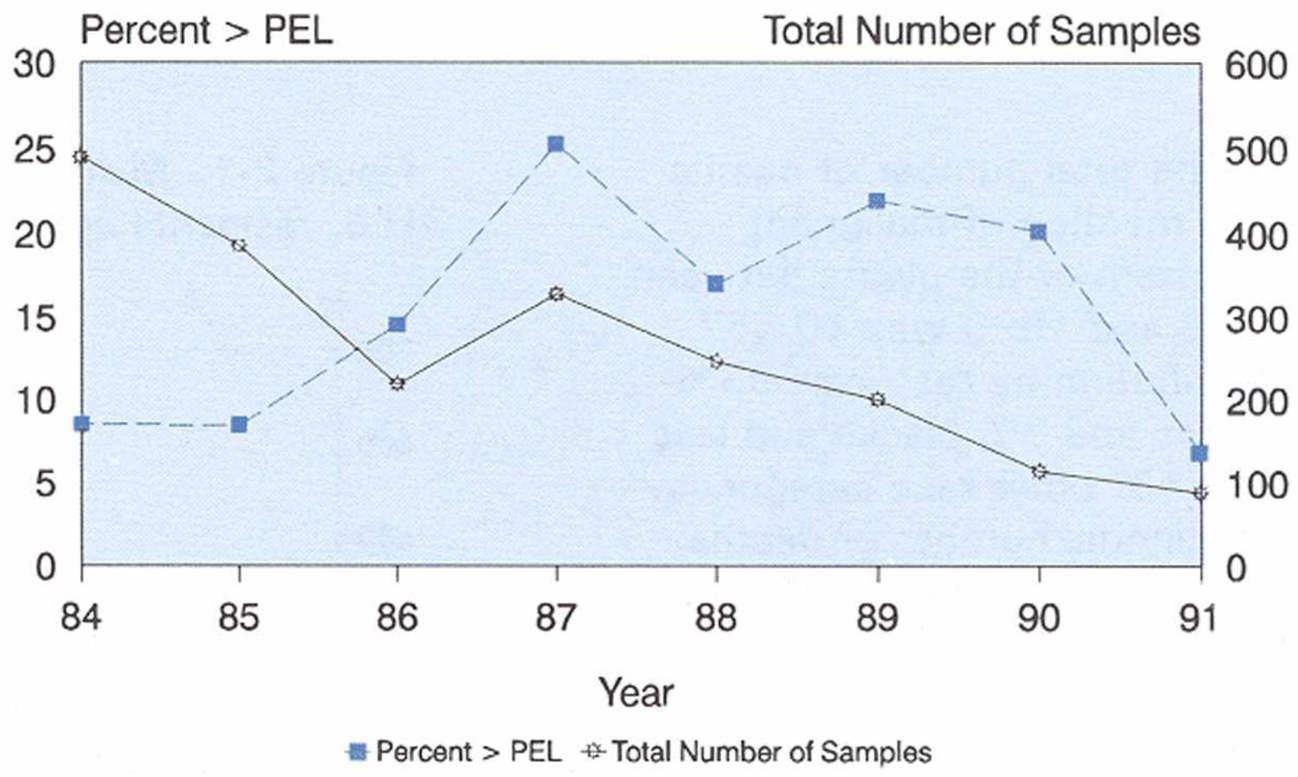


Table 1-14. Asbestos: number of samples collected by OSHA inspectors and percent exceeding various levels, U.S. general industry, 1984-1991

Year	Total number of samples	Samples > PEL	Percent of samples > PEL	Samples > 2x PEL	Percent of samples > 2x PEL	Complaint inspection samples	
						Number	% of total
1984	490	42	8.57	8	1.63	132	26.94
1985	386	33	8.55	8	2.07	111	28.76
1986	219	32	14.61	22	10.05	108	49.32
1987	328	83	25.30	51	15.55	196	59.76
1988	246	42	17.07	26	10.57	107	43.50
1989	200	44	22.00	30	15.00	102	51.00
1990	114	23	20.18	17	14.91	59	51.75
1991	88	6	6.82	4	4.55	52	59.09

NOTE: The PEL is 2 fibers/cc before June 20, 1986 and 0.2 fibers/cc after June 20, 1986. These data include corrections to previously published tabulations.

SOURCE: Occupational Safety and Health Administration (OSHA) Integrated Management Information System (IMIS) data files.

MALIGNANT NEOPLASM OF THE PLEURA

Mortality

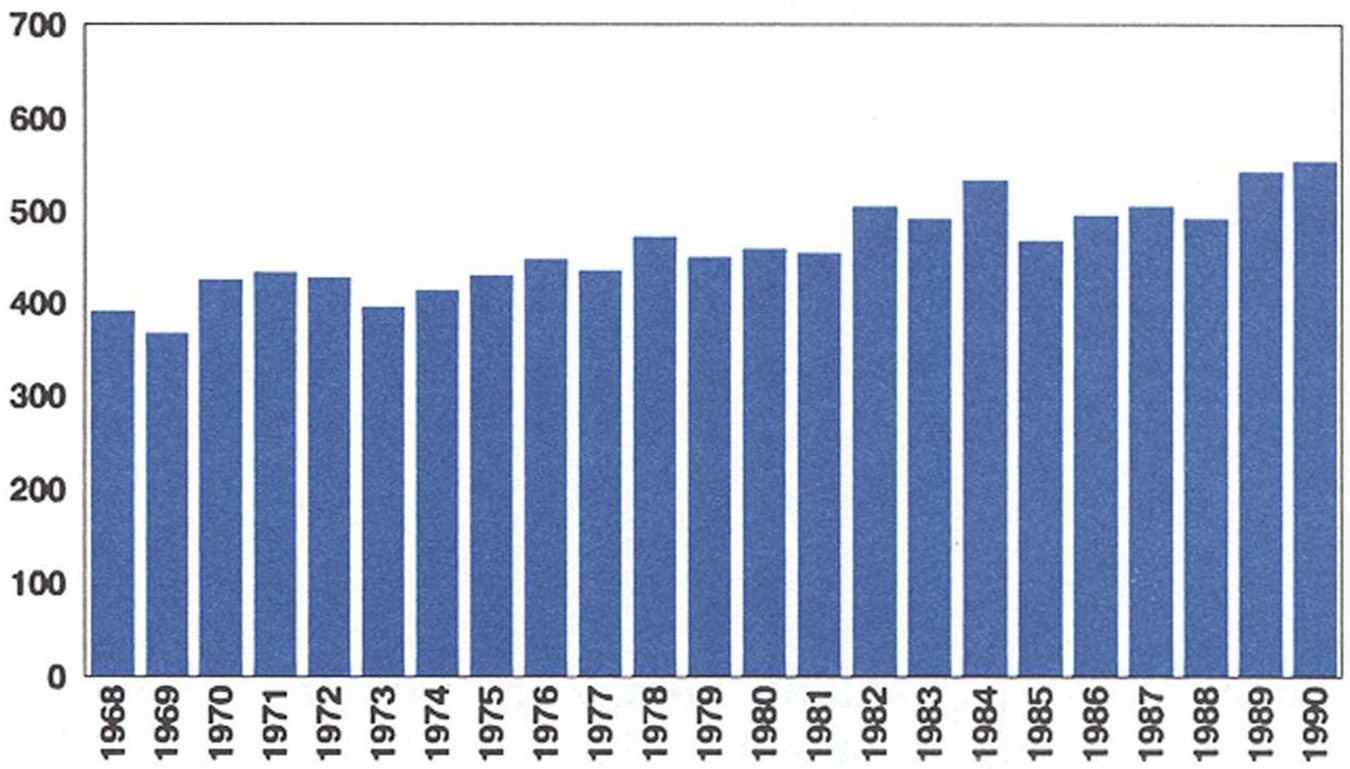
Malignant neoplasm of the pleura includes ICD-8 code 163.0 (malignant neoplasm of parietal pleura) for 1968-1978 and ICD-9 codes 163.0 (malignant neoplasm of parietal pleura), 163.1 (malignant neoplasm of visceral pleura) and 163.9 (malignant neoplasm of pleura, unspecified) for 1979-1990. [NOTE: These codes are not specific for malignant mesothelioma.]

- The total number of deaths with mention of malignant neoplasm of the pleura between 1968 and 1990 was 10,557. Distribution by race was 93% whites and 7% blacks and less than 1% other race categories. The annual number of deaths increased from 390 in 1968 to 553 in 1990.

- See Tables 2-3, 2-4, and 2-5 for data.

- See Appendix A for information about multiple cause of death data.

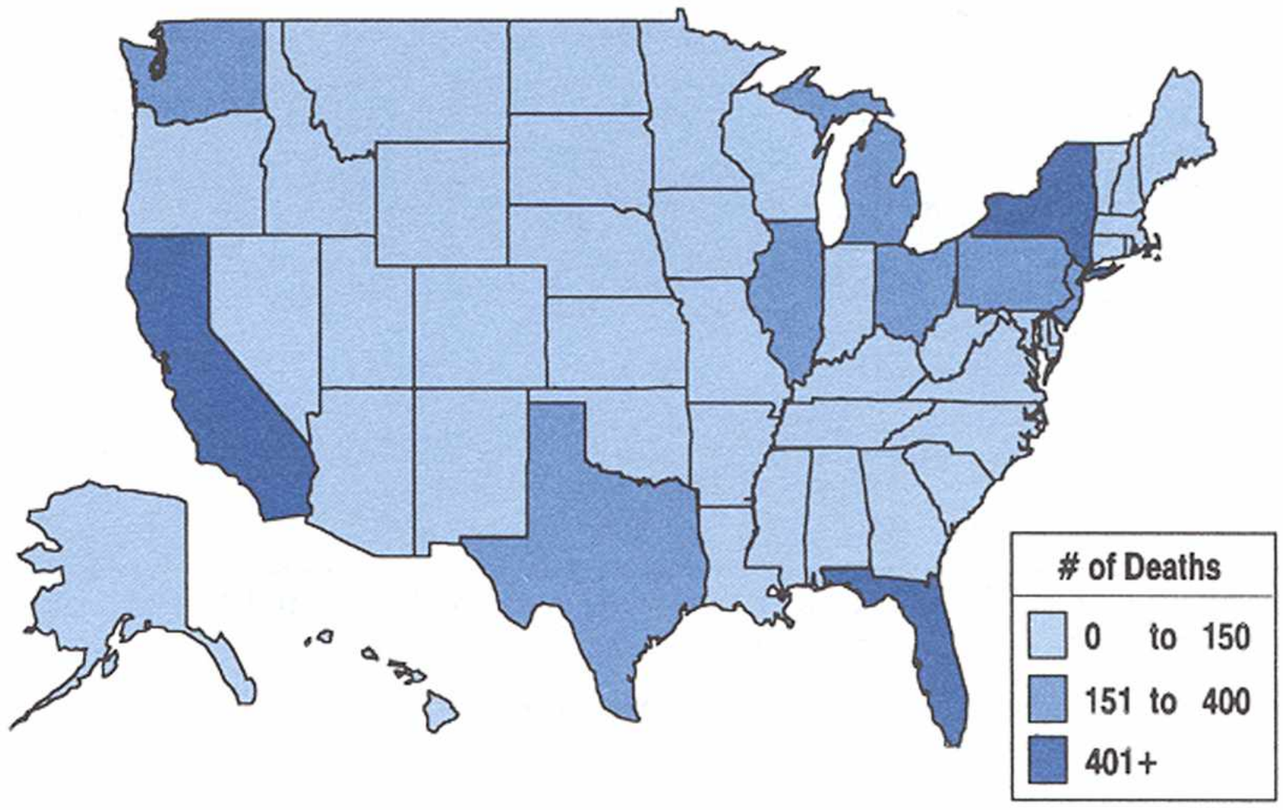
Figure 2-1. Malignant neoplasm of the pleura: number of deaths, U.S. residents age 15 and over, 1968-1990



- The states with the highest numbers of deaths with malignant neoplasm of the pleura are all coastal or Great Lakes states. New York had the highest number of deaths during this time period (n = 575).

- See Table 2-5 for data.

Figure 2-2. Malignant neoplasm of the pleura: number of deaths, U.S. residents age 15 and over, by state, 1979-1990

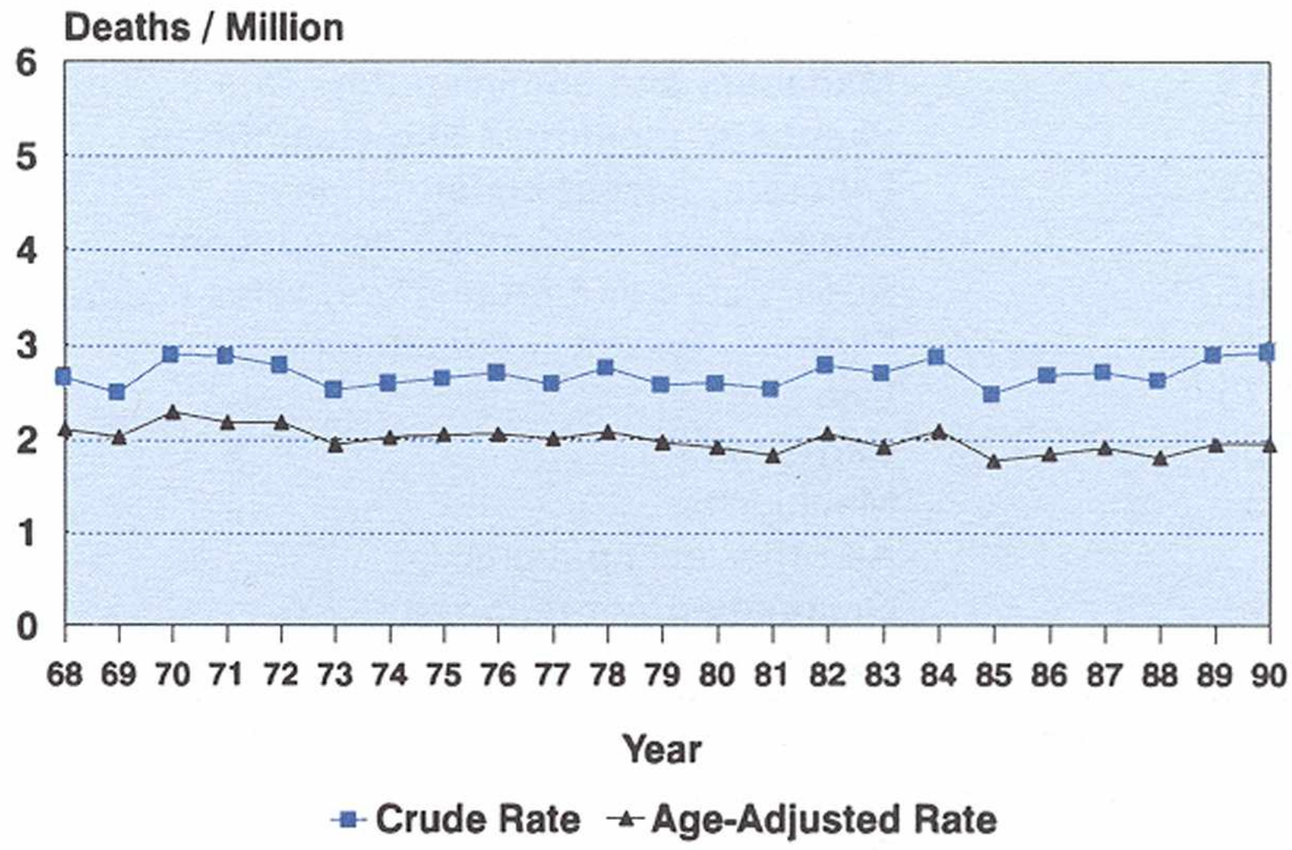


- The crude and age-adjusted mortality rates have been relatively stable over this time period. Crude rates have ranged from approximately 2.5 to 3 per million, while the age-adjusted rates have been approximately 2 per million.

- See Tables 2-6 and 2-7 for data.

- See Appendix B for methods.

Figure 2-3. Malignant neoplasm of the pleura: crude and age-adjusted mortality rates, U.S. residents age 15 and over, 1968-1990



- There is no clear geographic pattern for crude mortality rates by state. The state with the highest crude mortality rate for this time period was Washington.

- See Table 2-10 for data.

Figure 2-4. Malignant neoplasm of the pleura: crude mortality rates, U.S. residents age 15 and over, by state, 1989-1990

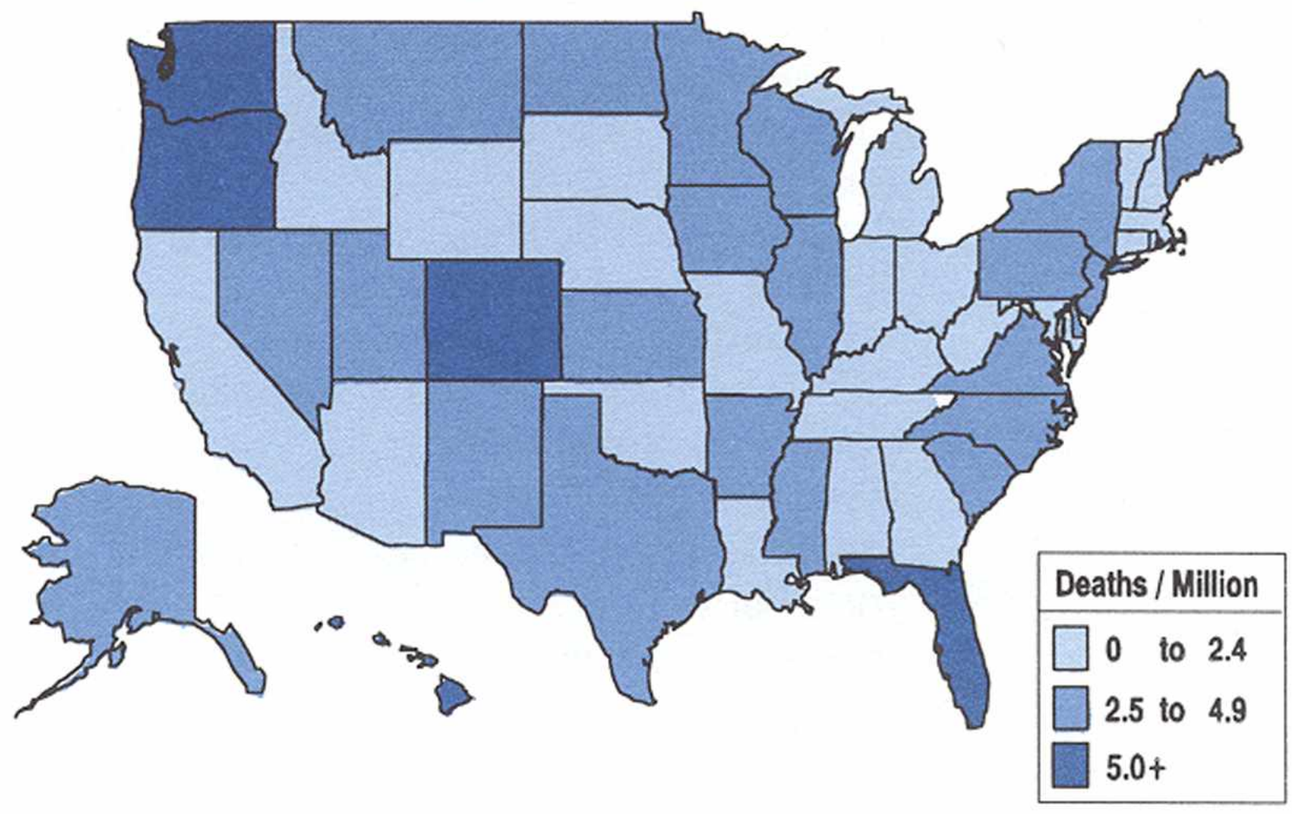


Table 2-1. Malignant neoplasm of the pleura: most frequently recorded occupations on death certificate, U.S. residents age 15 and over, selected states and years, 1985-1990

COC	Occupation	Number	Percent
914	Homemaker	84	10.4
019	Managers and administrators, n.e.c.	54	6.7
585	Plumbers, pipefitters and steamfitters	28	3.5
889	Laborers, except construction	26	3.2
633	Supervisors, production occupations	24	3.0
243	Supervisors and proprietors, sales occupations	22	2.7
473	Farmers, except horticultural	20	2.5
575	Electricians	20	2.5
567	Carpenters	18	2.2
637	Machinists	15	1.9
	All other occupations	468	58.0
	Occupation not reported	28	3.5
	TOTAL	**807**	**100.0**

COC - 1980 Census Occupation Code n.e.c. - not elsewhere classified

NOTE: See Appendix C for list of 25 states reporting usual occupation and years reporting. Percentages may not total to 100% due to rounding.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.

Table 2-2. Malignant neoplasm of the pleura: most frequently recorded industries on death certificate, U.S. residents age 15 and over, selected states and years, 1985-1990

CIC	Industry	Number	Percent
060	Construction	107	13.3
961	Homemaker, student, unemployed, volunteer	89	11.0
400	Railroads	24	3.0
360	Ship and boat building and repairing	22	2.7
901	General government, n.e.c.	18	2.2
010	Agricultural production, crops	17	2.1
842	Elementary and secondary schools	17	2.1
142	Yarn, thread and fabric mills	15	1.9
831	Hospitals	14	1.7
192	Industrial and miscellaneous chemicals	13	1.6
	All other industries	441	54.6
	Industry not reported	30	3.7
	TOTAL	**807**	**100.0**

CIC - 1980 Census Industry Code n.e.c. - not elsewhere classified

NOTE: See Appendix C for list of 25 states reporting usual industry and years reporting. Percentages may not total to 100% due to rounding.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.

Table 2-3. Malignant neoplasm of the pleura: number of deaths, U.S. residents age 15 and over, by age, race, and sex, 1968-1990

Years		1968-1978		1979-1990		1989-1990	
Total Deaths		4,622	%	5,935	%	1,095	%
Sex	Male	3,066	66.3	4,407	74.3	837	76.4
	Female	1,556	33.7	1,528	25.7	258	23.6
Race	White	4,260	92.2	5,546	93.4	1,023	93.4
	Black	347	7.5	350	5.9	64	5.8
	Other	15	0.3	39	0.7	8	0.7
Race/Sex	White Male	2,836	61.4	4,144	69.8	789	72.1
	White Female	1,424	30.8	1,402	23.6	234	21.4
	Black Male	221	4.8	232	3.9	42	3.8
	Black Female	126	2.7	118	2.0	22	2.0
	Other Male	9	0.2	31	0.5	6	0.5
	Other Female	6	0.1	8	0.1	2	0.2
Age	Years						
	15-24	21	0.5	5	0.1	1	0.1
	25-34	57	1.2	48	0.8	9	0.8
	35-44	181	3.9	142	2.4	22	2.0
	45-54	552	11.9	416	7.0	67	6.1
	55-64	1,194	25.8	1,291	21.8	187	17.1
	65-74	1,451	31.4	2,011	33.9	407	37.2
	75-84	913	19.8	1,576	26.6	319	29.1
	85 and Over	253	5.5	446	7.5	83	7.6
	Mean	65.7		69.0		70.2	
	Range	15-101		22-102		22-98	

NOTE: See Appendix B for methods. Percentages may not total to 100% due to rounding.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.

Table 2-4. Malignant neoplasm of the pleura: number of deaths, U.S. residents age 15 and over, by state, 1968-1978

State	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	TOTAL
Alabama	1	2	2	4	2	3	6	3	2	1	2	28
Alaska	-	-	-	-	-	-	-	-	-	1	-	1
Arizona	2	2	4	3	-	1	3	3	-	2	6	26
Arkansas	3	1	1	1	2	-	3	4	1	7	1	24
California	33	38	39	45	52	41	59	44	38	34	55	478
Colorado	3	4	6	1	6	5	4	5	1	9	4	48
Connecticut	5	5	8	5	6	1	2	5	8	4	4	53
Delaware	1	3	1	-	2	2	-	1	1	-	1	12
District of Columbia	3	3	2	3	6	1	2	1	1	1	-	23
Florida	11	15	16	14	14	12	17	19	29	25	360	208
Georgia	5	10	6	5	8	5	5	4	7	7	6	68
Hawaii	-	-	-	-	-	-	-	1	1	1	-	3
Idaho	3	1	1	-	-	1	2	2	1	1	-	12
Illinois	33	32	38	31	16	30	31	34	39	35	36	355
Indiana	6	10	7	8	10	8	7	9	9	6	8	88
Iowa	8	6	7	6	8	4	6	3	7	8	7	70
Kansas	3	4	7	5	14	1	1	3	1	4	8	51
Kentucky	6	3	7	9	6	8	7	6	6	5	5	68
Louisiana	8	4	8	6	4	7	5	1	5	2	6	56
Maine	2	1	3	3	2	2	2	4	2	5	4	30
Maryland	11	10	6	11	4	6	8	6	6	6	4	78
Massachusetts	10	9	11	15	10	13	12	7	16	22	8	133
Michigan	16	18	8	15	16	21	13	15	11	19	20	172
Minnesota	4	10	7	5	4	6	9	10	5	5	13	78
Mississippi	3	3	1	2	2	4	2	5	4	7	3	36
Missouri	6	8	7	6	6	13	9	5	14	6	13	93
Montana	-	1	-	2	-	-	3	3	-	2	4	15
Nebraska	3	2	2	4	-	3	1	2	4	4	2	27
Nevada	1	2	-	2	-	-	-	-	-	-	-	5
New Hampshire	1	1	2	1	-	-	1	2	1	2	1	12
New Jersey	23	19	34	22	22	23	25	34	22	19	21	264
New Mexico	1	-	2	1	2	-	1	4	2	1	-	14
New York	44	37	56	62	72	54	46	52	62	49	42	576
North Carolina	4	11	8	7	6	7	9	6	10	6	8	82
North Dakota	5	2	-	-	-	2	1	1	1	2	-	14
Ohio	22	14	20	27	24	21	15	23	19	26	24	235
Oklahoma	5	2	3	6	6	2	4	7	6	1	5	47
Oregon	4	3	6	2	2	3	3	3	7	9	8	50
Pennsylvania	30	28	26	23	24	30	28	36	29	25	30	309
Rhode Island	2	2	2	3	2	-	1	-	4	6	5	27
South Carolina	3	2	-	4	2	2	1	5	2	3	4	28
South Dakota	1	-	1	-	-	1	1	1	1	1	2	9
Tennessee	8	5	9	11	6	2	4	2	5	11	7	70
Texas	8	4	14	19	10	18	13	12	10	17	19	144
Utah	2	1	-	2	2	3	1	-	2	1	3	17
Vermont	1	-	1	1	-	1	-	3	1	-	1	9
Virginia	13	12	12	8	20	10	7	8	7	6	7	110
Washington	11	4	10	10	10	8	17	11	9	9	15	114
West Virginia	1	3	5	6	-	3	4	5	7	2	2	38
Wisconsin	8	8	8	4	14	6	9	6	18	9	10	100
Wyoming	3	1	-	1	2	-	2	2	2	-	1	14
TOTAL	**390**	**366**	**424**	**431**	**426**	**394**	**412**	**428**	**446**	**434**	**471**	**4,622**

NOTE: See Appendix B for methods.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.

- indicates quantity zero.

Table 2-5. Malignant neoplasm of the pleura: number of deaths, U.S. residents age 15 and over, by state, 1979-1990

State	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	TOTAL
Alabama	4	9	10	2	3	13	10	8	8	6	4	4	81
Alaska	-	-	-	-	2	-	-	-	-	-	2	-	4
Arizona	8	6	-	7	8	5	5	10	7	6	7	2	71
Arkansas	2	2	4	4	-	1	3	2	6	6	6	6	42
California	51	38	46	47	42	41	50	45	48	43	42	47	540
Colorado	4	6	5	4	2	5	5	8	7	8	19	9	82
Connecticut	6	5	7	7	8	6	7	5	5	5	3	6	70
Delaware	1	1	1	1	3	5	1	3	1	-	2	2	21
District of Columbia	2	3	-	-	-	2	-	2	1	-	2	1	13
Florida	36	31	33	47	39	57	36	30	58	55	53	59	534
Georgia	5	1	10	10	2	4	8	7	4	5	2	9	67
Hawaii	2	-	1	2	-	-	-	3	2	1	3	-	14
Idaho	-	-	-	-	-	3	2	2	3	1	-	1	12
Illinois	34	32	30	28	33	29	26	26	21	30	22	23	334
Indiana	7	8	20	2	5	5	5	10	11	8	8	11	100
Iowa	4	8	11	11	15	12	7	8	10	6	10	9	111
Kansas	3	5	2	6	6	10	3	3	7	10	7	4	66
Kentucky	3	8	-	10	3	9	9	4	5	10	7	4	72
Louisiana	5	7	12	3	8	6	3	3	4	2	8	4	65
Maine	4	4	2	3	4	4	-	3	3	5	4	2	38
Maryland	4	3	9	6	6	6	12	15	5	4	11	6	87
Massachusetts	9	10	10	18	7	18	12	11	6	10	11	12	134
Michigan	9	13	17	11	24	16	13	21	17	20	16	14	191
Minnesota	5	9	7	7	11	7	4	6	9	15	11	13	104
Mississippi	2	2	4	4	1	8	4	6	2	6	8	4	51
Missouri	7	6	10	8	6	6	4	6	8	5	5	10	81
Montana	1	3	1	2	5	4	3	2	2	3	3	2	31
Nebraska	1	3	1	2	2	2	2	2	2	2	2	2	23
Nevada	-	1	-	-	2	1	-	1	-	-	2	4	11
New Hampshire	-	-	1	3	3	4	3	3	-	1	1	1	20
New Jersey	31	38	34	41	49	44	28	20	17	22	19	21	364
New Mexico	2	1	3	1	1	2	2	2	1	2	2	4	23
New York	52	37	50	48	38	52	45	45	65	45	48	50	575
North Carolina	6	13	7	5	6	4	10	8	20	19	19	22	139
North Dakota	-	2	-	-	2	3	3	3	1	-	2	2	18
Ohio	20	19	12	26	18	26	17	19	19	12	21	15	224
Oklahoma	2	7	-	4	1	6	5	7	3	6	3	6	50
Oregon	9	6	4	6	9	4	7	18	9	18	13	19	122
Pennsylvania	33	30	27	26	28	19	29	30	31	19	26	19	317
Rhode Island	1	1	3	2	3	2	1	6	3	2	1	-	25
South Carolina	2	6	8	11	7	6	8	9	7	10	5	15	94
South Dakota	1	1	3	1	-	2	4	-	1	-	-	1	14
Tennessee	13	5	6	12	11	8	11	12	9	9	10	7	113
Texas	15	21	12	14	20	12	11	15	11	10	23	48	212
Utah	2	-	2	-	2	4	2	3	2	1	3	3	24
Vermont	1	-	2	-	-	1	-	1	-	2	1	-	8
Virginia	7	7	4	10	10	10	13	5	10	8	17	8	109
Washington	18	19	8	25	21	20	22	22	24	15	32	31	257
West Virginia	5	5	6	6	4	6	3	1	2	6	4	2	50
Wisconsin	9	14	7	10	10	11	9	12	7	12	12	9	122
Wyoming	-	1	1	1	-	1	-	1	-	-	-	-	5
TOTAL	**448**	**457**	**453**	**504**	**490**	**532**	**467**	**494**	**504**	**491**	**542**	**553**	**5,935**

NOTE: See Appendix B for methods.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.

- indicates quantity zero.

Table 2-6. Malignant neoplasm of the pleura: crude mortality rates (per 1,000,000 population), U.S. residents age 15 and over, by race and sex, 1968-1990

		White		Black	
Year	Overall rate	Males	Females	Males	Females
1968	2.67	3.51	2.00	3.00	1.48
1969	2.51	3.36	1.99	1.83	0.91
1970	2.90	4.25	1.88	2.87	1.25
1971	2.89	4.43	1.75	2.39	1.10
1972	2.80	4.05	1.57	4.37	1.91
1973	2.54	3.42	1.91	2.35	1.03
1974	2.60	3.78	1.77	1.82	1.29
1975	2.66	3.79	1.85	2.32	1.15
1976	2.72	3.90	1.91	2.68	0.65
1977	2.60	4.09	1.54	1.46	0.99
1978	2.77	4.31	1.79	1.11	1.13
1979	2.59	4.21	1.45	1.57	0.76
1980	2.60	4.20	1.44	1.70	1.22
1981	2.54	4.30	1.23	2.20	0.64
1982	2.80	4.21	1.98	1.70	0.39
1983	2.71	4.81	1.32	1.05	0.77
1984	2.88	4.67	1.56	2.11	0.95
1985	2.49	4.28	1.22	1.26	0.80
1986	2.69	4.32	1.43	2.24	0.87
1987	2.72	4.69	1.22	1.80	0.86
1988	2.63	4.32	1.38	2.07	0.42
1989	2.90	4.75	1.43	2.15	1.26
1990	2.93	5.12	1.30	1.92	0.58

NOTE: See Appendix B for methods.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.
U.S. Bureau of the Census: 1970-1990 population estimates of the U.S.

Table 2-7. Malignant neoplasm of the pleura: age-adjusted mortality rates (per 1,000,000 population), U.S. residents age 15 and over, by race and sex, 1968-1990

		White		Black	
Year	Overall rate	Males	Females	Males	Females
1968	2.10	2.90	1.44	3.06	1.23
1969	2.02	2.80	1.52	1.80	0.87
1970	2.29	3.49	1.34	2.92	1.23
1971	2.18	3.57	1.14	2.32	1.00
1972	2.18	3.32	1.04	4.49	1.88
1973	1.94	2.73	1.37	2.50	0.93
1974	2.02	3.10	1.21	1.96	1.24
1975	2.05	3.11	1.26	2.48	1.03
1976	2.05	3.17	1.24	2.78	0.64
1977	2.00	3.35	1.03	1.59	1.05
1978	2.08	3.50	1.14	1.32	0.97
1979	1.96	3.45	0.94	1.69	0.65
1980	1.91	3.37	0.84	1.91	1.05
1981	1.83	3.36	0.70	2.45	0.48
1982	2.06	3.36	1.20	1.96	0.38
1983	1.92	3.68	0.83	1.08	0.69
1984	2.09	3.61	0.97	2.36	0.87
1985	1.77	3.33	0.74	1.34	0.74
1986	1.85	3.21	0.84	2.35	0.70
1987	1.91	3.57	0.70	1.85	0.73
1988	1.81	3.19	0.82	2.10	0.46
1989	1.96	3.43	0.87	2.13	1.00
1990	1.95	3.68	0.73	1.93	0.40

NOTE: See Appendix B for methods.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.
U.S. Bureau of the Census: 1970-1990 population estimates of the U.S.

Table 2-8. Malignant neoplasm of the pleura: years of potential life lost to age 65, U.S. residents age 15 and over, by race and sex, 1968-1990

		White		Black	
Year	Total	Males	Females	Males	Females
1968	2,130	1,205	685	175	20
1969	2,220	1,205	865	115	35
1970	2,405	1,440	680	170	115
1971	1,720	1,180	435	75	25
1972	2,220	1,370	340	300	210
1973	1,980	820	895	230	35
1974	1,960	1,075	590	155	135
1975	1,940	1,070	635	200	35
1976	1,745	1,010	475	185	50
1977	1,720	1,120	385	85	115
1978	1,675	1,065	470	110	30
1979	1,725	1,200	435	65	15
1980	1,655	1,150	260	155	75
1981	1,530	1,025	205	245	5
1982	1,950	1,320	470	130	10
1983	1,335	965	305	40	25
1984	1,630	1,030	360	170	25
1985	1,340	895	335	45	40
1986	1,385	900	310	125	35
1987	1,515	1,015	310	95	80
1988	1,235	770	345	90	30
1989	1,470	825	445	100	100
1990	1,380	955	230	135	45

NOTE: See Appendix B for methods.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.

Table 2-9. Malignant neoplasm of the pleura: years of potential life lost to life expectancy, U.S. residents age 15 and over, by race and sex, 1968-1990

		White		Black	
Year	Total	Males	Females	Males	Females
1968	6,229	3,184	2,267	357	163
1969	6,191	3,114	2,543	237	137
1970	7,061	3,872	2,237	366	256
1971	6,433	3,808	1,830	252	152
1972	6,808	3,702	1,679	599	419
1973	6,217	2,861	2,551	394	160
1974	6,577	3,492	2,172	288	290
1975	6,943	3,618	2,374	386	199
1976	6,928	3,668	2,273	423	141
1977	6,979	4,017	1,970	225	265
1978	7,219	4,131	2,250	208	207
1979	7,203	4,356	1,917	225	132
1980	6,965	4,212	1,668	305	250
1981	6,786	4,192	1,404	450	85
1982	8,017	4,565	2,513	306	83
1983	7,154	4,615	1,685	153	158
1984	8,033	4,690	2,051	411	197
1985	6,854	4,263	1,646	194	184
1986	7,210	4,342	1,815	330	151
1987	7,572	4,931	1,559	247	197
1988	7,079	4,320	1,822	292	103
1989	7,997	4,806	2,030	306	264
1990	7,964	5,218	1,655	303	115

NOTE: See Appendix B for methods.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.

- indicates no deaths listed.

Mortality

Table 2-10. Malignant neoplasm of the pleura: number of deaths, crude and age-adjusted mortality rates (per 1,000,000 population), total years of potential life lost (YPLL) , U.S. residents age 15 and over, by state, 1989-1990

State	Deaths	Rank	Crude mortality		Age-adjusted mortality		YPLL to age 65		YPLL to life expectancy	
			Rate	Rank	Rate	Rank	Years	Rank	Years	Rank
Alabama	8	33	1.30	44	0.76	46	10	36	98	34
Alaska	2	45	3.03	19	4.67	3	25	27	46	43
Arizona	9	30	1.71	42	1.18	42	15	35	140	29
Arkansas	12	24	3.34	14	1.94	23	35	25	180	26
California	89	3	2.11	36	1.53	31	235	2	1,285	3
Colorado	28	13	5.59	3	4.71	2	65	18	397	14
Connecticut	9	30	1.73	41	0.87	43	5	40	100	33
Delaware	4	40	3.84	10	2.79	11	50	22	91	37
District of Columbia	3	43	2.91	22	1.75	27	0	43	30	45
Florida	112	1	5.40	4	2.52	13	140	5	1,463	2
Georgia	11	27	1.11	47	0.80	45	5	40	132	30
Hawaii	3	43	5.30	5	4.43	5	0	43	30	45
Idaho	1	47	0.69	49	0.46	47	0	43	14	47
Illinois	45	6	2.59	27	1.74	28	65	18	621	8
Indiana	19	19	2.24	31	1.48	33	25	27	254	20
Iowa	19	19	4.43	6	2.40	14	35	25	244	21
Kansas	11	27	2.92	21	1.88	25	40	23	162	27
Kentucky	11	27	1.94	38	1.35	38	25	27	159	28
Louisiana	12	24	1.92	39	1.62	29	60	20	214	23
Maine	6	34	3.16	17	1.96	22	5	40	79	39
Maryland	17	21	2.32	30	1.56	30	20	31	213	24
Massachusetts	23	16	2.42	28	1.41	35	40	23	289	19
Michigan	30	12	2.12	35	1.49	32	80	13	444	12
Minnesota	24	15	3.63	12	3.16	8	130	7	446	11
Mississippi	12	24	3.16	17	2.37	15	85	12	234	22
Missouri	15	23	1.89	40	1.21	41	20	31	212	25
Montana	5	39	4.31	7	3.29	7	10	36	78	41
Nebraska	4	40	1.67	43	0.86	44	0	43	44	44
Nevada	6	34	3.29	16	2.57	12	10	36	92	35
New Hampshire	2	45	1.16	45	1.30	39	20	31	50	42
New Jersey	40	9	3.34	14	2.08	20	135	6	615	9
New Mexico	6	34	2.97	20	2.15	18	0	43	83	38
New York	98	2	3.54	13	2.35	16	320	1	1,482	1
North Carolina	41	8	3.99	9	2.96	9	160	4	669	7
North Dakota	4	40	4.25	8	4.18	6	25	27	79	39
Ohio	36	10	2.15	33	1.37	36	80	13	504	10
Oklahoma	9	30	1.99	37	1.25	40	10	36	116	32
Oregon	32	11	7.43	2	4.45	4	80	13	437	13
Pennsylvania	45	6	2.39	29	1.47	34	100	9	671	6
Rhode Island	1	47	0.64	50	0.38	48	0	43	14	47
South Carolina	20	18	3.73	11	2.80	10	100	9	338	16
South Dakota	1	47	1.01	48	0.15	50	0	43	6	49
Tennessee	17	21	2.24	31	1.82	26	90	11	316	18
Texas	71	4	2.82	23	2.09	19	165	3	983	4
Utah	6	34	2.65	25	2.29	17	20	31	92	35
Vermont	1	47	1.15	46	0.24	49	0	43	6	49
Virginia	25	14	2.65	25	2.06	21	70	16	368	15
Washington	63	5	8.79	1	6.08	1	110	8	896	5
West Virginia	6	34	2.14	34	1.37	36	60	20	124	31
Wisconsin	21	17	2.81	24	1.89	24	70	16	320	17
Wyoming	-	51	-	51	-	51	-	51	-	51

NOTE: See Appendix B for methods.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.
U.S. Bureau of the Census: 1989-1990 population estimates of the U.S.

- indicates no deaths listed.

Table 2-11. Malignant neoplasm of the pleura: proportionate mortality ratios (PMR), based on underlying cause of death, by usual occupation for selected states, 1985-1990

COC	Occupation	Number of deaths	PMR	95% confidence interval LCL	UCL
593	Insulation workers	4	22.63	6.17	57.88
556	Supervisors; painters, paperhangers, plasterers	5	13.94	4.51	32.57
256	Advertising and related sales occupations	3	11.54	2.38	33.74
048	Chemical engineers	4	10.60	2.89	27.11
653	Sheet metal workers	11	9.81	4.90	17.55
585	Plumbers, pipefitters and steamfitters	26	7.92	5.18	11.61
363	Production coordinators	3	6.84	1.41	20.00
766	Furnace, kiln, and oven operators, except food	6	5.71	2.09	12.44
213	Electrical and electronic technicians	3	5.09	1.05	14.88
575	Electricians	18	4.82	2.85	7.61
055	Electrical and electronic engineers	6	4.20	1.54	9.15
417	Firefighting occupations	3	3.61	0.74	10.56
516	Heavy equipment mechanics	3	3.53	0.73	10.32
503	Supervisors, mechanics and repairers	4	3.41	0.93	8.72
696	Stationary engineers	6	3.36	1.23	7.32
518	Industrial machinery repairers	6	3.33	1.22	7.25
783	Welders and cutters	11	3.23	1.61	5.78
877	Stock handlers and baggers	3	3.17	0.65	9.27
365	Stock and inventory clerks	5	3.03	0.98	7.08
057	Mechanical engineers	3	2.84	0.59	8.30
633	Supervisors, production occupations	22	2.71	1.69	4.11
185	Designers	3	2.60	0.54	7.60
457	Barbers	3	2.37	0.49	6.93
734	Printing machine operators	3	2.05	0.42	5.99
567	Carpenters	18	1.94	1.15	3.06
019	Managers, administrators, n.e.c.	48	1.81	1.32	2.42
579	Painters, construction, and maintenance	6	1.79	0.66	3.90
637	Machinists	12	1.72	0.89	3.00
796	Production inspectors, checkers, examiners	6	1.69	0.62	3.68
563	Brickmasons and stonemasons	3	1.64	0.34	4.80
558	Supervisors; construction, n.e.c.	5	1.62	0.52	3.79
023	Accountants and auditors	5	1.33	0.43	3.11
426	Guards and police, except public service	4	1.32	0.36	3.38
913	Retired; with no other occupation	9	1.19	0.55	2.26
176	Clergy	3	1.16	0.24	3.39

COC - 1980 Census Occupation Code n.e.c. - not elsewhere classified

LCL - lower confidence limit UCL - upper confidence limit

NOTE: See Appendix B for methods and Appendix C for list of selected states.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.

COAL WORKERS' PNEUMOCONIOSIS

Mortality

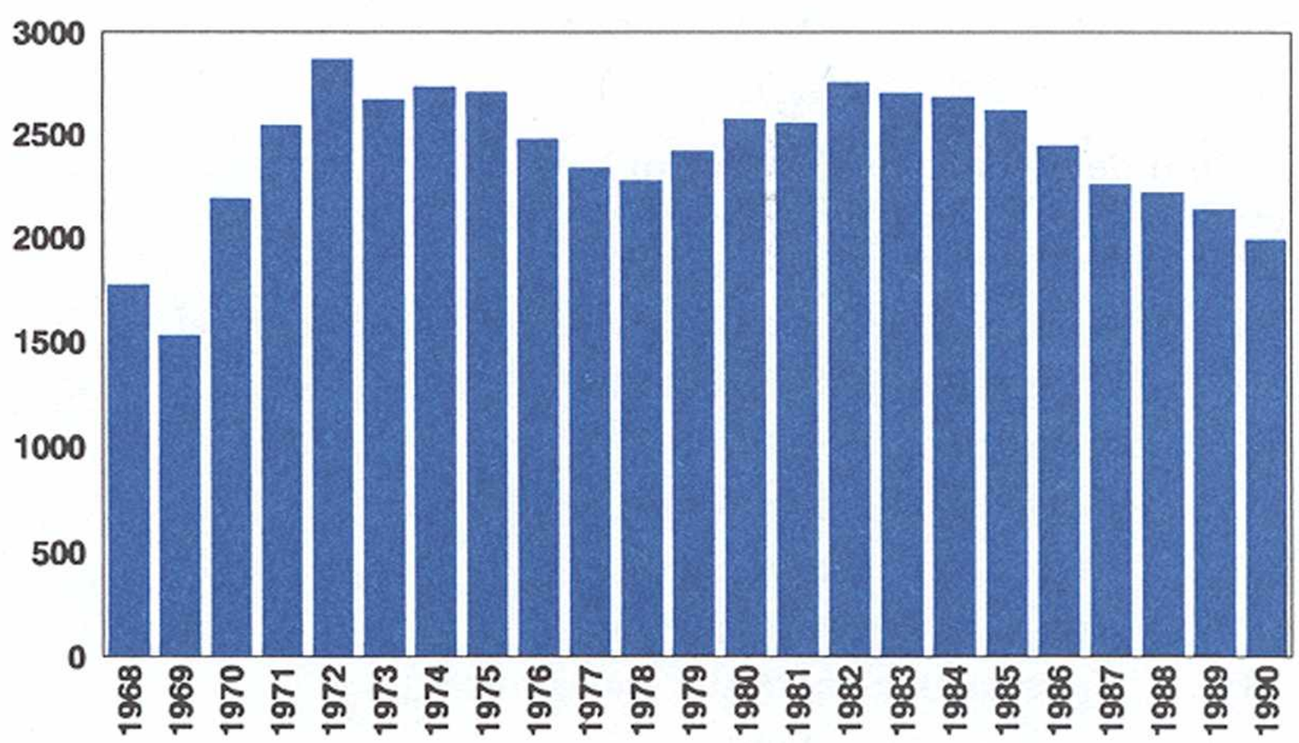
Coal workers' pneumoconiosis includes ICD-8 code 515.1 (anthracosilicosis) for 1968-1978 and ICD-9 code 500 (coal workers' pneumoconiosis) for 1979-1990.

- The total number of deaths with mention of coal workers' pneumoconiosis between 1968 and 1990 was 55,476. Racial distribution was 97% white, 3% black and less than 1% other races. Over 99% of deaths with coal workers' pneumoconiosis occurred in males.

- See Tables 3-3, 3-4 and 3-5 for data.

- See Appendix A for information about multiple cause of death data.

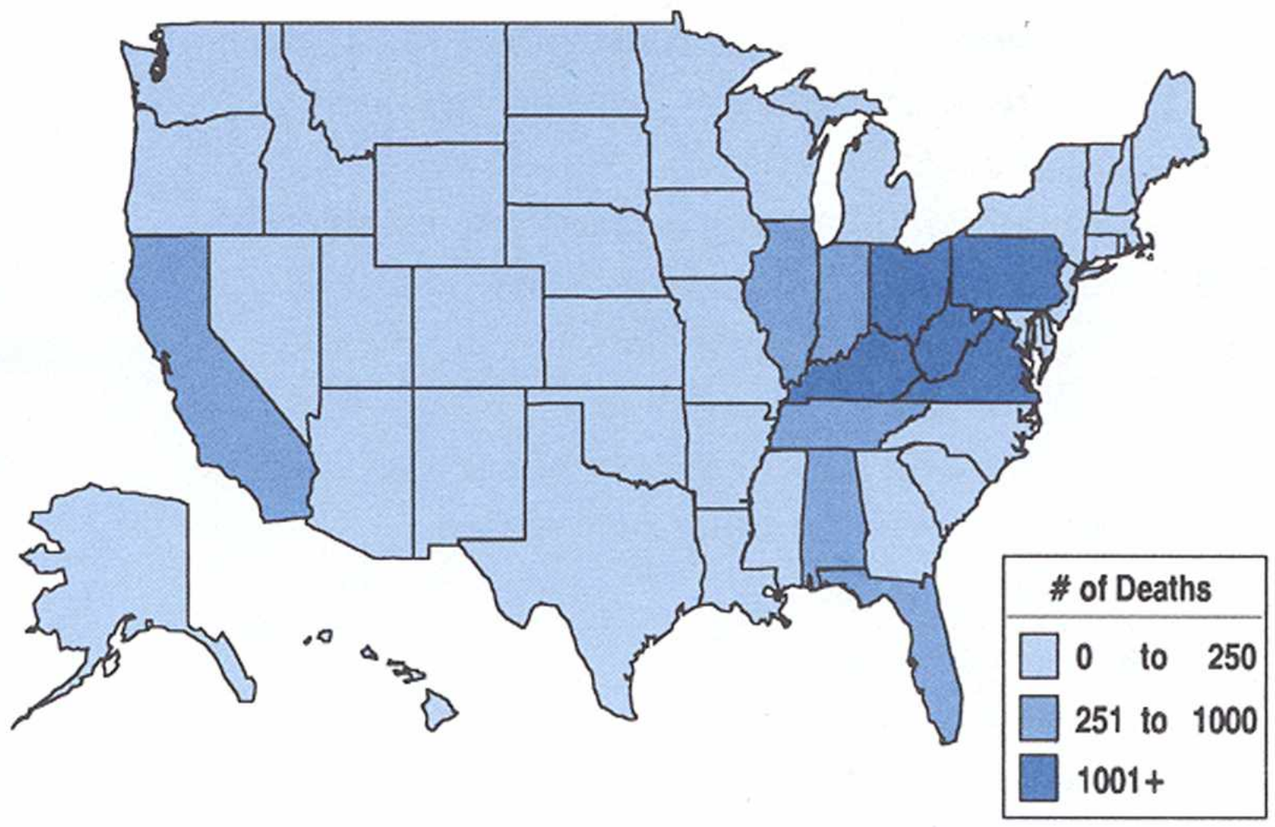
Figure 3-1. Coal workers' pneumoconiosis: number of deaths, U.S. residents age 15 and over, 1968-1990



- Pennsylvania had the highest number of deaths with CWP (n = 16,994). West Virginia ranked second with 3,339 deaths. Together these two states accounted for 69% of deaths with coal workers' pneumoconiosis from 1979-1990.

- See Table 3-5 for data.

Figure 3-2. Coal workers' pneumoconiosis: number of deaths, U.S. residents age 15 and over, by state, 1979-1990

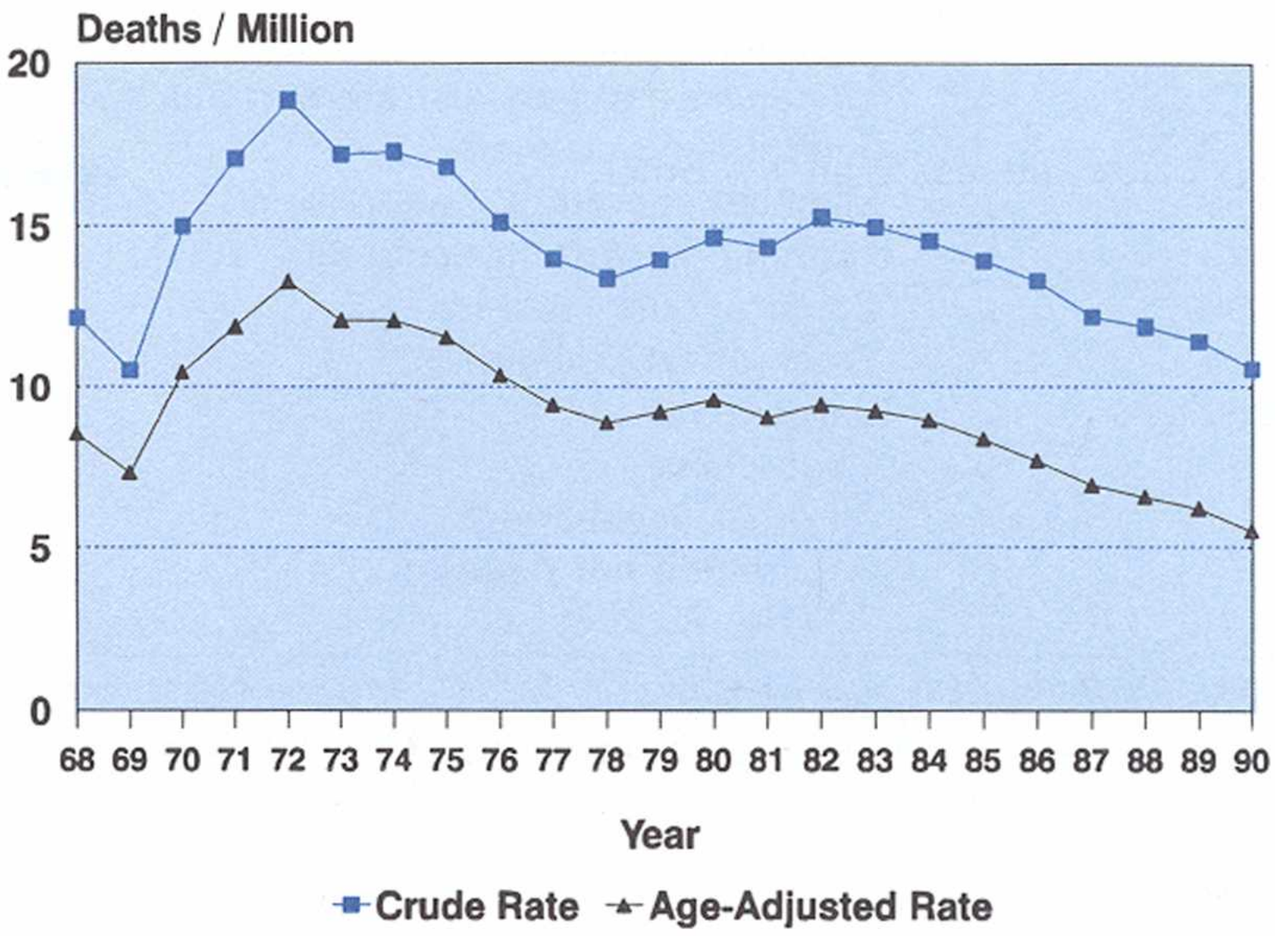


- The maximum crude rate for CWP between 1968 and 1990 occurred in 1972. Between 1972 and 1990, the crude rate decreased 44%. The age-adjusted rates show a parallel pattern decreasing by 58% from 1972 to 1990.

- See Tables 3-6 and 3-7 for data.

- See Appendix B for methods.

Figure 3-3. Coal workers' pneumoconiosis: crude and age-adjusted mortality rates, U.S. residents age 15 and over, 1968-1990



- Among those states with the highest crude mortality rates, West Virginia (218 deaths per million) ranked first and Pennsylvania (112 deaths per million) ranked second, followed by Kentucky (44 deaths per million) and Virginia (29 deaths per million).

- See Table 3-10 for data.

Figure 3-4. Coal workers' pneumoconiosis: crude mortality rates, U.S. residents age 15 and over, by state, 1989-1990

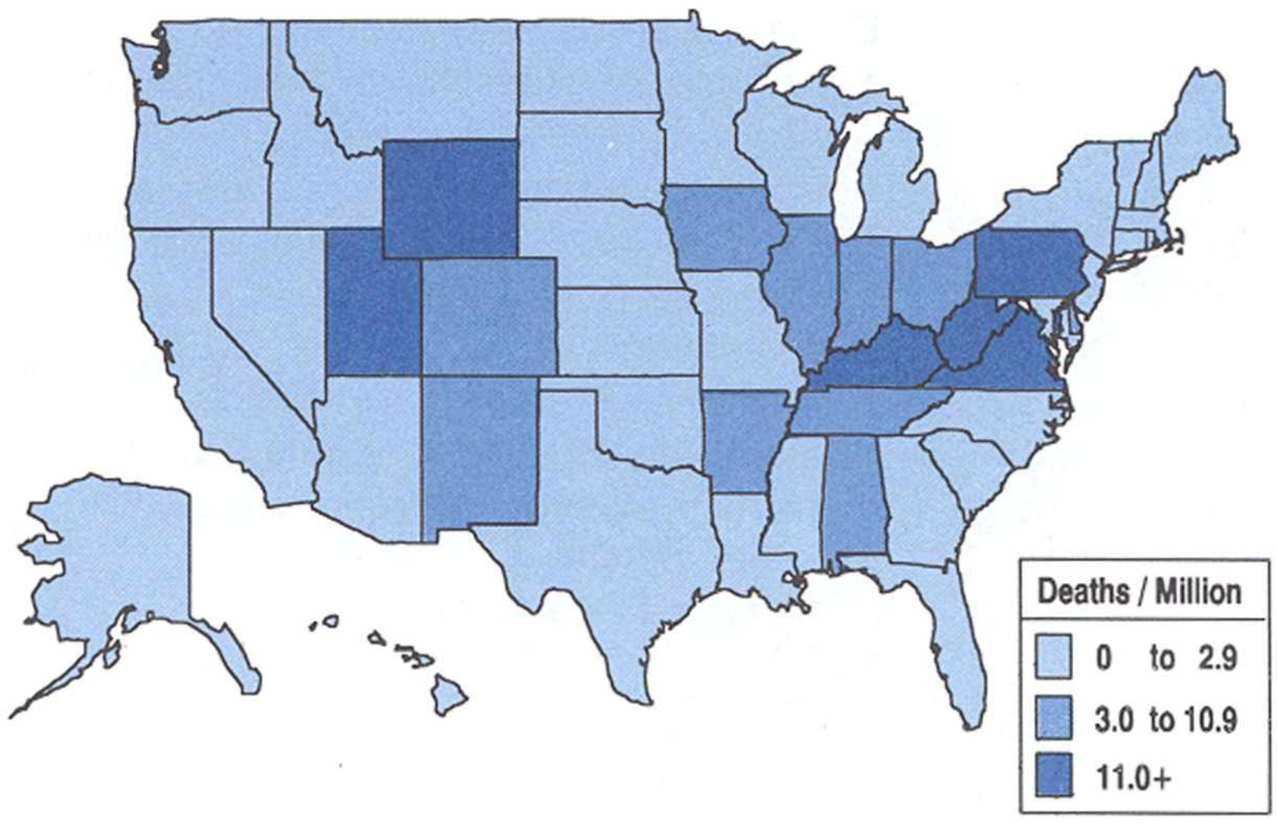


Table 3-1. Coal workers' pneumoconiosis: most frequently recorded occupations on death certificate, U.S. residents age 15 and over, selected states and years, 1985-1990

COC	Occupation	Number	Percent
616	Mining machine operators	2,139	69.0
889	Laborers, except construction	93	3.0
019	Managers and administrators, n.e.c.	41	1.3
453	Janitors and cleaners	36	1.2
779	Machine operators, not specified	36	1.2
473	Farmers, except horticultural	32	1.0
869	Construction, laborers	30	1.0
804	Truck drivers, heavy	29	0.9
567	Carpenters	27	0.9
575	Electricians	25	0.8
	All other occupations	480	15.5
	Occupation not reported	131	4.2
	TOTAL	**3,099**	100.0

COC - 1980 Census Occupation Code n.e.c. - not elsewhere classified

NOTE: See Appendix C for list of 25 states reporting usual occupation and years reporting.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.

Table 3-2. Coal workers' pneumoconiosis: most frequently recorded industries on death certificate, U.S. residents age 15 and over, selected states and years, 1985-1990

CIC	Industry	Number	Percent
041	Coal mining	2,271	73.3
060	Construction	100	3.2
270	Blast furnaces, steelworks, finishing mills	38	1.2
010	Agricultural production, crops	34	1.1
392	Not specified manufacturing industries	33	1.1
351	Motor vehicles and motor vehicle equipment	29	0.9
410	Trucking services	23	0.7
040	Metal mining	21	0.7
842	Elementary and secondary schools	18	0.6
961	Homemaker, student, unemployed, volunteer	18	0.6
331	Machinery, except electrical, n.e.c.	16	0.5
	All other industries	360	11.6
	Industry not reported	138	4.5
	TOTAL	**3,099**	**100.0**

CIC - 1980 Census Industry Code n.e.c. - not elsewhere classified

NOTE: See Appendix C for list of 25 states reporting usual industry and years reporting.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.

Table 3-3. Coal workers' pneumoconiosis: number of deaths, U.S. residents age 15 and over, by age, race, and sex, 1968-1990

Years		1968-1978		1979-1990		1989-1990	
Total Deaths		26,123	%	29,344	%	4,126	%
Sex	Male	25,923	99.2	29,149	99.3	4,102	99.4
	Female	200	0.8	195	0.7	24	0.6
Race	White	25,426	97.3	28,320	96.5	3,972	96.3
	Black	692	2.6	1,004	3.4	146	3.5
	Other	5	0.0	20	0.1	8	0.2
Race/Sex	White Male	25,237	96.6	28,157	95.9	3,952	95.8
	White Female	189	0.7	163	0.6	20	0.5
	Black Male	683	2.6	975	3.3	143	3.5
	Black Female	9	0.0	29	0.1	3	0.1
	Other Male	3	0.0	17	0.1	7	0.2
	Other Female	2	0.0	3	0.0	1	0.0
Age	Years						
	15-24	11	0.0	5	0.0	0	0.0
	25-34	15	0.1	12	0.0	1	0.0
	35-44	108	0.4	60	0.2	11	0.3
	45-54	1,096	4.2	485	1.7	55	1.3
	55-64	5,476	21.0	3,382	11.5	286	6.9
	65-74	9,789	37.5	10,679	36.4	1,284	31.1
	75-84	7,697	29.5	10,997	37.5	1,853	44.9
	85 and Over	1,931	7.4	3,724	12.7	636	15.4
	Mean	70.8		74.3		76.1	
	Range	15-102		21-106		34-104	

NOTE: See Appendix B for methods. Percentages may not total to 100% due to rounding.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.

Table 3-4. Coal workers' pneumoconiosis: number of deaths, U.S. residents age 15 and over, by state, 1968-1978

State	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	TOTAL
Alabama	3	7	2	5	8	6	12	17	22	27	17	126
Alaska	-	1	-	-	-	-	-	-	-	-	-	1
Arizona	2	2	2	2	2	5	4	-	5	2	6	32
Arkansas	-	2	1	2	-	3	-	1	1	3	4	17
California	14	12	18	17	18	20	21	25	24	17	20	206
Colorado	1	2	6	5	12	10	11	14	11	11	11	94
Connecticut	6	4	3	7	10	5	2	4	1	2	2	46
Delaware	3	1	2	2	-	-	2	3	-	2	2	17
District of Columbia	1	-	1	1	2	-	-	1	2	-	-	8
Florida	20	12	10	9	16	9	23	22	24	17	36	198
Georgia	-	-	-	2	-	2	1	2	3	1	1	12
Hawaii	-	-	-	-	-	-	-	1	-	-	-	1
Idaho	-	-	-	-	-	1	-	-	-	-	-	1
Illinois	6	8	24	40	36	33	20	40	33	34	31	305
Indiana	4	3	2	9	6	14	12	14	14	18	8	104
Iowa	-	-	1	1	4	7	3	2	6	7	4	35
Kansas	1	-	-	1	4	5	7	1	2	2	5	28
Kentucky	3	7	34	80	88	72	89	89	97	94	84	737
Louisiana	-	1	1	-	-	-	-	1	1	1	-	5
Maine	-	-	-	-	-	1	-	-	-	-	-	1
Maryland	4	5	6	5	12	6	6	8	3	4	6	65
Massachusetts	1	1	4	-	8	4	1	2	-	1	4	26
Michigan	7	9	17	16	12	10	9	12	22	11	10	135
Minnesota	2	-	-	1	2	1	1	-	-	1	1	9
Mississippi	-	2	-	-	-	-	-	2	2	1	-	7
Missouri	2	1	3	2	2	3	5	2	1	3	1	25
Montana	-	2	-	-	4	1	1	2	2	-	-	12
Nebraska	-	-	2	1	-	-	-	1	-	-	-	4
Nevada	-	-	1	-	-	-	-	1	-	-	2	4
New Hampshire	-	-	-	1	2	1	-	1	-	2	-	7
New Jersey	24	19	23	25	22	15	29	20	18	15	19	229
New Mexico	-	-	1	3	2	3	4	1	4	3	2	23
New York	18	12	17	17	22	9	18	18	17	10	9	167
North Carolina	2	3	3	1	-	4	2	4	4	3	4	30
North Dakota	-	1	-	-	-	-	-	-	-	-	-	1
Ohio	24	16	28	30	28	35	48	56	50	61	41	417
Oklahoma	-	-	-	1	4	1	1	3	2	4	3	19
Oregon	-	-	-	1	2	-	1	2	2	3	-	11
Pennsylvania	1,589	1,347	1,878	2,087	2,274	2,136	2,158	2,088	1,879	1,785	1,744	20,965
Rhode Island	-	-	1	-	-	2	2	-	-	-	-	5
South Carolina	-	-	2	1	-	-	1	2	2	1	2	11
South Dakota	-	-	-	1	-	-	-	-	-	-	2	3
Tennessee	-	4	6	8	20	17	17	19	13	14	22	140
Texas	2	3	2	1	-	4	5	3	3	6	2	31
Utah	-	3	-	-	-	4	3	5	2	3	4	24
Vermont	-	-	-	1	-	-	-	-	-	-	-	1
Virginia	3	4	10	46	48	45	43	55	55	40	49	398
Washington	1	1	3	-	2	3	4	2	-	1	2	19
West Virginia	30	37	70	109	190	166	156	159	148	125	115	1,305
Wisconsin	2	1	4	1	-	1	3	1	2	3	1	19
Wyoming	-	1	1	2	8	6	7	2	4	2	4	37
TOTAL	**1,775**	**1,534**	**2,189**	**2,544**	**2,870**	**2,670**	**2,732**	**2,708**	**2,481**	**2,340**	**2,280**	**26,123**

NOTE: See Appendix B for methods.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.

- indicates quantity zero.

Table 3-5. Coal workers' pneumoconiosis: number of deaths, U.S. residents age 15 and over, by state, 1979-1990

State	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	TOTAL
Alabama	19	13	18	40	32	26	30	32	23	33	33	29	328
Alaska	-	-	-	-	-	1	-	1	-	-	-	-	2
Arizona	6	8	14	10	9	10	8	7	2	4	5	5	88
Arkansas	3	7	4	8	8	4	9	6	7	3	4	9	72
California	24	24	24	21	25	24	20	23	18	16	7	28	254
Colorado	8	10	16	15	10	25	22	15	15	21	17	15	189
Connecticut	12	7	3	1	4	7	6	3	3	1	6	2	55
Delaware	-	3	3	-	4	3	1	4	1	2	1	4	26
District of Columbia	2	-	1	1	1	-	-	-	-	1	-	-	6
Florida	35	32	52	26	35	32	20	38	34	35	35	25	399
Georgia	2	2	4	2	1	4	3	6	2	6	7	4	43
Hawaii	-	-	1	1	-	-	-	1	-	-	-	-	3
Idaho	-	-	-	-	-	-	2	-	1	-	-	-	3
Illinois	36	41	86	68	68	83	78	64	63	53	38	49	727
Indiana	15	22	24	16	22	25	21	22	25	25	27	19	263
Iowa	7	5	11	6	8	6	10	8	3	6	9	6	85
Kansas	2	1	1	3	2	6	6	7	2	-	4	2	36
Kentucky	109	130	159	242	196	177	195	182	161	168	137	115	1,971
Louisiana	-	-	-	-	3	2	2	1	2	-	3	1	14
Maine	-	-	-	-	-	-	1	-	-	-	1	-	2
Maryland	9	8	13	19	19	3	5	8	8	6	5	12	115
Massachusetts	2	3	1	2	-	-	-	1	-	2	1	2	14
Michigan	12	15	19	23	24	14	17	16	21	20	14	21	216
Minnesota	1	1	-	4	1	1	-	-	-	-	-	-	8
Mississippi	1	-	2	2	-	1	1	-	1	2	-	2	12
Missouri	9	5	9	10	5	2	5	4	7	8	7	4	75
Montana	2	-	2	-	-	1	2	3	1	-	-	-	11
Nebraska	-	-	-	1	-	-	-	-	-	-	-	-	1
Nevada	1	-	1	2	1	3	2	-	-	-	1	1	12
New Hampshire	-	-	-	-	-	-	-	-	-	1	-	-	1
New Jersey	23	17	15	18	21	22	11	12	18	24	22	11	214
New Mexico	6	2	2	4	6	4	5	4	2	2	4	3	44
New York	16	24	16	15	15	6	11	16	13	13	13	9	167
North Carolina	2	12	9	8	15	4	7	10	12	6	11	12	108
North Dakota	-	-	-	-	-	-	-	1	1	-	1	1	4
Ohio	68	92	105	86	105	93	105	92	91	102	90	79	1,108
Oklahoma	3	2	10	4	6	3	4	5	8	4	3	5	57
Oregon	-	3	1	4	3	2	-	2	3	7	2	1	28
Pennsylvania	1,753	1,719	1,602	1,594	1,515	1,552	1,480	1,303	1,211	1,153	1,082	1,030	16,994
Rhode Island	1	-	-	-	-	-	-	-	-	1	-	-	2
South Carolina	-	4	1	1	2	1	2	1	2	1	3	1	19
South Dakota	-	1	2	1	1	1	-	1	-	2	1	-	10
Tennessee	16	25	35	33	37	41	40	39	39	45	33	37	420
Texas	6	4	5	12	7	8	11	7	1	7	5	5	78
Utah	3	1	6	14	4	17	14	16	12	16	14	18	135
Vermont	-	-	-	-	1	-	1	-	1	2	1	-	6
Virginia	46	56	66	110	129	133	167	169	150	157	146	131	1,460
Washington	3	7	2	6	4	4	3	7	6	4	3	6	55
West Virginia	153	262	204	315	345	326	281	302	284	255	333	279	3,339
Wisconsin	1	2	3	3	3	1	1	-	1	1	2	3	21
Wyoming	-	6	2	2	4	5	6	4	2	4	5	4	44
TOTAL	**2,417**	**2,576**	**2,554**	**2,753**	**2,701**	**2,683**	**2,615**	**2,443**	**2,257**	**2,219**	**2,136**	**1,990**	**29,344**

NOTE: See Appendix B for methods.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.

- indicates quantity zero.

Table 3-6. Coal workers' pneumoconiosis: crude mortality rates (per 1,000,000 population), U.S. residents age 15 and over, by race and sex, 1968-1990

		White		Black	
Year	Overall rate	Males	Females	Males	Females
1968	12.15	27.87	0.19	3.91	0.11
1969	10.50	24.14	0.06	4.04	-
1970	14.99	34.29	0.15	6.26	0.11
1971	17.06	38.96	0.31	6.42	0.11
1972	18.85	43.01	0.26	8.50	-
1973	17.20	39.00	0.27	9.53	0.20
1974	17.27	39.23	0.32	9.12	0.10
1975	16.81	38.34	0.34	7.96	-
1976	15.11	34.32	0.28	8.88	0.09
1977	14.00	31.89	0.25	7.80	0.18
1978	13.40	30.80	0.21	6.26	-
1979	13.96	32.16	0.17	6.47	0.08
1980	14.65	33.84	0.14	6.98	0.08
1981	14.34	33.07	0.17	7.06	0.32
1982	15.27	35.03	0.26	9.01	-
1983	14.96	34.23	0.16	9.83	0.31
1984	14.53	33.81	0.16	6.24	0.29
1985	13.93	32.28	0.14	6.62	0.22
1986	13.31	29.69	0.25	9.66	0.26
1987	12.18	27.35	0.13	8.39	0.26
1988	11.89	26.82	0.16	6.89	0.25
1989	11.43	25.79	0.09	7.14	0.08
1990	10.55	23.67	0.14	6.73	0.16

NOTE: See Appendix B for methods.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.
U.S. Bureau of the Census: 1970-1990 population estimates of the U.S.

- indicates no deaths listed.

Table 3-7. Coal workers' pneumoconiosis: age-adjusted mortality rates (per 1,000,000 population), U.S. residents age 15 and over, by race and sex, 1968-1990

		White		Black	
Year	Overall rate	Males	Females	Males	Females
1968	8.54	21.03	0.12	3.72	0.11
1969	7.31	18.10	0.05	3.87	-
1970	10.47	25.80	0.09	5.87	0.10
1971	11.92	29.41	0.17	6.17	0.12
1972	13.32	32.92	0.11	8.16	-
1973	12.10	29.89	0.15	8.94	0.17
1974	12.11	30.08	0.17	8.48	0.11
1975	11.58	29.08	0.22	7.58	-
1976	10.38	26.02	0.12	8.45	0.08
1977	9.44	23.81	0.17	7.45	0.15
1978	8.89	22.71	0.10	6.24	-
1979	9.23	23.61	0.09	6.21	0.08
1980	9.61	24.64	0.10	6.72	0.06
1981	9.06	23.42	0.11	6.78	0.32
1982	9.47	24.49	0.12	8.46	-
1983	9.27	23.98	0.10	8.77	0.26
1984	8.96	23.38	0.07	5.95	0.26
1985	8.38	22.32	0.07	5.73	0.16
1986	7.70	19.62	0.09	8.33	0.24
1987	6.94	17.77	0.05	7.17	0.22
1988	6.57	16.94	0.08	6.06	0.19
1989	6.22	16.01	0.04	6.16	0.02
1990	5.54	14.29	0.06	5.59	0.14

NOTE: See Appendix B for methods.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.
U.S. Bureau of the Census: 1970-1990 population estimates of the U.S.

- indicates no deaths listed.

Table 3-8. Coal workers' pneumoconiosis: years of potential life lost to age 65, U.S. residents age 15 and over, by race and sex, 1968-1990

		White		Black	
Year	Total	Males	Females	Males	Females
1968	2,900	2,835	10	50	5
1969	2,535	2,445	20	70	-
1970	3,960	3,850	35	75	0
1971	4,885	4,705	35	115	25
1972	6,190	6,000	0	190	-
1973	5,405	5,175	25	205	0
1974	5,710	5,510	25	140	35
1975	4,880	4,620	75	185	-
1976	4,345	4,150	5	190	0
1977	3,630	3,300	85	155	90
1978	3,100	2,885	65	150	-
1979	3,115	2,985	25	90	0
1980	3,280	3,165	35	80	0
1981	2,690	2,465	105	90	30
1982	2,500	2,360	40	100	-
1983	2,605	2,390	35	170	10
1984	2,390	2,305	5	55	15
1985	2,100	2,050	20	30	0
1986	1,850	1,790	5	45	10
1987	1,785	1,665	40	60	15
1988	1,450	1,365	10	70	5
1989	1,365	1,260	0	90	0
1990	1,200	1,145	0	25	5

NOTE: See Appendix B for methods.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.

- indicates no deaths listed.

Table 3-9. Coal worker's pneumoconiosis: years of potential life lost to life expectancy, U.S. residents age 15 and over, by race and sex, 1968-1990

		White		Black	
Year	Total	Males	Females	Males	Females
1968	20,868	18,037	159	334	18
1969	18,048	15,640	75	372	-
1970	27,106	23,063	141	540	14
1971	31,657	26,676	258	601	34
1972	36,580	30,842	151	861	-
1973	33,762	28,193	232	906	23
1974	35,186	29,411	273	891	44
1975	34,964	28,831	380	894	-
1976	31,941	26,274	207	978	14
1977	29,989	24,434	318	873	110
1978	28,517	23,381	223	800	-
1979	30,898	25,360	188	707	14
1980	31,913	26,639	197	693	8
1981	30,820	25,416	286	739	72
1982	32,983	27,031	245	897	-
1983	32,021	26,183	191	1,146	59
1984	31,624	26,422	146	680	60
1985	29,767	24,784	144	652	34
1986	27,772	22,977	206	808	49
1987	25,545	21,164	146	732	45
1988	24,244	20,114	168	625	37
1989	23,663	19,772	83	676	7
1990	21,510	17,914	125	570	29

NOTE: See Appendix B for methods.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.

- indicates no deaths listed.

COAL WORKERS' PNEUMOCONIOSIS

Mortality

Table 3-10. Coal workers' pneumoconiosis: number of deaths, crude and age-adjusted mortality rates (per 1,000,000 population), total years of potential life lost (YPLL) , U.S. residents age 15 and over, by state, 1989-1990

State	Deaths	Rank	Crude mortality Rate	Rank	Age-adjusted mortality Rate	Rank	YPLL to age 65 Years	Rank	YPLL to life expectancy Years	Rank
Alabama	62	8	10.05	8	4.20	9	10	17	542	9
Alaska	-	43	-	43	-	43	-	43	-	43
Arizona	10	23	1.89	23	0.96	23	15	15	112	22
Arkansas	13	20	3.62	14	1.31	18	0	23	116	21
California	35	11	0.82	33	0.54	31	80	7	458	11
Colorado	32	14	6.38	10	3.88	10	0	23	294	15
Connecticut	8	27	1.54	26	0.70	26	0	23	79	29
Delaware	5	31	4.79	13	2.42	13	0	23	45	34
District of Columbia	-	43	-	43	-	43	-	43	-	43
Florida	60	9	2.90	17	1.18	21	45	10	668	8
Georgia	11	21	1.12	30	0.80	25	0	23	134	20
Hawaii	-	43	-	43	-	43	-	43	-	43
Idaho	-	43	-	43	-	43	-	43	-	43
Illinois	87	6	5.00	12	2.73	12	100	6	991	6
Indiana	46	10	5.42	11	2.85	11	70	8	526	10
Iowa	15	19	3.50	15	1.33	17	0	23	141	19
Kansas	6	30	1.59	25	1.03	22	40	12	104	24
Kentucky	252	4	44.35	3	26.06	3	320	4	3,084	4
Louisiana	4	33	0.64	38	0.54	31	55	9	103	25
Maine	1	40	0.53	39	0.35	38	0	23	14	39
Maryland	17	18	2.30	20	1.56	15	15	15	208	17
Massachusetts	3	35	0.32	42	0.11	42	0	23	26	36
Michigan	35	11	2.48	19	1.21	20	5	20	332	13
Minnesota	-	43	-	43	-	43	-	43	-	43
Mississippi	2	37	0.52	40	0.28	40	0	23	22	37
Missouri	11	21	1.39	27	0.59	29	0	23	107	23
Montana	-	43	-	43	-	43	-	43	-	43
Nebraska	-	43	-	43	-	43	-	43	-	43
Nevada	2	37	1.10	31	0.60	28	0	23	14	39
New Hampshire	-	43	-	43	-	43	-	43	-	43
New Jersey	33	13	2.76	18	1.53	16	45	10	398	12
New Mexico	7	29	3.48	16	1.89	14	0	23	67	32
New York	22	17	0.80	34	0.33	39	5	20	197	18
North Carolina	23	16	2.24	21	1.31	18	10	17	256	16
North Dakota	2	37	2.12	22	0.81	24	0	23	17	38
Ohio	169	5	10.09	7	5.64	7	105	5	1,956	5
Oklahoma	8	27	1.77	24	0.65	27	0	23	69	31
Oregon	3	35	0.70	36	0.46	34	25	14	60	33
Pennsylvania	2,112	1	112.22	2	49.54	2	675	1	21,901	1
Rhode Island	-	43	-	43	-	43	-	43	-	43
South Carolina	4	33	0.75	35	0.42	36	0	23	33	35
South Dakota	1	40	1.01	32	0.36	37	0	23	8	41
Tennessee	70	7	9.20	9	4.75	8	35	13	747	7
Texas	10	23	0.40	41	0.20	41	0	23	89	26
Utah	32	14	14.11	5	8.58	5	0	23	296	14
Vermont	1	40	1.15	29	0.51	33	0	23	8	41
Virginia	277	3	29.30	4	21.45	4	355	3	3,514	3
Washington	9	25	1.25	28	0.59	29	0	23	82	28
West Virginia	612	2	218.87	1	113.40	1	540	2	7,199	2
Wisconsin	5	31	0.67	37	0.44	35	10	17	70	30
Wyoming	9	25	13.61	6	7.82	6	5	20	84	27

NOTE: See Appendix B for methods.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.
U.S. Bureau of the Census: 1989-1990 population estimates of the U.S.

- indicates no death listed.

Table 3-11. Coal workers' pneumoconiosis: proportionate mortality ratios (PMR), based on underlying cause of death, by usual occupation for selected states, 1985-1990

COC	Occupation	Number of deaths	PMR	95% confidence interval LCL	UCL
616	Mining machine operators	719	100.90	93.60	108.61
613	Supervisors, extractive occupations	3	10.27	2.12	30.03
859	Miscellaneous material moving equipment operators	3	3.71	0.76	10.84
824	Locomotive operating occupations	4	2.96	0.81	7.57
783	Welders and cutters	10	2.16	1.04	3.98
849	Crane and tower operators	3	2.09	0.43	6.11
563	Brickmasons and stonemasons	4	1.61	0.44	4.13
518	Industrial machinery repairers	4	1.54	0.42	3.93
575	Electricians	8	1.51	0.65	2.98
869	Construction laborers	15	1.49	0.83	2.45
777	Miscellaneous machine operators, n.e.c.	8	1.37	0.59	2.69
779	Machine operators not specified	11	1.14	0.57	2.04
844	Operating engineers	4	1.11	0.30	2.84

COC - 1980 Census Occupation Code n.e.c. - not elsewhere classified
LCL - lower confidence limit UCL - upper confidence limit
NOTE: See Appendix B for methods and Appendix C for list of selected states.
SOURCE: National Center for Health Statistics multiple cause of death data tapes.

Table 3-12. Federal Black Lung Program: number of beneficiaries and total payments by the Social Security Administration and Department of Labor, 1980-1991

	Social Security Administration		Department of Labor	
Year	Total beneficiaries	Total amount (dollars)	Total beneficiaries	Total amount (dollars)
1980	399,477	1,032,000,000	139,073	813,205,000
1981	376,505	1,081,300,000	163,401	805,627,000
1982	354,569	1,076,000,000	173,972	784,085,000
1983	333,358	1,055,800,000	166,043	859,854,000
1984	313,822	1,038,000,000	163,166	873,932,000
1985	294,846	1,025,000,000	160,437	905,516,000
1986	275,783	971,000,000	156,550	629,075,000
1987	258,988	940,000,000	153,289	655,290,000
1988	241,626	904,000,000	149,156	656,689,000
1989	225,764	882,000,000	144,187	650,123,000
1990	210,678	863,400,000	138,491	626,521,000
1991	196,419	844,400,000	133,001	942,428,000

NOTE: The Social Security Administration (SSA) was assigned initial responsibility for administering the Black Lung benefits program. The Department of Labor (DOL) assumed responsibility for processing and paying claims on July 1, 1973. Most claims filed prior to July 1, 1973 remain within the jurisdiction of SSA, which also continues to be responsible for processing and paying claims filed by the survivors of these miners. The dollar amounts from the Department of Labor are for fiscal years.

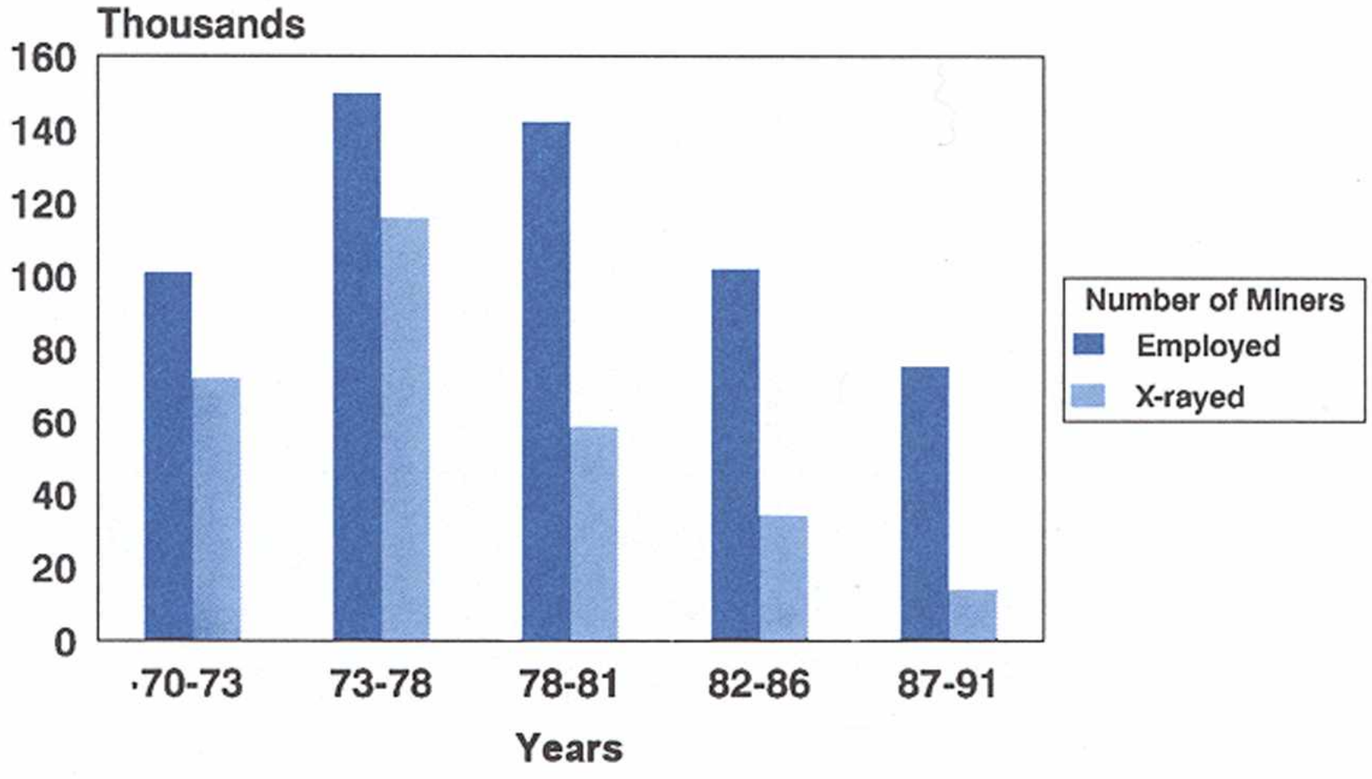
SOURCE: 1992 Social Security Bulletin Annual Statistical Supplement, and Black Lung Benefits Act Annual Report on Administration of the Act During Calendar Year 1991.

- Early participation in the Coal Workers' X-ray Surveillance Program (CWXSP) was high due to industry employment levels, awareness of health and safety issues, and program visibility. Since 1980 reduced coal mining employment, reduced program visibility and concern for job security have resulted in reduced participation.

- See Appendix A for information on CWXSP.

- See Table 3-13 for data.

Figure 3-5. CWXSP: estimated number of actively employed underground coal miners and number examined, 1970-1991



- CWP prevalence shows declines from the mid-70's to mid-80's in all groups with at least 10 years tenure. Declines were over 50% in miners with 15-24 years tenure. Lack of continued decline in recent years is noted.

- See Table 3-13 for data.

Figure 3-6. CWXSP: percentage of examined miners with CWP (category 1/0 +), by tenure in mining, 1970-1991

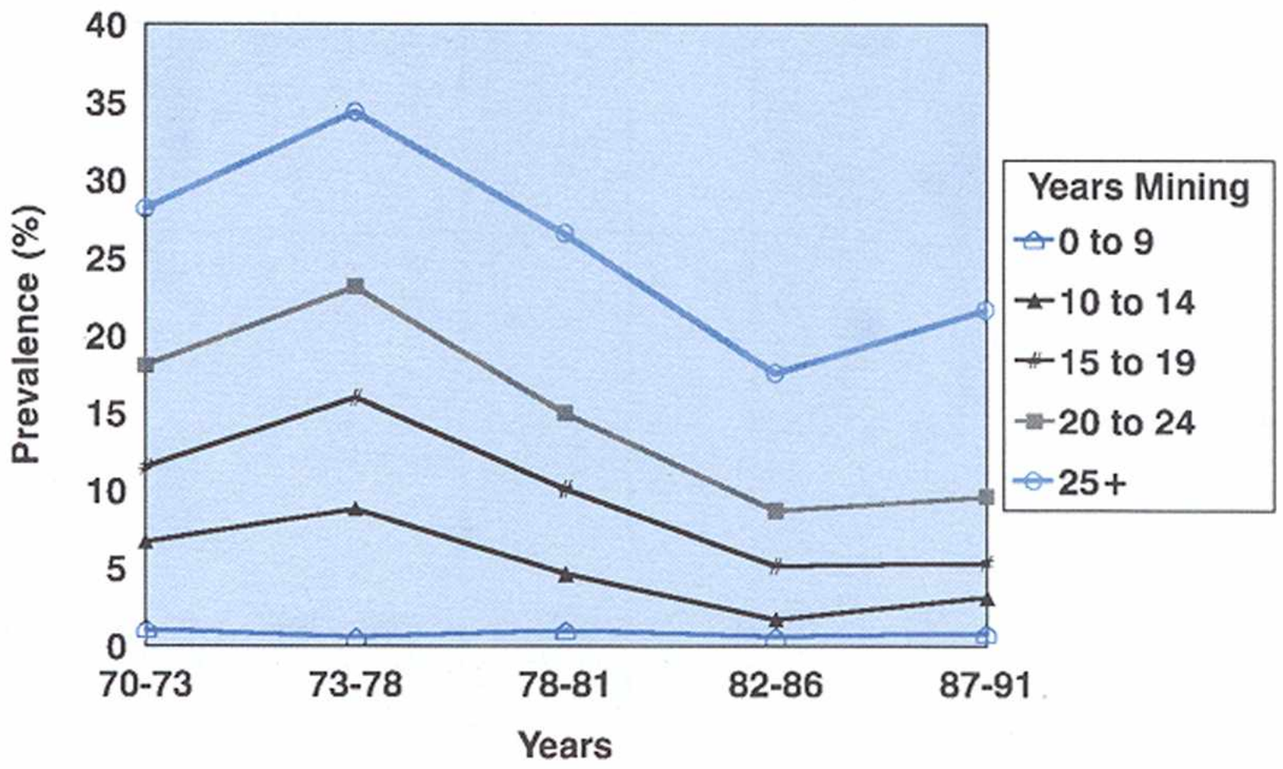


Table 3-13. CWXSP: number and percentage of examined miners with coal workers' pneumoconiosis, (category 1/0+), by round and tenure, 1970-1991

Tenure	Round 1 1970 - 1973			Round 2 1973 - 1978			Round 3 1978 - 1981			Round 4 1982 - 1986			Round 5 1987 - 1991		
Years in mining	No. miners examined	No. Cat 1/0+	%	No. miners examined	No. Cat 1/0+	%	No. miners examined	No. Cat 1/0+	%	No. miners examined	No. Cat 1/0+	%	No. miners examined	No. Cat 1/0+	%
0	15,844	101	0.6	50,344	31	0.1	14,856	92	0.6	6,218	24	0.4	1,936	10	0.5
1	5,287	49	0.9	9,574	13	0.1	3,632	15	0.0	1,220	1	0.1	343	0	0.0
2-4	8,274	73	0.9	18,433	137	0.7	12,128	112	0.1	5,539	32	0.6	1,023	5	0.5
5-9	6,706	182	2.7	13,527	386	2.8	14,018	218	1.6	9,733	71	0.7	2,605	30	1.2
10-14	4,451	298	6.7	5,284	466	8.8	5,185	236	4.6	6,539	113	1.7	3,979	122	3.1
15-19	4,743	546	11.5	3,376	540	16.0	2,133	215	10.1	2,130	109	5.1	2,222	118	5.3
20-24	7,279	1,321	18.1	3,218	746	23.2	1,508	227	15.0	840	73	8.7	750	72	9.6
25-29	6,260	1,369	21.9	4,438	1,280	20.8	1,286	260	20.2	543	75	13.8	247	51	20.6
30+	12,602	3,958	31.4	7,192	2,721	37.8	3,548	1,028	28.9	1,255	241	19.2	306	69	22.5
TOTAL	**71,446**	**7,897**	**11.1**	**115,386**	**6,320**	**5.5**	**58,294**	**2,403**	**4.1**	**34,017**	**739**	**2.2**	**13,411**	**477**	**3.6**

NOTE: Tabulations are based on one chest x-ray per round for each participating miner.
Round 1: Jan. 1970 - July 1973;
Round 2: Aug. 1973 - July 1978;
Round 3: Aug. 1978 - Dec. 1981;
Round 4: Jan. 1982 - Dec. 1986;
Round 5: Jan. 1987 - Dec. 1991.

SOURCE: Examination Processing Branch, Division of Respiratory Disease Studies, NIOSH.

Table 3-14. Coal workers' pneumoconiosis: estimated number of discharges from short-stay nonfederal hospitals, 1970-1991

Year	Number of cases
1970	6,000
1971	8,000
1972	11,000
1973	13,000
1974	14,000
1975	17,000
1976	18,000
1977	18,000
1978	13,000
1979	18,000
1980	17,000
1981	14,000
1982	17,000
1983	22,000
1984	23,000
1985	18,000
1986	16,000
1987	17,000
1988	15,000
1989	11,000
1990	7,000
1991	11,000

NOTE: Number of discharges have been rounded. NCHS recommends that in statistical comparisons, estimates of less than 5,000 not be used and that estimates of 5,000 to 10,000 be used with caution.

SOURCE: National Center for Health Statistics National Hospital Discharge Survey.

Table 3-15. Estimated number of workers with potential exposure to coal mine dust, by state, 1986-1991

State	1986	1987	1988	1989	1990	1991
Alabama	7,307	6,618	6,554	6,467	6,623	6,460
Alaska	106	105	100	98	94	100
Arizona	907	945	911	898	918	893
Arkansas	55	58	40	28	29	27
California	0	0	0	0	8	35
Colorado	2,245	1,805	1,884	2,026	2,119	1,832
Illinois	14,254	12,682	11,577	11,144	10,394	9,517
Indiana	4,482	4,261	3,912	3,820	4,088	3,858
Iowa	188	170	116	100	96	74
Kansas	140	122	115	140	148	112
Kentucky	36,170	34,675	32,919	31,396	32,267	28,377
Louisiana	55	56	56	69	76	79
Maryland	587	586	558	547	604	601
Missouri	1,131	1,042	871	659	617	580
Montana	997	936	957	950	952	958
New Mexico	1,676	1,556	1,412	1,306	1,475	1,542
New York	0	2	3	2	2	1
North Carolina	0	4	0	5	5	0
North Dakota	1,064	988	944	971	950	911
Ohio	8,685	7,838	6,792	6,619	6,278	5,276
Oklahoma	789	725	517	474	428	419
Pennsylvania	21,544	19,128	17,619	16,512	16,354	14,477
Tennessee	2,571	2,211	2,323	2,089	1,882	1,435
Texas	3,614	3,625	3,508	3,417	3,436	3,618
Utah	2,376	2,433	2,241	2,186	2,271	2,148
Virginia	13,800	13,130	12,484	11,239	11,436	10,825
Washington	762	740	748	756	742	598
West Virginia	33,535	30,430	30,064	29,752	30,558	28,638
Wyoming	4,291	4,013	4,048	4,060	4,176	4,259
Total workers employed by mine operators	**163,331**	**150,884**	**143,273**	**137,730**	**139,026**	**127,650**
Anthracite	2,841	2,373	2,281	2,120	2,159	2,075
Bituminous	160,490	148,517	140,992	135,610	136,866	125,570
Total workers employed by contractors	**12,269**	**12,915**	**13,906**	**17,599**	**20,752**	**22,457**
TOTAL	**175,600**	**163,799**	**157,179**	**155,329**	**159,778**	**150,107**

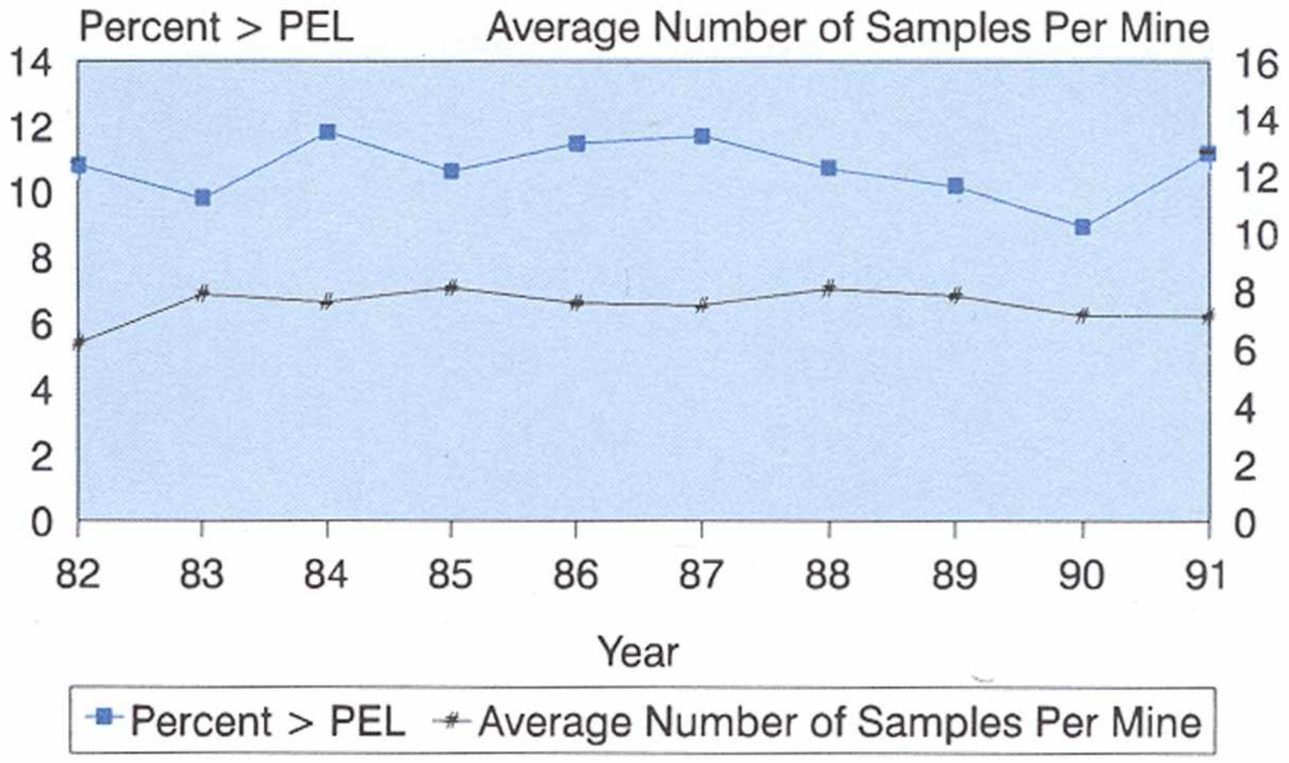
NOTE: Includes all coal mine employees except office workers.

SOURCE: U.S. Department of Labor, Mine Safety and Health Administration, Informational Report, Injury Experience in Coal Mining, 1986-1991.

- In the decade from 1982 to 1991, the average number of samples collected annually by MSHA inspectors per underground coal mine has ranged from 6.2 to 8.2, and the percent of samples exceeding the permissible exposure level (PEL) has ranged between 8 and 12%.

- See Table 3-16 for data.

Figure 3-7. Respirable coal mine dust: average number of samples per mine collected by MSHA inspectors, and percent above PEL, U.S. underground coal mines, 1982-1991



- In the decade from 1982 to 1991, the average number of samples collected annually by MSHA inspectors per surface coal mine has ranged from 1.6 to 2.7 and the percent of samples exceeding the PEL has ranged between 3 and 5%.

- See Table 3-17 for data.

Figure 3-8. Respirable coal mine dust: average number of samples per mine collected by MSHA inspectors, and percent above PEL, U.S. surface coal mines, 1982-1991

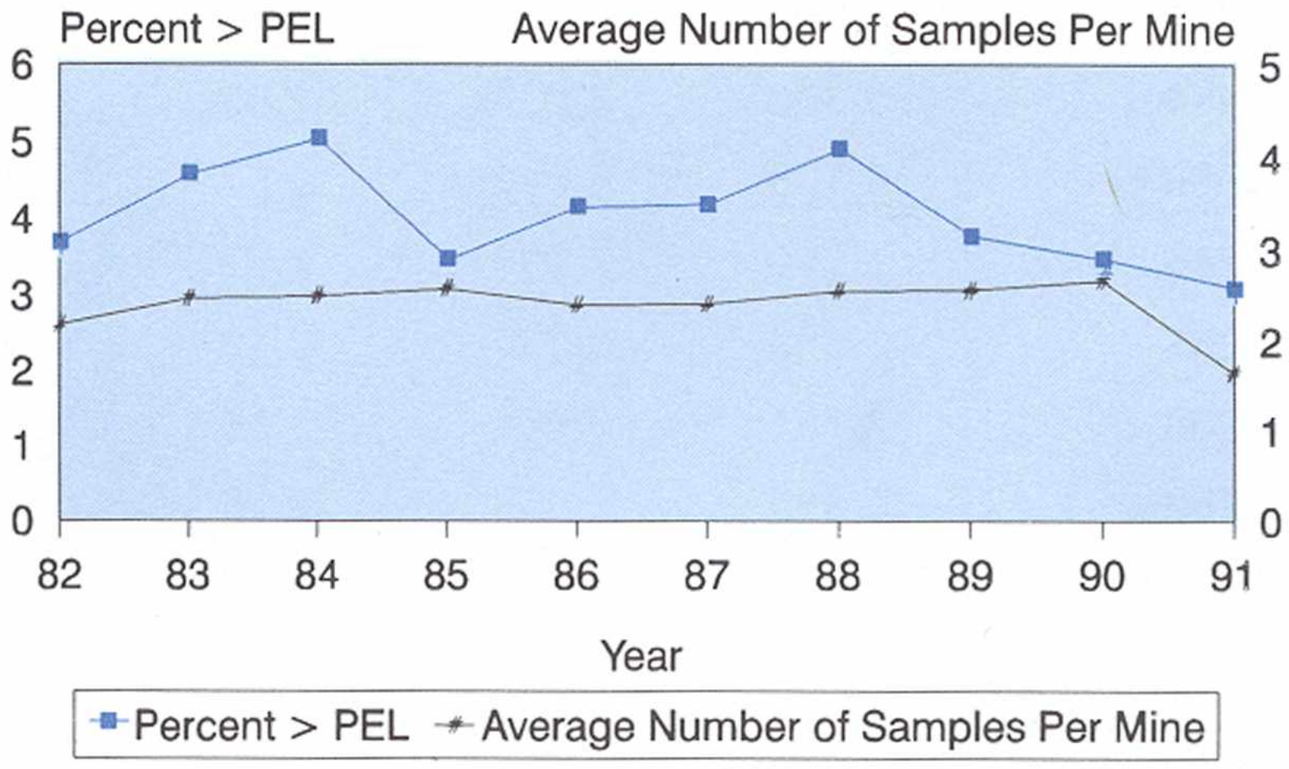


Table 3-16. Respirable coal mine dust: number of samples collected by MSHA inspectors and percent exceeding various levels, U.S. underground coal mines, 1982-1991

Year	Number of active mines	Total number of samples	Average samples per mine	Samples > PEL	Percent of samples > PEL	Samples > 2x PEL	Percent of samples > 2x PEL
1982	2,743	16,893	6.16	1,806	10.69	373	2.21
1983	2,188	17,194	7.86	1,666	9.69	403	2.34
1984	2,232	16,917	7.58	1,977	11.69	476	2.81
1985	2,120	17,078	8.06	1,794	10.50	421	2.47
1986	2,065	15,575	7.54	1,768	11.35	359	2.30
1987	2,029	15,160	7.47	1,752	11.56	398	2.63
1988	1,923	15,472	8.05	1,638	10.59	339	2.19
1989	1,798	14,030	7.80	1,409	10.04	272	1.94
1990	1,796	12,766	7.11	1,123	8.80	239	1.87
1991	1,621	11,511	7.10	1,273	11.06	262	2.28

NOTE: The MSHA permissible exposure limit (PEL) for respirable coal mine dust is 2 mg/m^3 MRE when not reduced due to quartz content. See Appendix A for additional information.

SOURCE: U.S. Department of Labor, Mine Safety and Health Administration (MSHA), Respirable coal mine dust data, 1982-1991.

Table 3-17. Respirable coal mine dust: number of samples collected by MSHA inspectors and percent exceeding various levels, U.S. surface coal mines, 1982-1991

Year	Number of active mines	Total number of samples	Average samples per mine	Samples > PEL	Percent of samples > PEL	Samples > 2x PEL	Percent of samples > 2x PEL
1982	4,118	8,955	2.17	327	3.65	99	1.11
1983	3,308	8,141	2.46	369	4.53	125	1.54
1984	3,306	8,239	2.49	411	4.99	96	1.17
1985	3,136	8,049	2.57	275	3.42	77	0.96
1986	3,050	7,298	2.39	299	4.10	80	1.10
1987	2,889	6,931	2.40	286	4.13	87	1.26
1988	2,751	6,988	2.54	339	4.85	96	1.37
1989	2,616	6,669	2.55	248	3.72	80	1.20
1990	2,524	6,704	2.66	229	3.42	62	0.92
1991	2,404	3,941	1.64	120	3.04	35	0.89

NOTE: The MSHA permissible exposure limit (PEL) for respirable coal mine dust is 2 mg/m^3 MRE when not reduced due to quartz content. See Appendix A for additional information.

SOURCE: U.S. Department of Labor, Mine Safety end Health Administration (MSHA), Respirable coal mine dust data, 1982-1991.

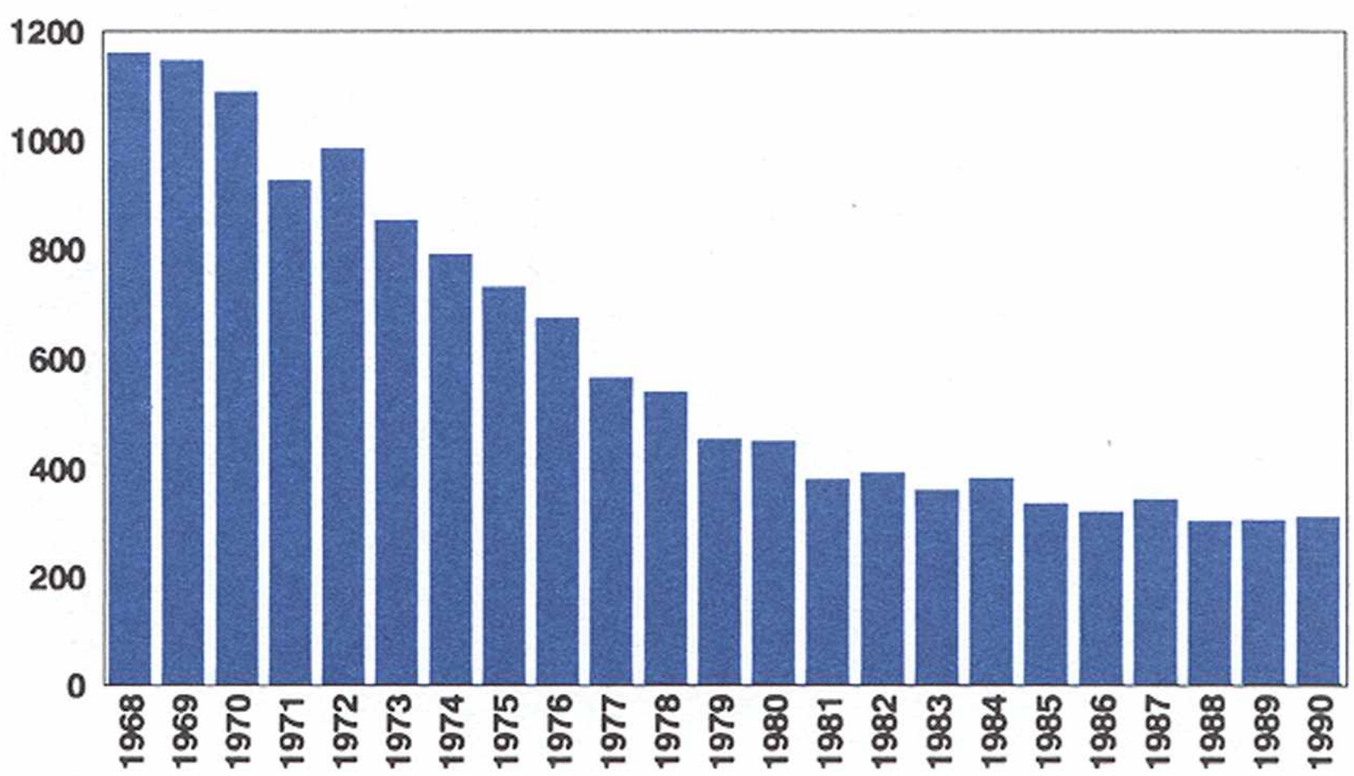
Silicosis includes ICD-8 codes 515.0 (silicosis) or ICD-8 code 010 (silicotuberculosis) for 1968-1978 and ICD-9 code 502 (pneumoconiosis due to other silica or silicates) for 1979-1990.

- The total number of deaths with mention of silicosis between 1968 and 1990 was 13,744. The annual number of deaths decreased from 1,157 in 1968 to 301 in 1988, with no further decline evident. About 98% of deaths with silicosis occurred in males. Racial distribution was 88% white, 11% black, and less than 1% other races.

- See Tables 4-3, 4-4 and 4-5 for data.

- See Appendix A for information about multiple cause of death data.

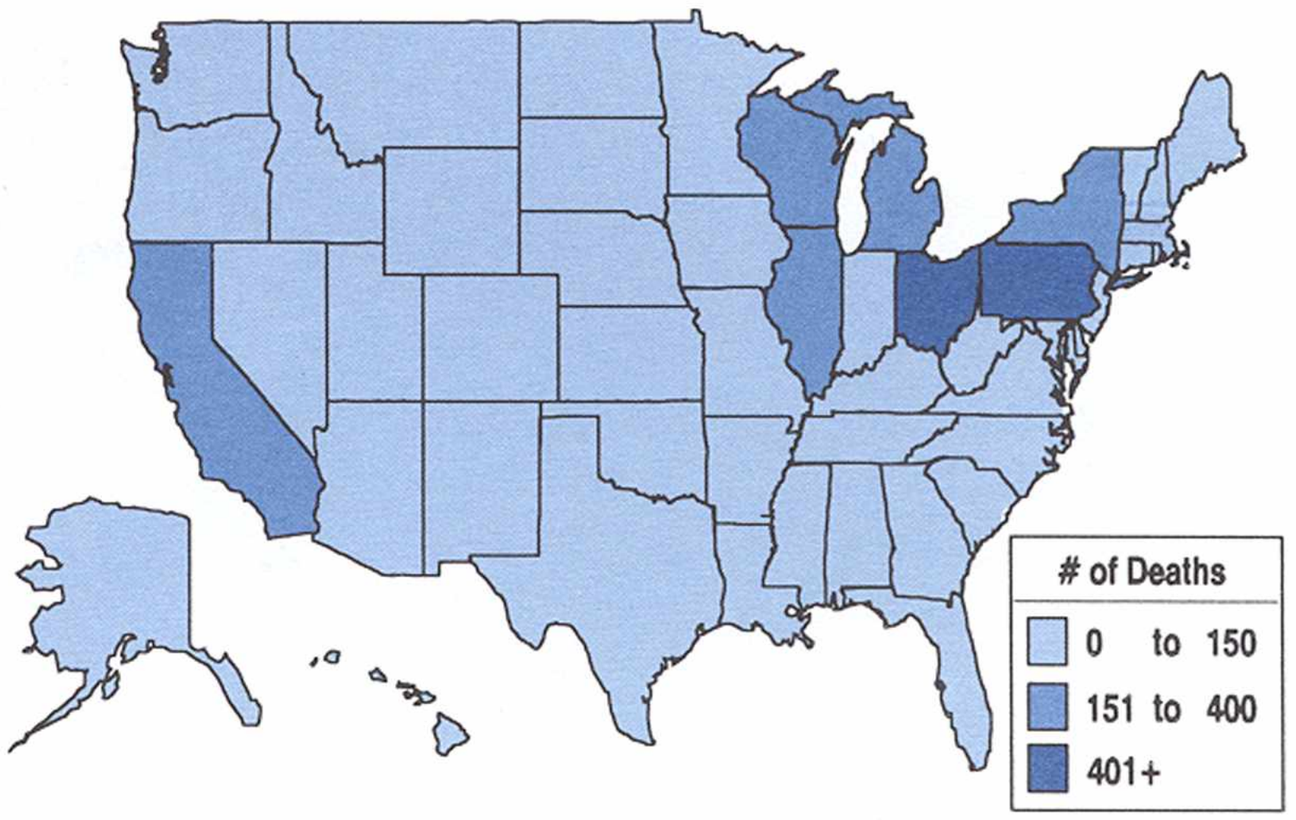
Figure 4-1. Silicosis: number of deaths, U.S. residents age 15 and over, 1968-1990



- Pennsylvania and Ohio had the highest number of deaths with silicosis (n = 755 and n = 456 deaths, respectively). California ranked third (n = 242 deaths).

- See Table 4-5 for data.

Figure 4-2. Silicosis: number of deaths, U.S. residents age 15 and over, by state, 1979-1990



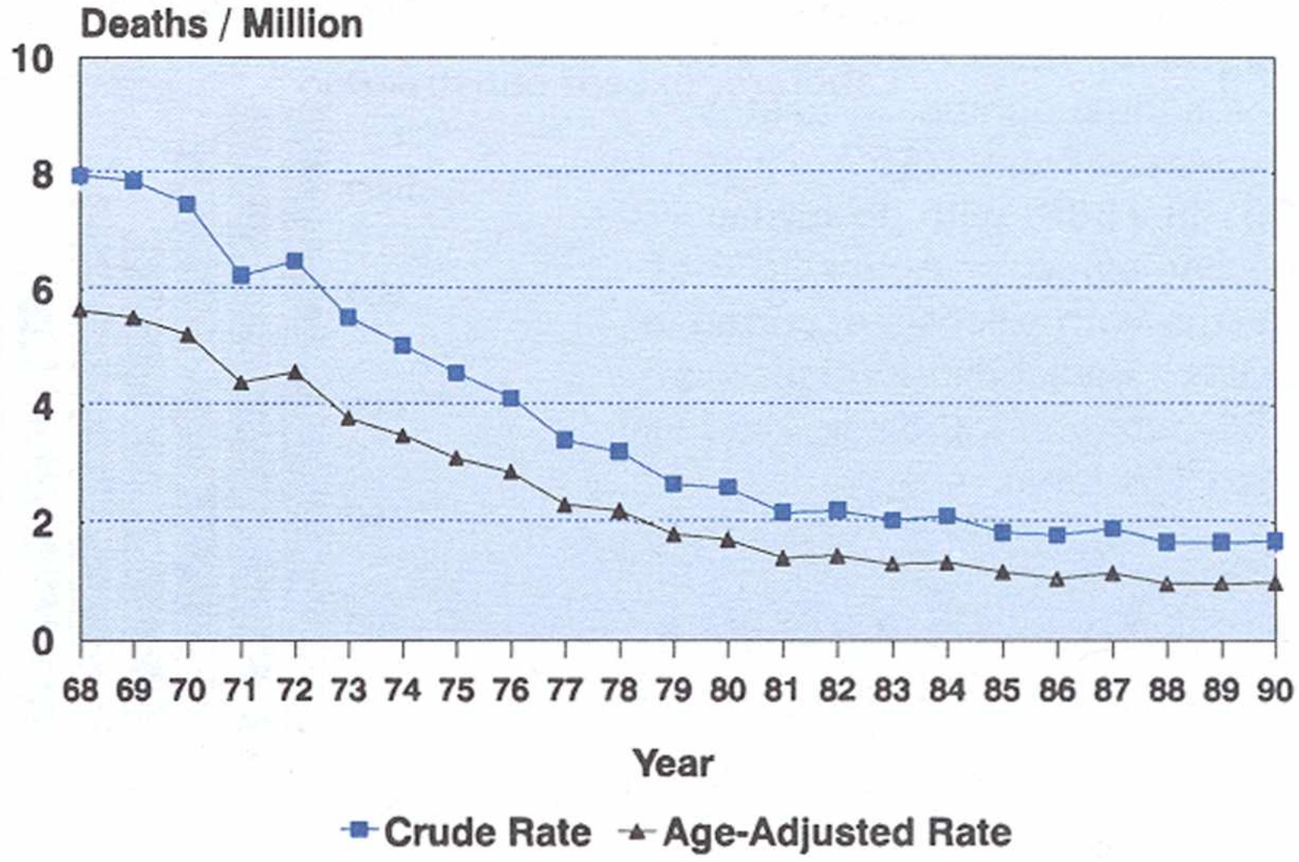
Mortality

- Crude and age-adjusted mortality rates have declined approximately 80% from 1968 to 1988, but remained stable from 1988 to 1990.

- See Tables 4-6 and 4-7 for data.

- See Appendix B for methods.

Figure 4-3. Silicosis: crude and age-adjusted mortality rates, U.S. residents age 15 and over, 1968-1990



- Vermont, Pennsylvania, and Colorado have the highest rates, with 10.3, 5.7 and 5.2 silicosis deaths per million population, respectively.

- See Table 4-10 for data.

Figure 4-4. Silicosis: crude mortality rates, U.S. residents age 15 and over, by state, 1989-1990

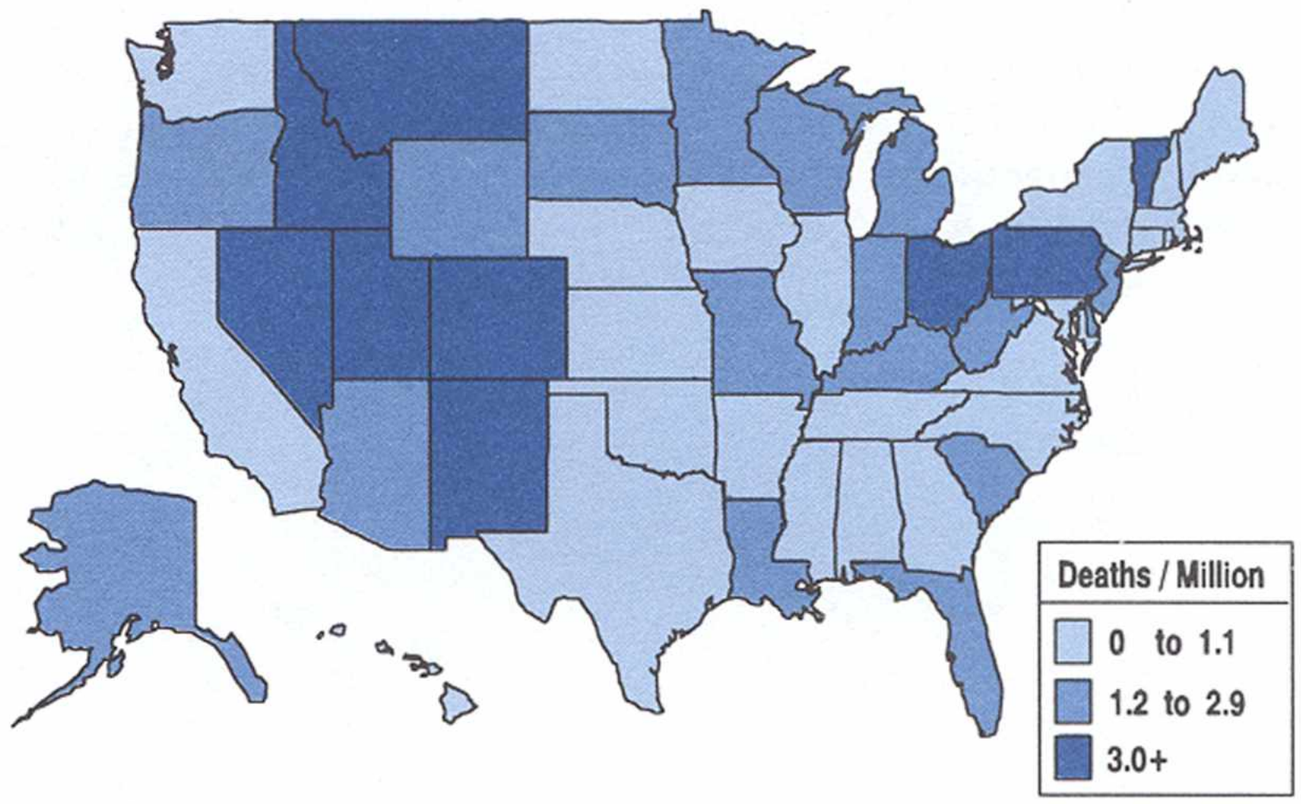


Table 4-1. Silicosis: most frequently recorded occupations on death certificate, U.S. residents age 15 and over, selected states and years, 1985-1990

COC	Occupation	Number	Percent
616	Mining machine operators	89	13.0
889	Laborers, except construction	84	12.3
473	Farmers, except horticultural	25	3.7
019	Managers and administrators, n.e.c.	24	3.5
453	Janitors and cleaners	20	2.9
719	Molding and casting machine operators	19	2.8
779	Machine operators, not specified	19	2.8
633	Supervisors, production occupations	18	2.6
869	Construction laborers	17	2.5
579	Painters, construction and maintenance	16	2.3
768	Crushing and grinding machine operators	16	2.3
	All other occupations	320	46.9
	Occupation not reported	16	2.3
	TOTAL	**683**	**100.0**

COC - 1980 Census Occupation Code n.e.c. - not elsewhere classified

NOTE: See Appendix C for list of 25 states reporting usual occupation and years reporting.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.

Table 4-2. Silicosis: most frequently recorded industries on death certificate, U.S. residents age 15 and over, selected states and years, 1985-1990

CIC	Industry	Number	Percent
060	Construction	74	10.8
040	Metal mining	54	7.9
270	Blast furnaces, steelworks, finishing mills	47	6.9
262	Miscellaneous nonmetallic mineral and stone products	42	6.1
041	Coal mining	40	5.9
271	Iron and steel foundries	37	5.4
050	Nonmetallic mining and quarrying, except fuel	35	5.1
392	Not specified manufacturing industries	25	3.7
010	Agricultural production, crops	22	3.2
961	Homemaker, student, unemployed, volunteer	17	2.5
261	Pottery and related products	15	2.2
	All other industries	252	36.9
	Industry not reported	23	3.4
	TOTAL	**683**	**100.0**

CIC - 1980 Census Industry Code

NOTE: See Appendix C for list of 25 states reporting usual industry and years reporting.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.

Table 4-3. Silicosis: number of deaths, U.S. residents age 15 and over, by age, race, and sex, 1968-1990

Years		1968-1978		1979-1990		1989-1990	
Total Deaths		9,431	%	4,313	%	610	%
Sex	Male	9,299	98.6	4,187	97.1	585	95.9
	Female	132	1.4	126	2.9	25	4.1
Race	White	8,479	89.9	3,670	85.1	514	84.3
	Black	932	9.9	621	14.4	93	15.2
	Other	20	0.2	22	0.5	3	0.5
Race/Sex	White Male	8,359	88.6	3,555	82.4	493	80.8
	White Female	120	1.3	115	2.7	21	3.4
	Black Male	920	9.8	610	14.1	89	14.6
	Black Female	12	0.1	11	0.3	4	0.7
	Other Male	20	0.2	22	0.5	3	0.5
	Other Female	0	0.0	0	0.0	0	0.0
Age	Years						
	15-24	10	0.1	6	0.1	2	0.3
	25-34	20	0.2	17	0.4	3	0.5
	35-44	75	0.8	62	1.4	10	1.6
	45-54	446	4.7	172	4.0	25	4.1
	55-64	1,960	20.8	609	14.1	79	13.0
	65-74	3,524	37.4	1,450	33.6	167	27.4
	75-84	2,728	28.9	1,501	34.8	247	40.5
	85 and Over	668	7.1	496	11.5	77	12.6
	Mean	70.4		72.5		73.2	
	Range	15-99		15-98		16-98	

NOTE: See Appendix B for methods. Percentages may not total to 100% due to rounding.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.

Table 4-4. Silicosis: number of deaths, U.S. residents age 15 and over, by state, 1968-1978

State	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	TOTAL
Alabama	21	27	19	15	22	12	9	17	6	14	10	**172**
Alaska	-	4	1	-	-	1	-	-	1	-	-	**7**
Arizona	28	21	16	11	24	12	15	18	10	12	10	**177**
Arkansas	7	3	11	4	6	4	-	1	3	2	2	**43**
California	46	56	59	51	46	37	41	34	28	27	30	**455**
Colorado	26	31	32	28	16	22	26	21	23	13	13	**251**
Connecticut	13	12	16	6	10	6	9	10	10	3	5	**100**
Delaware	-	1	-	1	-	-	1	3	-	-	1	**7**
District of Columbia	1	1	-	-	6	1	-	1	3	1	-	**14**
Florida	13	14	18	13	8	20	16	16	15	16	13	**162**
Georgia	4	5	11	6	8	9	11	-	9	12	7	**82**
Hawaii	-	-	-	-	2	1	1	1	-	-	1	**6**
Idaho	9	14	15	5	8	7	11	4	5	2	3	**83**
Illinois	27	20	17	19	24	20	15	21	13	6	9	**191**
Indiana	20	17	15	17	14	13	10	7	10	11	9	**143**
Iowa	-	6	3	2	6	4	4	2	-	1	2	**30**
Kansas	6	9	11	8	6	9	4	-	9	4	4	**70**
Kentucky	23	22	31	25	30	24	10	15	12	13	4	**209**
Louisiana	1	1	3	6	8	3	3	-	3	4	2	**34**
Maine	2	4	3	2	2	3	2	1	1	2	2	**24**
Maryland	14	9	13	7	6	8	7	7	6	6	4	**87**
Massachusetts	14	14	10	2	4	11	9	13	9	11	9	**106**
Michigan	55	52	43	34	32	38	25	35	24	20	20	**378**
Minnesota	18	13	6	5	12	3	9	11	6	6	8	**97**
Mississippi	-	1	1	1	-	2	3	4	1	1	-	**14**
Missouri	7	14	5	8	16	12	10	7	13	9	11	**112**
Montana	17	13	18	13	10	17	10	6	9	3	4	**120**
Nebraska	1	1	1	1	2	-	2	1	-	-	-	**9**
Nevada	7	3	11	6	4	4	4	8	5	7	2	**61**
New Hampshire	3	1	2	4	2	-	1	1	1	-	2	**17**
New Jersey	32	32	31	29	28	26	23	22	14	18	7	**262**
New Mexico	6	7	4	7	8	6	5	3	5	3	3	**57**
New York	59	56	44	57	42	46	38	27	21	31	26	**447**
North Carolina	13	19	18	15	24	11	13	13	16	11	11	**164**
North Dakota	1	2	-	-	-	-	-	1	-	1	-	**5**
Ohio	143	124	132	103	126	83	86	66	62	54	57	**1,036**
Oklahoma	10	4	7	5	6	2	8	5	1	3	-	**51**
Oregon	8	5	13	3	2	5	3	6	5	3	1	**54**
Pennsylvania	284	278	291	270	240	227	212	200	186	143	152	**2,483**
Rhode Island	1	1	1	-	-	-	1	2	3	1	-	**10**
South Carolina	5	2	4	-	-	2	6	4	2	3	2	**30**
South Dakota	3	3	3	1	6	1	3	1	1	-	1	**23**
Tennessee	18	22	9	9	16	10	4	13	10	6	7	**124**
Texas	8	15	7	9	12	6	7	11	10	7	13	**105**
Utah	10	10	5	11	12	13	8	8	11	9	5	**102**
Vermont	11	16	6	10	2	9	11	7	8	6	2	**88**
Virginia	38	35	15	15	38	22	22	17	20	13	14	**249**
Washington	17	15	11	9	14	12	9	12	6	10	10	**125**
West Virginia	75	87	71	55	58	47	44	32	32	17	24	**542**
Wisconsin	30	20	22	14	14	19	15	12	22	17	14	**199**
Wyoming	2	1	1	3	-	-	3	1	1	-	2	**14**
TOTAL	**1,157**	**1,143**	**1,086**	**925**	**982**	**850**	**789**	**728**	**671**	**562**	**538**	**9,431**

NOTE: See Appendix B for methods.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.

- indicates quantity zero.

Table 4-5. Silicosis: number of deaths, U.S. residents age 15 and over, by state, 1979-1990

State	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	TOTAL
Alabama	11	5	2	4	4	4	1	7	6	6	4	3	57
Alaska	-	-	-	2	-	-	1	2	-	-	-	1	6
Arizona	5	11	12	10	9	7	3	7	5	1	6	5	81
Arkansas	1	2	4	2	4	-	2	-	2	-	2	-	19
California	21	29	22	26	19	22	22	14	17	19	16	15	242
Colorado	18	8	16	7	13	10	7	8	8	8	16	10	129
Connecticut	6	6	3	7	4	9	6	3	2	5	1	2	54
Delaware	-	1	-	1	-	-	-	-	-	1	1	1	5
District of Columbia	2	1	1	3	-	1	-	1	-	-	-	1	10
Florida	11	13	17	6	11	10	10	14	14	13	14	12	142
Georgia	7	1	6	2	7	5	9	9	6	6	7	4	69
Hawaii	-	-	-	1	-	1	-	1	-	-	-	-	3
Idaho	3	1	2	2	1	2	1	-	4	4	5	2	27
Illinois	13	15	11	21	11	17	15	11	15	12	9	10	160
Indiana	12	9	6	6	8	7	3	6	8	6	6	8	85
Iowa	-	3	1	1	3	2	2	3	5	2	1	2	25
Kansas	2	1	3	4	2	-	2	-	5	1	-	-	20
Kentucky	10	4	4	12	6	3	10	5	2	11	3	6	76
Louisiana	4	2	6	2	5	2	5	3	5	3	2	6	45
Maine	1	3	1	1	-	1	1	1	3	1	-	2	15
Maryland	8	6	6	3	4	2	3	2	2	2	-	3	41
Massachusetts	8	8	5	4	2	2	3	5	5	5	4	4	55
Michigan	19	23	15	21	17	12	15	14	16	15	14	12	193
Minnesota	6	10	11	9	3	13	9	11	2	8	3	5	90
Mississippi	1	3	2	1	1	1	2	-	1	-	1	3	16
Missouri	6	9	6	5	2	9	7	2	7	2	8	5	68
Montana	10	3	2	4	4	2	5	5	3	6	3	2	49
Nebraska	-	-	-	-	-	-	-	-	-	-	-	-	-
Nevada	2	1	1	2	2	2	4	2	3	1	6	3	29
New Hampshire	-	-	-	3	1	1	1	1	1	2	1	1	12
New Jersey	8	13	13	10	10	17	8	9	12	12	12	10	134
New Mexico	3	10	4	3	1	2	2	2	1	2	4	6	40
New York	23	17	20	11	22	17	16	9	27	12	16	15	205
North Carolina	11	8	9	4	11	11	12	9	12	9	7	5	108
North Dakota	-	-	-	-	-	1	1	-	-	1	-	-	3
Ohio	52	42	38	50	32	47	31	41	29	26	35	33	456
Oklahoma	3	1	-	-	2	2	-	3	4	-	1	4	20
Oregon	3	5	3	4	3	2	1	-	2	2	5	3	33
Pennsylvania	85	94	75	64	68	60	55	49	52	45	47	61	755
Rhode Island	4	1	-	4	1	1	1	1	1	-	-	1	15
South Carolina	5	2	4	4	3	1	3	3	2	2	3	5	37
South Dakota	-	2	2	3	1	1	2	2	-	1	1	1	16
Tennessee	9	8	6	4	11	9	5	5	6	5	6	3	77
Texas	5	16	-	12	8	11	5	14	10	12	4	7	104
Utah	3	5	3	6	4	9	9	4	2	1	6	2	54
Vermont	5	4	2	2	3	5	3	-	3	2	4	5	38
Virginia	7	8	10	7	7	7	5	8	11	2	4	3	79
Washington	14	10	2	10	6	1	8	6	6	6	4	-	73
West Virginia	10	7	9	7	4	12	5	3	7	5	2	6	77
Wisconsin	15	17	13	12	18	17	12	10	10	16	7	10	157
Wyoming	-	-	-	1	1	1	1	3	1	-	1	-	9
TOTAL	**452**	**448**	**378**	**390**	**359**	**381**	**334**	**318**	**342**	**301**	**302**	**308**	**4,313**

NOTE: See Appendix B for methods.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.

- indicates quantity zero.

Table 4-6. Silicosis: crude mortality rates (per 1,000,000 population), U.S. residents age 15 and over, by race and sex, 1968-1990

		White		Black	
Year	Overall rate	Males	Females	Males	Females
1968	7.92	16.52	0.19	15.00	0.34
1969	7.83	16.26	0.18	15.39	0.11
1970	7.44	15.70	0.19	12.13	0.11
1971	6.20	13.30	0.15	8.81	0.11
1972	6.45	13.33	0.17	12.63	-
1973	5.48	11.41	0.16	9.77	0.20
1974	4.99	10.56	0.11	8.10	0.20
1975	4.52	9.44	0.16	7.96	0.10
1976	4.09	8.54	0.12	7.49	-
1977	3.36	7.02	0.07	6.34	-
1978	3.16	6.41	0.19	6.36	0.09
1979	2.61	5.25	0.06	6.27	0.08
1980	2.55	4.99	0.18	6.22	-
1981	2.12	4.37	0.22	2.84	0.08
1982	2.16	4.35	0.04	5.00	-
1983	1.99	4.07	0.06	3.95	-
1984	2.06	4.09	0.11	4.89	0.07
1985	1.78	3.49	0.10	4.36	0.07
1986	1.73	3.31	0.10	4.78	-
1987	1.85	3.49	0.18	4.90	0.09
1988	1.61	2.98	0.11	5.22	0.17
1989	1.62	3.03	0.14	4.30	0.25
1990	1.63	3.14	0.10	4.33	0.08

NOTE: See Appendix B for methods.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.
U.S. Bureau of the Census: 1970-1990 population estimates of the U.S.

- indicates no deaths listed.

Table 4-7. Silicosis: age-adjusted mortality rates (per 1,000,000 population), U.S. residents age 15 and over, by race and sex, 1968-1990

		White		Black	
Year	Overall rate	Males	Females	Males	Females
1968	5.64	12.52	0.13	14.50	0.34
1969	5.51	12.22	0.12	14.94	0.11
1970	5.21	11.75	0.14	11.60	0.12
1971	4.39	10.06	0.10	8.74	0.05
1972	4.58	10.10	0.13	12.69	-
1973	3.78	8.58	0.10	9.43	0.21
1974	3.48	7.99	0.07	8.09	0.20
1975	3.09	7.05	0.11	8.05	0.09
1976	2.86	6.49	0.08	7.59	-
1977	2.30	5.22	0.04	6.50	-
1978	2.19	4.80	0.14	6.56	0.06
1979	1.79	3.88	0.04	6.54	0.03
1980	1.70	3.60	0.12	6.54	-
1981	1.40	3.17	0.11	2.89	0.07
1982	1.42	3.10	0.02	5.32	-
1983	1.29	2.90	0.05	3.81	-
1984	1.31	2.80	0.06	5.27	0.10
1985	1.16	2.48	0.05	4.53	0.09
1986	1.04	2.24	0.05	4.42	-
1987	1.14	2.35	0.08	4.93	0.02
1988	0.96	1.94	0.05	5.01	0.13
1989	0.96	1.97	0.07	4.07	0.25
1990	0.98	2.05	0.04	4.24	0.08

NOTE: See Appendix B for methods.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.
U.S. Bureau of the Census: 1970-1990 population estimates of the U.S.

- indicates no deaths listed.

Table 4-8. Silicosis: years of potential life lost to age 65, U.S. residents age 15 and over, by race and sex, 1968-1990

		White		Black	
Year	Total	Males	Females	Males	Females
1968	2,535	2,105	50	330	50
1969	2,185	1,745	55	370	5
1970	2,315	1,920	35	315	15
1971	2,165	1,715	60	385	0
1972	2,110	1,560	50	450	0
1973	1,495	1,170	70	220	10
1974	1,740	1,345	20	325	35
1975	1,425	1,060	30	330	0
1976	1,360	1,050	15	295	-
1977	995	710	0	245	-
1978	1,190	840	60	290	0
1979	1,015	615	50	350	0
1980	865	505	50	295	-
1981	655	525	5	110	0
1982	745	440	0	260	-
1983	655	430	25	195	-
1984	670	395	25	235	15
1985	600	390	5	175	25
1986	450	365	40	45	-
1987	675	480	40	115	0
1988	495	285	5	190	15
1989	600	360	20	170	50
1990	615	430	0	160	25

NOTE: See Appendix B for methods.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.

- indicates no deaths listed.

Table 4-9. Silicosis: years of potential life lost to life expectancy, U.S. residents age 15 and over, by race and sex, 1968-1990

		White		Black	
Year	Total	Males	Females	Males	Females
1968	14,264	11,059	191	1,397	75
1969	13,873	10,659	192	1,514	18
1970	13,773	10,617	210	1,220	26
1971	11,927	9,193	178	1,021	7
1972	12,555	9,216	226	1,435	-
1973	10,365	7,737	202	1,009	39
1974	10,182	7,684	120	988	58
1975	9,361	6,861	194	1,015	14
1976	8,857	6,536	141	968	-
1977	7,324	5,321	66	844	-
1978	7,300	5,123	267	930	12
1979	6,254	4,258	115	924	9
1980	5,786	3,871	230	847	-
1981	4,906	3,629	221	353	14
1982	5,152	3,499	33	753	-
1983	4,657	3,279	94	599	-
1984	4,815	3,219	136	772	28
1985	4,261	2,870	102	642	37
1986	3,836	2,723	126	453	-
1987	4,406	3,015	191	570	7
1988	3,698	2,416	106	638	35
1989	3,859	2,568	153	549	90
1990	3,989	2,761	92	572	37

NOTE: See Appendix B for methods.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.

- indicates no deaths listed.

Table 4-10. Silicosis: number of deaths, crude and age-adjusted mortality rates (per 1,000,000 population), total years of potential life lost (YPLL), U.S. residents age 15 and over, by state, 1989-1990

			Crude mortality		Age-adjusted mortality		YPLL to age 65		YPLL to life expectancy	
State	Deaths	Rank	Rate	Rank	Rate	Rank	Years	Rank	Years	Rank
Alabama	7	29	1.14	30	0.84	26	75	4	154	16
Alaska	1	44	1.48	23	3.31	4	0	34	8	44
Arizona	11	14	2.08	12	1.23	14	10	24	139	20
Arkansas	2	39	0.56	44	0.41	41	5	27	35	38
California	31	3	0.74	39	0.40	42	15	19	304	6
Colorado	26	5	5.19	3	3.59	2	15	19	273	7
Connecticut	3	36	0.58	43	0.29	45	0	34	30	39
Delaware	2	39	1.92	14	1.63	12	15	19	37	37
District of Columbia	1	44	0.97	37	0.51	38	0	34	8	44
Florida	26	5	1.26	25	0.80	28	130	2	470	3
Georgia	11	14	1.12	31	0.86	25	20	16	147	18
Hawaii	-	48	-	48	-	48	-	48	-	48
Idaho	7	29	4.84	6	2.51	6	0	34	73	30
Illinois	19	9	1.09	34	0.72	32	55	9	268	8
Indiana	14	11	1.65	18	1.05	18	20	16	181	13
Iowa	3	36	0.70	41	0.47	39	15	19	49	35
Kansas	-	48	-	48	-	48	-	48	-	48
Kentucky	9	18	1.58	20	1.04	19	40	12	140	19
Louisiana	8	22	1.28	24	1.14	16	25	15	134	21
Maine	2	39	1.05	35	0.55	36	0	34	22	41
Maryland	3	36	0.40	47	0.22	46	0	34	28	40
Massachusetts	8	22	0.84	38	0.38	43	5	27	84	28
Michigan	26	5	1.84	16	1.14	16	60	7	343	5
Minnesota	8	22	1.21	26	0.82	27	20	16	111	22
Mississippi	4	34	1.05	35	0.73	31	5	27	57	32
Missouri	13	12	1.64	19	0.91	22	35	14	179	14
Montana	5	32	4.31	7	1.67	10	0	34	43	36
Nebraska	-	48	-	48	-	48	-	48	-	48
Nevada	9	18	4.98	4	3.39	3	5	27	108	23
New Hampshire	2	39	1.16	29	0.71	33	0	34	22	41
New Jersey	22	8	1.84	16	0.90	24	10	24	227	10
New Mexico	10	17	4.96	5	2.24	9	5	27	88	26
New York	31	3	1.12	31	0.65	34	45	11	389	4
North Carolina	12	13	1.17	28	0.80	28	70	5	201	12
North Dakota	-	48	-	48	-	48	-	48	-	48
Ohio	68	2	4.06	8	2.31	8	175	1	895	2
Oklahoma	5	32	1.11	33	0.58	35	0	34	56	33
Oregon	8	22	1.86	15	0.76	30	0	34	70	31
Pennsylvania	108	1	5.74	2	2.83	5	85	3	1,250	1
Rhode Island	1	44	0.63	42	0.11	47	0	34	6	47
South Carolina	8	22	1.50	22	1.23	14	60	7	153	17
South Dakota	2	39	2.02	13	0.98	20	0	34	22	41
Tennessee	9	18	1.18	27	0.93	21	65	6	178	15
Texas	11	14	0.44	46	0.44	40	55	9	212	11
Utah	8	22	3.54	9	2.39	7	5	27	86	27
Vermont	9	18	10.31	1	4.63	1	0	34	78	29
Virginia	7	29	0.74	39	0.52	37	5	27	89	25
Washington	4	34	0.56	44	0.31	44	15	19	50	34
West Virginia	8	22	2.87	10	1.66	11	10	24	103	24
Wisconsin	17	10	2.28	11	1.48	13	40	12	239	9
Wyoming	1	44	1.51	21	0.91	22	0	34	8	44

NOTE: See Appendix B for methods.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.
U.S. Bureau of the Census: 1989-1990 population estimates of the U.S.

- indicates no deaths listed.

Table 4-11. Silicosis: proportionate mortality ratios (PMR), based on underlying cause of death, by usual occupation for selected states, 1985-1990

COC	Occupation	Number of deaths	PMR	95% confidence interval LCL	UCL
725	Miscellaneous metal and plastic processing machine operators	8	330.23	142.34	650.05
675	Hand molders, shapers, except jewelers	8	77.59	33.44	152.73
768	Crushing, grinding machine operators	7	48.05	19.30	99.08
787	Hand mold, cast, forming occupations	3	33.65	6.94	98.39
719	Molding, casting machine operators	8	26.25	11.31	51.67
616	Mining machine operators	37	17.19	11.94	23.91
599	Construction trades, n.e.c.	5	15.39	4.98	35.97
709	Grind, buff, polish machine operators	4	10.96	2.99	28.02
878	Machine feeders, offbearers	3	8.08	1.67	23.62
516	Heavy equipment mechanics	3	7.43	1.53	21.71
579	Painters,construction maintenance	9	5.70	2.61	10.81
563	Brickmasons and stonemasons	4	4.72	1.29	12.07
889	Laborers, except construction	48	4.51	3.30	6.04
518	Industrial machinery repairers	3	3.61	0.74	10.56
779	Machine operators not specified	10	3.24	1.56	5.97
783	Welders and cutters	5	3.21	1.04	7.51
633	Supervisors, production occupations	10	2.64	1.27	4.86
869	Construction laborers	7	1.88	0.76	3.88
796	Production inspectors, checkers, examiners	3	1.80	0.37	5.26
453	Janitors and cleaners	9	1.59	0.73	3.02
637	Machinists	5	1.50	0.49	3.51
913	Retired; with no other occupation listed	5	1.35	0.44	3.16
567	Carpenters	6	1.33	0.49	2.91
804	Truck drivers, heavy	7	1.20	0.48	2.48
019	Managers, administrators, n.e.c.	15	1.19	0.67	1.97

COC - 1980 Census Occupation Code n.e.c. - not elsewhere classified
LCL - lower confidence limit UCL - upper confidence limit
NOTE: See Appendix B for methods and Appendix C for list of selected states.
SOURCE: National Center for Health Statistics multiple cause of death data tapes.

Table 4-12. Silicosis: estimated number of discharges from short-stay nonfederal hospitals, 1970-1991

Year	Number of cases
1970	6,000
1971	7,000
1972	6,000
1973	5,000
1974	4,000
1975	4,000
1976	5,000
1977	4,000
1978	2,000
1979	3,000
1980	—
1981	2,000
1982	3,000
1983	2,000
1984	—
1985	3,000
1986	3,000
1987	3,000
1988	—
1989	—
1990	—
1991	—

NOTE: Estimates have been rounded. No estimates are available for 1980, 1984, 1988, 1989, 1990 and 1991. NCHS recommends that in statistical comparisons, estimates of less than 5,000 not be used and that estimates of 5,000 to 10,000 be used with caution.

SOURCE: National Center for Health Statistics National Hospital Discharge Survey.

SILICOSIS

SENSOR

Figure 4-5 depicts states with silicosis surveillance and intervention programs funded under the NIOSH Sentinel Event Notification System for Occupational Risks (SENSOR) program. Since 1987, SENSOR silicosis programs have been under development in Michigan, New Jersey, Ohio, and Wisconsin. In October 1992, three additional states (Illinois, North Carolina, Texas) began developing SENSOR silicosis programs.

See Appendix A for more information about SENSOR.

Figure 4-5. States with SENSOR silicosis programs

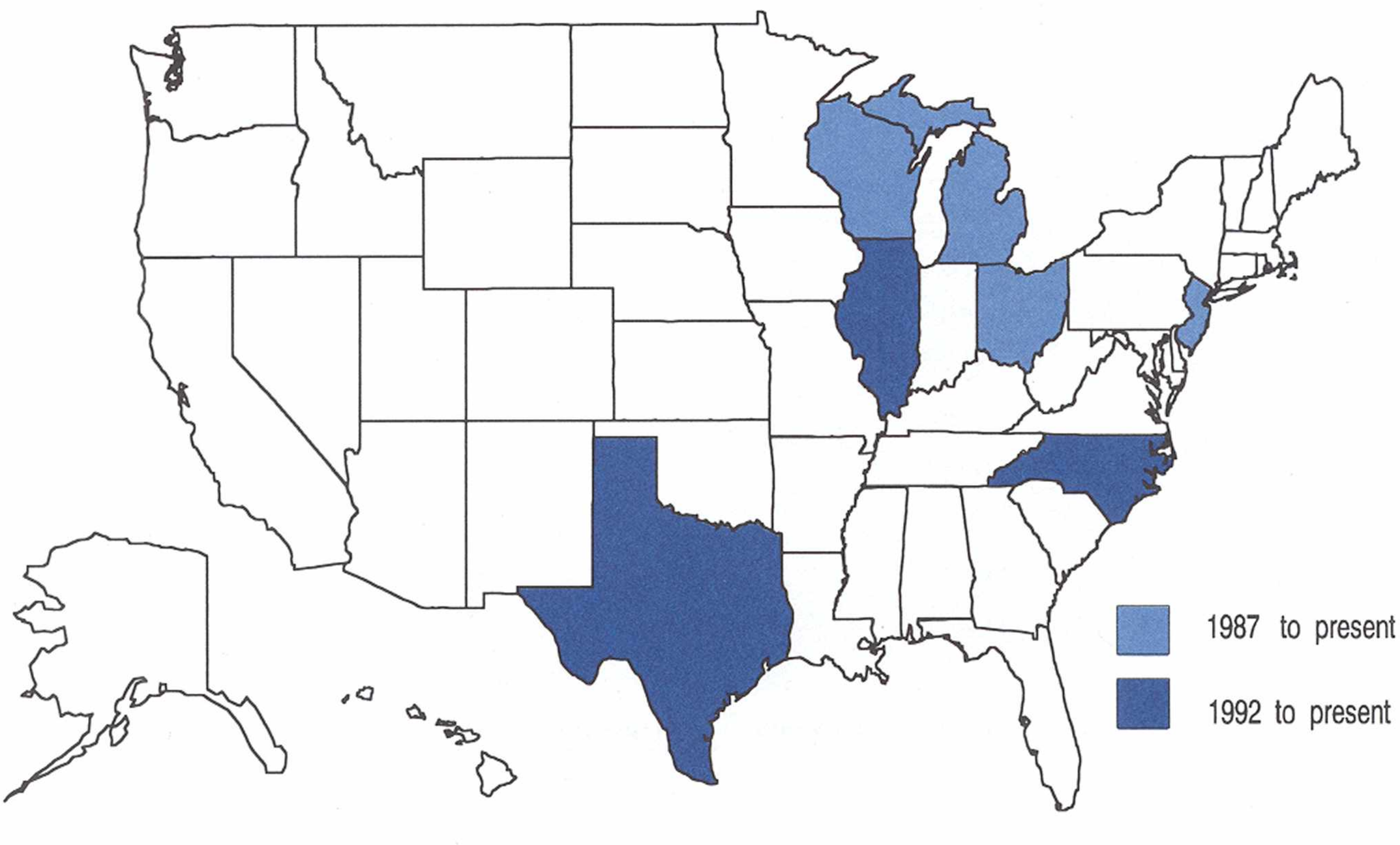


Table 4-13. Silicosis: number of confirmed cases reported, by state, race/ethnicity, and sex, 1988-1992*

Race/ethnicity	Sex	MI	NJ	OH	WI	TOTAL
White	Male	129	61	46	19	**255**
	Female	6	16	6	-	**28**
Black	Male	90	14	12	17	**133**
	Female	-	1	-	-	**1**
Hispanic	Male	5	2	-	1	**8**
	Female	-	1	-	-	**1**
Asian	Male	-	-	-	-	**-**
	Female	-	-	-	-	**-**
Other	Male	-	14	-	-	**14**
	Female	-	-	-	-	**-**
Unknown	Male	1	2	3	1	**7**
	Female	-	-	-	-	**-**
TOTAL		**231**	**111**	**67**	**38**	**447**

* Provisional data as of April 1993.

NOTE: MI (Michigan); NJ (New Jersey); OH (Ohio); WI (Wisconsin)

SOURCE: MJ Reilly, KD Rosenman, Michigan SENSOR; MJ Stanbury, New Jersey SENSOR; NA Migliozzi, ES Socie, Ohio SENSOR; HA Anderson, Wisconsin SENSOR.

- indicates no cases in category.

Table 4-14. Silicosis: number of confirmed cases reported, by duration of exposure to silica by state, 1988-1992

	Duration of exposure					
	< 10 years	10-20 years	21-30 years	>30 years	Unknown	
State	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	TOTAL
Michigan	25 (10.8)	45 (19.5)	69 (29.9)	85 (36.8)	7 (3.0)	**231**
New Jersey	18 (16.2)	22 (19.8)	16 (14.4)	29 (26.1)	26 (23.4)	**111**
Ohio	2 (3.0)	10 (14.9)	11 (16.4)	8 (11.9)	36 (53.7)	**67**
Wisconsin	3 (7.9)	15 (39.5)	13 (34.2)	6 (15.8)	1 (2.6)	**38**
TOTAL	**48 (10.7)**	**92 (20.6)**	**109 (24.4)**	**128 (28.6)**	**70 (15.7)**	**447**

NOTE: See Table 4-13 footnotes.

SOURCE: MJ Reilly, KD Rosenman, Michigan SENSOR; MJ Stanbury, New Jersey SENSOR; NA Migliozzi, ES Socie, Ohio SENSOR; HA Anderson, Wisconsin SENSOR.

Table 4-15. Silicosis: primary industries where silica exposure occurred for confirmed cases reported, by state, 1988-1992

Industry	SIC	MI	NJ	OH	WI	TOTAL
Agriculture, Forestry, and Fisheries	01-09	-	-	-	-	-
Mining	10-14	9	9	2	1	**21**
Construction	15-17	1	7	1	1	10
Manufacturing	20-39					
Chemicals and allied products	28	1	2	-	-	3
Rubber and miscellaneous plastics products	30	-	2	5	-	**7**
Stone, clay, glass, and concrete products	32	14	51	11	1	**77**
Primary metal industries	33	185	20	22	32	**259**
Fabricated metal products, except machinery and transportation equipment	34	5	1	7	-	13
Industrial and commercial machinery and computer equipment	35	2	13	7	2	**24**
Transportation equipment	37	6	2	2	1	**11**
Measuring, analyzing, and controlling instruments; photographic, medical and optical goods; watches and clocks	38	3	1	-	-	**4**
Other manufacturing	22,26,36	1	2	-	-	3
Transportation, Communications, Electric, Gas, and Sanitary Services	40-49	1	1	-	-	2
Wholesale Trade	50-51	-	-	-	-	-
Retail Trade	52-59	-	-	-	-	-
Finance, Insurance and Real Estate	60-67	-	-	-	-	-
Services	70-89	-	-	-	-	-
Public Administration	91-97	-	-	-	-	-
Unknown		3	-	10	-	13
TOTAL		**231**	**111**	**67**	**38**	**447**

SIC - 1987 Standard Industrial Classification

MI (Michigan); NJ (New Jersey); OH (Ohio); WI (Wisconsin)

NOTE: See Table 4-13 footnotes.

SOURCE: MJ Reilly, KD Rosenman, Michigan SENSOR; MJ Stanbury, New Jersey SENSOR; NA Migliozzi, ES Socie, Ohio SENSOR; HA Anderson, Wisconsin SENSOR.

- indicates no cases in category.

Table 4-16. Silicosis: primary occupations where silica exposure occurred for confirmed cases reported, by state, 1988-1992

Occupation	COC	MI	NJ	OH	WI	TOTAL
Managerial and Professional Specialty	003-199	-	3	-	-	**3**
Technical, Sales, and Administrative Support	203-389	3	2	-	-	**5**
Service	403-469	1	1	2	-	**4**
Farming, Forestry, and Fishing	473-499	-	-	-	-	**-**
Precision Production, Craft, and Repair						
Millwrights	544	9	2	1	-	**12**
Mining occupations, n.e.c.	617	6	-	-	1	**7**
Supervisors, production occupations	633	8	2	-	-	**10**
Hand molders and shapers, except jewelers	675	21	-	1	-	**22**
All others*	503-699	8	16	4	-	**28**
Operators, Fabricators, and Laborers						
Grinding, abrading, buffing, and polishing machine operators	709	45	4	1	6	**56**
Molding and casting machine operators	719	20	5	4	11	**40**
Miscellaneous metal and plastic processing machine operators	725	7	1	7	-	**15**
Mixing and blending machine operators	756	3	6	1	2	**12**
Crushing and grinding machine operators	768	3	5	5	-	**13**
Miscellaneous machine operators, n.e.c.	777	7	4	1	-	**12**
Welders and cutters	783	5	-	3	2	**10**
Hand molding, casting, and forming occupations	787	1	7	2	1	**11**
Laborers, except construction	889	41	8	7	2	**58**
All others*	703-889	25	15	13	13	**66**
Unknown		18	30	15	-	**63**
TOTAL		**231**	**111**	**67**	**38**	**447**

COC - 1980 Census Occupation Codes n.e.c. - not elsewhere classified

MI - Michigan; NJ - New Jersey; OH - Ohio; WI - Wisconsin

NOTE: See Table 4-13 footnotes.

SOURCE: MJ Reilly, KD Rosenman, Michigan SENSOR; MJ Stanbury, New Jersey SENSOR; NA Migliozzi, ES Socie, Ohio SENSOR; HA Anderson, Wisconsin SENSOR.

- indicates no cases in category.

* excludes categories shown separately.

Table 4-17. Coal mining occupations and mine area, with the largest estimated number of workers potentially exposed to quartz dust, 1991

Occupation	Mine area	Estimated workers
Bulldozer operator	Surface	8,381
Roof-bolter	Underground face	4,415
Shuttle car operator (on side)	Underground face	3,481
Scoop car operator	Underground face	3,060
Mechanic	Surface	3,064
Mechanic	Underground face	3,005
Laborer; Blacksmith	Surface	2,704
Section foreman	Underground face	2,651
Pan scraper operator	Surface	2,523
Coal truck driver	Surface	2,337
Continuous miner operator	Underground face	2,285
Utility man	Underground face	2,266
Mine foreman, Mine manager	Administration/Management	2,058
All other occupations potentially exposed to quartz		19,765
TOTAL		**61,986**

NOTE: Occupations with more than 2,000 workers are listed. See Appendix B for methods.
SOURCE: National Occupational Health Survey of Mining, NIOSH.
Mine Safety and Health Administration Address and Employment Data (1991).
Mine Safety and Health Administration Respirable Coal Mine Quartz Dust Data (1991).

Table 4-18. Non-coal mining occupations and activity area, with the largest estimated number of workers potentially exposed to quartz dust, 1991

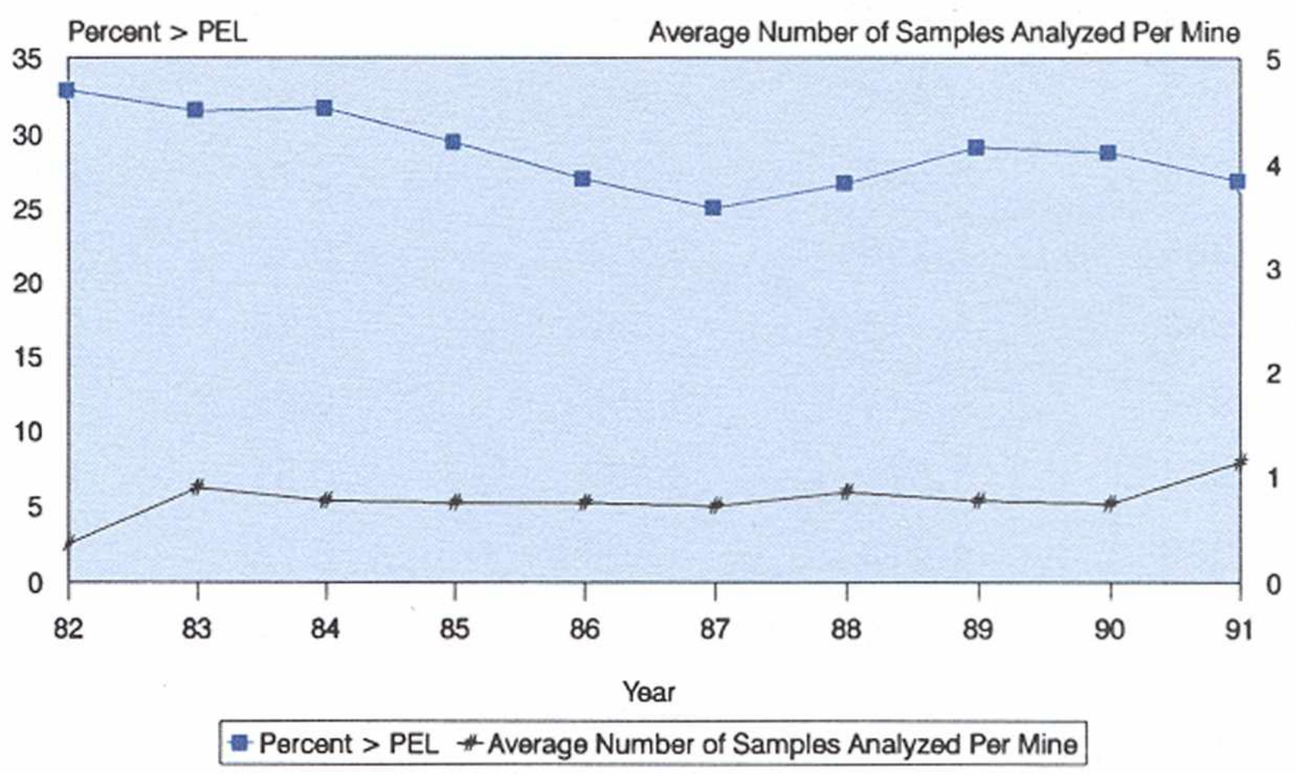
Occupation	Activity area	Estimated workers
Mechanic	Maintenance	17,493
Supervisors	Miscellaneous	10,271
Laborer, bullgang	Maintenance	8,353
Truck driver	Load/haul/dump	6,618
Front-end loader operator	Load/haul/dump	5,127
Crusher, operator	Ore/mineral processing	4,794
Electrician	Maintenance	4,379
Complete load/haul/dump cycle	Load/haul/dump	3,629
Welder	Maintenance	2,946
Greaser, oiler	Maintenance	2,260
Cleanup man	Maintenance	2,248
Ball, rod, pebble mill operator	Ore/mineral processing	2,228
Laboratory technician	Miscellaneous	2,092
Bulldozer operator	Load/haul/dump	1,944
Slurry, mixing or pumping worker	Ore/mineral processing	1,566
Sizing and washing operations worker	Ore/mineral processing	1,535
Barge/boat/dredge operator	Load/haul/dump	1,362
Dryer operator; kiln operator	Ore/mineral processing	1,250
Dragline operator	Load/haul/dump	1,185
Utility man	Development and production	1,125
All other occupations potentially exposed to quartz		17,442
TOTAL		**99,847**

NOTE: Occupations with more than 1,000 workers are listed. See Appendix B for methods.
SOURCE: National Occupation Health Survey of Mining, NIOSH.
Mine Safety and Health Administration Address and Employment Data (1991).

- In the decade from 1982 to 1991, the average number of dust samples analyzed by MSHA, per underground and surface coal mines, for respirable quartz ranged from 0.4 to 1.1. These samples of respirable coal mine dust were collected by MSHA inspectors. The percent of respirable quartz samples above the permissible exposure limit (PEL) ranged between 25 and 33%.

- See Table 4-19 for data.

Figure 4-6. Respirable quartz: average number of respirable coal mine dust samples analyzed for quartz by MSHA per mine, and percent above PEL, U.S. coal mines, 1982-1991



- MSHA's non-coal analytical laboratory changed to a different quartz reference standard on April 1, 1988, thereby affecting the percent of respirable quartz samples over the PEL. Since 1988, an annual decline in the percentage of respirable quartz samples above the PEL for non-coal mines is observed.

- See Table 4-20 for data.

- See Appendix A for additional information concerning the quartz reference standard and MIDAS respirable quartz data.

Figure 4-7. Respirable quartz: average number of respirable dust samples with >1% quartz, collected by MSHA inspectors per mine, and percent above PEL, U.S. non-coal mines, 1982-1991

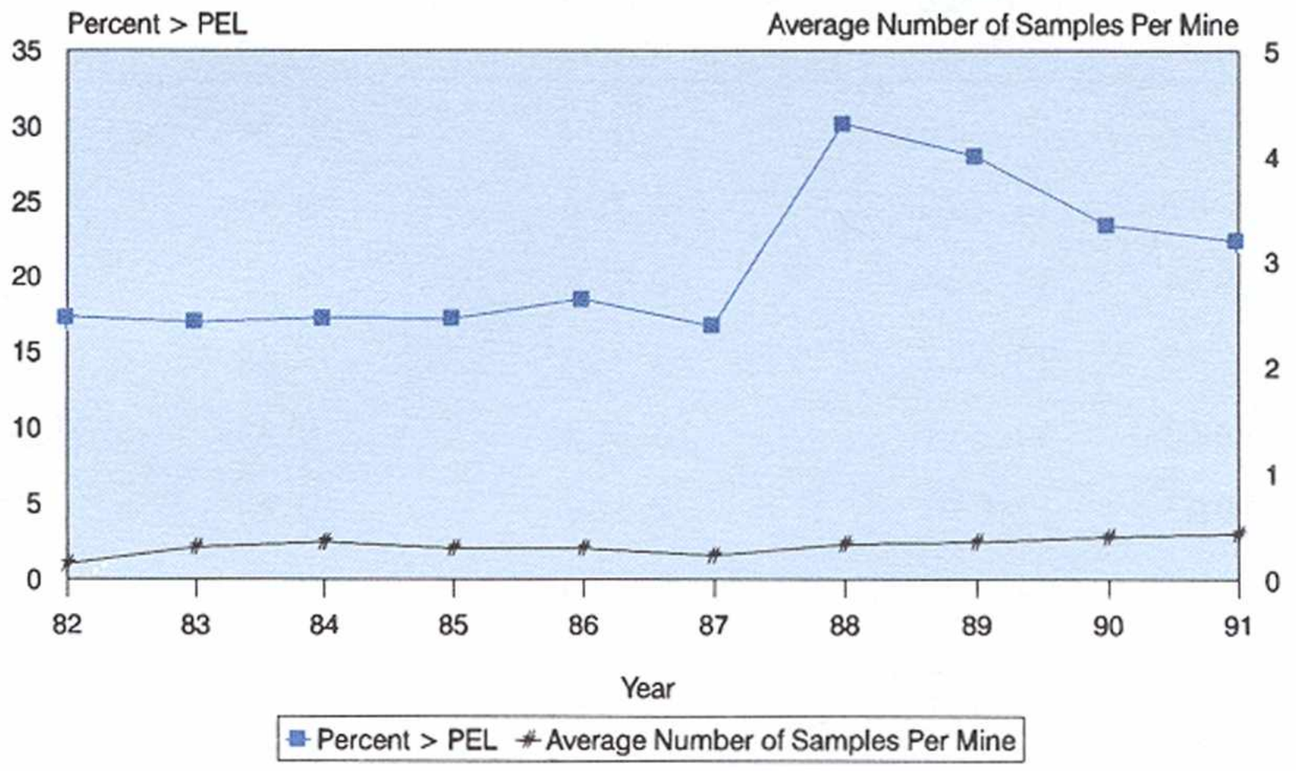


Table 4-19. Respirable quartz: number of MSHA inspector samples analyzed for quartz and percent exceeding various levels, U.S. coal mines, 1982-1991

Year	Number of active mines	Total number of samples	Average samples per mine	Samples > PEL	Percent of samples > PEL	Samples > 2x PEL	Percent of samples > 2x PEL
1982	6,861	2,491	0.36	818	32.84	359	14.41
1983	5,496	4,893	0.89	1,542	31.51	690	14.10
1984	5,538	4,291	0.77	1,360	31.69	601	14.01
1985	5,256	3,918	0.75	1,154	29.45	463	11.82
1986	5,115	3,853	0.75	1,041	27.02	436	11.32
1987	4,918	3,556	0.72	890	25.03	351	9.87
1988	4,674	3,983	0.85	1,064	26.71	466	11.70
1989	4,414	3,400	0.77	990	29.12	401	11.79
1990	4,320	3,208	0.74	922	28.74	409	12.75
1991	4,025	4,583	1.14	1,232	26.88	485	10.58

NOTE: Due to apparent differential accounting, some differences in annual number of samples will be observed when comparing NIOSH and MSHA tabulations of these data. MSHA analyzes a portion of each year's respirable coal mine dust inspector samples for quartz. At 100% quartz, the PEL is 0.1 mg/m^3 MRE. See Appendix A for additional information.

SOURCE: U.S. Department of Labor, Mine Safety and Health Administration (MSHA), Respirable coal mine quartz dust data, 1982-1991.

Table 4-20. Respirable quartz: number of respirable dust samples with > 1% quartz, collected by MSHA inspectors and percent exceeding various levels, U.S. non-coal mines, 1982-1991

Year	Number of active mines	Total number of samples with >1% quartz	Average samples per mine	Samples > PEL	Percent of samples > PEL	Samples > 2x PEL	Percent of samples > 2x PEL
1982	11,298	1,636	0.14	283	17.30	110	6.72
1983	11,290	3,399	0.30	577	16.98	217	6.38
1984	11,294	3,968	0.35	683	17.21	267	6.73
1985	11,832	3,384	0.29	581	17.17	233	6.89
1986	11,741	3,383	0.29	624	18.45	234	6.92
1987	11,614	2,560	0.22	427	16.68	186	7.27
1988	11,808	3,855	0.33	1,164	30.19	500	12.97
1989	11,765	4,082	0.35	1,146	28.07	514	12.59
1990	11,838	4,695	0.40	1,099	23.41	458	9.76
1991	11,596	5,018	0.43	1,121	22.34	461	9.19

NOTE: MIDAS records the quartz content for those samples which contain more than 1% quartz. Tabulations reported here are based on those data only. At 100% quartz the PEL is 0.098 mg/m^3. MSHA's metal/nonmetal analytical laboratory changed to a different quartz reference standard on April 1, 1988. See Appendix A for additional information.

SOURCE: Bureau of Mines (BOM), Mine Inspection Data Analysis System (MIDAS).

- The percentage of quartz samples collected by OSHA inspectors above the PEL ranged between 30 and 42%. The total number of samples collected annually declined from a maximum of 1,159 in 1982 to a minimum of 429 in 1991.

- See Table 4-21 for data.

Figure 4-8. Respirable quartz: number of samples collected by OSHA inspectors and percent above PEL, U.S. general industry, 1982-1991

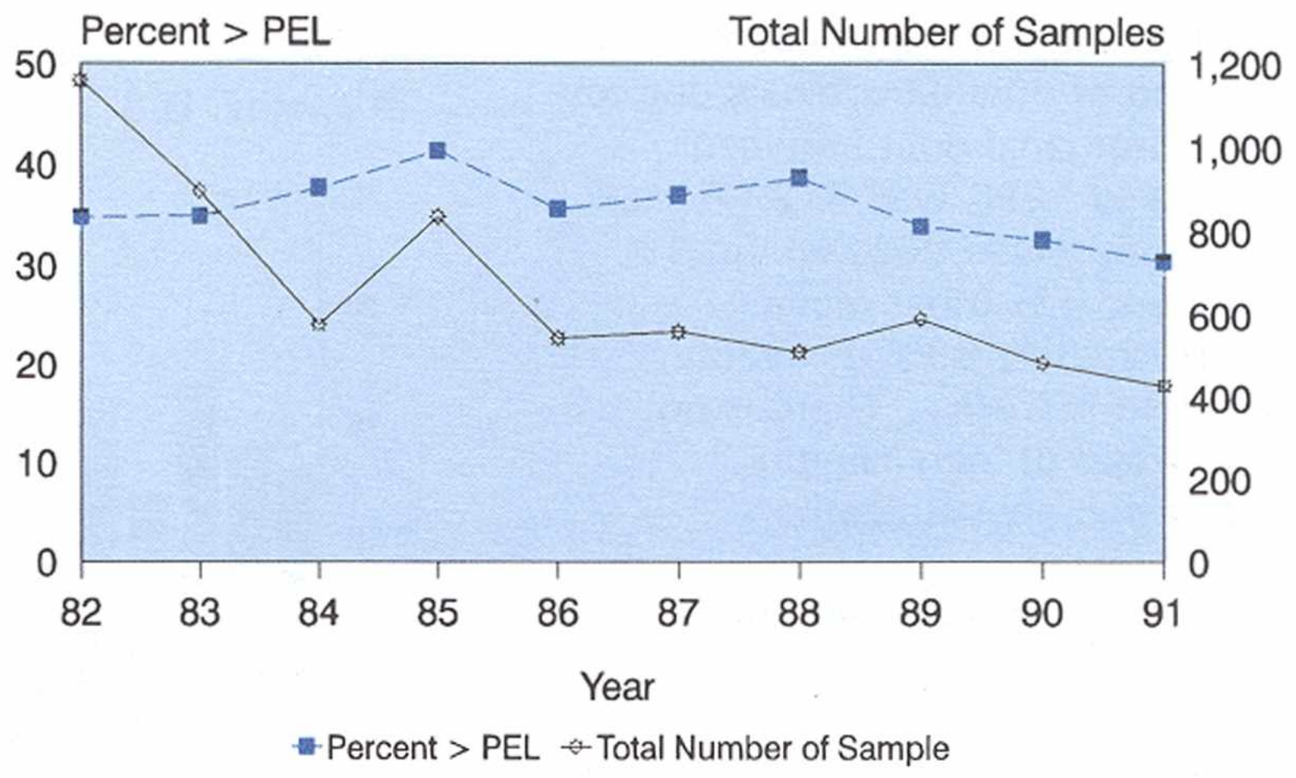


Table 4-21. Respirable quartz: number of samples collected by OSHA inspectors and percent exceeding various levels, U.S. general industry, 1982-1991

Year	Total number of samples	Samples > PEL	Percent of samples > PEL	Samples > 2x PEL	Percent of samples > 2x PEL	Complaint inspection samples	
						Number	% of total
1982	1,159	402	34.69	175	15.10	108	9.32
1983	897	312	34.78	147	16.39	97	10.81
1984	577	217	37.61	110	19.06	111	19.24
1985	836	345	41.27	183	21.89	211	25.24
1986	544	193	35.48	101	18.57	128	23.53
1987	559	206	36.85	120	21.47	158	28.26
1988	511	197	38.55	99	19.37	202	39.53
1989	590	199	33.73	95	16.10	185	31.36
1990	484	157	32.44	88	18.18	189	39.05
1991	429	130	30.30	78	18.18	153	35.66

NOTE: At 100% quartz, the PEL is 0.098 mg/m^3.

SOURCE: Occupational Safety and Health Administration (OSHA) Integrated Management Information System (IMIS) data files.

PNEUMOCONIOSIS DUE TO OTHER INORGANIC DUST

Mortality

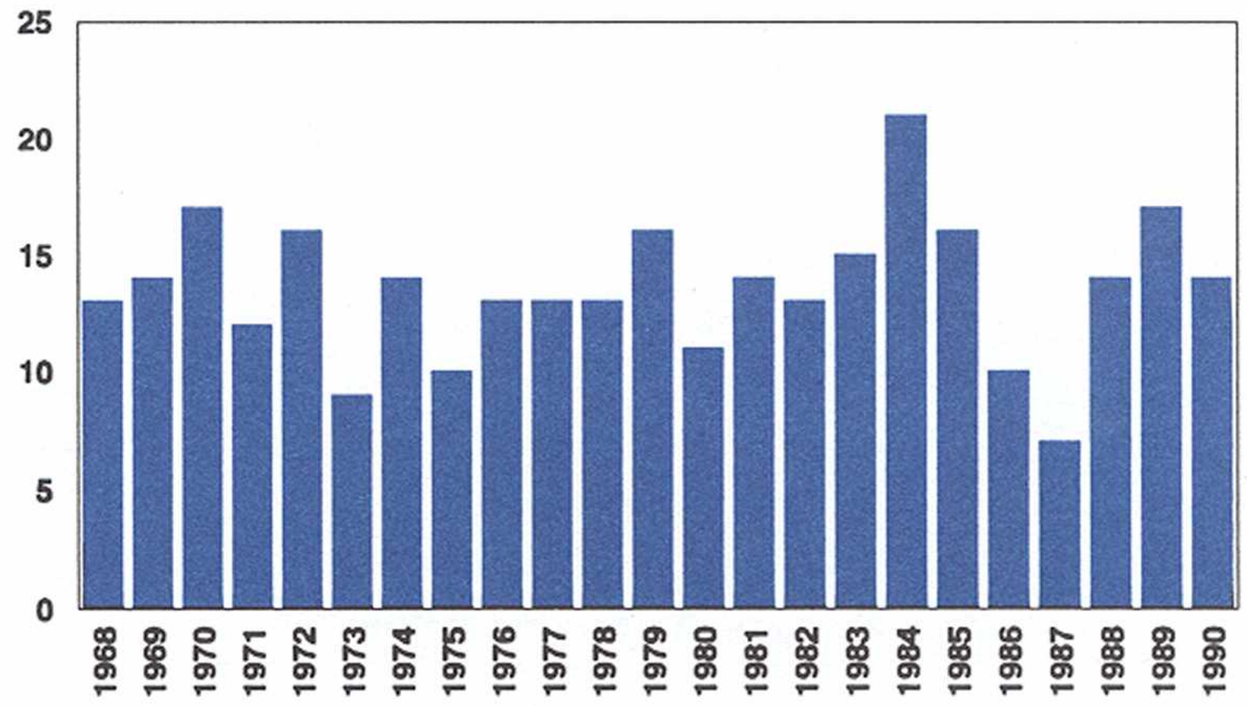
Pneumoconiosis due to other inorganic dust includes ICD-8 code 516.0 for 1968-1978 and ICD-9 code 503 for 1979-1990.

- The total number of deaths with mention of pneumoconiosis due to other inorganic dust between 1968 and 1990 was 312. Racial distribution was 90% white, 9% black and 1% other races. Approximately 69% of deaths occurred in males. There is no clear trend of increasing or decreasing annual deaths.

- See Tables 5-3, 5-4, and 5-5 for data.

- See Appendix A for information about multiple cause of death data.

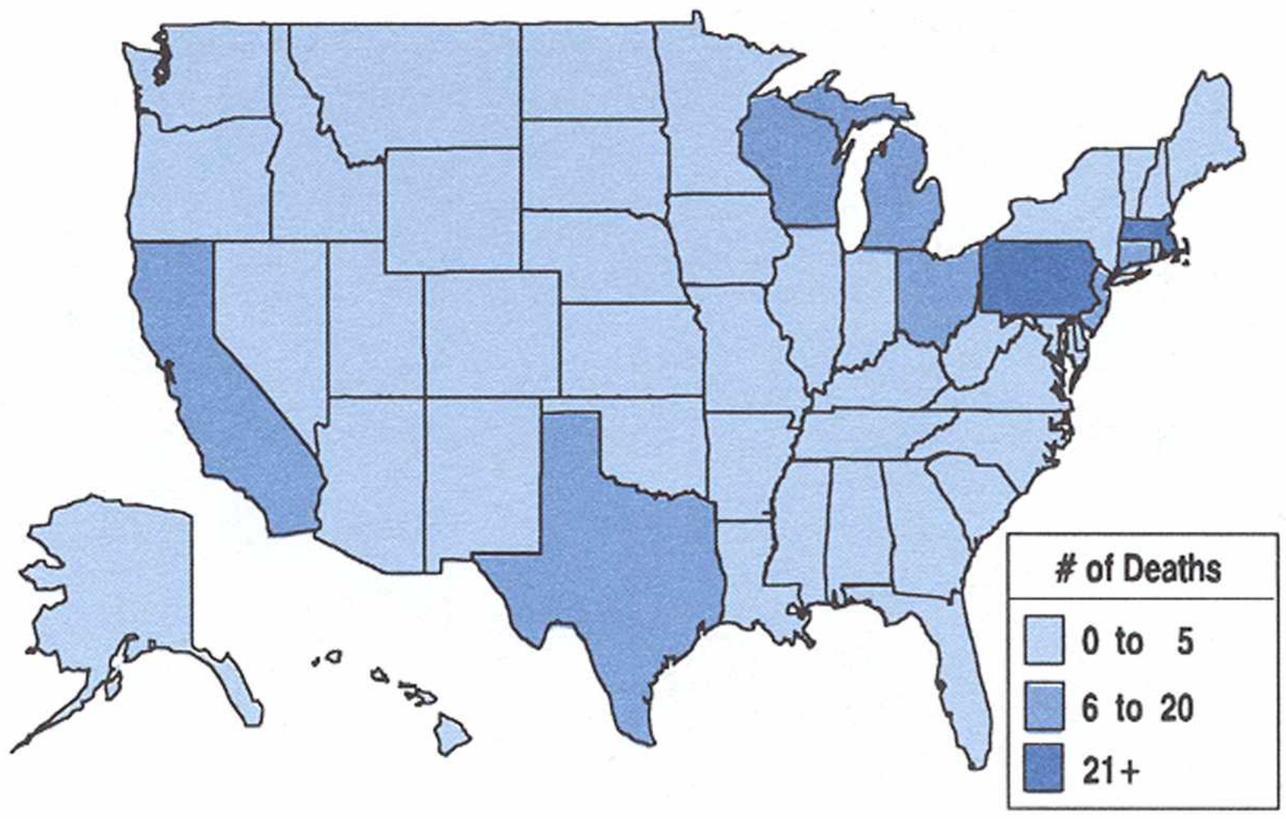
Figure 5-1. Pneumoconiosis due to other inorganic dust: number of deaths, U.S. residents age 15 and over, 1968-1990



- Pennsylvania had the highest number of deaths with pneumoconiosis due to other inorganic dust (n = 22) between 1979 and 1990. Other states which ranked in the top five were Ohio, Massachusetts, New Jersey, and California.

- See Table 5-5 for data.

Figure 5-2. Pneumoconiosis due to other inorganic dust: number of deaths, U.S. residents age 15 and over, by state, 1979-1990

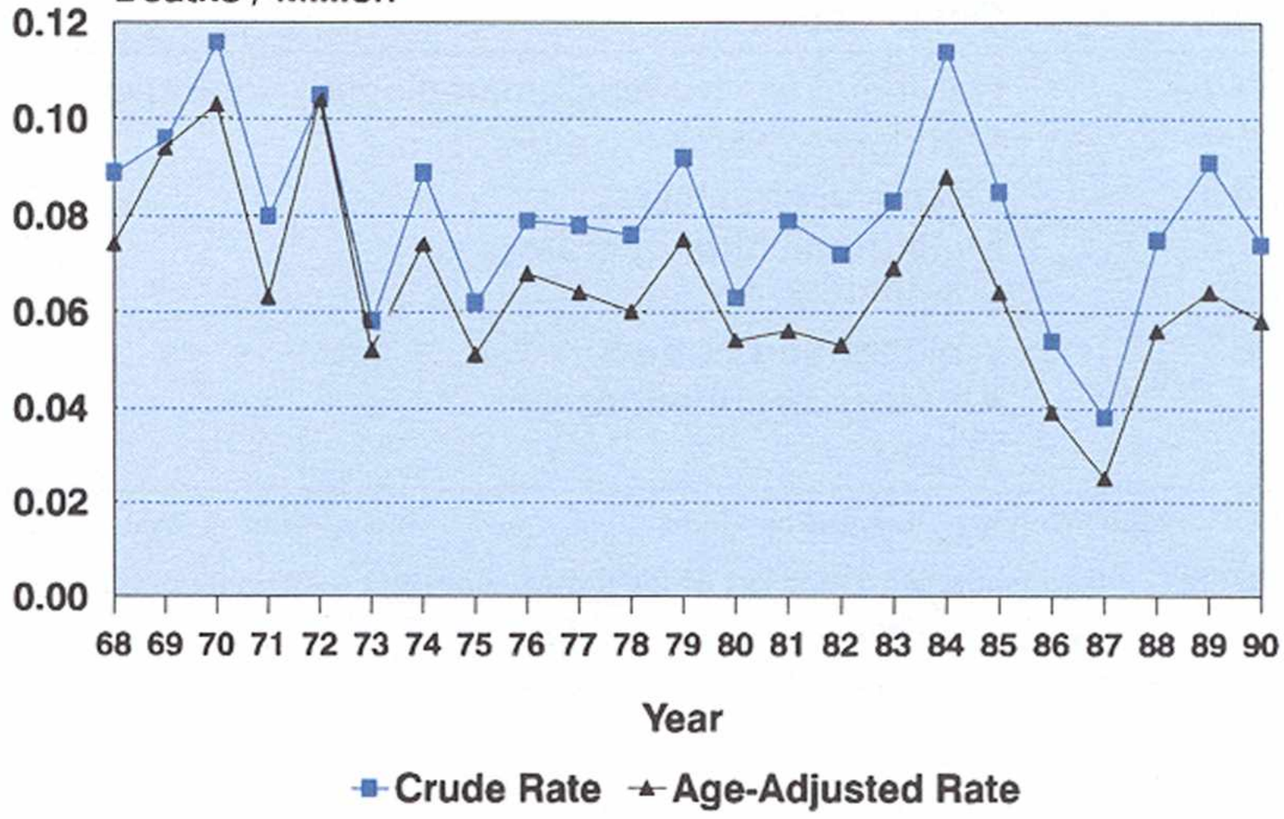


- The crude and age-adjusted mortality rates fluctuated between 1968 and 1990. Overall crude mortality rates decreased by 22%. The age-adjusted mortality rate also decreased by 14% from 1968 to 1990.

- See Tables 5-6 and 5-7 for data.

- See Appendix B for methods.

Figure 5-3. Pneumoconiosis due to other inorganic dust: crude and age-adjusted mortality rates, U.S. residents age 15 and over, 1968-1990



- The crude mortality rates for pneumoconiosis due to other inorganic dust were less than one death per million in all states. States which ranked in the top five in this period were District of Columbia, Maine, Pennsylvania, West Virginia, and Washington.

- See Table 5-10 for data.

Figure 5-4. Pneumoconiosis due to other inorganic dust: crude mortality rates, U.S. residents age 15 and over, by state, 1989-1990

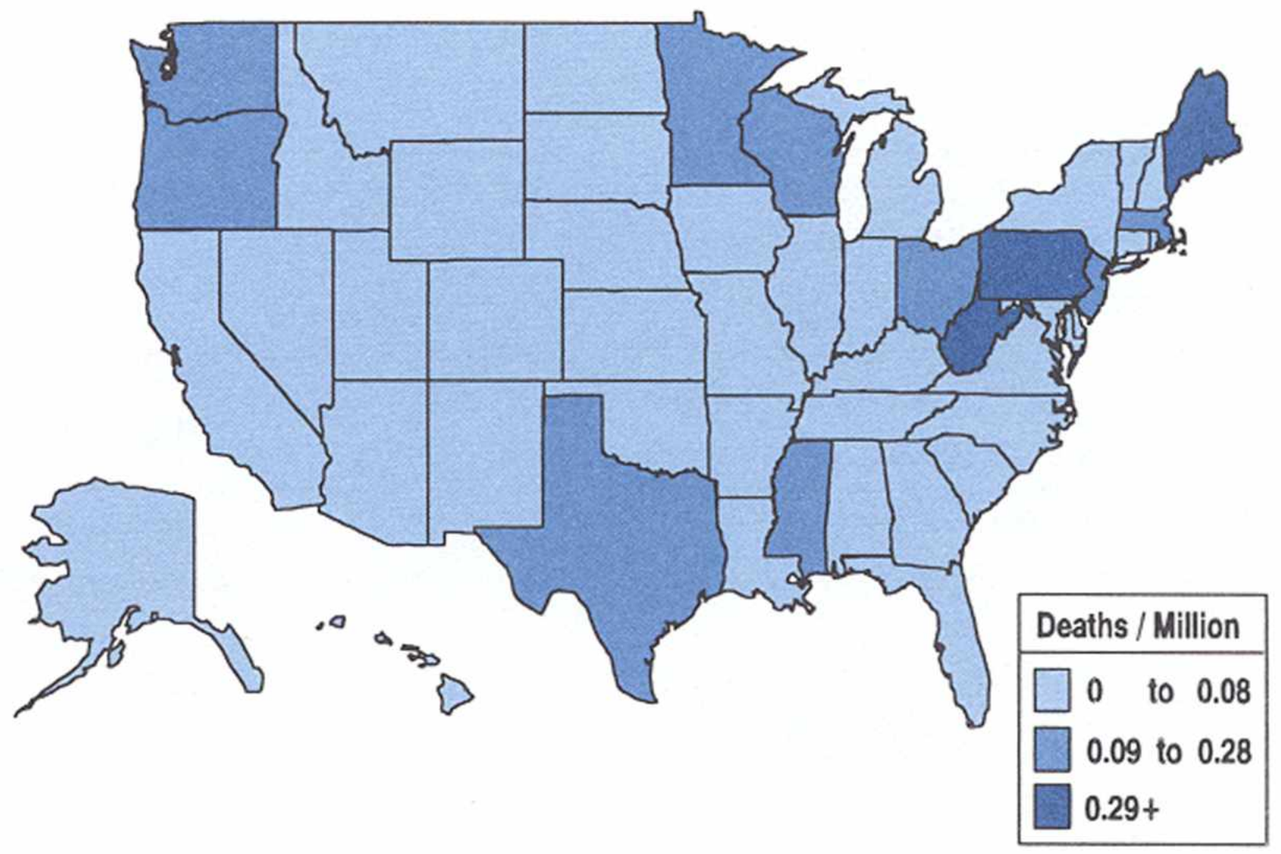


Table 5-1. Pneumoconiosis due to other inorganic dust: most frequently recorded occupations on death certificate, U.S. residents age 15 and over, selected states and years, 1985-1990

COC	Occupation	Number	Percent
914	Homemaker, student, unemployed, volunteer	4	16.7
019	Managers, administrators, n.e.c.	2	8.3
048	Chemical engineers	2	8.3
616	Mining machine operators	2	8.3
637	Machinists	2	8.3
783	Welders and cutters	2	8.3
	All other occupations	10	41.7
	TOTAL	**24**	**100.0**

COC - 1980 Census Occupation Code n.e.c. - not elsewhere classified

NOTE: See Appendix C for list of 25 states reporting usual occupation and years reporting. Percentages may not total to 100% due to rounding.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.

Table 5-2. Pneumoconiosis due to other inorganic dust: most frequently recorded industries on death certificate, U.S. residents age 15 and over, selected states and years, 1985-1990

CIC	Industry	Number	Percent
961	Homemaker, student , unemployed, volunteer	4	16.7
041	Coal mining	2	8.3
060	Construction	2	8.3
342	Manufacturing of electrical machinery, equipment and supplies, n.e.c.	2	8.3
	All other industries	14	58.4
	TOTAL	**24**	**100.0**

CIC - 1980 Census Industry Code n.e.c. - not elsewhere classified

NOTE: See Appendix C for list of 25 states reporting usual industry and years reporting. Percentages may not total to 100% due to rounding.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.

Table 5-3. Pneumoconiosis due to other inorganic dust: number of deaths, U.S. residents age 15 and over, by age, race, and sex, 1968-1990

Years		1968-1978		1979-1990		1989-1990	
Total Deaths		144	%	168	%	31	%
Sex	Male	97	67.4	117	69.6	24	77.4
	Female	47	32.6	51	30.4	7	22.6
Race	White	131	91.0	151	89.9	30	96.8
	Black	12	8.3	17	10.1	1	3.2
	Other	1	0.7	0	0.0	0	0.0
Race/Sex	White Male	86	59.7	100	59.5	23	74.2
	White Female	45	31.2	51	30.4	7	22.6
	Black Male	10	6.9	17	10.1	1	3.23
	Black Female	2	1.4	0	0.0	0	0.0
	Other Male	1	0.7	0	0.0	0	0.0
	Other Female	0	0.0	0	0.0	0	0.0
Age	Years						
	15-24	5	3.5	0	0.0	0	0.0
	25-34	5	3.5	4	2.4	0	0.0
	35-44	10	6.9	5	3.0	2	6.5
	45-54	34	23.6	13	7.7	3	9.7
	55-64	42	29.2	58	34.5	7	22.6
	65-74	28	19.4	50	29.8	11	35.5
	75-84	16	11.1	26	15.5	6	19.4
	85 and Over	4	2.8	12	7.1	2	6.5
	Mean	58.1		65.9		66.3	
	Range	18-88		31-93		37-87	

NOTE: See Appendix B for methods. Percentages may not total to 100% due to rounding.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.

Mortality

Table 5-4. Pneumoconiosis due to other inorganic dust: number of deaths, U.S. residents age 15 and over, by state, 1968-1978

State	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	TOTAL
Alabama	-	1	-	-	2	-	1	-	1	-	2	7
Alaska	-	-	-	-	-	-	-	-	-	-	-	-
Arizona	-	1	-	-	-	-	-	-	-	-	-	1
Arkansas	-	-	-	-	-	-	-	-	-	-	-	-
California	2	-	1	4	2	1	1	-	-	1	-	12
Colorado	1	-	1	-	-	-	-	-	-	-	-	2
Connecticut	-	1	-	-	-	-	-	-	-	-	-	1
Delaware	-	-	-	-	-	-	-	-	-	-	-	-
District of Columbia	-	-	-	-	-	-	-	-	-	-	-	-
Florida	-	-	2	2	-	1	-	1	1	-	-	7
Georgia	-	-	1	-	-	1	-	-	-	-	-	2
Hawaii	-	-	-	-	-	-	1	-	-	-	-	1
Idaho	-	-	-	-	-	-	-	-	-	-	-	-
Illinois	1	-	-	-	-	-	1	1	-	-	-	3
Indiana	-	-	-	-	-	-	-	-	-	-	-	-
Iowa	-	-	-	-	-	-	-	-	-	-	-	-
Kansas	-	-	-	-	-	-	-	-	-	-	-	-
Kentucky	1	-	-	-	-	-	-	-	1	-	-	2
Louisiana	-	-	-	-	-	-	1	-	-	-	-	1
Maine	-	-	-	-	-	-	-	-	-	-	-	-
Maryland	-	-	-	-	-	1	-	-	-	-	-	1
Massachusetts	-	2	4	-	-	-	2	1	2	1	3	15
Michigan	1	1	-	1	-	-	2	1	2	-	1	9
Minnesota	-	-	1	-	-	-	-	-	-	1	-	2
Mississippi	-	-	-	-	-	-	-	-	-	-	-	-
Missouri	-	-	-	-	-	-	-	-	-	-	-	-
Montana	-	-	-	-	-	-	-	-	-	-	-	-
Nebraska	-	-	-	-	-	-	-	-	-	-	-	-
Nevada	-	-	-	-	-	-	-	-	-	-	-	-
New Hampshire	-	-	-	-	-	-	-	-	-	-	-	-
New Jersey	2	1	4	1	2	1	-	-	1	3	-	15
New Mexico	-	-	-	-	-	-	-	-	-	-	-	-
New York	-	-	-	1	-	1	2	-	1	-	-	5
North Carolina	-	-	-	-	-	-	-	-	-	-	-	-
North Dakota	-	-	-	-	-	-	-	-	-	-	-	-
Ohio	3	2	1	3	6	1	1	1	2	1	4	25
Oklahoma	-	-	-	-	-	-	-	-	-	-	-	-
Oregon	-	-	-	-	-	-	-	1	-	-	-	1
Pennsylvania	2	4	-	-	2	2	-	3	2	2	1	18
Rhode Island	-	-	-	-	-	-	-	-	-	-	-	-
South Carolina	-	-	-	-	-	-	-	-	-	-	-	-
South Dakota	-	-	-	-	-	-	-	-	-	1	-	1
Tennessee	-	-	-	-	-	-	-	1	-	-	-	1
Texas	-	1	1	-	2	-	-	-	-	1	1	6
Utah	-	-	-	-	-	-	-	-	-	1	-	1
Vermont	-	-	-	-	-	-	-	-	-	-	-	-
Virginia	-	-	-	-	-	-	-	-	-	-	-	-
Washington	-	-	1	-	-	-	1	-	-	-	-	2
West Virginia	-	-	-	-	-	-	-	-	-	-	-	-
Wisconsin	-	-	-	-	-	-	-	-	-	-	1	1
Wyoming	-	-	-	-	-	-	1	-	-	-	-	1
TOTAL	**13**	**14**	**17**	**12**	**16**	**9**	**14**	**10**	**13**	**13**	**13**	**144**

NOTE: See Appendix B for methods.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.

- indicates quantity zero.

Table 5-5. Pneumoconiosis due to other inorganic dust: number of deaths, U.S. residents age 15 and over, by state, 1979-1990

State	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	TOTAL
Alabama	2	-	-	-	1	-	1	-	-	-	-	-	4
Alaska	-	-	-	-	-	-	-	-	-	-	-	-	-
Arizona	-	-	-	-	-	-	-	-	-	-	-	-	-
Arkansas	-	-	-	-	-	-	-	-	-	-	-	-	-
California	3	-	-	6	1	2	2	-	-	-	-	-	14
Colorado	-	-	-	-	-	-	-	-	-	-	-	-	-
Connecticut	1	3	1	1	1	1	-	-	-	1	-	-	9
Delaware	-	-	-	-	-	-	-	-	-	-	-	-	-
District of Columbia	-	-	-	-	-	-	-	-	-	-	1	-	1
Florida	1	-	-	-	1	-	-	-	1	-	1	-	4
Georgia	-	-	2	-	-	-	1	-	-	-	-	-	3
Hawaii	-	-	-	-	-	-	-	-	-	-	-	-	-
Idaho	-	-	-	-	-	-	-	-	-	-	-	-	-
Illinois	-	1	-	-	-	-	-	1	-	-	1	-	3
Indiana	-	-	-	-	-	-	-	-	-	-	-	-	-
Iowa	-	-	-	-	-	-	-	-	-	-	-	-	-
Kansas	-	-	-	-	-	-	-	-	-	-	-	-	-
Kentucky	1	-	-	2	-	-	-	-	1	-	-	-	4
Louisiana	-	-	-	-	-	-	1	1	1	-	-	-	3
Maine	-	-	-	-	-	1	-	-	-	-	1	-	2
Maryland	1	-	1	-	-	-	-	-	-	1	-	-	3
Massachusetts	1	1	4	1	4	4	1	1	1	2	1	-	21
Michigan	1	-	-	1	-	1	-	-	-	2	-	1	6
Minnesota	-	-	-	-	-	-	-	1	-	-	1	-	2
Mississippi	-	-	-	-	-	-	-	-	-	-	1	-	1
Missouri	-	-	-	-	-	-	-	-	-	-	-	-	-
Montana	-	-	-	-	-	-	-	-	-	-	-	-	-
Nebraska	-	-	-	-	-	-	-	-	-	-	-	-	-
Nevada	-	-	-	-	-	-	-	-	-	-	-	-	-
New Hampshire	-	-	-	-	-	1	1	-	-	-	-	-	2
New Jersey	1	2	1	-	2	3	-	1	1	-	1	1	13
New Mexico	-	-	-	-	-	-	-	-	-	1	-	-	1
New York	-	-	1	-	1	1	1	-	-	1	-	-	5
North Carolina	1	-	-	-	-	-	-	1	-	2	-	-	4
North Dakota	-	-	-	-	-	-	-	-	-	-	-	-	-
Ohio	2	2	2	-	2	2	-	2	2	-	-	4	18
Oklahoma	-	-	-	-	-	-	-	-	-	-	-	-	-
Oregon	-	-	-	-	-	-	-	-	-	-	1	-	1
Pennsylvania	1	-	2	1	2	2	3	1	-	1	5	4	22
Rhode Island	-	-	-	-	-	-	-	-	-	-	-	-	-
South Carolina	-	-	-	-	-	-	-	-	-	-	-	-	-
South Dakota	-	-	-	-	-	-	-	-	-	-	-	-	-
Tennessee	-	-	-	-	-	-	-	-	-	-	-	-	-
Texas	-	-	-	-	-	-	2	-	-	1	2	1	6
Utah	-	-	-	-	-	-	-	1	-	-	-	-	1
Vermont	-	-	-	-	-	-	-	-	-	1	-	-	1
Virginia	-	2	-	-	-	1	2	-	-	-	-	-	5
Washington	-	-	-	-	-	1	1	-	-	-	1	1	4
West Virginia	-	-	-	-	-	-	-	-	-	1	-	1	2
Wisconsin	-	-	-	-	-	1	-	-	-	-	-	1	2
Wyoming	-	-	-	1	-	-	-	-	-	-	-	-	1
TOTAL	**16**	**11**	**14**	**13**	**15**	**21**	**16**	**10**	**7**	**14**	**17**	**14**	**168**

NOTE: See Appendix B for methods.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.

- indicates quantity zero.

Table 5-6. Pneumoconiosis due to other inorganic dust: crude mortality rates (per 1,000,000 population), U.S. residents age 15 and over, by race and sex, 1968-1990

		White		Black	
Year	Overall rate	Males	Females	Males	Females
1968	0.09	0.18	0.02	-	0.11
1969	0.10	0.10	0.10	0.13	-
1970	0.12	0.18	0.09	-	-
1971	0.08	0.11	0.04	0.13	0.11
1972	0.10	0.12	0.09	0.24	-
1973	0.06	0.11	0.03	-	-
1974	0.09	0.15	0.03	0.11	-
1975	0.06	0.09	0.04	0.11	-
1976	0.08	0.10	0.07	0.11	-
1977	0.08	0.13	0.05	-	-
1978	0.08	0.06	0.08	0.30	-
1979	0.09	0.08	0.06	0.49	-
1980	0.06	0.08	0.05	0.09	-
1981	0.08	0.11	0.08	-	-
1982	0.07	0.15	-	0.18	-
1983	0.08	0.12	0.06	0.09	-
1984	0.11	0.13	0.10	0.25	-
1985	0.08	0.14	0.05	0.08	-
1986	0.05	0.09	0.04	-	-
1987	0.04	0.05	0.04	-	-
1988	0.08	0.06	0.07	0.30	-
1989	0.09	0.14	0.06	0.10	-
1990	0.07	0.15	0.02	-	-

NOTE: See Appendix B for methods.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.
U.S. Bureau of the Census: 1970-1990 population estimates of the U.S.

- indicates no deaths listed.

Table 5-7. Pneumoconiosis due to other inorganic dust: age-adjusted mortality rates (per 1,000,000 population), U.S. residents age 15 and over, by race and sex, 1968-1990

		White		Black	
Year	Overall rate	Males	Females	Males	Females
1968	0.07	0.15	0.02	-	0.11
1969	0.09	0.09	0.10	0.15	-
1970	0.10	0.16	0.07	-	-
1971	0.06	0.08	0.04	0.10	0.12
1972	0.10	0.12	0.08	0.28	-
1973	0.05	0.10	0.02	-	-
1974	0.07	0.13	0.02	0.10	-
1975	0.05	0.08	0.03	0.13	-
1976	0.07	0.09	0.06	0.10	-
1977	0.06	0.11	0.04	-	-
1978	0.06	0.05	0.06	0.31	-
1979	0.08	0.07	0.04	0.54	-
1980	0.05	0.08	0.04	0.11	-
1981	0.06	0.08	0.04	-	-
1982	0.05	0.11	-	0.19	-
1983	0.07	0.10	0.06	0.07	-
1984	0.09	0.10	0.08	0.29	-
1985	0.06	0.11	0.04	0.10	-
1986	0.04	0.06	0.03	-	-
1987	0.02	0.04	0.02	-	-
1988	0.06	0.05	0.05	0.32	-
1989	0.06	0.11	0.03	0.10	-
1990	0.06	0.13	0.01	-	-

NOTE: See Appendix B for methods.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.
U.S. Bureau of the Census: 1970-1990 population estimates of the U.S.

- indicates no deaths listed.

Table 5-8. Pneumoconiosis due to other inorganic dust: years of potential life lost to age 65, U.S. residents age 15 and over, by race and sex, 1968-1990

		White		Black	
Year	Total	Males	Females	Males	Females
1968	105	85	15	-	5
1969	225	90	110	25	-
1970	170	130	40	-	-
1971	110	30	20	45	15
1972	310	200	80	30	-
1973	70	65	5	-	-
1974	85	55	15	0	-
1975	65	45	5	15	-
1976	110	80	30	0	-
1977	60	55	5	-	-
1978	60	15	20	25	-
1979	90	35	10	45	-
1980	70	50	15	5	-
1981	25	20	5	-	-
1982	30	30	-	0	-
1983	75	45	30	0	-
1984	120	50	55	15	-
1985	90	45	40	5	-
1986	55	10	45	-	-
1987	15	5	10	-	-
1988	50	5	15	30	-
1989	55	30	0	25	-
1990	75	75	0	-	-

NOTE: See Appendix B for methods.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.

- indicates no deaths listed.

Table 5-9. Pneumoconiosis due to other inorganic dust: years of potential life lost to life expectancy, U.S. residents age 15 and over, by race and sex, 1968-1990

		White		Black	
Year	Total	Males	Females	Males	Females
1968	239	177	29	-	18
1969	361	132	204	28	-
1970	367	227	128	-	-
1971	237	88	64	45	26
1972	485	263	165	43	-
1973	180	133	35	-	-
1974	253	158	44	8	-
1975	186	104	45	22	-
1976	269	147	111	9	-
1977	228	148	67	-	-
1978	214	54	113	48	-
1979	288	106	72	83	-
1980	218	112	82	16	-
1981	201	108	86	-	-
1982	189	140	-	22	-
1983	270	140	114	7	-
1984	403	155	186	48	-
1985	285	151	103	16	-
1986	181	82	95	-	-
1987	98	44	52	-	-
1988	232	66	94	57	-
1989	272	151	70	30	-
1990	252	209	22	-	-

NOTE: See Appendix B for methods.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.

- indicates no deaths listed.

PNEUMOCONIOSIS DUE TO OTHER INORGANIC DUST

Mortality

Table 5-10. Pneumocooniosis due to other inorganic dust: number of deaths, crude and age-adjusted mortality rates (per 1,000,000 population), total years of potential life lost (YPLL), U.S. residents age 15 and over, by state, 1989-1990

			Crude mortality		Age-adjusted mortality		YPLL to age 65		YPLL to life expectancy	
State	Deaths	Rank	Rate	Rank	Rate	Rank	Years	Rank	Years	Rank
Alabama	-	17	-	17	-	17	-	17	-	17
Alaska	-	17	-	17	-	17	-	17	-	17
Arizona	-	17	-	17	-	17	-	17	-	17
Arkansas	-	17	-	17	-	17	-	17	-	17
California	-	17	-	17	-	17	-	17	-	17
Colorado	-	17	-	17	-	17	-	17	-	17
Connecticut	-	17	-	17	-	17	-	17	-	17
Delaware	-	17	-	17	-	17	-	17	-	17
District of Columbia	1	6	0.97	1	1.07	1	25	1	38	6
Florida	1	6	0.05	16	0.02	16	0	10	8	14
Georgia	-	17	-	17	-	17	-	17	-	17
Hawaii	-	17	-	17	-	17	-	17	-	17
Idaho	-	17	-	17	-	17	-	17	-	17
Illinois	1	6	0.06	15	0.03	14	0	10	8	14
Indiana	-	17	-	17	-	17	-	17	-	17
Iowa	-	17	-	17	-	17	-	17	-	17
Kansas	-	17	-	17	-	17	-	17	-	17
Kentucky	-	17	-	17	-	17	-	17	-	17
Louisiana	-	17	-	17	-	17	-	17	-	17
Maine	1	6	0.53	2	0.35	2	0	10	14	10
Maryland	-	17	-	17	-	17	-	17	-	17
Massachusetts	1	6	0.11	13	0.07	13	0	10	14	10
Michigan	1	6	0.07	14	0.03	14	0	10	8	14
Minnesota	1	6	0.15	10	0.16	8	5	7	21	8
Mississippi	1	6	0.26	6	0.18	7	0	10	14	10
Missouri	-	17	-	17	-	17	-	17	-	17
Montana	-	17	-	17	-	17	-	17	-	17
Nebraska	-	17	-	17	-	17	-	17	-	17
Nevada	-	17	-	17	-	17	-	17	-	17
New Hampshire	-	17	-	17	-	17	-	17	-	17
New Jersey	2	4	0.17	9	0.15	10	15	4	43	5
New Mexico	-	17	-	17	-	17	-	17	-	17
New York	-	17	-	17	-	17	-	17	-	17
North Carolina	-	17	-	17	-	17	-	17	-	17
North Dakota	-	17	-	17	-	17	-	17	-	17
Ohio	4	2	0.24	7	0.14	11	5	7	49	4
Oklahoma	-	17	-	17	-	17	-	17	-	17
Oregon	1	6	0.23	8	0.24	4	5	7	21	8
Pennsylvania	9	1	0.48	3	0.30	3	20	3	139	1
Rhode Island	-	17	-	17	-	17	-	17	-	17
South Carolina	-	17	-	17	-	17	-	17	-	17
South Dakota	-	17	-	17	-	17	-	17	-	17
Tennessee	-	17	-	17	-	17	-	17	-	17
Texas	3	3	0.12	12	0.11	12	15	4	51	3
Utah	-	17	-	17	-	17	-	17	-	17
Vermont	-	17	-	17	-	17	-	17	-	17
Virginia	-	17	-	17	-	17	-	17	-	17
Washington	2	4	0.28	5	0.22	5	25	1	52	2
West Virginia	1	6	0.36	4	0.22	5	0	10	14	10
Wisconsin	1	6	0.13	11	0.16	8	15	4	29	7
Wyoming	-	17	-	17	-	17	-	17	-	17

NOTE: See Appendix B for methods.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.
U.S. Bureau of the Census: 1989-1990 population estimates of the U.S.

- indicates no deaths listed.

Table 5-11. Pneumoconiosis due to other inorganic dust: proportionate mortality ratios (PMR), based on underlying cause of death, by usual occupation for selected states, 1985-1990

COC	Occupation	Number of deaths	PMR	95% confidence interval LCL	UCL
914	Homemaker, student, unemployed, volunteer	3	1.00	0.21	2.93

COC - 1980 Census Occupation Code

LCL - lower confidence limit UCL - upper confidence limit

NOTE: See Appendix B for methods and Appendix C for list of selected states.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.

UNSPECIFIED PNEUMOCONIOSIS

Mortality

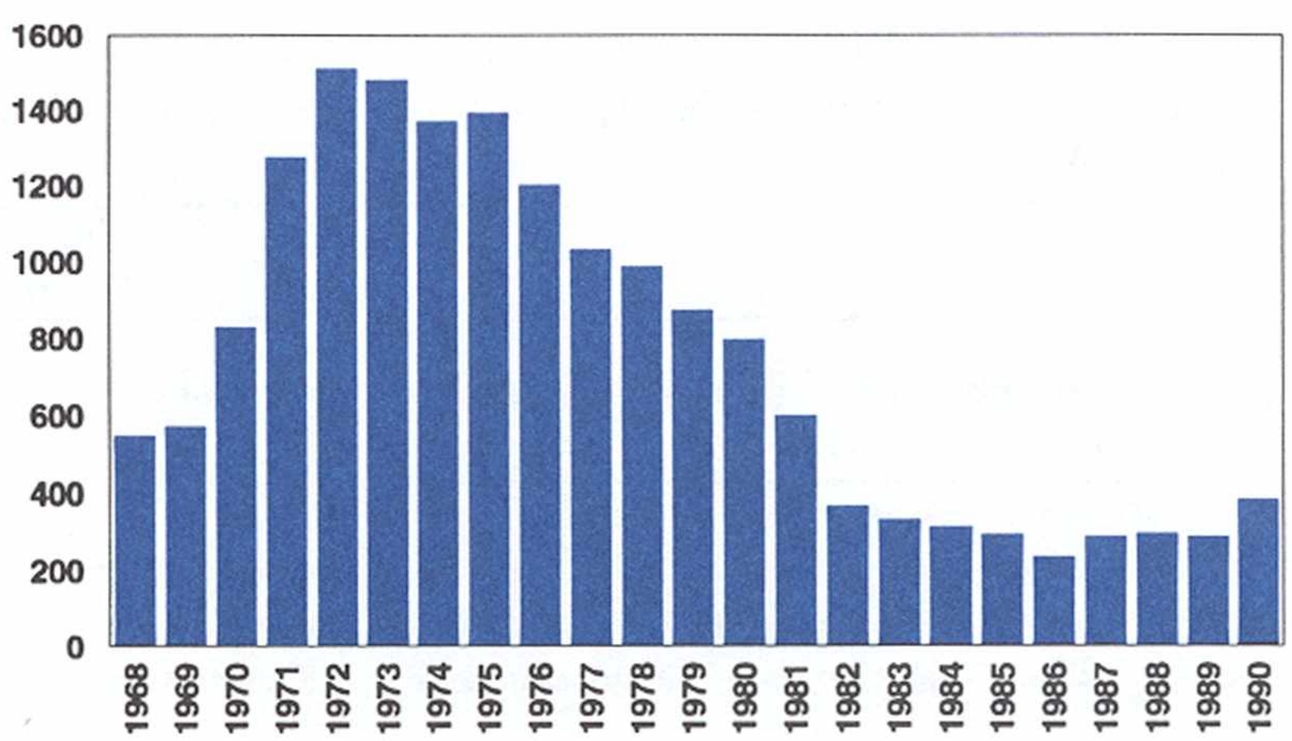
Unspecified pneumoconiosis includes ICD-8 code 515.9 for 1968-1978 and ICD-9 code 505 for 1979-1990.

- The total number of deaths with mention of unspecified pneumoconiosis between 1968 and 1990 was 17,214. The annual number of deaths increased from 546 in 1968 to 1508 in 1972 and then decreased to 381 in 1990.

- See Tables 6-3, 6-4, and 6-5 for data.

- See Appendix A for information about multiple cause of death data.

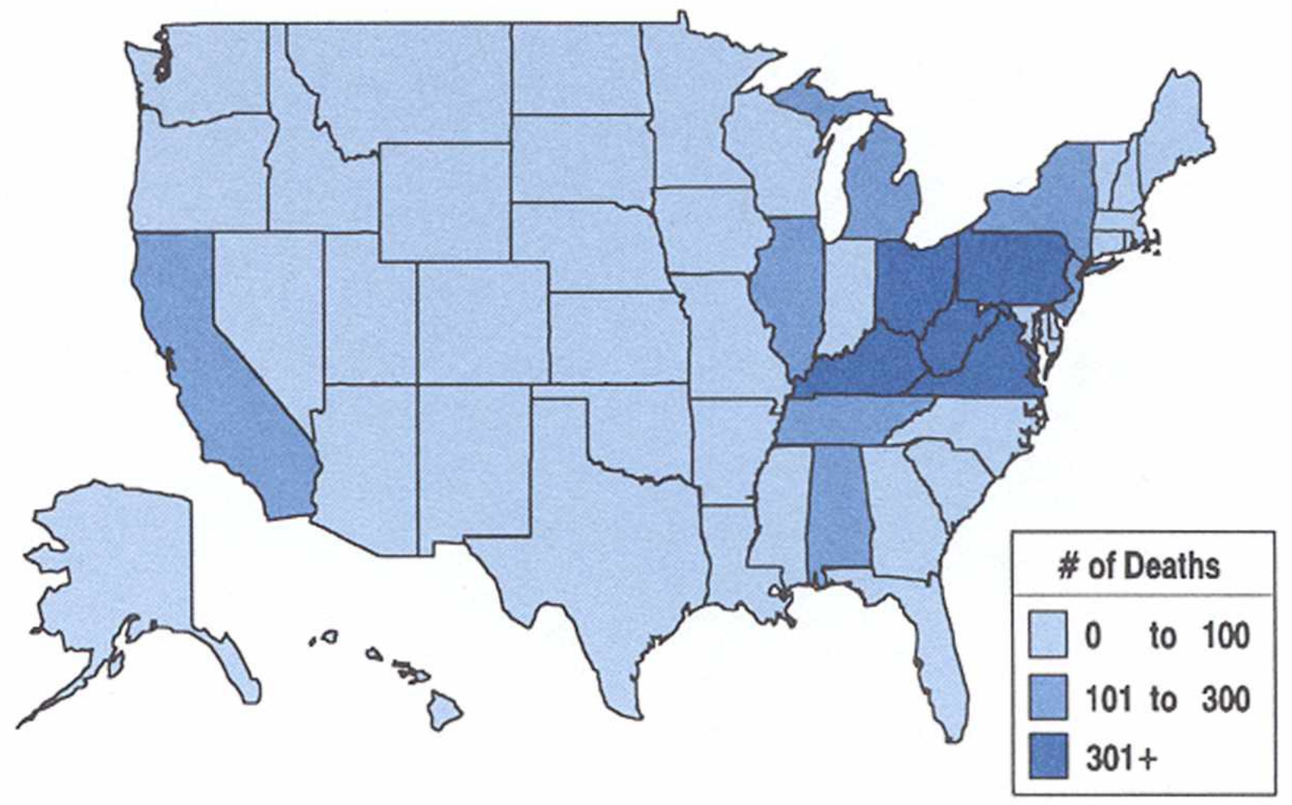
Figure 6-1. Unspecified pneumoconiosis: number of deaths, U.S. residents age 15 and over, 1968-1990



- Pennsylvania had the highest number of deaths with unspecified pneumoconiosis (n = 1,168). Other states which ranked in the top five in this period were West Virginia, Kentucky, Ohio, and Illinois.

- See Table 6-5 for data.

Figure 6-2. Unspecified pneumoconiosis: number of deaths, U.S. residents age 15 and over, by state, 1979-1990

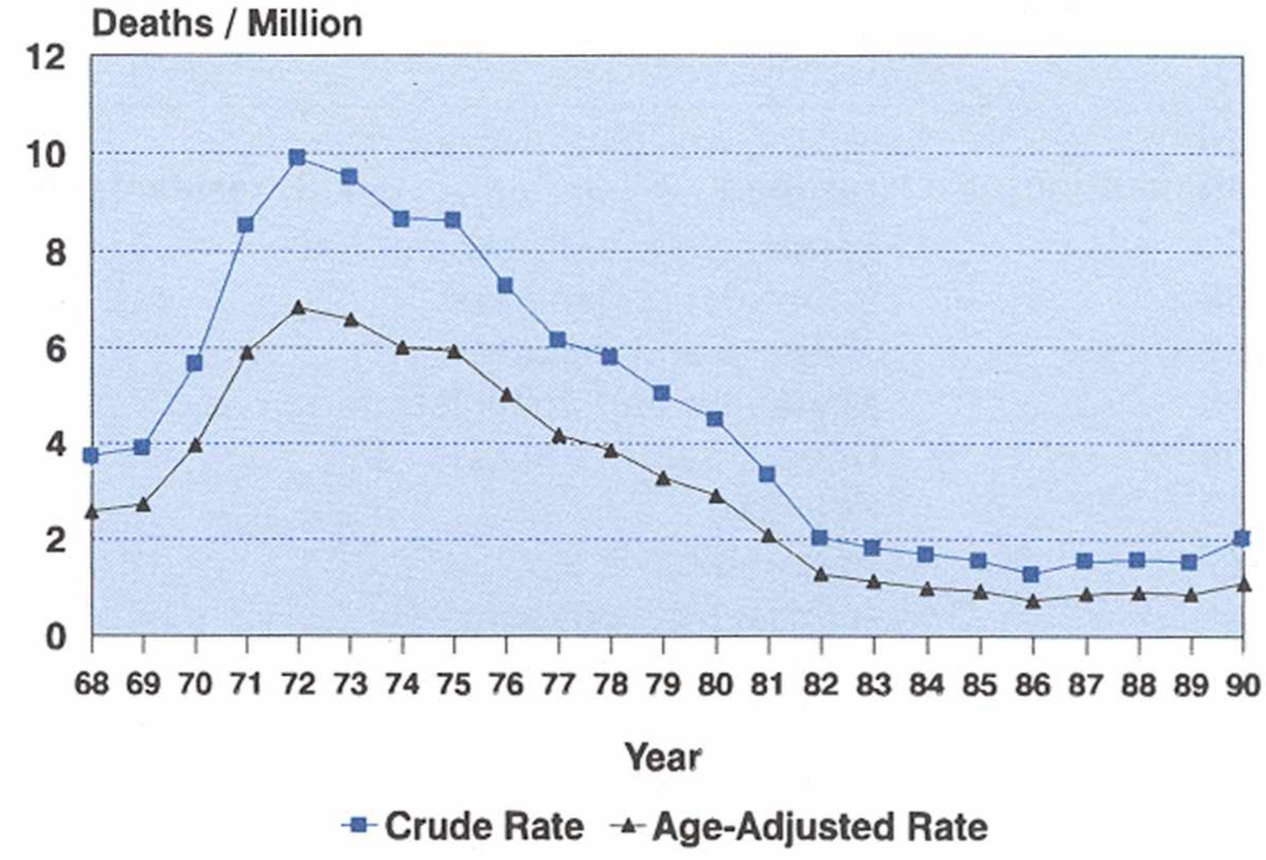


- Crude and age-adjusted mortality rates have increased approximately 160% between 1968 and 1972 and then these rates declined until 1986, but remained stable from 1987 to 1989.

- See Tables 6-6 and 6-7 for data.

- See Appendix B for methods.

Figure 6-3. Unspecified pneumoconiosis: crude and age-adjusted mortality rates, U.S. residents age 15 and over, 1968-1990



- West Virginia had the highest crude mortality rate with 53.8 deaths per million. Other states with over 3 deaths with unspecified pneumoconiosis were Wyoming, Kentucky, Pennsylvania, New Mexico, Ohio, and Utah.

- See Table 6-10 for data.

Figure 6-4. Unspecified pneumoconiosis: crude mortality rates, U.S. residents age 15 and over, by state, 1989-1990

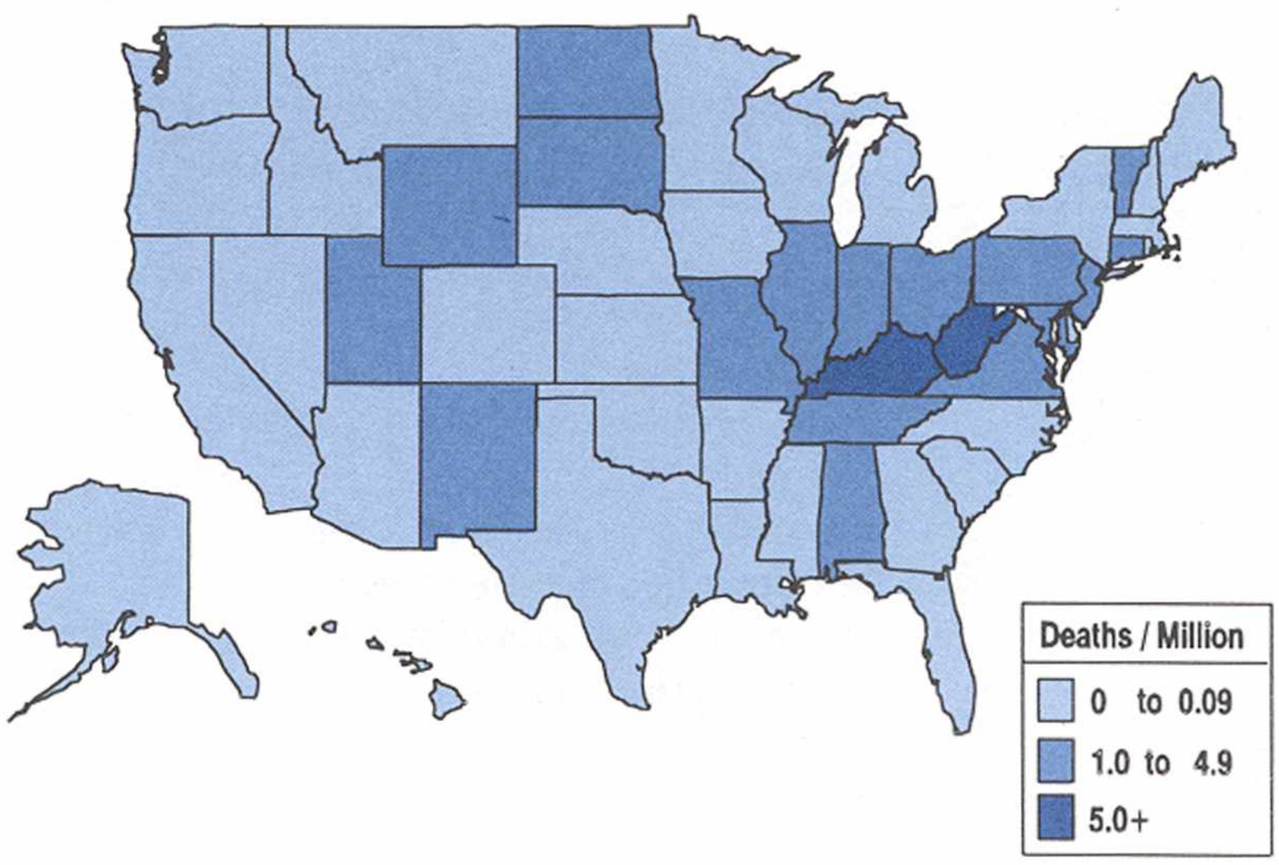


Table 6-1. Unspecified pneumoconiosis: most frequently recorded occupations on death certificate, U.S. residents age 15 and over, selected states and years, 1985-1990

COC	Occupation	Number	Percent
616	Mining machine operators	287	37.1
889	Laborers, except construction	45	5.8
473	Farmers, except horticultural	24	3.1
869	Construction laborers	22	2.8
453	Janitors and cleaners	20	2.6
019	Managers and administrators, n.e.c.	17	2.2
804	Drivers-heavy trucks	17	2.2
913	Retired	17	2.2
567	Carpenters	16	2.1
	All other occupations	289	37.3
	Occupation not reported	20	2.6
	TOTAL	**774**	**100.0**

COC - 1980 Census Occupation Code n.e.c. - not elsewhere classified

NOTE: See Appendix C for list of 25 states reporting usual occupation and years reporting.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.

Table 6-2. Unspecified pneumoconiosis: most frequently recorded industries on death certificate, U.S. residents age 15 and over, selected states and years, 1985-1990

CIC	Industry	Number	Percent
041	Coal mining	326	42.1
060	Construction	64	8.3
270	Blast furnaces, steelworks, rolling and finishing mills	27	3.5
400	Railroads	18	2.3
010	Agricultural production, crops	17	2.2
392	Not specified manufacturing industries	17	2.2
351	Motor vehicles and motor vehicle equipment	15	1.9
262	Miscellaneous nonmetallic mineral and stone products	13	1.7
410	Trucking service	12	1.6
	All other industries	236	30.5
	Industry not reported	29	3.7
	TOTAL	**774**	**100.0**

CIC - 1980 Census Industry Code

NOTE: See Appendix C for list of 25 states reporting usual industry and years reporting.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.

Table 6-3. Unspecified pneumoconiosis: number of deaths, U.S. residents age 15 and over, by age, race, and sex, 1968-1990

Years		1968-1978		1979-1990		1989-1990	
Total Deaths		12,180	%	5,034	%	667	%
Sex	Male	11,655	95.7	4,958	98.5	647	97.0
	Female	525	4.3	76	1.5	20	3.0
Race	White	11,289	92.7	4,660	92.6	613	91.9
	Black	879	7.2	363	7.2	51	7.6
	Other	12	0.1	11	0.2	3	0.4
Race/Sex	White Male	10,814	88.8	4,589	91.2	594	89.1
	White Female	475	3.9	71	1.4	19	2.8
	Black Male	834	6.8	358	7.1	50	7.5
	Black Female	45	0.4	5	0.1	1	0.2
	Other Male	7	0.1	11	0.2	3	0.4
	Other Female	5	0.0	0	0.0	0	0.0
Age	Years						
	15-24	8	0.1	2	0.0	0	0.0
	25-34	14	0.1	6	0.1	2	0.3
	35-44	98	0.8	24	0.5	3	0.4
	45-54	576	4.7	118	2.3	11	1.6
	55-64	2,477	20.3	667	13.2	75	11.2
	65-74	4,233	34.8	1,715	34.1	200	30.0
	75-84	3,686	30.3	1,805	35.9	269	40.3
	85 and Over	1,088	8.9	697	13.8	107	16.0
	Mean	71.0		73.9		75.2	
	Range	19-101		21-118		28-98	

NOTE: See Appendix B for methods. Percentages may not total to 100% due to rounding.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.

Table 6-4. Unspecified pneumoconiosis: number of deaths, U.S. residents age 15 and over, by state, 1968-1978

State	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	TOTAL
Alabama	17	21	26	42	58	30	30	29	25	29	28	335
Alaska	-	-	2	-	-	-	-	-	-	-	1	3
Arizona	3	2	3	4	8	14	5	9	7	9	9	73
Arkansas	3	5	4	6	6	8	4	4	4	5	9	58
California	30	27	19	29	44	32	29	37	32	29	35	343
Colorado	4	11	12	8	8	19	12	18	6	8	10	116
Connecticut	7	5	8	12	10	9	3	9	7	3	7	80
Delaware	-	3	3	-	-	2	-	-	-	-	2	10
District of Columbia	1	-	3	1	2	1	1	3	2	-	-	14
Florida	7	6	8	9	12	8	22	16	25	18	19	150
Georgia	2	3	4	4	6	1	5	4	6	9	6	50
Hawaii	-	-	1	-	2	-	-	-	1	-	2	6
Idaho	-	-	1	1	2	-	2	-	1	1	2	10
Illinois	16	15	29	76	112	89	85	85	88	65	69	729
Indiana	9	5	9	21	22	21	23	21	19	11	13	174
Iowa	1	-1		7	6	7	4	4	2	2	7	41
Kansas	1	3	-	3	6	5	5	5	5	5	5	43
Kentucky	17	22	51	138	140	119	143	123	120	89	82	1,044
Louisiana	1	3	2	-	2	3	2	1	5	5	2	26
Maine	3	2	2	-	4	2	-	1	1	1	2	18
Maryland	5	3	4	7	6	6	7	11	13	4	4	70
Massachusetts	7	9	4	9	6	4	9	7	6	6	6	73
Michigan	31	31	26	23	18	23	21	21	22	13	15	244
Minnesota	1	3	4	5	4	9	4	5	4	8	5	52
Mississippi	-	-	-	-	2	-	1	-	3	-	2	8
Missouri	2	3	7	6	8	6	3	4	9	6	10	84
Montana	1	-	-	-	4	3	-	-	-	1	2	11
Nebraska	-	-	-	2	-	-	-	1	1	1	-	9
Nevada	-	-	2	-	-	4	4	1	-	3	1	11
New Hampshire	3	2	2	-	2	1	1	-	-	-	-	11
New Jersey	23	35	22	20	18	18	19	29	14	21	19	238
New Mexico	6	2	3	4	4	9	4	4	4	7	2	49
New York	27	31	20	36	24	36	33	43	29	22	21	322
North Carolina	3	4	2	3	2	10	8	11	7	11	10	71
North Dakota	2	-	1	1	-	1	1	-	-	-	1	7
Ohio	36	37	32	51	64	77	81	79	75	55	60	647
Oklahoma	3	1	3	2	4	4	3	5	5	7	1	38
Oregon	3	-	2	2	-	2	-	1	3	5	4	22
Pennsylvania	174	175	266	402	416	492	451	436	324	303	239	3,678
Rhode Island	-	2	1	1	2	1	1	-	3	1	1	13
South Carolina	-	-	1	2	4	-	1	3	3	1	2	17
South Dakota	-	1	1	1	2	1	-	1	1	-	1	9
Tennessee	9	11	18	21	50	42	26	23	28	13	25	266
Texas	6	9	8	6	8	8	8	8	4	8	15	88
Utah	4	2	5	5	16	8	8	10	5	-	6	69
Vermont	2	1	2	7	4	2	-	2	2	3	3	28
Virginia	11	8	37	50	94	80	59	65	68	56	54	582
Washington	2	-	5	2	10	2	9	4	4	7	3	48
West Virginia	52	53	150	231	270	241	224	236	190	169	144	1,960
Wisconsin	5	11	7	7	8	9	7	7	10	7	12	90
Wyoming	6	3	5	6	8	9	2	5	6	3	9	62
TOTAL	**546**	**570**	**828**	**1,273**	**1,508**	**1,478**	**1,370**	**1,391**	**1,199**	**1,030**	**987**	**12,180**

NOTE: See Appendix B for methods.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.

- indicates quantity zero.

Table 6-5. Unspecified pneumoconiosis: number of deaths, U.S. residents age 15 and over, by state, 1979-1990

State	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	TOTAL
Alabama	15	23	6	10	17	9	14	4	10	6	8	7	129
Alaska	1	-	-	-	-	-	-	-	-	-	-	-	1
Arizona	6	7	2	-	5	3	2	4	3	1	2	3	38
Arkansas	2	-	-	4	-	2	2	1	4	-	1	1	17
California	14	21	14	12	12	12	9	8	10	10	11	7	140
Colorado	12	6	7	4	2	4	4	4	3	-	1	1	48
Connecticut	2	2	10	2	2	6	3	3	2	2	4	2	40
Delaware	3	2	-	-	-	-	-	-	2	2	-	-	9
District of Columbia	-	-	1	-	-	-	-	-	-	-	-	-	1
Florida	12	10	13	4	6	6	9	7	4	9	10	5	95
Georgia	3	5	1	-	4	2	4	2	6	4	1	2	34
Hawaii	-	-	-	-	-	-	-	-	1	-	-	-	1
Idaho	2	1	-	-	-	-	2	-	-	-	-	-	5
Illinois	48	44	22	20	14	14	12	11	18	18	35	16	272
Indiana	11	11	18	10	7	6	5	3	7	6	6	6	96
Iowa	2	-	1	2	2	-	1	-	-	-	-	-	8
Kansas	2	3	1	-	1	1	1	2	-	3	1	-	15
Kentucky	79	111	34	32	27	40	21	22	30	39	26	47	508
Louisiana	1	1	2	1	1	1	3	3	1	2	3	3	22
Maine	2	1	1	-	-	1	-	1	-	3	-	-	9
Maryland	6	7	5	5	3	5	2	2	5	5	4	4	53
Massachusetts	1	5	2	3	2	-	3	3	1	2	2	-	24
Michigan	18	14	11	8	8	15	10	9	5	8	7	7	120
Minnesota	3	3	1	1	-	2	1	2	-	1	1	1	16
Mississippi	1	-	-	-	-	1	-	-	-	-	-	-	2
Missouri	3	7	2	2	3	2	1	1	2	-	3	6	32
Montana	-	1	-	-	-	2	1	3	1	-	-	1	9
Nebraska	-	-	-	-	1	-	-	1	-	2	-	-	4
Nevada	-	-	2	-	1	-	-	-	-	-	1	-	4
New Hampshire	-	1	-	3	-	-	-	-	1	-	-	-	5
New Jersey	15	9	12	15	18	15	9	13	10	12	10	8	146
New Mexico	2	7	2	3	-	1	2	2	2	5	3	4	33
New York	15	18	14	10	7	11	10	10	9	8	12	10	134
North Carolina	3	5	9	1	2	-	1	1	1	6	4	4	37
North Dakota	-	-	-	-	-	-	-	-	-	-	-	1	1
Ohio	48	44	28	34	34	26	36	20	34	20	27	25	376
Oklahoma	3	-	2	-	1	2	1	-	1	4	2	2	18
Oregon	1	-	-	1	1	-	3	1	1	2	-	1	11
Pennsylvania	265	252	226	83	63	62	46	35	33	25	31	47	1,168
Rhode Island	-	-	-	-	-	-	1	1	3	1	1	-	7
South Carolina	1	1	-	1	3	-	2	-	-	-	-	-	8
South Dakota	1	1	-	-	-	2	-	-	-	-	-	1	5
Tennessee	17	17	2	12	4	5	7	6	6	9	13	11	109
Texas	2	6	2	2	5	1	3	1	4	1	4	5	36
Utah	6	1	3	4	2	7	3	6	1	1	2	5	41
Vermont	-	-	-	-	1	2	-	2	-	1	1	-	7
Virginia	73	84	72	35	19	15	14	17	14	16	10	17	386
Washington	1	1	6	-	-	1	-	1	-	-	2	3	15
West Virginia	164	54	59	37	48	25	39	20	46	55	33	117	697
Wisconsin	5	5	1	2	-	1	4	1	2	3	1	1	26
Wyoming	1	3	2	2	2	1	-	-	2	-	3	-	16
TOTAL	**872**	**794**	**596**	**365**	**328**	**311**	**291**	**233**	**285**	**292**	**286**	**381**	**5,034**

NOTE: See Appendix B for methods.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.

- indicates quantity zero.

Table 6-6. Unspecified pneumoconiosis: crude mortality rates (per 1,000,000 population), U.S. residents age 15 and over, by race and sex, 1968-1990

		White		Black	
Year	Overall rate	Males	Females	Males	Females
1968	3.74	7.79	0.22	6.00	0.11
1969	3.90	7.99	0.19	7.56	0.34
1970	5.67	11.90	0.27	8.74	0.46
1971	8.54	18.21	0.36	11.71	-
1972	9.90	21.02	0.49	13.84	-
1973	9.52	20.53	0.58	9.41	0.51
1974	8.66	18.28	0.88	8.44	0.70
1975	8.63	17.80	1.06	10.06	0.77
1976	7.30	15.02	0.90	9.10	0.46
1977	6.16	12.63	0.74	8.11	0.45
1978	5.80	12.10	0.83	4.85	0.61
1979	5.04	11.19	0.05	5.20	0.17
1980	4.52	9.99	0.06	5.09	-
1981	3.35	7.43	0.02	3.67	-
1982	2.02	4.33	0.11	2.68	-
1983	1.82	3.90	0.15	2.02	-
1984	1.69	3.66	0.04	2.28	0.07
1985	1.55	3.42	0.04	1.59	-
1986	1.27	2.67	0.06	1.73	-
1987	1.54	3.24	0.07	2.20	0.09
1988	1.56	3.34	0.04	2.26	-
1989	1.53	3.12	0.14	2.44	-
1990	2.02	4.31	0.08	2.40	0.08

NOTE: See Appendix B for methods.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.
U.S. Bureau of the Census: 1970-1990 population estimates of the U.S.

- indicates no deaths listed.

Table 6-7. Unspecified pneumoconiosis: age-adjusted mortality rates (per 1,000,000 population), U.S. residents age 15 and over, by race and sex, 1968-1990

		White		Black	
Year	Overall rate	Males	Females	Males	Females
1968	2.57	5.75	0.14	5.75	0.12
1969	2.72	5.96	0.14	7.23	0.33
1970	3.96	8.86	0.21	8.34	0.45
1971	5.92	13.62	0.26	10.98	-
1972	6.85	15.80	0.34	13.28	-
1973	6.60	15.52	0.42	8.94	0.54
1974	6.02	13.84	0.57	8.24	0.66
1975	5.94	13.38	0.73	9.83	0.80
1976	5.04	11.36	0.59	8.73	0.43
1977	4.18	9.42	0.49	7.75	0.51
1978	3.86	8.86	0.56	4.66	0.65
1979	3.28	8.16	0.02	4.82	0.12
1980	2.91	7.21	0.04	4.99	-
1981	2.08	5.21	0.01	3.52	-
1982	1.29	3.07	0.05	2.65	-
1983	1.13	2.72	0.06	2.01	-
1984	0.99	2.45	0.02	2.20	0.05
1985	0.93	2.35	0.02	1.56	-
1986	0.74	1.78	0.02	1.53	-
1987	0.88	2.10	0.04	1.99	0.05
1988	0.90	2.17	0.02	2.08	-
1989	0.88	1.97	0.07	2.37	-
1990	1.10	2.67	0.03	2.13	0.07

NOTE: See Appendix B for methods.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.
U.S. Bureau of the Census: 1970-1990 population estimates of the U.S.

- indicates no deaths listed.

Table 6-8. Unspecified pneumoconiosis: years of potential life lost to age 65, U.S. residents age 15 and over, by race and sex, 1968-1990

		White		Black	
Year	Total	Males	Females	Males	Females
1968	960	765	65	115	15
1969	985	770	70	130	15
1970	1,840	1,375	120	275	70
1971	2,565	2,295	110	155	-
1972	3,300	2,960	160	180	-
1973	3,025	2,640	175	145	65
1974	2,935	2,535	180	175	45
1975	2,700	2,120	335	180	60
1976	2,465	2,055	205	150	35
1977	1,955	1,550	220	110	70
1978	1,595	1,230	195	105	55
1979	1,345	1,245	15	85	0
1980	1,145	1,030	15	100	-
1981	625	575	0	50	-
1982	485	400	10	75	-
1983	330	265	5	60	-
1984	300	270	0	30	0
1985	275	215	25	35	-
1986	200	185	0	15	-
1987	295	275	10	10	0
1988	320	260	5	55	-
1989	320	255	5	55	-
1990	365	290	10	65	0

NOTE: See Appendix B for methods.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.

- indicates no deaths listed.

Table 6-9. Unspecified pneumoconiosis: years of potential life lost to life expectancy, U.S. residents age 15 and over, by race and sex, 1968-1990

		White		Black	
Year	Total	Males	Females	Males	Females
1968	6,269	4,824	226	546	25
1969	6,733	5,092	230	703	53
1970	10,474	7,893	368	909	117
1971	15,806	12,376	438	1,062	-
1972	18,704	14,618	572	1,274	-
1973	18,351	14,391	709	896	128
1974	17,522	13,449	972	908	130
1975	18,042	13,197	1,366	1,097	176
1976	15,675	11,570	1,079	988	101
1977	13,445	9,748	978	901	137
1978	12,548	9,182	1,059	589	159
1979	11,143	8,877	54	554	21
1980	9,689	7,756	69	520	-
1981	7,050	5,644	16	366	-
1982	4,559	3,470	104	318	-
1983	3,915	2,971	129	281	-
1984	3,527	2,736	37	265	9
1985	3,341	2,600	56	206	-
1986	2,656	2,098	49	141	-
1987	3,286	2,566	78	206	9
1988	3,392	2,653	40	241	-
1989	3,394	2,510	148	293	-
1990	4,368	3,432	78	272	14

NOTE: See Appendix B for methods.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.

- indicates no deaths listed.

UNSPECIFIED PNEUMOCONIOSIS

Mortality

Table 6-10. Unspecified pneumoconiosis: number of deaths, crude and age-adjusted mortality rates (per 1,000,000 population), total years of potential life lost (YPLL), U.S. residents age 15 and over, by state, 1989-1990

			Crude mortality		Age-adjusted mortality		YPLL to age 65		YPLL to life expectancy	
State	Deaths	Rank	Rate	Rank	Rate	Rank	Years	Rank	Years	Rank
Alabama	15	11	2.43	11	1.23	12	10	17	161	13
Alaska	-	41	-	41	-	41	-	41	-	41
Arizona	5	23	0.94	22	0.42	25	0	25	45	25
Arkansas	2	28	0.56	30	0.32	29	0	25	28	26
California	18	9	0.43	32	0.30	31	20	11	231	9
Colorado	2	28	0.40	33	0.30	31	0	25	22	29
Connecticut	6	21	1.16	14	0.58	19	0	25	64	22
Delaware	-	41	-	41	-	41	-	41	-	41
District of Columbia	-	41	-	41	-	41	-	41	-	41
Florida	15	11	0.73	27	0.31	30	5	19	180	12
Georgia	3	26	0.30	35	0.17	34	0	25	28	26
Hawaii	-	41	-	41	-	41	-	41	-	41
Idaho	-	41	-	41	-	41	-	41	-	41
Illinois	51	5	2.94	9	1.48	10	35	8	532	5
Indiana	12	14	1.41	13	0.73	15	5	19	125	15
Iowa	-	41	-	41	-	41	-	41	-	41
Kansas	1	33	0.27	37	0.04	40	0	25	6	39
Kentucky	73	3	12.84	2	6.50	2	50	3	768	3
Louisiana	6	21	0.96	21	0.83	14	15	13	98	18
Maine	-	41	-	41	-	41	-	41	-	41
Maryland	8	17	1.09	17	0.59	18	5	19	75	21
Massachusetts	2	28	0.21	40	0.06	39	0	25	14	34
Michigan	14	13	0.99	20	0.58	19	45	4	191	11
Minnesota	2	28	0.30	35	0.13	37	0	25	17	33
Mississippi	-	41	-	41	-	41	-	41	-	41
Missouri	9	15	1.14	16	0.66	17	15	13	119	16
Montana	1	33	0.86	24	0.17	34	0	25	6	39
Nebraska	-	41	-	41	-	41	-	41	-	41
Nevada	1	33	0.56	30	0.37	27	0	25	8	36
New Hampshire	-	41	-	41	-	41	-	41	-	41
New Jersey	18	9	1.51	12	0.89	13	20	11	231	9
New Mexico	7	19	3.48	5	2.14	5	5	19	76	20
New York	22	8	0.80	25	0.43	24	15	13	250	8
North Carolina	8	17	0.78	26	0.54	21	10	17	108	17
North Dakota	1	33	1.07	18	0.69	16	0	25	14	34
Ohio	52	4	3.10	7	1.80	8	65	2	635	4
Oklahoma	4	25	0.88	23	0.44	23	25	10	61	23
Oregon	1	33	0.23	39	0.09	38	0	25	8	36
Pennsylvania	78	2	4.14	4	1.86	7	40	6	819	2
Rhode Island	1	33	0.64	29	0.54	21	5	19	21	31
South Carolina	-	41	-	41	-	41	-	41	-	41
South Dakota	1	33	1.01	19	0.36	28	0	25	8	36
Tennessee	24	7	3.16	6	1.74	9	40	6	293	7
Texas	9	15	0.36	34	0.27	33	45	4	148	14
Utah	7	19	3.08	8	2.15	4	15	13	86	19
Vermont	1	33	1.15	15	1.25	11	5	19	21	31
Virginia	27	6	2.85	10	2.04	6	30	9	332	6
Washington	5	23	0.70	28	0.39	26	0	25	53	24
West Virginia	150	1	53.79	1	28.50	1	160	1	1,834	1
Wisconsin	2	28	0.27	37	0.14	36	0	25	22	29
Wyoming	3	26	4.53	3	2.26	3	0	25	23	28

NOTE: See Appendix B for methods.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.
U.S. Bureau of the Census: 1989-1990 population estimates of the U.S.

- indicates no deaths listed.

Table 6-11. Unspecified pneumoconiosis: proportionate mortality ratios (PMR), based on underlying cause of death, by usual occupation for selected states, 1985-1990

COC	Occupation	Number of deaths	PMR	95% confidence interval LCL	UCL
616	Mining machine operators	87	50.07	39.74	62.35
719	Molding and casting machine operators	3	12.35	2.55	36.11
563	Brickmasons and stonemasons	3	4.61	0.95	13.48
844	Operating engineers	3	3.19	0.66	9.33
869	Construction laborers	8	2.98	1.28	5.87
453	Janitors and cleaners	11	2.48	1.24	4.44
913	Retired; with no other occupation listed	7	2.30	0.92	4.74
575	Electricians	3	2.21	0.46	6.46
777	Miscellaneous machine operators, n.e.c.	3	2.01	0.41	5.88
889	Laborers, except construction	16	1.96	1.12	3.18
804	Drivers-heavy trucks	8	1.79	0.77	3.52
633	Supervisors, production occupations	5	1.65	0.53	3.86
779	Machine operators, not specified	4	1.65	0.45	4.22
637	Machinists	4	1.51	0.41	3.86
019	Managers, administrators, n.e.c.	10	1.01	0.49	1.86

COC - 1980 Census Occupation Code n.e.c. - not elsewhere classified
LCL - lower confidence limit UCL - upper confidence limit
NOTE: See Appendix B for methods and Appendix C for list of selected states.
SOURCE: National Center for Health Statistics multiple cause of death data tapes.

BYSSINOSIS

Mortality

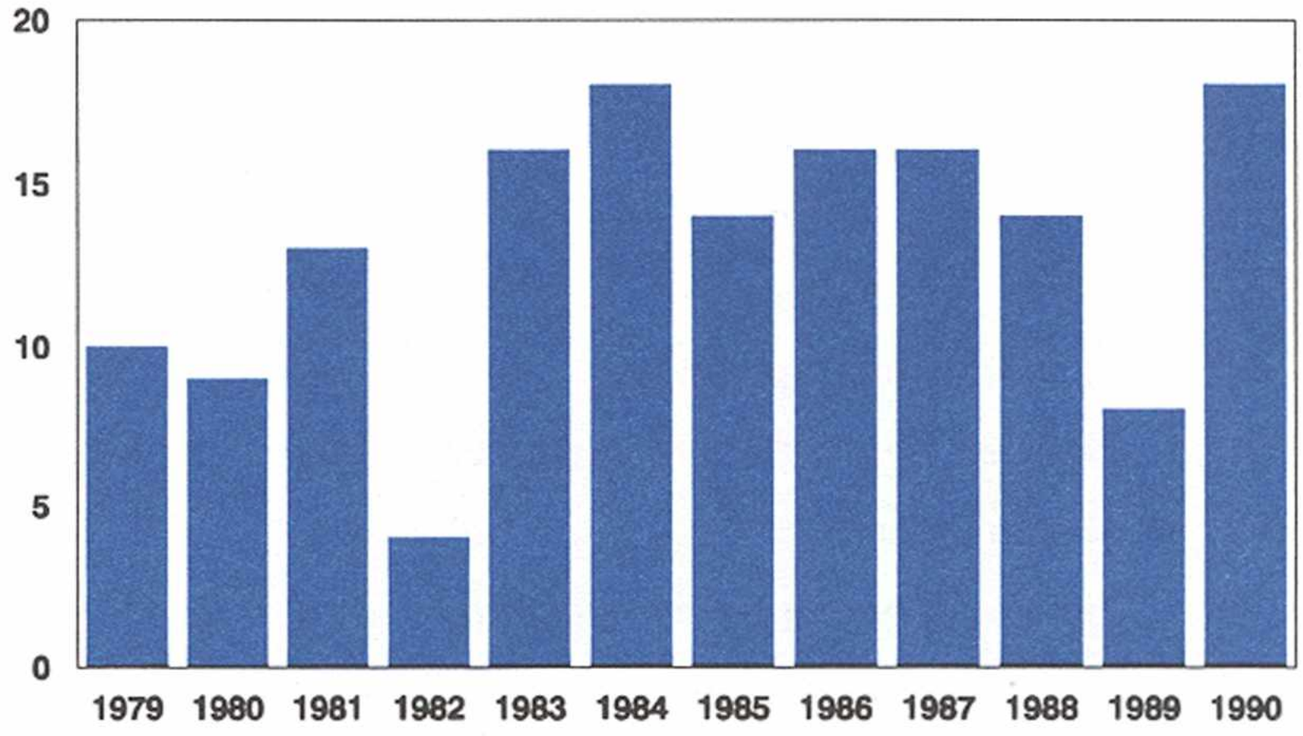
Byssinosis is included in ICD-9 code 504 (pneumonopathy due to inhalation of other dust) for 1979-1990. Other specific ICD-9 code 504 diseases are flax-dressers' disease and cannabinosis.

- The total number of deaths with mention of byssinosis from 1979 to 1990 was 156. The annual number of deaths with byssinosis has not exceeded 20 during this time period and there is no clear trend of increasing or decreasing annual deaths.

- See Tables 7-3 and 7-4 for data.

- See Appendix A for information about multiple cause of death data.

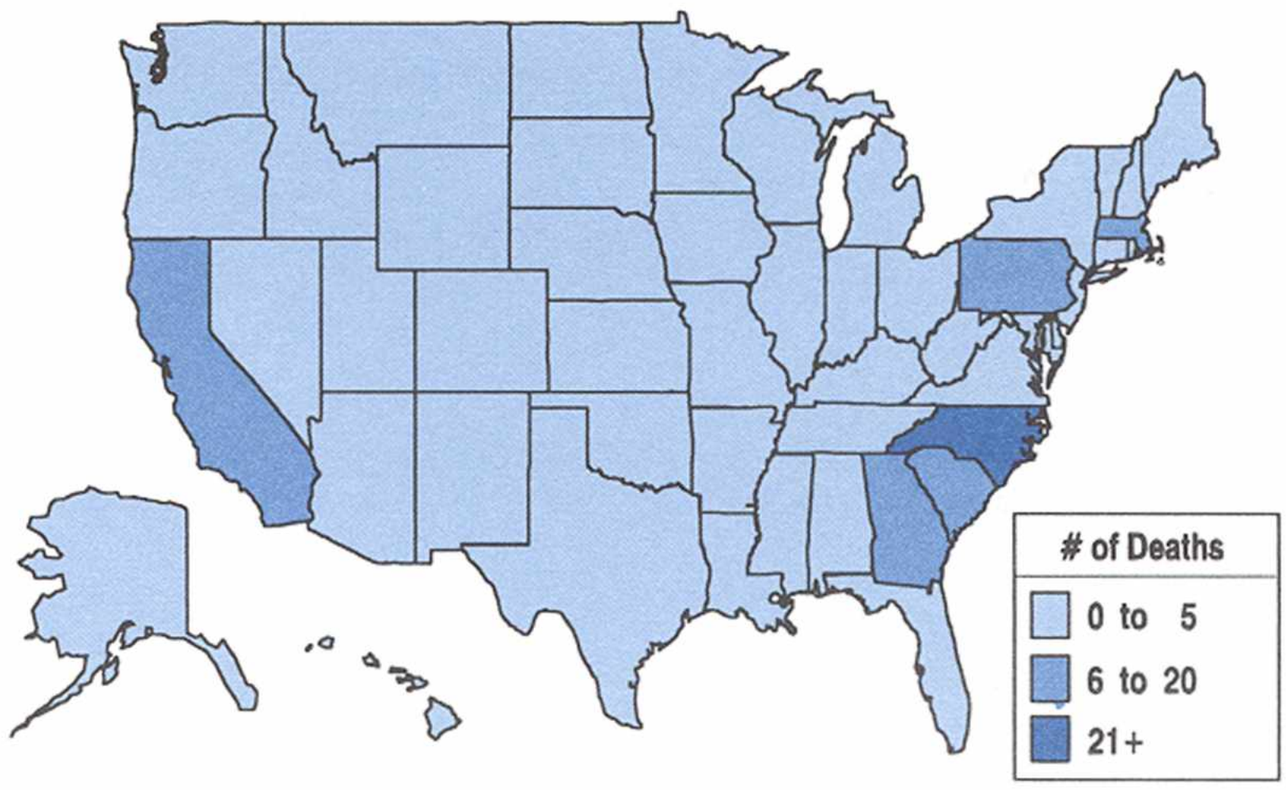
Figure 7-1. Byssinosis: number of deaths, U.S. residents age 15 and over, 1979-1990



- North Carolina had the highest number of deaths with byssinosis during this time period (n = 66).

- See Table 7-4 for data.

Figure 7-2. Byssinosis: number of deaths, U.S. residents age 15 and over, by state, 1979-1990

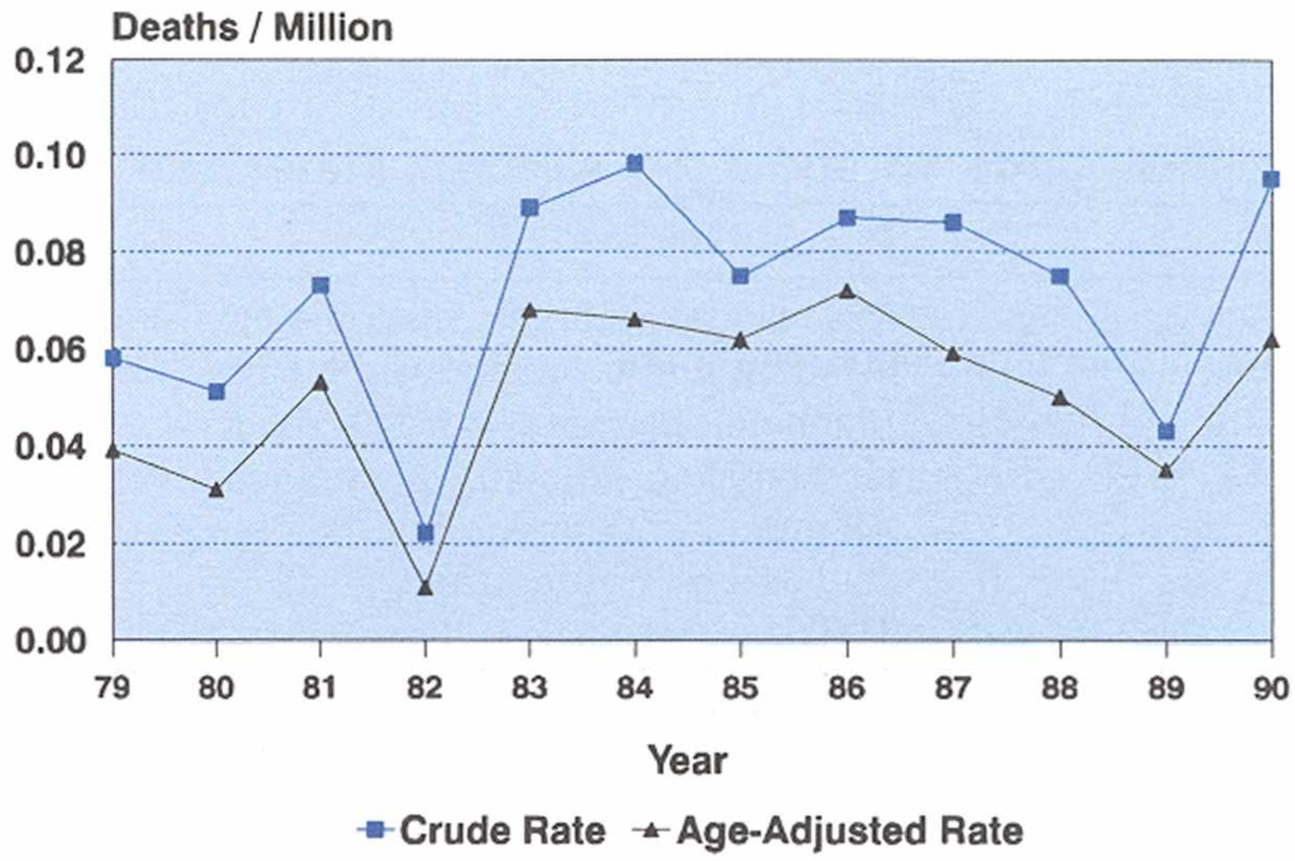


- Due to the small number of deaths with byssinosis, crude and age-adjusted mortality rates fluctuate substantially, but have not exceeded 0.1 deaths per million during this time period.

- See Tables 7-5 and 7-6 for data.

- See Appendix B for methods.

Figure 7-3. Byssinosis: crude and age-adjusted mortality rates, U.S. residents age 15 and over, 1979-1990



- The state with the highest crude mortality rate was North Carolina (0.88 deaths per million). Virginia ranked second and Kansas third, but these two states had only 2 deaths and 1 death with byssinosis, respectively, over this time period.

- See Table 7-9 for data.

Figure 7-4. Byssinosis: crude mortality rates, U.S. residents age 15 and over, by state, 1989-1990

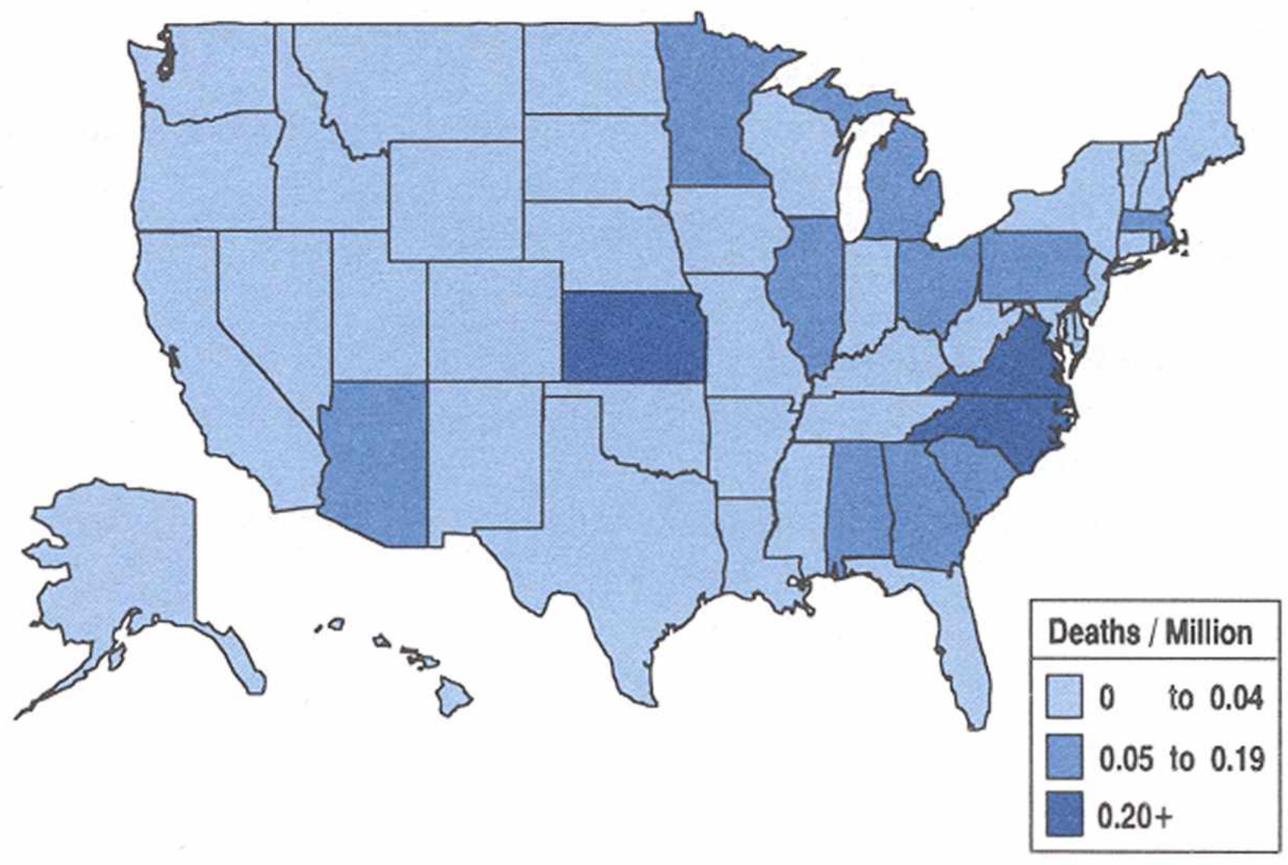


Table 7-1. Byssinosis: most frequently recorded occupations on death certificate, U.S. residents age 15 and over, selected states and years, 1985-1990

COC	Occupation	Number	Percent
749	Miscellaneous textile machine operators	13	28.3
738	Winding and twisting machine operators	7	15.2
779	Machine operators, not specified	2	4.3
914	Homemaker, student, unemployed, volunteer	2	4.3
	All other occupations	21	45.7
	Occupation not reported	1	2.2
	TOTAL	**46**	**100.0**

COC - 1980 Census Occupation Code

NOTE: See Appendix C for list of 25 states reporting usual occupation and years reporting.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.

Table 7-2. Byssinosis: most frequently recorded industries on death certificate, U.S. residents age 15 and over, selected states and years, 1985-1990

CIC	Industry	Number	Percent
142	Yarn, thread and fabric mills	33	71.7
060	Construction	3	6.5
961	Homemaker, student, unemployed, volunteer	2	4.3
	All other industries	7	15.2
	Industry not reported	1	2.2
	TOTAL	**46**	**100.0**

CIC - 1980 Census Industry Code

NOTE: See Appendix C for list of 25 states reporting usual industry and years reporting. Percentages may not total to 100% due to rounding.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.

Table 7-3. Byssinosis: number of deaths, U.S. residents age 15 and over, by age, race, and sex, 1979-1990

Years		1979-1990		1989-1990	
Total Deaths		156	%	26	%
Sex	Male	112	71.8	20	76.9
	Female	44	28.2	6	23.1
Race	White	146	93.6	23	88.5
	Black	10	6.4	3	11.5
	Other	0	0.0	0.0	0.0
Race/Sex	White Male	102	65.4	17	65.4
	White Female	44	28.2	6	23.1
	Black Male	10	6.4	3	11.5
	Black Female	0	0.0	0	0.0
	Other Male	0	0.0	0	0.0
	Other Female	0	0.0	0	0.0
Age	Years				
	15-24	2	1.3	1	3.8
	25-34	1	0.6	1	3.8
	35-44	3	1.9	1	3.8
	45-54	6	3.8	0	0.0
	55-64	37	23.7	6	23.1
	65-74	61	39.1	10	38.5
	75-84	36	23.1	5	19.2
	85 and Over	10	6.4	2	7.7
	Mean	68.7		66.5	
	Range	22-92		22-89	

NOTE: Data not available prior to 1979. See Appendix B for methods. Percentages may not total to 100% due to rounding.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.

Table 7-4. Byssinosis: number of deaths, U.S. residents age 15 and over, by state, 1979-1990

State	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	TOTAL
Alabama	2	1	-	-	-	-	-	1	-	-	-	1	5
Alaska	-	-	-	-	-	-	-	-	-	-	-	-	-
Arizona	1	-	-	-	-	1	-	-	-	-	-	1	3
Arkansas	-	-	-	-	-	-	-	-	-	-	-	-	-
California	-	-	-	2	-	-	1	-	-	1	2	-	6
Colorado	-	-	-	-	-	-	-	-	-	-	-	-	-
Connecticut	-	-	-	-	-	1	-	-	-	-	-	-	1
Delaware	-	-	-	-	-	-	-	-	-	-	-	-	-
District of Columbia	-	-	-	-	-	-	-	-	-	-	-	-	-
Florida	-	-	-	-	-	-	-	-	-	-	-	1	1
Georgia	-	-	2	-	3	5	1	2	4	-	1	-	18
Hawaii	-	-	-	-	-	-	-	-	-	-	-	-	-
Idaho	-	-	-	-	-	-	-	-	-	-	-	-	-
Illinois	-	1	-	-	-	-	-	1	-	-	-	1	3
Indiana	-	-	-	-	-	-	-	-	-	-	-	-	-
Iowa	-	-	-	-	-	-	-	-	-	-	-	-	-
Kansas	-	-	-	-	-	-	-	-	-	-	-	1	1
Kentucky	-	-	-	-	-	-	-	-	-	-	-	-	-
Louisiana	-	-	1	-	-	-	-	-	-	-	-	-	1
Maine	-	-	-	-	-	-	-	-	-	-	-	-	-
Maryland	1	-	-	-	-	-	-	1	-	-	-	-	2
Massachusetts	-	1	-	1	2	-	1	-	-	-	-	1	6
Michigan	-	-	-	-	-	-	-	-	-	-	-	1	1
Minnesota	-	-	-	-	-	-	-	-	-	-	-	1	1
Mississippi	-	-	-	-	-	-	-	-	-	-	-	-	-
Missouri	-	-	-	-	-	-	-	-	-	-	-	-	-
Montana	-	-	-	-	-	-	-	-	-	-	-	-	-
Nebraska	-	-	-	-	-	-	-	-	-	-	-	-	-
Nevada	-	-	-	-	-	-	-	-	-	-	-	-	-
New Hampshire	-	-	-	-	-	1	-	-	-	-	-	-	1
New Jersey	-	-	-	1	-	-	1	-	-	-	-	-	2
New Mexico	-	-	-	-	-	-	-	-	-	-	-	-	-
New York	-	-	-	-	-	-	-	1	-	-	-	-	1
North Carolina	3	3	7	-	7	4	7	7	9	10	4	5	66
North Dakota	-	-	-	-	-	-	-	-	-	-	-	-	-
Ohio	1	-	-	-	-	-	-	-	-	2	-	1	4
Oklahoma	-	-	-	-	-	-	-	-	-	-	-	-	-
Oregon	-	-	-	-	-	-	-	-	-	-	-	-	-
Pennsylvania	1	1	3	-	1	-	1	-	-	-	-	1	8
Rhode Island	-	-	-	-	1	1	-	-	-	-	-	-	2
South Carolina	-	1	-	-	2	4	-	1	1	-	-	1	10
South Dakota	-	-	-	-	-	-	-	-	-	-	-	-	-
Tennessee	-	-	-	-	-	-	-	1	-	-	-	-	1
Texas	-	-	-	-	-	1	-	1	-	-	1	-	3
Utah	-	-	-	-	-	-	-	-	-	-	-	-	-
Vermont	-	-	-	-	-	-	1	-	1	-	-	-	2
Virginia	-	-	-	-	-	-	1	-	1	-	-	2	4
Washington	1	-	-	-	-	-	-	-	-	-	-	-	1
West Virginia	-	1	-	-	-	-	-	-	-	-	-	-	1
Wisconsin	-	-	-	-	-	-	-	-	-	1	-	-	1
Wyoming	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL	10	9	13	4	16	18	14	16	16	14	8	18	156

NOTE: See Appendix B for methods.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.

- indicates quantity zero.

Table 7-5. Byssinosis: crude mortality rates (per 1,000,000 population), U.S. residents age 15 and over, by race and sex, 1979-1990

		White		Black	
Year	Overall rate	Males	Females	Males	Females
1979	0.06	0.08	0.05	-	-
1980	0.05	0.10	0.02	-	-
1981	0.07	0.15	0.01	0.09	-
1982	0.02	0.04	0.01	-	-
1983	0.09	0.08	0.11	0.09	-
1984	0.10	0.13	0.08	0.08	-
1985	0.08	0.10	0.06	0.08	-
1986	0.09	0.12	0.07	0.10	-
1987	0.09	0.16	0.01	0.20	-
1988	0.08	0.15	0.02	-	-
1989	0.04	0.06	0.01	0.20	-
1990	0.10	0.15	0.06	0.10	-

NOTE: See Appendix B for methods.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.
U.S. Bureau of the Census: 1979-1990 population estimates of the U.S.

- indicates no deaths listed.

Table 7-6. Byssinosis: age-adjusted mortality rates (per 1,000,000 population), U.S. residents age 15 and over, by race and sex, 1979-1990

		White		Black	
Year	Overall rate	Males	Females	Males	Females
1979	0.04	0.06	0.04	-	-
1980	0.03	0.07	0.01	-	-
1981	0.05	0.11	0.01	0.10	-
1982	0.01	0.03	0.00	-	-
1983	0.07	0.06	0.07	0.11	-
1984	0.07	0.09	0.06	0.10	-
1985	0.06	0.09	0.04	0.10	-
1986	0.07	0.09	0.06	0.10	-
1987	0.06	0.12	0.01	0.20	-
1988	0.05	0.10	0.02	-	-
1989	0.04	0.06	0.01	0.19	-
1990	0.06	0.11	0.02	0.09	-

NOTE: See Appendix B for methods.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.
U.S. Bureau of the Census: 1979-1990 population estimates of the U.S.

- indicates no deaths listed.

Table 7-7. Byssinosis: years of potential life lost to age 65, U.S. residents age 15 and over, by race and sex, 1979-1990

		White		Black	
Year	Total	Males	Females	Males	Females
1979	20	5	15	-	-
1980	0	0	0	-	-
1981	30	20	5	5	-
1982	0	0	0	-	-
1983	60	10	25	25	-
1984	20	5	10	5	-
1985	75	35	15	25	-
1986	100	60	40	0	-
1987	15	10	0	5	-
1988	20	15	5	-	-
1989	80	55	0	25	-
1990	55	55	0	0	-

NOTE: See Appendix B for methods.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.

- indicates no deaths listed.

Table 7-8. Byssinosis: years of potential life lost to life expectancy, U.S. residents age 15 and over, by race and sex, 1979-1990

		White		Black	
Year	Total	Males	Females	Males	Females
1979	142	58	83	-	-
1980	90	61	21	-	-
1981	198	136	23	16	-
1982	40	28	7	-	-
1983	267	82	150	30	-
1984	238	99	114	16	-
1985	243	113	85	30	-
1986	302	152	132	11	-
1987	217	152	15	23	-
1988	185	131	38	-	-
1989	186	116	15	37	-
1990	273	187	55	11	-

NOTE: See Appendix B for methods.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.

- indicates no deaths listed.

Table 7-9. Byssinosis: number of deaths, crude and age-adjusted mortality rates (per 1,000,000 population), total years of potential life lost (YPLL), U.S. residents age 15 and over, by state, 1989-1990

State	Deaths	Rank	Crude mortality Rate	Rank	Age-adjusted mortality Rate	Rank	YPLL to age 65 Years	Rank	YPLL to life expectancy Years	Rank
Alabama	1	4	0.16	6	0.07	8	0	9	8	12
Alaska	-	17	-	17	-	17	-	17	-	17
Arizona	1	4	0.19	4	0.18	3	5	4	21	6
Arkansas	-	17	-	17	-	17	-	17	-	17
California	2	2	0.05	13	0.05	12	50	1	77	2
Colorado	-	17	-	17	-	17	-	17	-	17
Connecticut	-	17	-	17	-	17	-	17	-	17
Delaware	-	17	-	17	-	17	-	17	-	17
District of Columbia	-	17	-	17	-	17	-	17	-	17
Florida	1	4	0.05	13	0.02	13	0	9	14	10
Georgia	1	4	0.10	8	0.10	6	25	3	38	4
Hawaii	-	17	-	17	-	17	-	17	-	17
Idaho	-	17	-	17	-	17	-	17	-	17
Illinois	1	4	0.06	11	0.06	10	35	2	47	3
Indiana	-	17	-	17	-	17	-	17	-	17
Iowa	-	17	-	17	-	17	-	17	-	17
Kansas	1	4	0.26	2	0.10	6	0	9	8	12
Kentucky	-	17	-	17	-	17	-	17	-	17
Louisiana	-	17	-	17	-	17	-	17	-	17
Maine	-	17	-	17	-	17	-	17	-	17
Maryland	-	17	-	17	-	17	-	17	-	17
Massachusetts	1	4	0.10	8	0.07	8	0	9	14	10
Michigan	1	4	0.07	10	0.02	13	0	9	6	16
Minnesota	1	4	0.15	7	0.16	4	5	4	21	6
Mississippi	-	17	-	17	-	17	-	17	-	17
Missouri	-	17	-	17	-	17	-	17	-	17
Montana	-	17	-	17	-	17	-	17	-	17
Nebraska	-	17	-	17	-	17	-	17	-	17
Nevada	-	17	-	17	-	17	-	17	-	17
New Hampshire	-	17	-	17	-	17	-	17	-	17
New Jersey	-	17	-	17	-	17	-	17	-	17
New Mexico	-	17	-	17	-	17	-	17	-	17
New York	-	17	-	17	-	17	-	17	-	17
North Carolina	9	1	0.88	1	0.59	1	5	4	124	1
North Dakota	-	17	-	17	-	17	-	17	-	17
Ohio	1	4	0.06	11	0.06	10	5	4	21	6
Oklahoma	-	17	-	17	-	17	-	17	-	17
Oregon	-	17	-	17	-	17	-	17	-	17
Pennsylvania	1	4	0.05	13	0.02	13	0	9	8	12
Rhode Island	-	17	-	17	-	17	-	17	-	17
South Carolina	1	4	0.19	4	0.19	2	5	4	21	6
South Dakota	-	17	-	17	-	17	-	17	-	17
Tennessee	-	17	-	17	-	17	-	17	-	17
Texas	1	4	0.04	16	0.02	13	0	9	8	12
Utah	-	17	-	17	-	17	-	17	-	17
Vermont	-	17	-	17	-	17	-	17	-	17
Virginia	2	2	0.21	3	0.15	5	0	9	22	5
Washington	-	17	-	17	-	17	-	17	-	17
West Virginia	-	17	-	17	-	17	-	17	-	17
Wisconsin	-	17	-	17	-	17	-	17	-	17
Wyoming	-	17	-	17	-	17	-	17	-	17

NOTE: See Appendix B for methods.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.
U.S. Bureau of the Census: 1989-1990 population estimates of the U.S.

- indicates no deaths listed.

Table 7-10. Byssinosis: proportionate mortality ratios (PMR), based on underlying cause of death, by usual occupation for selected states, 1985-1990

COC	Occupation	Number of deaths	PMR	95% confidence interval LCL	UCL
749	Miscellaneous textile machine operators	5	61.80	20.00	144.39
738	Winding, twisting machine operators	4	49.61	13.52	126.89

COC - 1980 Census Occupation Code

LCL - lower confidence limit UCL - upper confidence limit

NOTE: See Appendix B for methods and Appendix C for list of selected states.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.

- Fewer than 100 cotton dust samples were collected by OSHA inspectors in each year from 1984 to 1991. The percentage of samples above the permissible exposure limit (PEL) fluctuated between 17 and 74%.

- See Table 7-11 for data.

Figure 7-5. Cotton dust: total number of samples collected by OSHA inspectors and percent above PEL, U.S. general industry, 1984-1991

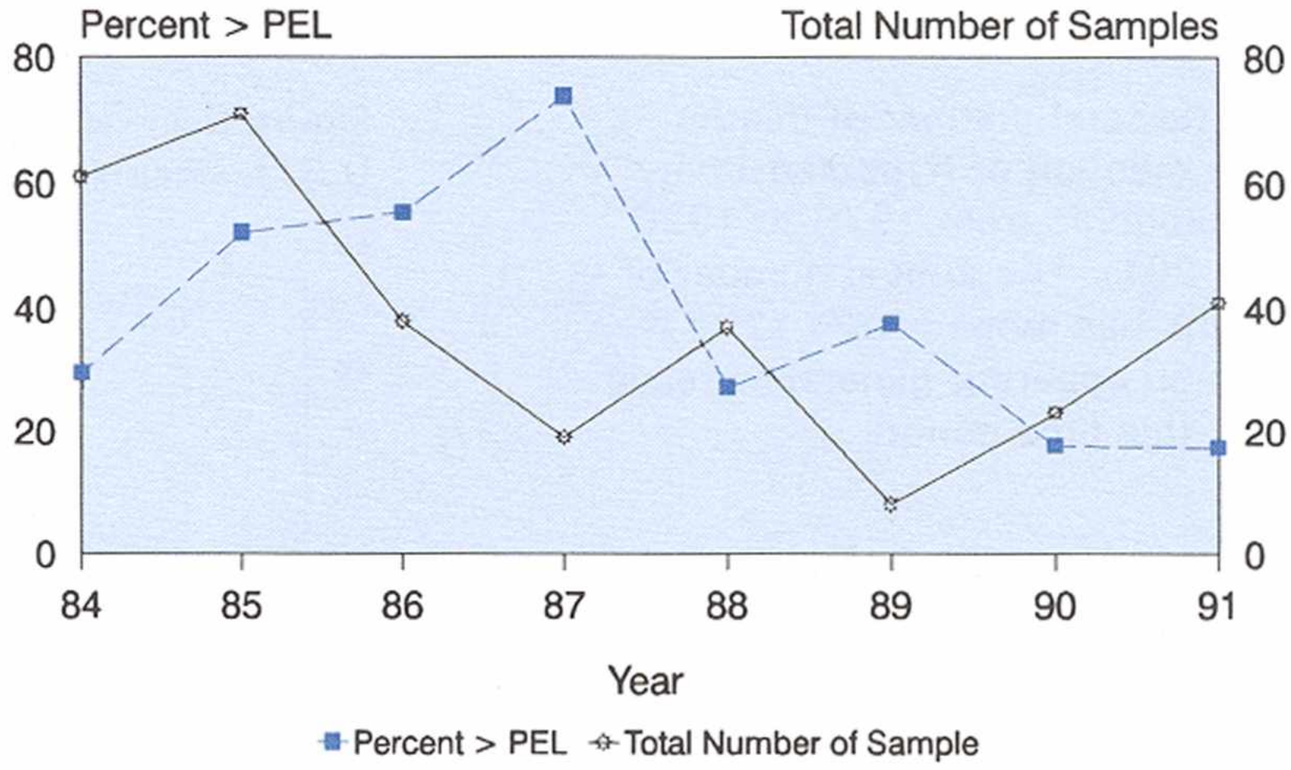


Table 7-11. Cotton dust: number of samples collected by OSHA inspectors and percent exceeding various levels, U.S. general industry, 1984-1991

Year	Total number of samples	Samples > PEL	Percent of samples > PEL	Samples > 2x PEL	Percent of samples > 2x PEL	Complaint inspection samples	
						Number	% of total
1984	61	18	29.51	3	4.92	0	0.00
1985	71	37	52.11	9	12.68	3	4.23
1986	38	21	55.26	12	31.58	2	5.26
1987	19	14	73.68	3	15.79	6	31.58
1988	37	10	27.03	6	16.22	20	54.05
1989	8	3	37.50	0	0.00	3	37.50
1990	23	4	17.39	0	0.00	20	86.96
1991	41	7	17.07	4	9.76	26	63.41

NOTE: PEL is 200 ug/m^3 lint-free respirable cotton dust in yarn manufacturing and cotton washing operations; 500 ug/m^3, lint-free respirable cotton dust in textile mill waste house operations or lower grade washed cotton in yarn manufacturing; 750 ug/m^3, lint-free respirable cotton dust in slashing and weaving processes; and 1 mg/m^3, in cotton waste processing operations of waste, recycling and garnetting.

SOURCE: Occupational Safety and Health Administration (OSHA) Integrated Management Information System (IMIS) data files.

HYPERSENSITIVITY PNEUMONITIS

Mortality

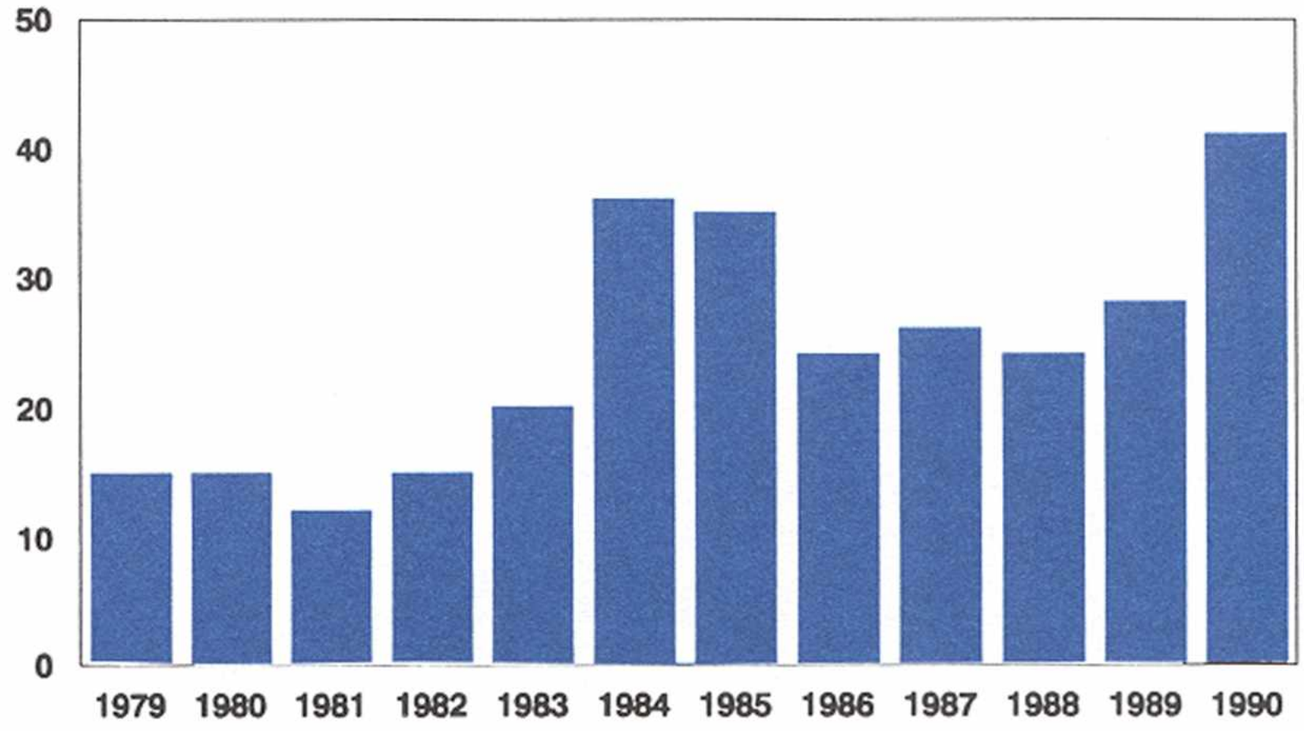
Hypersensitivity pneumonitis includes ICD-9 code 495 (extrinsic allergic alveolitis) for 1979-1990. Among the ICD-9 code 495 categories are: farmers' lung, bagassosis, bird-fanciers' lung, suberosis, malt workers' lung, mushroom workers' lung, maple bark-strippers' lung and "ventilation" pneumonitis.

- The total number of deaths with mention of hypersensitivity pneumonitis from 1979 to 1990 was 291. The annual number of deaths has ranged from 12 to 41, with an apparent general increase over this time period.

- See Tables 8-3 and 8-4 for data.

- See Appendix A for information about multiple cause of death data.

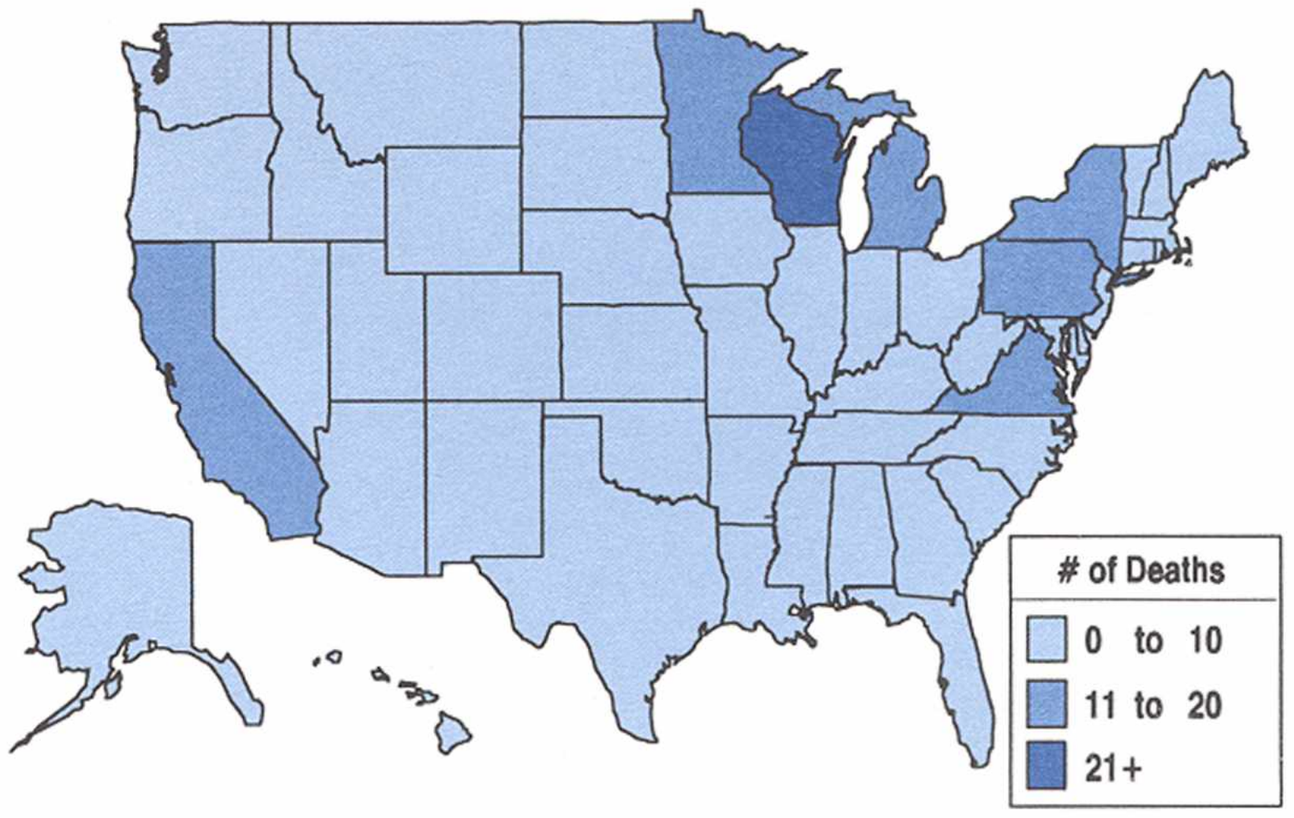
Figure 8-1. Hypersensitivity pneumonitis: number of deaths, U.S. residents age 15 and over, 1979-1980



- Wisconsin had the highest number of deaths with hypersensitivity pneumonitis (n = 47) for this period.

- See Table 8-4 for data.

Figure 8-2. Hypersensitivity pneumonitis: number of deaths, U.S. residents age 15 and over, by state, 1979-1990

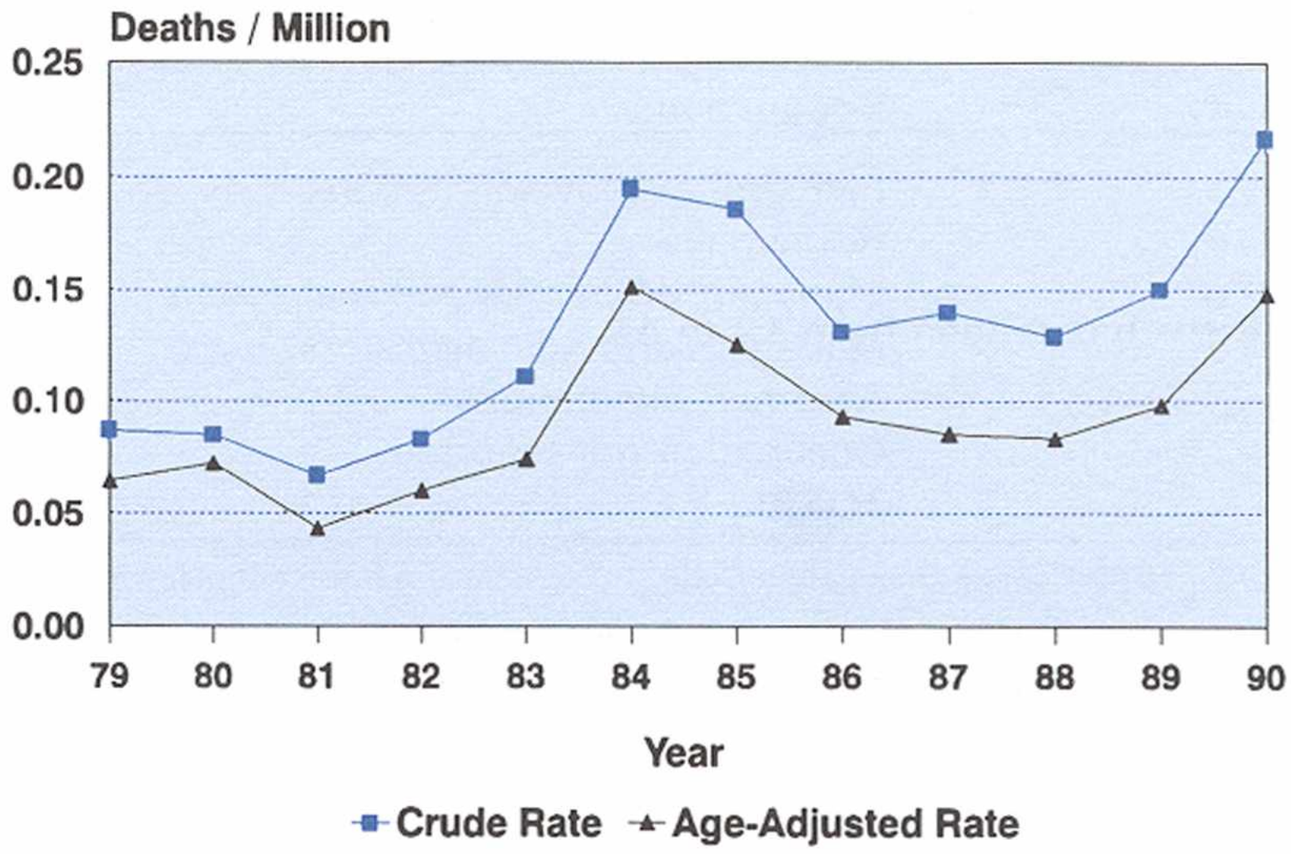


- The crude mortality rates have generally increased from less than 0.1 to more than 0.2 deaths per million from 1979 to 1990.

- See Tables 8-5 and 8-6 for data.

- See Appendix B for methods.

Figure 8-3. Hypersensitivity pneumonitis: crude and age-adjusted mortality rates, U.S. residents age 15 and over, 1979-1990



- Crude mortality rates for hypersensitivity pneumonitis were highest in the north central states and Vermont.

- See Table 8-9 for data.

Figure 8-4. Hypersensitivity pneumonitis: crude mortality rates, U.S. residents age 15 and over, by state, 1989-1990

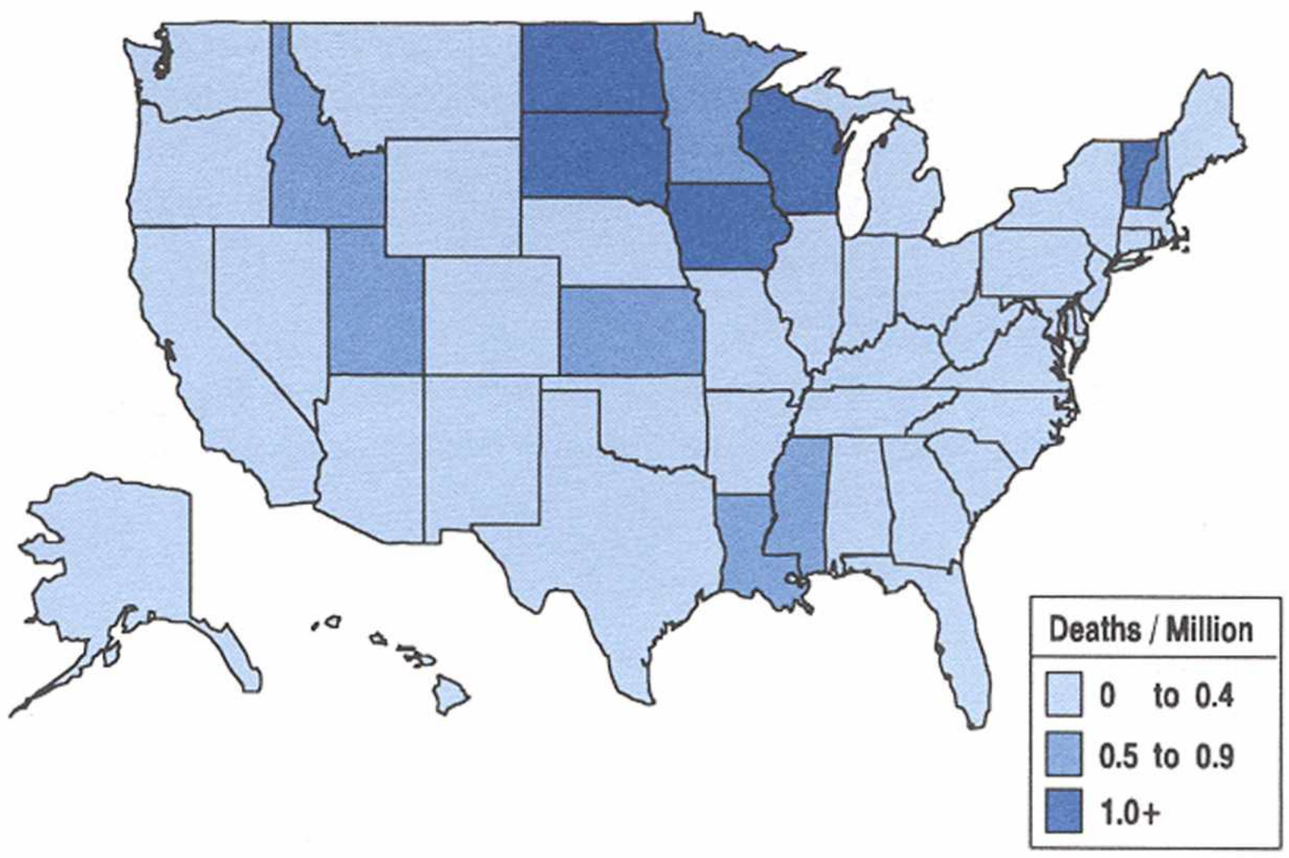


Table 8-1. Hypersensitivity pneumonitis: most frequently recorded occupations on death certificate, U.S. residents age 15 and over, selected states and years, 1985-1990

COC	Occupation	Number	Percent
473	Farmers, except horticultural	29	50.0
914	Homemaker	8	13.8
016	Manager, properties and real estate	2	3.4
019	Managers and administrators, n.e.c.	2	3.4
	All other occupations	13	22.4
	Occupation not reported	4	6.9
	TOTAL	**58**	**100.0**

COC - 1980 Census Occupation Code n.e.c. - not elsewhere classified

NOTE: See Appendix C for list of 25 states reporting usual occupation and years reporting. Percentages may not add to 100% due to rounding.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.

Table 8-2. Hypersensitivity pneumonitis: most frequently recorded industries on death certificate, U.S. residents age 15 and over, selected states and years, 1985-1990

CIC	Industry	Number	Percent
010	Agricultural production, crops	16	27.6
011	Agricultural production, livestock	15	25.9
961	Homemaker, student, unemployed, volunteer	8	13.8
712	Real estate, including real estate-insurance-law offices	2	3.4
	All other industries	12	20.7
	Industry not reported	5	8.6
	TOTAL	**58**	**100.0**

CIC - 1980 Census Industry Code

NOTE: See Appendix C for list of 25 states reporting usual industry and years reporting.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.

Table 8-3. Hypersensitivity pneumonitis: number of deaths, U.S. residents age 15 and over, by age, race, and sex, 1979-1990

Years		1979-1990		1989-1990	
Total Deaths		291	%	69	%
Sex	Male	210	72.2	48	69.6
	Female	81	27.8	21	30.4
Race	White	278	95.5	65	94.2
	Black	11	3.8	2	2.9
	Other	2	0.7	2	2.9
Race/Sex	White Male	205	70.4	45	65.2
	White Female	73	25.1	20	29.0
	Black Male	4	1.4	2	2.9
	Black Female	7	2.4	0	0.0
	Other Male	1	0.3	1	1.4
	Other Female	1	0.3	1	1.4
Age	Years				
	15-24	5	1.7	0	0.0
	25-34	9	3.1	2	2.9
	35-44	7	2.4	4	5.8
	45-54	19	6.5	3	4.3
	55-64	47	16.2	10	14.5
	65-74	92	31.6	23	33.3
	75-84	88	30.2	24	34.8
	85 and Over	24	8.2	3	4.3
	Mean	68.5		68.8	
	Range	15-98		29-88	

NOTE: See Appendix B for methods. Percentages may not total to 100% due to rounding.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.

Table 8-4. Hypersensitivity pneumonitis: number of deaths, U.S. residents age 15 and over, by state, 1979-1990

State	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	TOTAL
Alabama	-	-	-	-	-	-	-	1	-	-	-	-	1
Alaska	-	-	-	-	-	-	-	-	-	-	-	-	-
Arizona	-	-	-	-	-	-	2	-	1	-	2	-	5
Arkansas	-	-	-	-	-	1	-	-	-	1	-	-	2
California	1	-	-	-	1	7	1	2	4	1	1	2	20
Colorado	-	-	-	-	1	-	-	-	1	-	-	-	2
Connecticut	2	1	-	1	1	-	2	1	-	-	1	1	10
Delaware	-	-	-	-	-	-	-	-	-	-	-	-	-
District of Columbia	-	-	-	-	-	-	-	-	-	-	-	-	-
Florida	1	1	2	-	1	1	-	3	-	-	1	-	10
Georgia	-	-	-	-	-	-	-	1	-	-	1	-	2
Hawaii	-	-	-	-	-	-	-	-	-	-	-	-	-
Idaho	-	-	-	-	1	-	-	-	-	-	1	-	2
Illinois	1	-	-	-	3	-	1	1	-	1	1	1	9
Indiana	1	-	2	-	-	-	1	-	1	1	-	1	7
Iowa	-	-	-	-	-	2	2	-	1	-	4	1	10
Kansas	-	-	-	1	-	1	-	-	-	-	1	1	4
Kentucky	-	-	-	-	-	-	-	-	-	-	-	-	-
Louisiana	2	-	-	-	-	-	1	-	-	-	-	4	7
Maine	-	-	-	-	-	1	-	-	-	1	-	-	2
Maryland	-	-	-	-	-	-	2	-	1	-	-	1	4
Massachusetts	-	-	-	-	-	1	-	-	1	1	-	1	4
Michigan	1	1	1	2	-	3	2	-	-	3	-	5	18
Minnesota	-	-	2	-	1	4	2	-	1	2	2	2	16
Mississippi	-	-	-	-	-	-	-	-	-	-	-	-	-
Missouri	-	1	-	-	-	-	1	-	-	1	-	-	3
Montana	-	-	-	-	-	-	-	1	-	-	-	-	1
Nebraska	1	-	-	-	-	-	-	-	-	1	-	1	3
Nevada	-	-	-	-	-	-	-	-	-	-	-	-	-
New Hampshire	-	-	-	-	-	-	-	-	-	-	-	1	1
New Jersey	-	1	-	-	-	-	-	-	1	1	-	-	3
New Mexico	-	-	-	-	-	-	-	-	-	-	-	-	-
New York	2	2	1	-	-	-	2	-	3	-	1	3	14
North Carolina	-	-	1	-	-	-	-	-	-	1	-	-	2
North Dakota	-	-	-	-	-	-	-	-	-	-	-	1	1
Ohio	-	1	-	-	-	1	-	-	-	1	3	-	6
Oklahoma	-	-	-	-	-	-	-	-	-	-	-	-	-
Oregon	-	-	-	-	-	-	-	-	1	1	-	1	3
Pennsylvania	-	-	1	2	2	4	2	-	-	2	1	5	19
Rhode Island	1	-	-	-	-	1	-	-	1	-	-	-	3
South Carolina	-	-	-	-	-	-	-	-	1	-	-	1	2
South Dakota	-	-	-	-	1	2	-	1	1	-	-	1	6
Tennessee	-	1	-	-	1	-	1	1	-	-	-	-	4
Texas	-	1	-	2	2	1	2	1	-	-	1	-	10
Utah	-	-	-	-	-	-	-	-	-	-	2	-	2
Vermont	-	-	-	2	-	-	-	-	-	1	1	-	4
Virginia	-	1	-	1	-	1	2	3	1	2	-	-	11
Washington	-	-	-	2	-	-	2	1	-	-	1	-	6
West Virginia	-	-	-	-	1	-	-	-	2	-	-	-	3
Wisconsin	2	4	2	2	3	4	7	7	4	2	3	7	47
Wyoming	-	-	-	-	1	1	-	-	-	-	-	-	2
TOTAL	**15**	**15**	**12**	**15**	**20**	**36**	**35**	**24**	**26**	**24**	**28**	**41**	**291**

NOTE: See Appendix B for methods.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.

- indicates quantity zero.

Table 8-5. Hypersensitivity pneumonitis, crude mortality rates (per 1,000,000 population), U.S. residents age 15 and over, by race and sex, 1979-1990

		White		Black	
Year	Overall rate	Males	Females	Males	Females
1979	0.09	0.14	0.05	0.10	-
1980	0.08	0.12	0.06	-	0.08
1981	0.07	0.12	0.04	-	-
1982	0.08	0.17	0.02	-	-
1983	0.11	0.20	0.06	-	-
1984	0.20	0.39	0.06	-	0.07
1985	0.19	0.28	0.13	0.08	0.07
1986	0.13	0.23	0.05	-	0.17
1987	0.14	0.23	0.08	-	0.09
1988	0.13	0.20	0.08	-	0.08
1989	0.15	0.20	0.13	0.10	-
1990	0.22	0.36	0.10	0.10	-

NOTE: See Appendix B for methods.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.
U.S. Bureau of the Census: 1979-1990 population estimates of the U.S.

- indicates no deaths listed.

Table 8-6. Hypersensitivity pneumonitis: age-adjusted mortality rates (per 1,000,000 population), U.S. residents age 15 and over, by race and sex, 1979-1990

		White		Black	
Year	Overall rate	Males	Females	Males	Females
1979	0.06	0.11	0.03	0.10	-
1980	0.07	0.10	0.05	-	0.09
1981	0.04	0.08	0.03	-	-
1982	0.06	0.13	0.02	-	-
1983	0.07	0.14	0.04	-	-
1984	0.15	0.32	0.03	-	0.10
1985	0.12	0.22	0.05	0.12	0.10
1986	0.09	0.18	0.03	-	0.15
1987	0.08	0.16	0.03	-	0.11
1988	0.08	0.14	0.05	-	0.07
1989	0.10	0.15	0.06	0.11	-
1990	0.15	0.27	0.05	0.08	-

NOTE: See Appendix B for methods.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.
U.S. Bureau of the Census: 1979-1990 population estimates of the U.S.

- indicates no deaths listed.

Table 8-7. Hypersensitivity pneumonitis: years of potential life lost to age 65, U.S. residents age 15 and over, by race and sex, 1979-1990

		White		Black	
Year	Total	Males	Females	Males	Females
1979	60	50	10	0	-
1980	80	30	45	-	5
1981	25	15	10	-	-
1982	95	50	45	-	-
1983	40	25	15	-	-
1984	265	205	45	-	15
1985	105	70	5	15	15
1986	140	100	5	-	35
1987	35	20	0	-	15
1988	125	45	45	-	35
1989	120	115	0	5	-
1990	145	95	5	35	-

NOTE: See Appendix B for methods.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.

- indicates no deaths listed.

Table 8-8. Hypersensitivity pneumonitis: years of potential life lost to life expectancy, U.S. residents age 15 and over, by race and sex, 1979-1990

		White		Black	
Year	Total	Males	Females	Males	Females
1979	242	147	67	11	-
1980	272	130	114	-	20
1981	148	82	60	-	-
1982	251	159	75	-	-
1983	275	168	89	-	-
1984	696	516	99	-	28
1985	478	278	115	22	28
1986	434	287	59	-	60
1987	318	202	61	-	28
1988	389	195	131	-	46
1989	450	283	128	16	-
1990	628	396	102	38	-

NOTE: See Appendix B for methods.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.

- indicates no deaths listed.

Table 8-9. Hypersensitivity pneumonitis: number of deaths, crude and age-adjusted mortality rates (per 1,000,000 population), total years of potential life lost (YPLL), U.S. residents age 15 and over, by state, 1989-1990

State	Deaths	Rank	Crude mortality Rate	Rank	Age-adjusted mortality Rate	Rank	YPLL to age 65 Years	Rank	YPLL to life expectancy Years	Rank
Alabama	-	30	-	30	-	30	-	30	-	30
Alaska	-	30	-	30	-	30	-	30	-	30
Arizona	2	10	0.38	14	0.27	13	35	2	56	8
Arkansas	-	30	-	30	-	30	-	30	-	30
California	3	8	0.07	27	0.05	27	5	10	37	13
Colorado	-	30	-	30	-	30	-	30	-	30
Connecticut	2	10	0.39	13	0.26	14	25	4	46	9
Delaware	-	30	-	30	-	30	-	30	-	30
District of Columbia	-	30	-	30	-	30	-	30	-	30
Florida	1	15	0.05	28	0.02	29	0	16	14	19
Georgia	1	15	0.10	25	0.08	23	0	16	14	19
Hawaii	-	30	-	30	-	30	-	30	-	30
Idaho	1	15	0.69	7	0.63	4	25	4	38	11
Illinois	2	10	0.12	23	0.11	18	15	8	43	10
Indiana	1	15	0.12	23	0.08	23	0	16	14	19
Iowa	5	3	1.16	2	0.91	2	40	1	103	2
Kansas	2	10	0.53	11	0.28	11	0	16	22	15
Kentucky	-	30	-	30	-	30	-	30	-	30
Louisiana	4	5	0.64	8	0.39	10	35	2	72	3
Maine	-	30	-	30	-	30	-	30	-	30
Maryland	1	15	0.14	20	0.08	23	0	16	8	27
Massachusetts	1	15	0.10	25	0.07	26	0	16	14	19
Michigan	5	3	0.35	15	0.24	15	5	10	69	4
Minnesota	4	5	0.61	9	0.44	8	5	10	57	7
Mississippi	-	30	-	30	-	30	-	30	-	30
Missouri	-	30	-	30	-	30	-	30	-	30
Montana	-	30	-	30	-	30	-	30	-	30
Nebraska	1	15	0.42	12	0.28	11	0	16	14	19
Nevada	-	30	-	30	-	30	-	30	-	30
New Hampshire	1	15	0.57	10	0.43	9	0	16	14	19
New Jersey	-	30	-	30	-	30	-	30	-	30
New Mexico	-	30	-	30	-	30	-	30	-	30
New York	4	5	0.14	20	0.10	19	10	9	64	6
North Carolina	-	30	-	30	-	30	-	30	-	30
North Dakota	1	15	1.07	4	1.17	1	5	10	21	16
Ohio	3	8	0.18	19	0.09	22	0	16	34	14
Oklahoma	-	30	-	30	-	30	-	30	-	30
Oregon	1	15	0.23	17	0.24	15	5	10	21	16
Pennsylvania	6	2	0.32	16	0.15	17	5	10	66	5
Rhode Island	-	30	-	30	-	30	-	30	-	30
South Carolina	1	15	0.19	18	0.10	19	0	16	8	27
South Dakota	1	15	1.01	5	0.62	5	0	16	14	19
Tennessee	-	30	-	30	-	30	-	30	-	30
Texas	1	15	0.04	29	0.04	28	25	4	38	11
Utah	2	10	0.89	6	0.52	6	0	16	17	18
Vermont	1	15	1.15	3	0.51	7	0	16	8	27
Virginia	-	30	-	30	-	30	-	30	-	30
Washington	1	15	0.14	20	0.10	19	0	16	14	19
West Virginia	-	30	-	30	-	30	-	30	-	30
Wisconsin	10	1	1.34	1	0.88	3	25	4	140	1
Wyoming	-	30	-	30	-	30	-	30	-	30

NOTE: See Appendix B for methods.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.
U.S. Bureau of the Census: 1989-1990 population estimates of the U.S.

- indicates no deaths listed.

Table 8-10. Hypersensitivity pneumonitis: proportionate mortality ratios (PMR), based on underlying cause of death, by usual occupation for selected states, 1985-1990

COC	Occupation	Number of deaths	PMR	95% confidence interval LCL	UCL
473	Farmers, excluding horticultural	19	11.51	6.93	17.98

COC - 1980 Census Occupation Code

LCL - lower confidence limit UCL - upper confidence limit

NOTE: See Appendix B for methods and Appendix C for list of selected states.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.

Figure 9-1 depicts the states currently and formerly involved in occupational asthma surveillance and intervention activities funded under the NIOSH Sentinel Event Notification System for Occupational Risks (SENSOR) program. Since 1987, SENSOR occupational asthma programs have been under development in Massachusetts, Michigan, and New Jersey. California began development of an occupational asthma program in October 1992.

See Appendix A for more information about SENSOR.

Figure 9-1. States with SENSOR occupational asthma programs

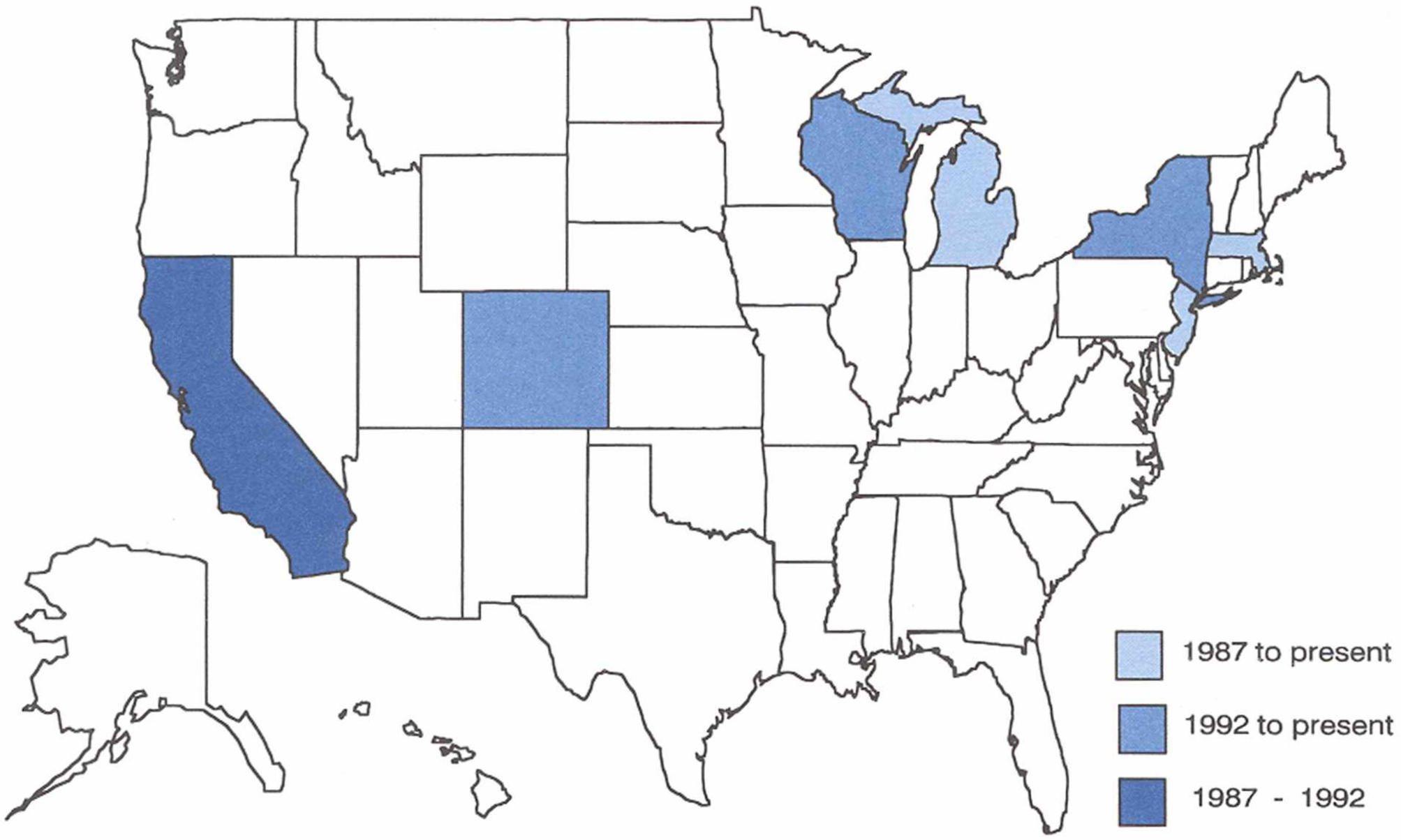


Table 9-1. Occupational asthma: number of cases reported, by state, race/ethnicity and sex, 1988-1992*

State	Race/ethnicity	Sex	Confirmed	Possible	Total
Colorado[1,2]	**Total**		**102**	**29**	**131**
	White	male	39	11	50
		female	33	12	45
	Black	male	2	1	3
		female	6	-	6
	Hispanic	male	9	2	11
		female	3	1	4
	Asian	male	1	-	1
		females	1	-	1
	Unknown	male	7	2	9
		female	1	-	1
Massachusetts[2,3]	**Total**		**46**	**32**	**78**
	White	male	23	17	40
		female	17	10	27
	Black	male	2	1	3
		female	1	-	1
	Hispanic	male	1	2	3
		female	1	-	1
	Asian	male	-	-	-
		female	-	-	-
	Other	male	1	1	2
		female	-	1	1
Michigan[3]	**Total**		**268**	**108**	**376**
	White	male	134	46	180
		female	84	42	126
	Black	male	9	9	18
		female	28	9	37
	Hispanic	male	1	1	2
		female	1	-	1
	Asian	male	-	-	-
		female	1	-	1
	Other	male	1	-	1
		female	3	-	3
	Unknown	male	4	-	4
		female	2	1	3

Table 9-1(continued). Occupational asthma: number of cases reported, by state, race/ethnicity and sex, 1988-1992*

State	Race/ethnicity	Sex	Confirmed	Possible	Total
New Jersey[3]	**Total**		**140**	**18**	**158**
	White	male	55	9	64
		female	48	4	52
	Black	male	10	1	11
		female	7	-	7
	Hispanic	male	14	2	16
		female	3	2	5
	Asian	male	1	-	1
		female	1	-	1
	Other	male	1	-	1
		female	-	-	-
New York[1]	**Total**		**71**	**-**	**71**
	White	male	40	-	40
		female	18	-	18
	Black	male	6	-	6
		female	2	-	2
	Hispanic	male	4	-	4
		female	-	-	-
	Asian	male	-	-	-
		female	-	-	-
	Other	male	1	-	1
		female	-	-	-
Wisconsin[1,2]	**Total**		**38**	**-**	**38**
	White	male	19	-	19
		female	17	-	17
	Black	male	1	-	1
		female	-	-	-
	Hispanic	male	-	-	-
		female	-	-	-
	Asian	male	1	-	1
		female	-	-	-
TOTAL			**665**	**187**	**852**

* Provisional data as of April 1993.

[1]Confirmed and possible categories are mutually exclusive. Confirmed cases meet the published NIOSH/SENSOR occupational asthma case definition; possible cases meet the published NIOSH/SENSOR reporting guidelines.

[2]Physician reported cases only.

[3]Confirmed cases meet the published NIOSH/SENSOR occupational asthma case definition or also include RADS and work-aggravated asthma supplemental case classification scheme; possible cases meet the published NIOSH/SENSOR reporting guidelines.

SOURCE: RE Hoffman, JB McCammon, Colorado SENSOR; LK Davis, Massachusetts SENSOR; MJ Reilly, KD Rosenman, Michigan SENSOR; MJ Stanbury, New Jersey SENSOR; JM Melius, New York SENSOR; HA Anderson, Wisconsin SENSOR.

- indicates no cases in category.

Table 9-2. Occupational asthma: most frequently reported primary putative exposures, Michigan and New Jersey, 1988-1992

	Michigan		New Jersey		TOTAL	
Agent	Number	%	Number	%	Number	%
Isocyanates	88	23.4	16	10.1	**104**	**19.5**
Coolant/oil mists generated from machining operations	47	12.5	6	3.8	**53**	**9.9**
Aldehydes[1]	14	3.7	14	8.9	**28**	**5.2**
Epoxy resins	11	2.9	5	3.2	**16**	**3.0**
Tungsten carbide/cobalt	14	3.7	1	0.6	**15**	**2.8**
Acrylates	9	2.4	4	2.5	**13**	**2.4**
Chlorine	6	1.6	6	3.8	**12**	**2.2**
Acids	7	1.9	4	2.5	**11**	**2.1**
Diesel exhaust	2	0.5	8	5.1	**10**	**1.9**
Smoke/fumes, unspecified	10	2.7	0	0.0	**10**	**1.9**
Welding fumes	7	1.9	3	1.9	**10**	**1.9**
Pesticides/herbicides	1	0.3	8	5.1	**9**	**1.7**
Styrene	8	2.1	1	0.6	**9**	**1.7**
Unidentified agents	99	26.3	9	5.7	**108**	**20.2**
All other agents	53	14.1	73	46.2	**126**	**23.6**
TOTAL	**376**	**100**	**158**	**100**	**534**	**100**

[1]Includes formaldehyde and glutaraldehyde.

NOTE: See Table 9-1 footnotes.

SOURCE: MJ Reilly, KD Rosenman, Michigan SENSOR; MJ Stanbury, New Jersey SENSOR.

Table 9-3. Occupational asthma: primary industries where exposure to agents causing occupational asthma and related conditions occurred, by state, 1988-1992

Industry	SIC	CO	MA	MI	NJ	NY	WI	TOTAL
Agriculture, Forestry, and Fisheries	01-09	-	-	-	1	1	1	3
Mining	10-14	2	-	4	4	-	-	10
Construction	15-17	6	8	12	-	7	-	33
Manufacturing	20-39	48	42	288	76	27	32	513
Food and kindred products	20	6	2	13	4	-	1	26
Tobacco products	21	-	-	-	-	-	-	-
Textile mill products	22	-	6	2	2	-	-	10
Apparel	23	1	2	1	1	-	-	5
Lumber and wood, except furniture	24	19	-	3	2	-	2	26
Furniture and fixtures	25	-	1	1	-	1	-	3
Paper and allied products	26	-	-	5	-	1	-	6
Printing, publishing, allied products	27	2	2	5	4	1	1	15
Chemicals and allied products	28	3	1	23	25	1	2	55
Petroleum refining	29	-	-	1	3	-	-	4
Rubber and misc. plastic products	30	3	4	19	5	3	10	44
Leather and leather products	31	-	1	-	1	-	-	2
Stone, clay, glass, concrete	32	4	-	2	6	1	1	14
Primary metals industries	33	-	1	14	4	1	-	20
Fabricated metal products except machinery and computer equipment	34	-	3	16	-	1	1	21
Industrial and commercial machinery and computer equipment	35	3	4	18	4	11	1	41
Electrical Equipment, except computers	36	2	5	1	6	2	5	21
Transportation equipment	37	1	4	156	7	2	8	178
Measuring, analyzing, and controlling equipment	38	3	3	6	1	1	-	14
Miscellaneous industries	39	1	3	2	1	1	-	8
Transportation, Communications, Electric, Gas, and Sanitary Services	40-49	5	5	5	7	2	-	24
Wholesale Trade	50-51	-	-	9	3	1	-	13
Retail Trade	52-59	5	-	6	11	3	1	26
Finance, Insurance and Real Estate	60-67	5	-	2	3	-	-	10
Services	70-89	41	22	41	37	25	4	170
Public Administration	91-97	17	-	8	16	5	-	46
Unknown		2	1	1	-	-	-	4
TOTAL		131	78	376	158	71	38	852

SIC - 1987 Standard Industrial Classification

CO (Colorado); MA (Massachusetts); MI (Michigan); NJ (New Jersey); NY (New York); WI (Wisconsin)

NOTE: See Table 9-1 footnotes.

SOURCE: RE Hoffman, JB McCammon, Colorado SENSOR; LK Davis, Massachusetts SENSOR; MJ Reilly, KD Rosenman, Michigan SENSOR; MJ Stanbury, New Jersey SENSOR; JM Melius, New York SENSOR; HA Anderson, Wisconsin SENSOR.

- indicates no cases in category.

Table 9-4. Occupational asthma: primary occupations where exposure to agents causing occupational asthma and related conditions occurred, by state, 1988-1992

Occupation	COC	CO	MA	MI	NJ	NY	WI	TOTAL
Managerial and Professional Specialty								
Managers and administrators, n.e.c.	019	1	1	3	11	-	-	16
Registered nurses	095	1	-	1	5	1	-	8
All others*	003-199	14	5	17	13	9	1	59
Technical, Sales, and Administrative Support								
Secretaries	313	2	1	6	1	-	-	10
Insurance adjusters, examiners, and investigators	375	5	-	-	-	-	-	5
All others*	203-389	26	12	29	33	6	1	107
Service								
Janitors and cleaners	453	1	1	8	6	3	2	21
Hairdressers and cosmetologists	458	7	-	2	1	-	-	8
All others*	403-469	6	2	13	11	6	2	42
Farming, Forestry, and Fishing	473-499	-	-	1	-	1	2	4
Precision Production, Craft, and Repair								
Automobile body and related repairers	514	7	2	1	-	2	-	12
Industrial machinery repairers	518	2	-	11	2	-	-	15
Millwrights	544	3	-	5	-	2	-	10
Specified mechanics and repairers, n.e.c.	547	3	-	10	-	-	-	13
Supervisors, production occupations	633	-	-	15	9	-	-	24
Precision assemblers, metal	636	-	-	-	-	-	5	5
Machinists	637	-	3	5	1	1	-	10
All others*	503-699	15	11	27	11	19	2	85
Operators, Fabricators, and Laborers								
Grinding, abrading, buffing, and polishing machine operators	709	1	1	3	-	6	-	11
Miscellaneous metal, plastic, stone, and glass working machine operators	715	1	-	14	-	-	-	15
Molding and casting machine operators	719	-	3	6	-	2	-	11
Miscellaneous metal and plastic processing machine operators	725	-	-	6	-	-	8	14
Extruding and forming machine operators	755	-	-	8	-	-	-	8
Mixing and blending machine operators	756	4	2	6	1	-	-	13
Separating, filtering, and clarifying machine operators	757	-	-	5	4	-	-	9
Painting and paint spraying machine operators	759	-	8	2	2	-	8	20
Miscellaneous machine operators, n.e.c.	777	1	-	17	6	1	-	25
Welders and cutters	783	3	3	8	1	-	1	16
Assemblers	785	2	-	41	2	1	-	46
Production inspectors, checkers, and examiners	796	1	1	19	-	1	-	22
Machine feeders and offbearers	878	1	-	7	-	-	-	8
Hand packers and packagers	888	2	-	5	1	2	-	10
Laborers, except construction	889	-	3	20	3	-	-	26
All others*	703-889	19	17	49	29	8	6	128
Unknown	999	3	2	6	5	-	-	16
TOTAL		131	78	376	158	71	38	852

COC - 1980 Census Occupation Codes n.e.c. - not elsewhere classified

NOTE: See Table 9-1 footnotes.

SOURCE: RE Hoffman, JB McCammon, Colorado SENSOR; LK Davis, Massachusetts SENSOR; MJ Reilly, KD Rosenman, Michigan SENSOR; MJ Stanbury, New Jersey SENSOR; JM Melius, New York SENSOR; HA Anderson, Wisconsin SENSOR.

- indicates no cases in category.

* excludes categories shown separately.

Table 10-1. Occupational respiratory conditions due to toxic agents: estimated number of cases reported by employers, by industry division, U.S. private sector, 1973-1991

Year	Total	Agri-culture	Mining	Con-struction	Manu-facturing	Trans-portation & Public Utilities	Wholesale & Retail Trade	Finance	Services
1973	11,500	100	-	1,000	7,300	700	1,100	100	1,100
1974	12,700	200	100	900	8,500	700	1,200	100	1,000
1975	11,900	200	100	900	7,100	900	1,400	300	1,100
1976	13,100	200	100	1,100	7,700	1,100	1,000	200	1,600
1977	13,100	100	-	1,100	7,500	1,100	1,400	100	1,700
1978	13,600	100	100	1,100	7,900	1,100	1,600	200	1,600
1979	13,100	100	100	1,100	7,800	900	1,300	200	1,700
1980	11,400	100	100	700	6,700	1,000	1,300	100	1,300
1981	10,800	100	100	1,000	5,900	800	1,100	100	1,600
1982	8,800	100	100	600	4,700	700	700	100	1,600
1983	7,900	100	100	700	4,000	600	700	100	1,700
1984	10,600	100	100	700	5,500	700	1,200	200	2,100
1985	11,600	200	100	800	6,000	900	1,400	400	1,800
1986	12,300	100	-	600	6,400	700	1,600	400	2,400
1987	14,300	700	-	700	7,500	900	1,700	400	2,400
1988	16,100	200	100	900	9,200	1,000	1,300	500	3,000
1989	18,900	100	-	700	9,900	800	3,500	300	3,500
1990	20,500	200	100	1,200	10,300	1,200	2,200	800	4,700
1991	18,300	300	-	800	8,800	1,100	1,600	700	4,800

NOTE: Examples of respiratory conditions due to toxic agents include pneumonitis, pharyngitis, rhinitis or acute congestion due to chemicals, dusts, gases or fumes, and farmers' lung.

SOURCE: Bureau of Labor Statistics annual reports of occupational injuries and illnesses.

- indicates no data reported or data that do not meet BLS publication guidelines.

Table 10-2. Occupational respiratory conditions due to toxic agents: rate per 10,000 full-time workers, by industry division, U.S. private sector, 1973-1991

Year	Overall	Agri-culture	Mining	Con-struction	Manu-facturing	Trans-portation & Public Utilities	Wholesale & Retail Trade	Finance	Services
1973	2.1	1.8	1.7	3.2	3.8	1.7	0.8	0.2	1.2
1974	2.2	2.4	0.9	3.0	4.4	1.6	0.8	0.2	0.9
1975	2.2	1.7	0.8	3.1	4.1	2.1	1.0	0.7	1.1
1976	2.3	3.1	1.6	3.7	4.3	2.6	0.7	0.5	1.5
1977	2.2	2.0	0.5	3.3	4.0	2.5	0.9	0.2	1.4
1978	2.2	2.2	0.8	2.9	4.0	2.4	1.0	0.6	1.3
1979	2.0	1.1	0.8	2.8	3.9	1.9	0.8	0.5	1.3
1980	1.8	2.0	0.8	2.0	3.5	2.0	0.8	0.2	1.0
1981	1.7	1.1	1.0	2.9	3.1	1.7	0.7	0.2	1.1
1982	1.4	1.7	0.5	1.9	2.7	1.5	0.5	0.3	1.1
1983	1.2	1.4	0.8	2.0	2.3	1.4	0.4	0.2	1.1
1984	1.6	1.5	0.9	1.8	2.9	1.4	0.7	0.5	1.3
1985	1.7	2.4	1.0	1.9	3.2	1.8	0.8	0.8	1.1
1986	1.7	1.3	-	1.5	3.5	1.5	0.9	0.6	1.4
1987	2.0	7.9	0.6	1.6	4.0	1.7	0.9	0.7	1.3
1988	2.2	2.1	0.7	2.0	4.9	1.9	0.6	0.9	1.6
1989	2.5	1.5	0.5	1.5	5.2	1.6	1.7	0.5	1.7
1990	2.7	1.6	0.7	2.6	5.6	2.2	1.1	-	2.2
1991	2.4	2.7	0.6	2.1	5.0	2.1	0.8	-	2.3

SOURCE: Bureau of Labor Statistics annual reports of occupational injuries and illnesses.

- indicates no data reported or data that do not meet BLS publication guidelines.

Table 10-3. Occupational respiratory conditions due to toxic agents: industries with the highest reported incidence rates, U.S. private sector, 1989-1991

Year/Industry	SIC	Rates per 10,000 full time workers
1989		
Ship and boat building and repairing	373	31.2
Public building furniture and vehicle seats	253	16.7
Preserved fruits and vegetables	203	16.7
Forestry	08	14.0
Household audio and video equipment	365	13.5
Primary nonferrous metals	333	13.1
Pulp mills	261	11.7
Nonferrous rolling and drawing	335	11.0
Metal services, n.e.c.	347	10.9
Motor vehicles and equipment	371	10.8
OVERALL		**2.5**
1990		
Miscellaneous petroleum and coal products	299	78.2
Ship and boat building and repairing	373	28.2
Primary nonferrous metals	333	23.1
Girls' and children's outerwear	236	19.9
Secondary nonferrous metals	334	18.0
Metal services, n.e.c.	347	16.5
Ordnance and accessories, n.e.c.	348	14.2
Miscellaneous wood products	249	14.1
Motor vehicles and equipment	371	13.4
Meat products	201	12.8
OVERALL		**2.7**
1991		
Miscellaneous petroleum and coal products	299	46.8
Secondary nonferrous metals	334	31.9
Ship and boat building and repair	373	24.8
Ophthalmic goods	385	21.9
Primary nonferrous metals	333	17.3
Motor vehicle and equipment	371	13.4
Paperboard mills	263	13.4
Pulp mills	261	13.0
Miscellaneous manufacturing	399	12.4
Flat glass manufacturing	321	10.9
OVERALL		**2.4**

SIC - 1987 Standard Industrial Classification n.e.c. - not elsewhere classified

NOTE: The 1989 BLS report shows dashes for "Miscellaneous petroleum and coal products" which indicate no data reported or data that do not meet BLS publication guidelines.

SOURCE: Bureau of Labor Statistics annual reports of occupational injuries and illnesses.

Table 10-4. Occupational dust diseases of the lungs: estimated number of cases reported by employers, by industry division, U.S. private sector, 1973-1991

Year	Total	Agri-culture	Mining	Con-struction	Manu-facturing	Trans-portation & Public Utilities	Wholesale & Retail Trade	Finance	Services
1973	1,500	100	-	100	700	200	200	-	100
1974	1,700	100	300	100	900	-	300	-	100
1975	1,000	-	-	200	600	-	100	-	-
1976	1,200	-	-	200	800	100	-	-	-
1977	2,000	100	200	800	700	100	100	100	100
1978	1,600	-	300	200	800	100	200	-	100
1979	1,700	-	300	200	900	100	100	-	100
1980	2,300	-	300	200	1,300	100	100	-	200
1981	2,100	-	300	200	1,500	-	-	-	100
1982	2,000	-	300	100	1,200	100	100	-	100
1983	1,700	-	200	100	900	-	200	-	200
1984	1,800	-	200	200	1,000	100	100	-	100
1985	1,700	-	200	100	800	100	200	-	200
1986	3,200	100	600	100	-	-	-	100	300
1987	3,400	-	900	500	1,200	200	-	-	400
1988	2,900	-	700	200	1,200	300	-	-	300
1989	2,600	-	500	200	1,300	100	100	-	200
1990	3,000	100	300	300	1,600	400	100	-	300
1991	2,500	100	500	200	1,000	200	-	-	300

NOTE: Because of rounding, components may not add to totals. Examples of dust diseases of the lungs (pneumoconioses) include silicosis, asbestosis and other asbestos-related diseases, coal worker's pneumoconiosis, byssinosis, siderosis, and other pneumoconioses.

SOURCE: Bureau of Labor Statistics annual reports of occupational injuries and illnesses.

- indicates no data reported or data that do not meet BLS publication guidelines.

Table 10-5. Occupational dust diseases of the lungs: rate per 10,000 full-time workers, by industry division, U.S. private sector, 1973-1991

Year	Overall	Agri-culture	Mining	Con-struction	Manu-facturing	Trans-portation & Public Utilities	Wholesale & Retail Trade	Finance	Services
1973	0.3	1.3	0.5	0.4	0.4	0.3	0.2	0.1	0.1
1974	0.3	0.8	4.8	0.3	0.4	-	0.2	0.0	0.1
1975	0.2	0.4	0.2	0.6	0.4	0.1	-	-	-
1976	0.2	0.2	0.1	0.5	0.4	0.2	-	-	-
1977	0.3	1.3	2.0	2.5	0.4	0.1	-	0.1	0.1
1978	0.3	0.3	4.0	0.6	0.4	0.1	0.1	-	-
1979	0.3	0.1	3.4	0.5	0.4	0.1	0.1	-	0.1
1980	0.4	0.4	3.3	0.6	0.7	0.1	0.1	-	0.1
1981	0.3	0.3	2.5	0.5	0.8	0.1	-	-	0.1
1982	0.3	0.4	3.2	0.3	0.7	0.2	0.1	-	0.1
1983	0.3	0.3	1.9	0.4	0.5	0.1	0.1	-	0.1
1984	0.3	0.4	1.7	0.5	0.5	0.2	0.1	-	0.1
1985	0.2	0.5	2.7	0.3	0.4	0.2	0.1	-	0.1
1986	0.5	1.0	8.4	0.3	0.9	-	-	-	0.1
1987	0.5	0.5	12.9	1.2	0.6	0.3	-	-	0.2
1988	0.4	-	10.2	0.5	0.6	0.6	-	-	0.1
1989	0.3	0.2	7.5	0.5	0.7	0.2	-	-	0.1
1990	0.4	0.6	4.4	0.6	0.9	0.7	-	-	0.1
1991	0.3	0.5	7.3	0.4	0.5	0.3	-	-	0.1

SOURCE: Bureau of Labor Statistics annual reports of occupational injuries and illnesses.

- indicates no data reported or data that do not meet BLS publication guidelines.

Table 10-6. Occupational dust diseases of the lungs: industries with the highest reported incidence rates, U.S. private sector, 1989-1991

Year/Industry	SIC	Rates per 10,000 full time workers
1989		
Coal mining	12	35.2
Ship and boat building and repairing	373	17.2
Tobacco stemming and redrying	214	9.1
Plastics materials and synthetics	282	4.8
Industrial organic chemicals	286	4.5
Iron and steel foundries	332	4.3
Petroleum refining	291	3.7
Industrial inorganic chemicals	281	2.6
Photographic equipment and supplies	386	2.5
Flat glass manufacturing	321	2.3
Miscellaneous nonmetallic mineral products	329	2.3
OVERALL		**0.3**
1990		
Ship and boat building and repairing	373	33.5
Coal mining	12	20.0
Plastics materials and synthetics	282	5.3
Office furniture	252	3.9
Petroleum refining	291	3.0
Pulp mills	261	2.7
Fats and oils	207	2.5
Flat glass manufacturing	321	2.3
Nonmetallic mineral mining, except fuels	14	2.3
Highway and street construction	161	2.3
OVERALL		**0.4**
1991		
Coal mining	12	36.8
Ship and boat building and repairing	373	3.3
Plastics materials and synthetics	282	3.5
Pottery and related products	326	2.3
Nonmetallic mineral mining, except fuels	14	1.8
Petroleum refining	291	1.8
Grain mill products	204	1.7
Metal mining	10	1.6
Nonferrous rolling and drawing	335	1.3
Household furniture	251	1.3
Pulp mills	261	1.3
OVERALL		**0.3**

SIC - 1987 Standard Industrial Classification

SOURCE: Bureau of Labor Statistics annual reports of occupational injuries and illnesses.

Table 10-7. Estimated number of occupational illnesses by type of illness, U.S., private sector, 1973-1991

Year	Dust diseases of the lungs	Respiratory conditions due to toxic agents	Poisoning	Skin diseases or disorders	Disorders due to physical agents	Associated with repeated trauma	All other occupational illness	TOTAL
1973	1,500	11,500	6,800	89,200	27,500	23,600	40,400	200,500
1974	1,700	12,700	7,400	89,400	27,100	24,600	37,400	200,400
1975	1,000	11,900	6,200	74,400	21,200	23,700	24,900	163,300
1976	1,200	13,100	6,100	71,600	24,200	23,000	28,800	167,900
1977	2,000	13,100	5,700	73,000	23,600	23,400	21,100	161,900
1978	1,600	13,600	5,600	65,900	16,700	20,200	19,600	143,500
1979	1,700	13,100	5,800	67,900	15,100	21,900	23,200	148,900
1980	2,300	11,400	4,700	56,100	13,200	23,100	19,200	130,200
1981	2,100	10,800	5,600	51,200	11,900	22,900	21,600	126,100
1982	2,000	8,800	3,400	41,900	8,300	22,600	18,600	105,600
1983	1,700	7,900	3,000	39,500	8,800	26,700	18,400	106,100
1984	1,800	10,600	4,500	42,500	9,000	34,700	21,400	124,800
1985	1,700	11,600	4,200	41,800	9,000	37,000	20,100	125,400
1986	3,200	12,300	4,300	41,900	9,200	46,000	20,400	136,800
1987	3,400	14,300	4,800	54,200	13,800	72,900	26,800	190,200
1988	2,900	16,100	5,500	57,900	17,300	115,400	25,600	240,700
1989	2,600	18,900	5,800	62,100	17,700	146,900	29,700	283,700
1990	3,000	20,500	6,100	60,900	18,200	185,400	37,300	331,600
1991	2,500	18,300	6,700	58,200	18,200	223,600	40,800	368,300

SOURCE: Bureau of Labor Statistics annual reports of occupational injuries and illnesses.

Table 10-8. Estimated percent of occupational illnesses by type of illness, U.S., private sector, 1973-1991

Year	Dust diseases of the lungs	Respiratory conditions due to toxic agents	Poisoning	Skin diseases or disorders	Disorders due to physical agents	Associated with repeated trauma	All other occupational illness	TOTAL
1973	0.7	5.7	3.4	44.5	13.7	11.8	20.1	100.0
1974	0.8	6.3	3.7	44.6	13.5	12.3	18.7	100.0
1975	0.6	7.3	3.8	45.6	13.0	14.5	15.2	100.0
1976	0.7	7.8	3.6	42.6	14.4	13.7	17.2	100.0
1977	1.2	8.1	3.5	45.1	14.6	14.5	13.0	100.0
1978	1.1	9.5	3.9	46.9	11.6	14.1	13.7	100.0
1979	1.1	8.8	3.9	45.6	10.1	14.7	15.6	100.0
1980	1.8	8.8	3.6	43.1	10.1	17.7	14.7	100.0
1981	1.7	8.6	4.4	40.6	9.4	18.2	17.0	100.0
1982	1.9	8.3	3.2	39.7	7.9	21.4	17.6	100.0
1983	1.6	7.4	2.8	37.2	8.3	25.2	17.3	100.0
1984	1.4	8.5	3.6	34.1	7.2	27.8	17.1	100.0
1985	1.4	9.3	3.3	33.3	7.2	29.5	16.0	100.0
1986	2.3	9.0	3.1	30.6	6.7	33.6	14.9	100.0
1987	1.8	7.5	2.5	28.5	7.3	38.3	14.1	100.0
1988	1.2	6.7	2.3	24.1	7.2	47.9	10.6	100.0
1989	0.9	6.7	2.0	21.9	6.2	51.8	10.5	100.0
1990	0.9	6.2	1.8	18.4	5.5	55.9	11.2	100.0
1991	0.7	5.0	1.8	15.8	4.9	60.7	11.1	100.0

SOURCE: Bureau of Labor Statistics annual reports of occupational injuries and illnesses.

Table 10-9. Selected lung diseases: prevalence of self-reported conditions by sex, race, and age, respondents age 18 and over who have worked at some time during their life, U.S., 1988

	Number of respondents	Lung Cancer		Asthma		Chronic Bronchitis		Emphysema		Dust Diseases of the lungs	
		No.	%	No.	%	No.	%	No.	%	No.	%
Total	**42,487**	**43**	**0.10**	**1,291**	**3.04**	**1,142**	**2.69**	**553**	**1.30**	**109**	**0.26**
Sex											
Male	18,403	27	0.15	454	2.47	326	1.77	337	1.83	82	0.45
Female	24,084	16	0.07	837	3.48	816	3.39	216	0.90	27	0.11
Race											
White	35,548	35	0.10	1,062	2.99	1,021	2.87	508	1.43	89	0.25
Black	5,864	8	0.14	204	3.48	106	1.81	41	0.70	19	0.32
Other	1,075	0	0.00	25	2.33	15	1.40	4	0.37	1	0.09
Age											
18-24	4,992	0	0.00	162	3.25	70	1.40	1	0.02	4	0.08
25-44	18,761	4	0.02	547	2.92	353	1.88	41	0.22	25	0.13
45-64	10,434	14	0.13	305	2.92	377	3.61	183	1.75	37	0.35
65+	8,300	25	0.30	277	3.34	342	4.12	328	3.95	43	0.52

SOURCE: National Health Interview Survey, Occupational Supplement (1988).

Table 10-10. Selected lung diseases: industry-specific prevalence rate ratios (PRR) for self-reported conditions, among respondents age 18 and over who have worked at some time during their life, U.S., 1988

Industry	Total	Lung Cancer		Asthma		Chronic Bronchitis		Emphysema		Dust Diseases of the Lungs	
		Total	PRR	Total	PRR	Total	PRR	Total	PRR	Total	PRR
Agriculture forestry and fishing	1,544	5	3.49	70	1.52	36	0.86	37	1.90	7	1.82
Mining	334	0	0.00	12	1.18	11	1.23	11	2.56	17	23.32
Construction	2,322	4	1.77	49	0.68	51	0.81	54	1.87	14	2.55
Manufacturing	8,611	10	1.19	235	0.88	235	1.02	143	1.37	28	1.36
Transportation, communication, and public utilities	2,714	4	1.50	83	1.01	68	0.93	52	1.52	4	0.56
Wholesale trade	1,286	1	0.76	44	1.13	34	0.98	19	1.14	4	1.22
Retail trade	7,234	7	0.95	242	1.12	230	1.23	78	0.80	11	0.55
Finance, insurance, real estate	2,423	1	0.39	55	0.74	55	0.84	16	0.49	0	0.00
Business/repair services	1,662	1	0.58	63	1.26	45	1.01	18	0.83	4	0.94
Personal services	2,100	4	1.97	65	1.02	51	0.90	20	0.72	2	0.36
Entertainment, recreational services	555	0	0.00	18	1.07	14	0.94	5	0.69	0	0.00
Professional/related services	8,541	3	0.30	283	1.12	224	0.97	56	0.45	13	0.54
Public administration	2,098	1	0.46	54	0.84	59	1.05	26	0.95	2	0.36
Armed services	531	2	3.85	10	0.62	14	0.98	13	1.90	3	2.24
Unknown industry	532	0	0.00	8	0.49	15	1.05	5	0.72	0	0.00
TOTAL	**42,487**	**43**		**1,291**		**1,142**		**553**		**109**	

NOTE: See Appendix B for methods. Tabulated PRRs are not adjusted for age, race, sex, or smoking status.

SOURCE: National Health Interview Survey, Occupational Supplement (1988).

OTHER LUNG CONDITIONS

Mortality

Bronchitis and emphysema include ICD-9 codes 490 (bronchitis, not specified as acute or chronic), 491 (chronic bronchitis), 492 (emphysema) and 496 (chronic airway obstruction, not elsewhere classified).

Table 10-11. Bronchitis and emphysema: proportionate mortality ratios (PMR), based on underlying cause of death, by usual occupation for selected states, 1985-1990

COC	Occupation	Number of deaths	PMR	95% confidence interval LCL	UCL
729	Nailing, tacking machine operators	4	4.98	1.36	12.73
583	Paperhangers	25	2.06	1.33	3.04
616	Mining machine operators	1,763	2.01	1.91	2.11
704	Lathe and turning machine operators	67	1.97	1.51	2.54
826	Rail vehicle operators, n.e.c.	30	1.93	1.30	2.76
598	Drillers, earth	33	1.86	1.26	2.66
614	Drillers, oil well	82	1.86	1.48	2.32
725	Miscellaneous metal, and plastic processing machine operators	16	1.77	1.01	2.87
617	Mining occupations, n.e.c.	134	1.74	1.45	2.09
509	Small engine repairers	33	1.74	1.18	2.49
829	Sailors and deckhands	110	1.73	1.40	2.10
597	Structural metal workers	184	1.69	1.45	1.95
566	Carpet installers	54	1.68	1.25	2.22
556	Supervisors; painters, paperhangers, plasterers	109	1.66	1.35	2.02
595	Roofers	160	1.64	1.40	1.91
773	Motion picture projectionists	31	1.64	1.11	2.34
719	Molding, and casting machine operators	195	1.61	1.38	1.86
885	Garage, and service station related occupations	162	1.61	1.37	1.88
579	Painters, construction, and maintenance	952	1.59	1.48	1.69
567	Carpenters	2,734	1.58	1.52	1.64
496	Timber cutting, and logging occupations	444	1.57	1.42	1.73
643	Boilermakers	112	1.55	1.26	1.89
565	Tile setters, hard and soft	38	1.55	1.08	2.16
534	Heating, air conditioning, and refrigeration mechanics	112	1.54	1.25	1.88
723	Metal plating machine operators	49	1.54	1.12	2.06
806	Driver-sales workers	205	1.54	1.33	1.76
783	Welders and cutters	888	1.50	1.40	1.61
206	Radiologic technicians	33	1.49	1.01	2.13

COC - 1980 Census Occupation Code n.e.c. - not elsewhere classified

LCL - lower confidence limit UCL - upper confidence limit

NOTE: See Appendix B for methods and Appendix C for list of selected states and years reporting.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.

Table 10-11 (continued). Bronchitis and emphysema: proportionate mortality ratios (PMR), based on underlying cause of death, by usual occupation for selected states, 1985-1990

COC	Occupation	Number of deaths	PMR	95% confidence interval LCL	UCL
563	Brickmasons and stonemasons	476	1.48	1.35	1.63
843	Supervisors, material moving equipment operators	47	1.48	1.08	1.99
505	Automobile mechanics	1,318	1.48	1.40	1.57
825	Railroad brake, signal, and switch operators	175	1.48	1.26	1.73
526	Household appliance and power tool repairers	60	1.48	1.13	1.90
514	Auto body and related repairers	161	1.48	1.26	1.73
435	Waiters and waitresses	740	1.48	1.37	1.59
218	Surveying and mapping technicians	48	1.47	1.07	1.97
584	Plasterers	61	1.46	1.12	1.88
265	Sales workers, shoes	54	1.46	1.08	1.92
516	Heavy equipment mechanics	232	1.45	1.26	1.67
678	Dental laboratory and medical appliance technicians	38	1.44	1.00	2.01
269	Sales workers, parts	72	1.44	1.13	1.82
707	Rolling machine operators	55	1.44	1.06	1.90
368	Weighers, measurers, and checkers	61	1.43	1.09	1.85
507	Bus, truck, and stationary engine mechanics	242	1.43	1.24	1.64
759	Painting and paint spraying machine operators	151	1.43	1.20	1.69
844	Operating engineers	664	1.43	1.32	1.55
268	Sales workers, hardware and building supplies	124	1.42	1.18	1.70
575	Electricians	947	1.41	1.32	1.50
789	Hand painting, coating, and decorating occupations	52	1.40	1.04	1.85
804	Truck drivers, heavy	3,074	1.40	1.35	1.45
547	Specified mechanics and repairers, n.e.c.	243	1.38	1.20	1.59
375	Insurance adjusters, examiners, and investigators	70	1.38	1.08	1.75
434	Bartenders	178	1.38	1.18	1.61
823	Railroad conductors and yardmasters	221	1.38	1.19	1.58
668	Upholsterers	113	1.37	1.11	1.66
585	Plumbers, pipefitters, and steamfitters	821	1.36	1.27	1.46
727	Sawing machine operators	182	1.35	1.16	1.56
849	Crane and tower operators	243	1.34	1.17	1.54

COC - 1980 Census Occupation Code
n.e.c. - not elsewhere classified
LCL - lower confidence limit
UCL - upper confidence limit

NOTE: See Appendix B for methods and Appendix C for list of selected states and years reporting.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.

Table 10-11 (continued). Bronchitis and emphysema: proportionate mortality ratios (PMR), based on underlying cause of death, by usual occupation for selected states, 1985-1990

COC	Occupation	Number of deaths	PMR	95% confidence interval LCL	UCL
498	Fishers	103	1.34	1.09	1.63
805	Truck drivers, light	219	1.33	1.15	1.52
809	Taxicab drivers, and chauffeurs	281	1.33	1.17	1.50
549	Not specified mechanics and repairers	386	1.32	1.19	1.47
599	Construction trades, n.e.c.	163	1.32	1.13	1.54
766	Furnace, kiln, and oven operators, except food	266	1.32	1.16	1.50
905	Military occupations, rank not specified	1,308	1.31	1.23	1.38
686	Butchers and meat cutters	400	1.29	1.17	1.43
869	Construction laborers	1,717	1.29	1.23	1.36
637	Machinists	1,714	1.29	1.23	1.36
426	Guards and police, except public service	697	1.29	1.19	1.39
706	Punching, and stamping press machine operators	175	1.28	1.09	1.49
653	Sheet metal workers	256	1.27	1.11	1.43
824	Locomotive operating occupations	210	1.27	1.10	1.45
577	Electrical power installers and repairers	115	1.26	1.03	1.54
808	Bus drivers	351	1.26	1.13	1.40
878	Machine feeders and offbearers	183	1.26	1.08	1.46
734	Printing machine operators	337	1.26	1.12	1.41
689	Inspectors, testers, and graders	189	1.25	1.07	1.45
523	Electronic repairers, communications and industrial equipment	107	1.24	1.01	1.51
359	Dispatchers	100	1.24	1.01	1.51
544	Millwrights	236	1.23	1.06	1.41
479	Farm workers	599	1.22	1.11	1.33
303	Supervisors, general office	178	1.21	1.03	1.42
473	Farmers, except horticultural	7,784	1.21	1.19	1.24
518	Industrial machinery repairers	396	1.21	1.08	1.34
709	Grinding, abrading, buffing, and polishing machine operators	173	1.20	1.02	1.40

COC - 1980 Census Occupation Code
n.e.c. - not elsewhere classified
LCL - lower confidence limit
UCL - upper confidence limit

NOTE: See Appendix B for methods and Appendix C for list of selected states and years reporting.

SOURCE: National Centar for Health Statistics multiple cause of death data tapes.

Table 10-11 (continued). Bronchitis and emphysema: proportionate mortality ratios (PMR), based on underlying cause of death, by usual occupation for selected states, 1985-1990

COC	Occupation	Number of deaths	PMR	95% confidence interval LCL	UCL
263	Sales workers, motor vehicle and boats	326	1.20	1.07	1.34
457	Barbers	305	1.20	1.06	1.34
687	Bakers	208	1.19	1.04	1.37
889	Laborers, except construction	4,818	1.19	1.15	1.23
779	Machine operators, not specified	1,436	1.19	1.13	1.25
053	Civil engineer	333	1.18	1.05	1.33
777	Miscellaneous machine operators, n.e.c.	876	1.18	1.10	1.27
558	Supervisors; construction, n.e.c.	657	1.17	1.08	1.27
883	Freight, stock, material handlers, n.e.c	246	1.16	1.01	1.34
749	Miscellaneous textile machine operators	582	1.16	1.06	1.27
355	Mail carriers, postal service	353	1.15	1.04	1.28
634	Tool and die makers	352	1.14	1.02	1.27
913	Retired; with no other occupation listed	1,741	1.14	1.08	1.20
453	Janitors and cleaners	2,443	1.11	1.06	1.16
633	Supervisors, production occupations	1,673	1.10	1.05	1.16
023	Accountants and auditors	761	1.08	1.00	1.16
785	Assemblers	901	1.08	1.01	1.15

COC - 1980 Census Occupation Code
n.e.c. - not elsewhere classified
LCL - lower confidence limit
UCL - upper confidence limit

NOTE: See Appendix B for methods and Appendix C for list of selected states and years reporting.

SOURCE: National Center for Health Statistics multiple cause of death data tapes.

ASSOCIATION OF OCCUPATIONAL AND ENVIRONMENTAL CLINICS

Occupational Disease Surveillance Database

The Association of Occupational and Environmental Clinics (AOEC) has developed a unique surveillance database for a broad range of occupational diseases and cumulative injuries. The development of this Occupational Disease Surveillance Database has been supported in part by funding from the National Institute for Occupational Safety and Health (NIOSH).

See Appendix A for more information about the AOEC Database.

Figure 11-1. Geographic locations of AOEC member clinics reporting cases: January 1991 - September 1992

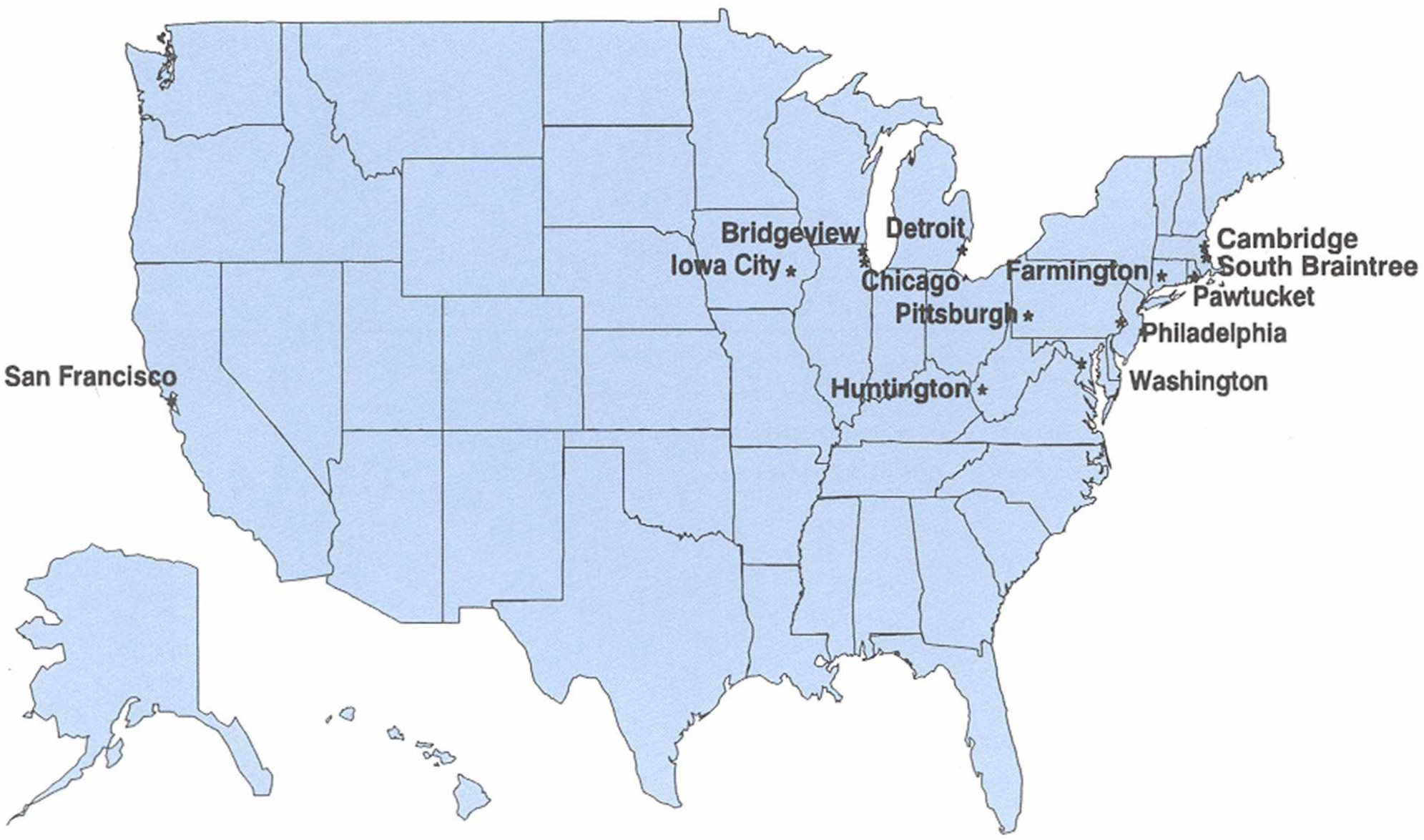


Table 11-1. Occupational disorders: major diagnostic categories among 920 reported cases, January 1991 - September 1992

Diagnosis	Number	%
Respiratory disorders, including respiratory cancer	586	49.3
Musculoskeletal disorders	327	27.5
Symptoms and ill-defined conditions	63	5.3
Psychiatric and neurological disorders	62	5.2
Chemical poisonings/syndromes	57	4.8
Skin disorders	39	3.3
Disorders of sensory organs	20	1.7
Miscellaneous conditions, non-respiratory	18	1.5
Hepatic and renal disorders	9	0.8
Infectious diseases, non-respiratory	5	0.4
Tumors, non-respiratory	3	0.3
Total diagnoses	**1,189**	**100.0**

NOTE: Purified protein derivative conversions are included with respiratory disorders. Percentages may not total to 100% due to rounding.

SOURCE: AOEC Occupational Disease Surveillance Database.

Table 11-2. Occupational respiratory disorders: distribution of diagnoses related to exposures other than asbestos among 294 reported cases, January 1991 - September 1992

Diagnosis	Number	%
Asthma/RADS/hyperactive airways disease	118	37.7
Acute upper respiratory irritation	47	15.0
Chronic respiratory irritation	45	14.4
Bronchitis (not otherwise specified)	21	6.7
Chronic obstructive pulmonary disease	16	5.1
Chronic bronchitis	14	4.5
Chemical pneumonitis	11	3.5
Purified protein derivative (PPD) conversion	10	3.2
Hypersensitivity pneumonitis	6	1.9
Coal workers' pneumoconiosis	5	1.6
Silicosis	5	1.6
Acute bronchitis	4	1.3
Nasal septum perforation	3	1.0
Vocal chord/laryngeal disorders	3	1.3
Lung function abnormalities	3	1.0
Siderosis	1	0.3
Occupational pneumoconiosis, other	1	0.3
Total diagnoses	**313**	**100.0**

NOTE: Percentages may not total to 100% due to rounding. The AOEC Database contains reports of 1,189 occupational diagnoses made in 1991 and 1992 among 920 cases. Respiratory disorders constituted 586 (49%) of the diagnoses and 507 (55%) of the cases. Table 11-2 describes the diagnoses related to occupational exposures other than asbestos. Since asbestos-related diagnoses constitute such a distinct subset of the respiratory disease spectrum, and reflect the present burden of historical exposures, these diagnoses are described separately in Table 11-3.

SOURCE: AOEC Occupational Disease Surveillance Database.

Table 11-3. Diagnoses among 213 reported cases with asbestos-related diseases, January 1991 - September 1992

Diagnosis	Number	%
Pleural disease	135	63.1
Asbestosis	106	49.5
Chronic obstructive pulmonary disease	14	6.5
Respiratory cancer	11	
Larynx	1	0.5
Bronchogenic	1	0.5
Adenocarcinoma	4	1.9
Mesothelioma	1	0.5
Lung cancer, not otherwise specified	4	1.9
Other	7	
Chronic bronchitis	3	1.4
Asthma	1	0.5
Restrictive lung disease, not otherwise specified	3	1.4
Total diagnoses	**273**	**100.0**

NOTE: Percents total to greater than 100% because some cases have more than one diagnosis.

SOURCE: AOEC Occupational Disease Surveillance Database.

Table 11-4. Occupational respiratory disorders: distribution by industry in which exposure occurred, January 1991 - September 1992

SIC	Industry	Number	%
20-39	Manufacturing	194	38.3
15-17	Construction	97	19.1
70-89	Services (hotel, motel, education, other)	84	16.6
40-49	Transportation, communication, electric, Gas and sanitary services	62	12.2
91-97	Public administration	22	4.3
1-9	Agriculture	14	2.8
10-14	Mining	9	1.8
51-59	Wholesale and retail trade	8	1.6
60-67	Finance, insurance and real estate	4	0.8
---	Industry missing	13	2.6
TOTAL		**507**	**100.0**

SIC - Standard Industrial Classification

NOTE: Cases include both non-asbestos and asbestos-related. Percentages may not total to 100% due to rounding.

SOURCE: AOEC Occupational Disease Surveillance Database.

Table 11-5. Occupational respiratory disorders: distribution by occupation in which exposure occurred, January 1991 - September 1992

SOC	Occupation	Number	%
63-65	Construction and extractive occupations	123	24.3
71-78	Production working occupations	116	22.9
67-69	Precision production occupations	55	10.8
85-87	Handlers, equipment cleaners, helpers, laborers	39	7.7
60-61	Mechanics and repairers	33	6.5
81-83	Transportation and material moving occupations	24	4.7
40-47	Marketing, sales, and administrative support	21	4.1
50-52	Service occupations	19	3.7
19-25	Social scientists, social workers, lawyers, and teachers	15	3.0
55-58	Agricultural, forestry and fishing occupations	13	2.6
26-30,36	Health care occupations and health technicians	10	2.0
37-39	Technologists and technicians, except health	8	1.6
11-14	Executive, administrative, and managerial	8	1.6
16-18	Engineers, architects, natural scientists, and mathematicians	7	1.4
32-34	Writers, artists, and entertainers	5	1.0
91,99	Military and miscellaneous occupations	2	0.4
---	Occupation missing	9	1.8
TOTAL		**507**	**100.0**

SOC - Standard Occupation Classification

NOTE: This table includes both non-asbestos and asbestos-related cases.

SOURCE: AOEC Occupational Disease Surveillance Database.

APPENDIX A
Sources of Data

Address and Employment Data File, MSHA

The Address and Employment Data File includes MSHA's most current information regarding operational status of commercial mines in the U.S., including address for purposes of correspondence and contact and the number of workers employed in both production and administration activities. The data are reported to MSHA by mine operators. MSHA provides the Address and Employment Data File to NIOSH on a quarterly basis.

For more information, contact: MSHA, Division of Mining Information Systems, Safety and Health Technology Center, PO Box 25367, Denver Colorado, 80225.

Annual Reports of Occupational Injuries and Illnesses, BLS

The Bureau of Labor Statistics (BLS) program of Occupational Safety and Health Statistics is mandated by the Occupational Safety and Health Act of 1970. The BLS Office of Occupational Safety and Health Statistics maintains a nationwide employer record keeping system on job related injuries and illnesses, annually compiles data from these records, analyzes the results, and reports supplementary statistics from other sources. The annual survey, done in cooperation with participating State agencies, eliminates duplicate reporting by employers and ensures maximum comparability of data.

Data are collected by mail from a sample of approximately 280,000 establishments each calendar year. Nearly all industries in the private sector (employers covered by the Occupational Safety and Health Act of 1970) are included. National estimates of incidence rates for injuries and illnesses, by industry, are developed from the collected data.

A limitation of the summary statistics is the under-count of chronic diseases. Diseases with a long latency are often not detected by the survey system. Also the annual survey excludes: the self-employed; farmers with fewer than 11 employees; private households; and employees in Federal, state, and local government agencies.

For more information refer to: Occupational Injuries and Illnesses in the United States by Industry, 1991: U.S. Department of Labor, Bureau of Labor Statistics, Bulletin 2424, U.S. Government Printing Office, Washington, D.C. 1993.

Coal Workers' X-ray Surveillance Program, NIOSH

The Coal Workers' X-ray Surveillance Program (CWXSP) was mandated by the Coal Mine Health and Safety Act of 1969. Currently, the Division of Respiratory Disease Studies, NIOSH, administers the Program. The primary objective of the CWXSP is to screen miners for coal workers' pneumoconiosis (CWP). Miners who show signs of CWP on their chest radiographs are offered the option to transfer to an area of the mine with a respirable coal mine dust level of 1 mg/m^3 or less.

The population eligible for participation in the screening program includes all working underground coal miners, estimated at approximately 80,000 in 1991. Information collected includes a posterior/anterior chest x-ray and ancillary information: miner age, tenure, and specific job in the mine. Data has been collected since 1970.

Miners employed since 1970 must have a chest radiograph at the time of hire and again 3 years later. Subsequently, working coal miners may volunteer for radiographs at approximately 5-year intervals. The chest x-rays are taken at no cost to the miners.

The chest films are interpreted by physicians or radiologists who are certified by NIOSH as proficient in use of the International Labour Office (ILO) system for classifying radiographs of

pneumoconioses. Each film is seen by at least two readers, and a consensus rule is used to reach a final determination for each film. The CWXSP defines CWP as small opacity profusion category of at least 1/0 or large opacities (i.e., larger than one centimeter) consistent with pneumoconiosis.

The CWXSP is a unique federally mandated occupational health screening program. The large number of chest x-rays (over 350,000) collected since 1970 provide a means of monitoring the incidence and prevalence of CWP since the respirable coal mine dust standard has been in effect.

Coal miner participation rates have decreased since 1970 to less than 50% of coal miners. Recent programs have been implemented to reverse this trend. Overall crude prevalence estimates may reflect over-representation of newly employed miners. Except for the lowest tenure category, tenure specific prevalence estimates may be biased due to selective participation. Thus, CWXSP data should be used with caution in relating to the entire coal mine work force.

For more information contact: Examination Processing Branch, Division of Respiratory Disease Studies, NIOSH, 944 Chestnut Ridge Road, Morgantown, WV 26505-2888. (304) 291-4301.

Informational Reports on Mining, MSHA

The Mine Safety and Health Administration (MSHA) informational reports review occupational injury and illness experience of United States miners for each year. Data are available from 1970 to the present. Data reported by mine operators include work location, occupation, and commodity mined. Related information on employment, work time and operating activity is also presented. Estimates of the average workforce are tabulated by state and mining activity. Data reported by contractors performing certain work at mining locations are reported separately.

Data reported by mine operators is mandated by the Federal Mine Safety and Health Act of 1977. Operators subject to the Act are required to submit reports of all injuries, occupational illnesses, and related data.

Incidence rates and severity measures are not calculated for reported occupational illnesses, but reported illnesses are enumerated for each work location, commodity being mined, and State.

For more information refer to: Injury Experience in Coal Mining, 1991, U.S. Department of Labor, Mine Safety and Health Administration, Information Report, IR 1189, 1991. U.S. Government Printing Office, Washington, D.C. 20402. See analogous reports for other sectors of the mining industry.

Integrated Management Information System, OSHA

The Integrated Management Information System (IMIS) includes most of the industrial hygiene sampling data from Occupational Safety and Health Administration (OSHA) compliance inspections. The data are reported to OSHA by their field compliance officers. OSHA provides the IMIS to NIOSH on an annual basis.

For more information contact: OSHA, Office of Management Data Systems, 200 Constitution Avenue, NW, Washington, D.C. 20210.

Mine Inspection Data Analysis System, BOM

The Mine Inspection Data Analysis System (MIDAS) was developed by the Bureau of Mines to analyze the records of industrial hygiene samples collected by the Department of Labor's Mine Safety and Health Administration (MSHA).

APPENDIX A

Sources of Data

Data in MIDAS include both personal exposure samples and area samples. Personal samples measure the exposure of a person to a contaminant over a period of time, and are usually obtained by attaching a sampling device to the worker. Area samples are usually obtained by placing a stationary sampling device in a location for a period of time. The MIDAS data used in this report came from non-coal mines (also known as metal/nonmetal mines) and were obtained by MSHA field inspectors. The MSHA dust collection program is broad-based and does not focus on all specific types of dust. As a result, the asbestos samples gathered each year are neither representative of miners' exposures nor worst-case conditions.

MIDAS contains several categories of respirable dust data. This report focuses on the 35,980 records of "respirable quartz" data for the years 1982-1991. MIDAS contains an additional 33,896 records of respirable dust data for those same years with less than 1% respirable quartz. While quartz exposures are not quantified in those records, quartz overexposures would be unlikely for such a low percentage of quartz.

For more information refer to: Watts WF, Johnson RL, Donovan DJ, Parker DR. An Introduction to the Mine Inspection Data Analysis System (MIDAS). Bureau of Mines, IC 8859, 1981.

Multiple Cause of Death Data, NCHS

Since 1968, the National Center for Health Statistics NCHS) has coded all conditions listed on death certificates. The data are released annually on public use computer tapes. This allows researchers to evaluate the interaction of diseases in causing death and also is useful in determining the number of deaths in which specific diseases play a contributing role.

Previous to the availability of multiple cause of death data, cause of death studies focused on underlying cause of death. Underlying cause of death is defined as the disease or injury that initiated events leading to death. Statistics based on underlying cause of death do not fully consider the influence of diseases which contribute to cause of death.

NCHS codes all deaths in the United States (approximately two million annually) that are reported to vital registration offices. Data coded for each decedent includes residence, age, race, sex, and ethnicity (since 1984). The usual occupation and industry of each decedent are available for some states from 1985 through 1990. (See Appendix C.)

Limitations of multiple cause of death data include: under- or over-reporting of conditions on the death certificate by certifying physicians and incomplete/unclassified reporting of occupation and industry.

For more information refer to: Vital Statistics of the United States, 1990, Vol. I, DHHS Pub. No. (PHS) 91-1100 and Vol. II, Part A, DHHS Pub. No. (PHS) 92-1101, Public Health Service, National Center for Health Statistics. U.S. Government Printing Office, Washington, D.C. 20402.

National Health Interview Survey (1988 Occupational Supplement), NCHS

The National Health Interview Survey (NHIS) is a major data collection program administered by the National Center for Health Statistics and is regarded as a principle source of information on the health of the noninstitutionalized civilian population of the United States. The survey was mandated by The National Health Survey Act of 1956 to provide for a continuing survey to collect information on illness and disability in the United States. The NHIS was initiated in July of 1957 and has been conducted on an annual basis. The NHIS questionnaire consists of two parts: a set of basic health and demographic questions that are repeated each year of the survey, and

one or more supplemental sections that focus questions on specific current health topics. Data are collected via household interviews that are conducted each week throughout the year using a probability sample. The interviewing is performed by permanent staff interviewers employed by the U.S. Bureau of the Census. It should be noted that persons in long-term care facilities, persons on active duty in the Armed Forces and U.S. nationals living in foreign countries are excluded from the survey because of technical and logistical problems.

In 1988, the National Health Interview Survey contained a special section called the Occupational Health Supplement. The goal of this special supplement was to obtain detailed information on respondent work histories, common work-related health problems, workplace injuries and smoking status. This is the special section from which the National Health Interview Survey tables in this report are derived. Emphasis is placed on the longest held occupation reported by those who have ever worked.

For more information refer to the following publications: 1) Adams PF, Hard AM. Current estimates from the National Health Interview Survey: United States, 1988. National Center for Health Statistics. Vital Health Stat 10(173). 1989; and 2) Massey JT, Moore TF, Parsons VL, Tadros W. Design and estimation for the National Health Interview Survey, 1985-94. National Center for Health Statistics. Vital Health Stat 2(110). 1989.

National Hospital Discharge Survey, NCHS

The National Hospital Discharge Survey (NHDS) is conducted yearly by the National Center for Health Statistics (NCHS) and collects data on the use of short stay non-Federal hospitals in the United States. Data collected from the survey includes information on patient's age, race, sex, ethnicity (since 1985), marital status, length of stay, source of payment (since 1977), diagnoses and surgical procedures, hospital size, ownership, and region of the United States. Diagnoses are coded according to ICD-8 coding system (1970-1978) and ICD-9 coding system (1979-1991).

Since 1964 several sampling methods have been used. In 1991, data were abstracted from approximately 180,000 records from 400 hospitals. Only hospitals with six or more beds for patient use and those in which the average length of stay for all patients is less than 30 days are included in the survey. One of the limitations of National Hospital Discharge Survey data is that it represents number of discharges, not number of patients. In addition, information is available by region and not by state. Also, information is based on physician diagnostic practices and depends on the completeness of medical records.

For more information refer to the following publications: 1) National Center for Health Statistics, E.J. Graves: Utilization of Short-stay Hospitals, United States, 1990, Annual Summary; and 2) Vital and Health Statistics. Series 13, No. 113. DHHS Pub. No. (PHS) 92-1774. Public Health Service. U.S. Government Printing Office, Washington, D.C 20402. June 1992.

National Occupational Health Survey of Mining, NIOSH

The National Occupational Health Survey of Mining (NOHSM) was conducted by the National Institute for Occupational Safety and Health (NIOSH) at the request of the Mine Safety and Health Administration (MSHA)(1,2). The NOHSM inventoried and characterized health-related agents to which U.S. miners are potentially exposed. The term "potential exposure" means that a health-related agent was observed to be present at a miner's work site but the level of the exposure was not measured. The health-related agents observed by NIOSH during the NOHSM included generic chemicals and trade name products, physical agents, musculoskeletal

overload conditions, welding-related processes, and bulk dust.

A representative sample of mines (491) from 66 different mineral commodities was surveyed during the period of May 1984 through August 1989. Each survey included interviews with workers and work site observations to determine the health-related agents associated with their work. Bulk dust samples were gathered during the NOHSM as a means of characterizing dust exposures. Each bulk dust sample was associated with a number of miners in the vicinity of the sample location.

For more information refer to: Groce DW, Carr WG, Hearl FJ. The National Occupational Health Survey of Mining. Annals of the American Conference of Governmental Industrial Hygienists. 1986; 14:327-335.

Occupational Disease Surveillance Database, AOEC

The Association of Occupational and Environmental Clinics (AOEC) has developed a unique surveillance database for a broad range of occupational diseases and cumulative injuries. The development of this Occupational Disease Surveillance Database has been supported in part by funding from the National Institute for Occupational Safety and Health (NIOSH). In addition, AOEC member clinics, clinicians, and staff have volunteered their efforts to contribute case-report data to this project and to provide database direction and oversight.

A total of thirteen AOEC member clinics (as of December 1992) have reported cases of occupational or environmental disease or injury to this surveillance system. One of these clinics is no longer an active participant in the database project. For inclusion in the database, a case must have at least one condition diagnosed which, in the physician's judgement, is more likely than not to be related to occupational or environmental exposure(s). This criterion was established jointly by AOEC Database Committee members and NIOSH.

Just past the pilot phase, and currently operated with a minimal funding base and the volunteer efforts of many clinics, the AOEC database is a relatively small surveillance system. Case reports from a few clinics still dominate the database. At this time, the case data cannot be considered a representative sample of either cases seen in all AOEC clinics, or of occupational disease in the U.S. The AOEC database is, however, expanding to include data from many more clinics, and will continue to provide a valuable source of surveillance data.

For more information contact: Association of Occupational and Environmental Clinics, 1010 Vermont Ave., NW, #513, Washington, D.C. 20005. (202) 347-4976.

Quartz Reference Standard

For information regarding the quartz reference standard contact: Laboratory Division, Denver Technical Support Center, Mine Safety and Health Administration, PO Box 25367, Denver, CO 80225.

Respirable Coal Mine Dust Data, MSHA

These data were obtained from MSHA, and provide indications of the respirable dust levels found by MSHA inspectors at surface and underground coal mines. The data provided to NIOSH from MSHA includes the mine at which the sample was obtained, date of the sample, mining method associated with the sample, dust concentration, production level during sampling, and occupation associated with the sample. For the purposes of this report, NIOSH has used the date and concentration information from each record.

The "MRE" designation was adopted by MSHA to indicate that the sampling instruments were to have roughly the same collection efficiencies for respirable particles as the horizontal elutriators on which the British standards have been based. The MSHA dust samples are obtained by drawing air through a filter at the rate of 2 liters per minute, with a 10 millimeter nylon cyclone used to extract non-respirable particles prior to the filter. The dust weight collected on the filter is multiplied by 1.38 to complete the conversion to "MRE" units.

For more information, contact: Mine Safety and Health Administration, Safety and Health Technology Center (Pittsburgh), Dust Division, PO Box 18233, Pittsburgh, PA 15236.

Respirable Coal Mine Quartz Dust Data, MSHA

These data were obtained from MSHA, and provide indications of the respirable quartz levels found by MSHA inspectors at surface and underground coal mines. Prior to 1988, the quartz analyses were performed on respirable dust samples for known high risk occupations. In 1988, MSHA began a program to determine the quartz content of samples collected on other occupations, as well. The data provided to NIOSH from MSHA includes the mine at which the sample was obtained, date of the sample, sampling time, initial and final weights, percent quartz, production level during sampling, and occupation associated with the sample.

For more information, contact: Mine Safety and Health Administration, Safety and Health Technology Center (Pittsburgh), Dust Division, PO Box 18233, Pittsburgh, PA 15236.

Social Security Administration Disability Awards

The Coal Mine Health and Safety Act of 1969, made comprehensive legislative efforts to deal with pneumoconiosis among coal miners. Under Title IV of the Act, a benefits program was established for coal miners. The program consisted of a cash benefit program for miners totally disabled because of pneumoconiosis arising out of employment in underground coal mining, and for the widows of coal miners whose death resulted from the disease or who were entitled to black lung benefits at the time of death. The Social Security Administration was delegated responsibility for the operation of the benefits program. The Black Lung Benefits Act of 1972 made changes in the program, designating to the Social Security Administration continued responsibility for payments to miners who were granted claims before July 1973. The Department of Labor was designated responsibility for claims filed after July 1973.

Other significant changes brought about by the 1972 Act were to extend eligibility for benefits to surface coal miners, and to extend benefits to surviving children of miners. This provision allowed children to receive benefits if both parents were deceased, or if a widow ceased to qualify for benefits through remarriage.

For more information refer to: 1) Social Security Bulletin, Annual Statistical Supplement, 1992. SSA Pub. No. 13-11700. U.S. Government Printing Office, Washington, D.C. 20402; and 2) Black Lung Benefits Act, Annual Report on Administration of the Act During Calendar Year 1991. Submitted to Congress, 1992. U.S. Department of Labor, Employment Standards Administration.

The Sentinel Event Notification System for Occupational Risks (SENSOR) Program

General Background

Since October 1987, the National Institute for Occupational Safety and Health (NIOSH) has awarded five-year cooperative agreements to state health departments to develop models for

state-based surveillance of selected occupational diseases and injuries through the SENSOR program. An important component of the SENSOR program is the provision for preventive intervention at worksites identified as potentially hazardous by this sentinel event surveillance. The SENSOR program originated out of a desire to improve capability to collect, analyze, and disseminate data on occupational conditions at the state level. SENSOR began its second five-year funding cycle in October 1992. NIOSH awarded SENSOR co-operative agreements to 14 states for 12 different target conditions and contributed funds to another surveillance program (Adult Blood Lead Surveillance and Epidemiology) which aggregates laboratory reports of elevated blood lead levels in adults from 21 states. Three SENSOR target conditions are occupational respiratory diseases: occupational asthma, silicosis, and work-related tuberculosis. Since 1987, surveillance approaches for occupational asthma and silicosis have been field-tested and refined. In 1992, state activities were initiated to develop a model for work-related tuberculosis surveillance.

SENSOR Silicosis

Silicosis case ascertainment methods vary by state. Hospital reporting, using hospital discharge data or direct hospital reports to the state health department, represent primary case identification sources for Michigan, New Jersey, Ohio, Illinois, Texas, and Wisconsin. North Carolina utilizes a long-established screening program for employees exposed to silica, the North Carolina Dusty Trades Program. In addition, each of the silicosis states except Illinois currently have legislation mandating physician reporting of occupational diseases, including silicosis. North Carolina's legislation became effective January 1, 1994. SENSOR staff from each of the seven states actively solicit occupational disease reports from physicians likely to see silicosis cases, such as pulmonary and occupational medicine physicians and B-readers (physicians trained and certified by NIOSH in the use of the International Labour Office system for classification of radiographs for pneumoconioses). Death certificate data and workers' compensation records are also used to identify silicosis cases in most of the seven silicosis states. State SENSOR staff collect demographic, work history, and medical information about each silicosis case from case-patient interviews, disease reports, death certificates, hospital records, state Department of Labor records, or some combination of these.

The silicosis surveillance guidelines [*MMWR 1990;39;25:433-437*] encourage physicians, including radiologists and pathologists, and other health care providers to report all diagnosed or suspected cases of silicosis. This includes persons with: 1) a physician's provisional diagnosis of silicosis, OR 2) a chest radiograph consistent with silicosis, OR 3) pathological findings consistent with silicosis. Silicosis is considered confirmed for surveillance purposes if: 1) there is a history of occupational exposure to silica, and a chest radiograph or other imaging technique is interpreted as consistent with silicosis, OR 2) pathological findings are characteristic of silicosis. States apply specific exclusion criteria for individuals with occupational work histories involving coal mining.

Prevention efforts vary among the participating State Health Departments, and include some or all of the following activities: 1) interviews with individuals with reported and/or confirmed silicosis; 2) the distribution of literature to cases and physicians regarding the health hazards of silica exposure; 3) State Health Department industrial hygiene investigations with environmental monitoring to measure exposures to airborne respirable silica; and 4) referral to appropriate regulatory agencies (e.g. OSHA or MSHA). In addition to occupational disease newsletters, reports, and educational material, NIOSH and the SENSOR states have published numerous articles on SENSOR-related occupational respiratory disease surveillance. For a listing of these articles, contact the Surveillance Section, Epidemiological

Investigations Branch, Division of Respiratory Disease Studies, NIOSH, 944 Chestnut Ridge Road, Morgantown, WV 26505-2888. (304) 291-4476.

SENSOR Occupational Asthma

California, Massachusetts, Michigan, New Jersey, New York, and Wisconsin currently have legislation mandating physician reporting of occupational diseases, including occupational asthma. SENSOR staff actively solicit reports from physicians in their states who have a high likelihood of encountering patients with occupational asthma, such as allergy, pulmonary and occupational medicine specialists. These physician-generated occupational disease reports represent a primary case ascertainment source for occupational asthma surveillance.

Although the original SENSOR concept was based primarily on physician reporting, other sources of case ascertainment, including hospital discharge data, emergency room data, and workers' compensation data, have been utilized. In addition, California identifies cases through a unique mandatory reporting system, the Doctor's First Report (DFR) of Occupational Injury or Illness, which is tied directly to physician reimbursement procedures.

SENSOR occupational asthma surveillance guidelines [*MMWR 1990;39;7:119-123*] have two distinct components: the "reporting guidelines" and the "surveillance case definition". The reporting guidelines encourage health care providers to report all suspected or diagnosed cases of occupational asthma. This includes individuals with a diagnosis of asthma and an association between symptoms of asthma and work. The surveillance case definition requires meeting the reporting guidelines and one or more of the following work-relatedness criteria: 1) workplace exposure to an agent or process previously associated with occupational asthma, OR 2) significant work-related changes in forced expiratory volume in one second or peak expiratory flow rate, OR 3) significant work-related changes in airways responsiveness as measured by nonspecific inhalation challenge, OR 4) positive response to inhalation provocation testing with an agent to which the patient is exposed at work.

While not specifically addressed by the published occupational asthma surveillance guidelines, the following supplemental case classification scheme was devised to augment the published occupational asthma guidelines:

1) A reported case is considered **possible occupational asthma** if it meets the reporting guidelines and insufficient information or available information indicates it did not meet any of the work-relatedness criteria in the case definition.

2) A reported case is considered reactive airways dysfunction syndrome (RADS) if asthma developed for the first time immediately following an acute exposure to an irritating substance at work.

3) A reported case is considered to have **work-aggravated asthma** if there is a work-related worsening of asthma symptoms in a previously diagnosed asthmatic.

NIOSH and the four current asthma states (California, Massachusetts, Michigan, New Jersey) are revising the published occupational asthma guidelines to explicitly include the supplemental categories listed above (possible occupational asthma, RADS, work-aggravated asthma).

In addition to occupational disease newsletters, reports, and educational material, NIOSH and the SENSOR states have published numerous articles on SENSOR-related occupational respiratory disease surveillance. For a listing of these articles, contact the Surveillance Section, Epidemiological Investigations Branch, Division of Respiratory Disease Studies, NIOSH, 944 Chestnut Ridge Road, Morgantown, WV 26505-2888. (304) 291-4476.

APPENDIX B
Methods

MORTALITY

Number of Deaths

The number of deaths for each of the specific occupational respiratory diseases represents the number of deaths in which the condition was mentioned as underlying or contributing cause of death on the death certificate. The numbers were tabulated from the record axis of the multiple cause of death data tapes (see Appendix A for further information on multiple cause of death tapes). For the period from 1968-1978 all conditions were coded according to the International Classification of Disease, Eighth Revision (ICD-8), while the International Classification of Disease, Ninth Revision (ICD-9) was used for coding from 1979-1990. All deaths were reported for United States residents, 15 years or older, based on state of residence at death. Where race was specifically noted in this report, race classifications were black, white, and all others.

Crude Mortality Rates

The cause-specific crude mortality rates for occupational lung conditions were computed annually for the years 1968-1990 for the United States. To compute rates, the annual total number of deaths, mentioned as either underlying or contributing cause, due to the specified condition in United States residents, 15 years and older, was divided by the United States population, 15 years and older, in the same year. Further restrictions may be placed on the data to compute rates for specific age, race, and sex groups. In this report, the cause-specific crude rate is presented as the number of deaths per million population for a given time period. The state-specific rates for 1989-1990 were computed by dividing the yearly reported deaths in each state by the state population, 15 years and older, in the corresponding year, and then computing a two-year (1989-1990) average.

Age-adjusted Mortality Rates

Age-adjusted mortality rates published in this report were computed by the direct method. Rates were calculated annually for each specified condition from 1968 through 1990. The age-adjusted rates represent the rates that would have been observed if the age-specific rates for a given year, for specified age intervals, had occurred in a population with the same age distribution as that of the standard population. This allows a more valid comparison for trends over time. For this report, the 1940 United States population was used as the standard. The specific age intervals used were 15-24, 25-34, 35-44, 45-54, 55-64, 65-74, 75-84, and 85 years and older. Rates for the entire U.S. population, and for each sex-race group were adjusted separately, each using the same standard population.

The method of calculation first computed the annual age-specific rate per million population for each age-sex-race group of interest. The product of the age-specific rates and the number in the comparable age-sex-race specific group in the standard population equals the expected number of deaths per million population for each age group. The expected numbers of deaths were then summed over all age groups. The sum of the expected number of deaths was divided by the sum of the standard population and the resulting quotient was multiplied by 1,000,000 to produce the age-adjusted rate.

Years of Potential Life Lost

Years of potential life lost (YPLL) were calculated using the method used at the Centers for Disease Control (CDC) (MMWR, Vol 34/2S: December 19,1986). YPLL were calculated both to age 65 and to life expectancy. YPLL to age 65 may be seen as a loss of years to working life, while YPLL until life expectancy may be seen as a loss of years in the overall life span. For YPLL to age 65, the number of deaths with a mention of the condition of interest were classified into the ten-year age groups mentioned in the section on age-

adjusted mortality rates. The number of deaths in each age group was then multiplied by the difference between 65 years and the mid-point of the age group. Thus for the 15-24 year age group, the number of deaths would be multiplied by 45, (65 minus 20 years). The age- specific YPLL were summed over all age groups for the total value. For YPLL to life expectancy, the single difference was that the calculation was based on the number of deaths in the age-specific group multiplied by the difference between the mid-point of the age group and the life expectancy at that age in that year of death. Life tables published annually by NCHS were used to determine life expectancy.

Proportionate Mortality Ratio (PMR)

The data for PMR analysis were death certificates from 25 states which reported usual occupation and industry codes from 1985 to 1990. (See Appendix C for a list of these 25 states and years reporting.)

PMR was defined as the observed number of deaths from the disease of interest with the specified occupation divided by the expected number of deaths for that disease. The PMRs in the report have been internally age-adjusted. A PMR over 1.00 indicates that there may be an elevated risk of the disease of interest in the specified occupation. For bronchitis and emphysema, PMRs with 95% confidence interval exceeding 1 have been listed. For all other diseases, PMRs have been listed for occupations with at least 3 deaths from the disease of interest, regardless of the confidence interval.

MORBIDITY

Prevalence Rate Ratios

The prevalence rate ratios were computed by dividing the industry-specific prevalence of the disease of interest by the overall prevalence of that disease. The industry-specific prevalence of the disease of interest was computed by dividing the observed number of the disease of interest within the specified industry by the total respondents of that industry. The overall prevalence was computed by dividing the total observed number of the disease of interest by the total respondents excluding data for the specified industry. For disease which typically have long durations (e.g. emphysema), a ratio greater than 1 indicates that there may be an increased risk in the specified industry compared to the combined risk in all other industries. However, the same may not be true for diseases with shorter durations (e.g. lung cancer). The ratios in Table 10-10 are not adjusted for age, race, sex, or smoking status.

Computation of Estimated Number of Workers Potentially Exposed to Silica

Estimates of the number of miners potentially exposed to silica were computed from information in three databases: the National Occupational Health Survey of Mining (NOHSM), the Mine Safety and Health Administration (MSHA) address and employment data, and the MSHA respirable coal mine dust data analyzed for quartz.

The number of miners potentially exposed to respirable quartz was calculated by mining class and by occupation. "Mining class" refers to a grouping of the mineral commodities into one of two groups: coal (anthracite and bituminous) or non-coal (stone, nonmetallic, metallic, and sand and gravel). The estimated percent of the mining work force attributable to each occupation, within the mining class, was estimated from the NOHSM data. During NOHSM, the surveyors recorded the number of workers associated with each occupation at each mine. The estimated number of workers in the current mine labor force for each mining class was determined from the 1991 MSHA address and employment data tapes. The NOHSM percent of work force for each occupation/mining class combination was multiplied by the current mine labor force for each mine class to estimate the current number of miners in each occupation/mining class combination.

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Methods

For the coal mining class only, the estimated number of current miners in each occupation was multiplied by the percentage of the MSHA respirable coal mine dust samples analyzed for quartz which had been found to contain any amount of quartz. The result was the estimated number of workers potentially exposed to respirable quartz in coal mining.

For the non-coal mining class, the estimated number of current miners in each occupation was multiplied by the proportional NOHSM projection factors associated with each mine when the occupation was potentially exposed to quartz through (a) a NOHSM bulk dust sample, (b) a trade named product, or (c) a generic chemical substance known to contain quartz. The data for each class was totalled, by occupation. The result was the number of workers potentially exposed to respirable quartz for each occupation in non-coal mining classes.

It should be noted that these are estimates of potential exposure only (i.e., the presence, but not the exposure level, of quartz has been determined), and do not necessarily reflect actual measurements of exposure. The estimates for non-coal mining are likely to be underestimates, since only a minority of all NOHSM bulk dust samples were analyzed for quartz.

APPENDIX C
Selected states

States reporting industry and occupation codes from death certificates to NCHS, 1985-1990

State	1985	1986	1987	1988	1989	1990
Alaska			X	X		
Colorado	X	X	X	X	X	X
Georgia	X	X	X	X	X	X
Idaho				X	X	X
Indiana		X	X	X	X	X
Kansas	X	X	X	X	X	X
Kentucky	X	X	X	X	X	X
Maine	X	X	X	X	X	X
Missouri	X	X				
Nebraska	X					
Nevada	X	X	X	X	X	X
New Hampshire	X	X	X	X	X	X
New Jersey				X	X	X
New Mexico		X	X	X	X	X
North Carolina			X	X	X	X
Ohio	X	X	X	X	X	X
Oklahoma	X	X	X	X	X	X
Rhode Island	X	X	X	X	X	X
South Carolina	X	X	X	X	X	X
Tennessee	X	X	X	X		
Utah	X	X	X	X	X	X
Vermont		X	X	X	X	X
Washington					X	X
West Virginia				X	X	X
Wisconsin	X	X	X	X	X	X

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