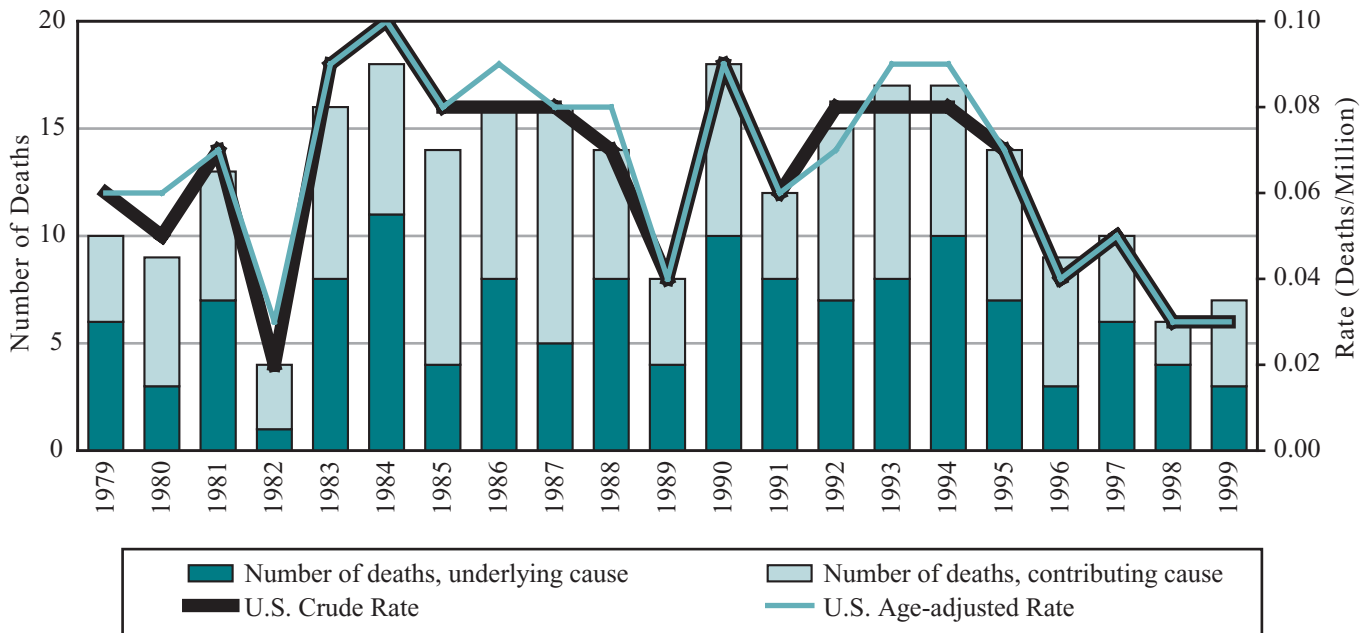

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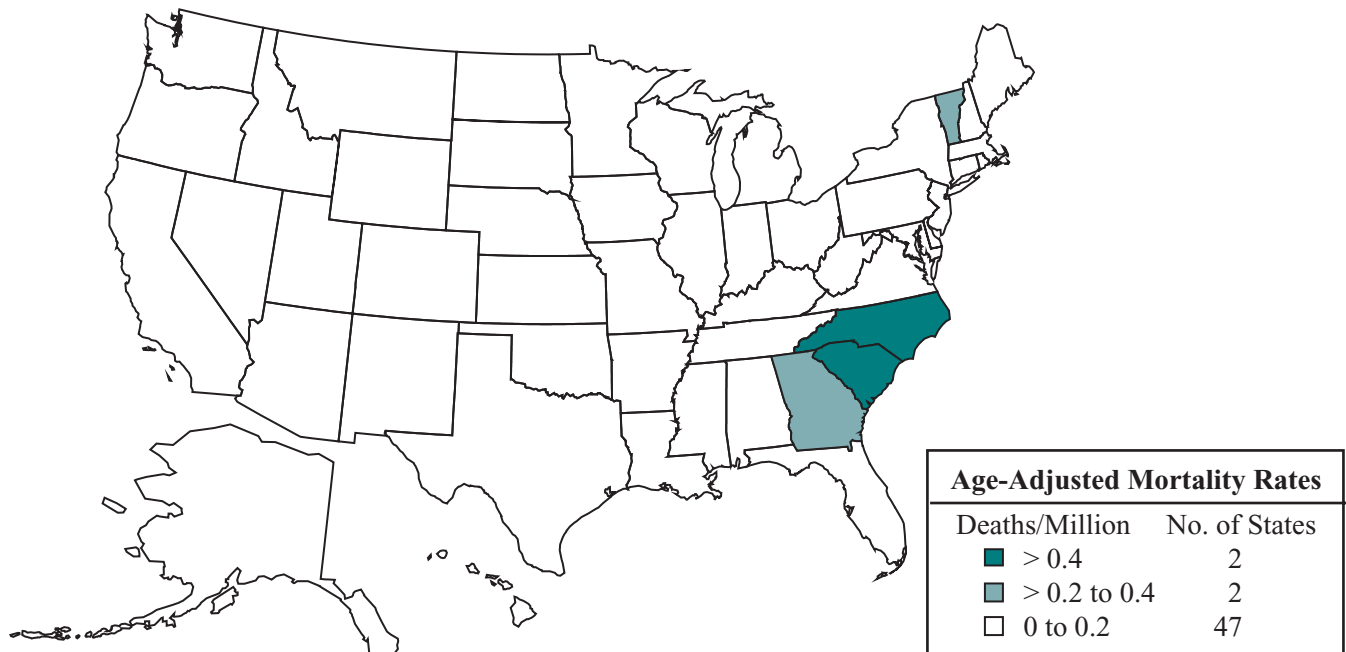
Byssinosis and Related Exposures

Figure 4-1. Byssinosis: Number of deaths, crude and age-adjusted mortality rates, U.S. residents age 15 and over, 1979-1999



NOTE: See appendices for source description, methods, and ICD codes.
 SOURCE: National Center for Health Statistics multiple cause of death data. Population estimates from U.S. Bureau of the Census.

Figure 4-2. Byssinosis: Age-adjusted mortality rates by state, U.S. residents age 15 and over, 1990-1999



NOTE: See appendices for source description, methods, and ICD codes.
 SOURCE: National Center for Health Statistics multiple cause of death data. Population estimates from U.S. Bureau of the Census.

Table 4-1. Byssinosis: Number of deaths by sex, race, and age, and median age at death, U.S. residents age 15 and over, 1990-1999

Year	No. of Deaths	Underlying Cause (%)	Sex		Race			Age Group (yrs)								Median Age (yrs)
			Male	Female	White	Black	Other	15-24	25-34	35-44	45-54	55-64	65-74	75-84	85+	
1990	18	55.6	13	5	17	1	-	-	1	-	-	4	7	4	2	71.0
1991	12	66.7	8	4	11	1	-	-	-	-	1	1	4	4	2	75.0
1992	15	46.7	9	6	10	5	-	3	1	-	-	1	8	2	-	67.0
1993	17	47.1	11	6	12	5	-	-	1	1	1	4	3	3	4	73.0
1994	17	58.8	11	6	15	2	-	-	-	1	1	3	4	5	3	72.0
1995	14	50.0	11	3	14	-	-	-	1	1	-	-	6	6	-	74.0
1996	9	33.3	4	5	9	-	-	-	-	-	1	2	2	4	-	71.0
1997	10	60.0	9	1	9	1	-	-	-	-	-	1	3	4	2	76.5
1998	6	66.7	5	1	6	-	-	-	-	-	-	1	1	3	1	77.0
1999	7	42.9	3	4	7	-	-	-	-	1	-	1	2	2	1	68.0
TOTAL	125	52.8	84	41	110	15	0	3	4	4	4	18	40	37	15	72.0

- indicates no deaths listed.

NOTE: See appendices for source description, methods, and ICD codes.

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

Table 4-2. Byssinosis: Mortality rates (per million population) by race and sex, U.S. residents age 15 and over, 1990-1999

Year	Overall	White		Black		Other	
		Male	Female	Male	Female	Male	Female
Crude Mortality Rate							
1990	0.09	0.15	0.06	0.10	—	—	—
1991	0.06	0.09	0.05	0.10	—	—	—
1992	0.08	0.06	0.06	0.38	0.08	—	—
1993	0.08	0.09	0.06	0.37	0.08	—	—
1994	0.08	0.11	0.07	0.18	—	—	—
1995	0.07	0.13	0.03	—	—	—	—
1996	0.04	0.05	0.06	—	—	—	—
1997	0.05	0.09	0.01	0.09	—	—	—
1998	0.03	0.06	0.01	—	—	—	—
1999	0.03	0.03	0.04	—	—	—	—
1990-1999	0.06	0.08	0.04	0.12	0.02	—	—
Age-Adjusted Mortality Rate							
1990	0.09	0.17	0.05	0.14	—	—	—
1991	0.06	0.12	0.05	0.20	—	—	—
1992	0.07	0.06	0.05	0.46	0.11	—	—
1993	0.09	0.10	0.05	0.47	0.11	—	—
1994	0.09	0.13	0.06	0.39	—	—	—
1995	0.07	0.14	0.03	—	—	—	—
1996	0.04	0.05	0.05	—	—	—	—
1997	0.05	0.11	0.01	0.18	—	—	—
1998	0.03	0.07	0.01	—	—	—	—
1999	0.03	0.03	0.03	—	—	—	—
1990-1999	0.06	0.10	0.04	0.18	0.02	—	—

— indicates no deaths listed.

NOTE: See appendices for source description, methods, and ICD codes.

SOURCE: National Center for Health Statistics multiple cause of death data. Population estimates from U.S. Bureau of the Census.

Byssinosis: Mortality

Table 4-3. Byssinosis: Years of potential life lost to age 65 and to life expectancy by race and sex, U.S. residents age 15 and over, 1990-1999

Year	White		Black		Other		Total
	Male	Female	Male	Female	Male	Female	
Years of Potential Life Lost to Age 65							
1990	55	—	—	—	—	—	55
1991	—	20	—	—	—	—	20
1992	50	35	90	—	—	—	175
1993	45	5	45	—	—	—	95
1994	25	30	—	—	—	—	55
1995	60	—	—	—	—	—	60
1996	5	20	—	—	—	—	25
1997	5	—	—	—	—	—	5
1998	5	—	—	—	—	—	5
1999	30	—	—	—	—	—	30
TOTAL	280	110	135	—	—	—	525
Years of Potential Life Lost to Life Expectancy							
1990	187	55	11	—	—	—	253
1991	64	79	7	—	—	—	150
1992	111	113	112	9	—	—	345
1993	120	54	80	6	—	—	260
1994	117	104	16	—	—	—	237
1995	167	40	—	—	—	—	207
1996	47	88	—	—	—	—	135
1997	85	7	7	—	—	—	99
1998	48	16	—	—	—	—	64
1999	70	40	—	—	—	—	110
TOTAL	1,016	596	233	15	—	—	1,860

— indicates no deaths listed.

NOTE: See appendices for source description, methods, and ICD codes.

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

Table 4-4. Byssinosis: Number of deaths by state, U.S. residents age 15 and over, 1990-1999

State	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Total
Alabama	1	1	-	-	-	-	-	1	-	-	3
Alaska	-	-	-	-	-	-	-	-	-	-	-
Arizona	1	-	-	-	-	-	-	-	-	-	1
Arkansas	-	-	-	-	-	-	1	-	-	-	1
California	-	-	1	2	2	1	-	1	-	1	8
Colorado	-	-	-	-	1	-	-	-	-	1	2
Connecticut	-	-	-	-	-	-	-	-	-	-	-
Delaware	-	-	-	-	-	-	-	-	-	-	-
District of Columbia	-	-	-	-	-	-	-	-	-	-	-
Florida	1	-	1	-	1	-	-	1	-	-	4
Georgia	-	1	-	3	1	1	1	1	2	1	11
Hawaii	-	-	-	-	-	-	-	-	-	-	-
Idaho	-	-	-	-	-	-	-	-	-	-	-
Illinois	1	-	1	-	-	-	-	-	-	-	2
Indiana	-	1	-	-	-	-	-	-	-	-	1
Iowa	-	-	-	-	1	-	-	-	-	-	1
Kansas	1	-	-	-	-	-	-	-	-	-	1
Kentucky	-	-	-	-	-	1	-	-	-	-	1
Louisiana	-	-	1	-	-	-	-	-	-	-	1
Maine	-	-	-	-	-	-	-	-	-	-	-
Maryland	-	-	-	-	-	1	-	-	-	-	1
Massachusetts	1	-	1	1	-	-	-	-	-	-	3
Michigan	1	-	-	2	-	-	-	-	-	-	3
Minnesota	1	-	-	-	-	-	-	2	-	-	3
Mississippi	-	-	-	-	-	-	-	-	-	-	-
Missouri	-	-	-	-	-	1	-	-	-	-	1
Montana	-	-	-	-	-	-	-	-	-	-	-
Nebraska	-	-	-	-	-	-	-	-	-	-	-
Nevada	-	-	-	-	-	-	-	-	-	-	-
New Hampshire	-	1	-	-	-	-	-	-	-	-	1
New Jersey	-	-	-	-	-	-	-	-	-	-	-
New Mexico	-	-	-	-	-	-	-	-	-	-	-
New York	-	-	-	-	1	-	-	-	-	-	1
North Carolina	5	2	8	4	8	8	4	-	3	1	43
North Dakota	-	-	-	-	-	-	-	-	-	-	-
Ohio	1	-	-	-	-	-	-	-	-	-	1
Oklahoma	-	1	-	1	-	-	-	-	-	-	2
Oregon	-	-	-	-	-	-	-	-	-	-	-
Pennsylvania	1	1	-	-	1	-	-	-	-	1	4
Rhode Island	-	-	-	-	-	-	1	-	-	-	1
South Carolina	1	3	2	-	-	1	1	1	1	1	11
South Dakota	-	-	-	-	-	-	-	-	-	-	-
Tennessee	-	-	-	-	-	-	-	-	-	-	-
Texas	-	-	-	2	-	-	1	1	-	-	4
Utah	-	-	-	-	-	-	-	-	-	-	-
Vermont	-	-	-	-	-	-	-	-	-	1	1
Virginia	2	-	-	1	-	-	-	-	-	-	3
Washington	-	-	-	-	-	-	-	-	-	-	-
West Virginia	-	1	-	1	-	-	-	-	-	-	2
Wisconsin	-	-	-	-	1	-	-	2	-	-	3
Wyoming	-	-	-	-	-	-	-	-	-	-	-
TOTAL	18	12	15	17	17	14	9	10	6	7	125

- indicates no deaths listed.

NOTE: See appendices for source description, methods, and ICD codes.

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

Byssinosis: Mortality

Table 4-5. Byssinosis: Number of deaths, mortality rates (per million population), and years of potential life lost (YPLL) by state, U.S. residents age 15 and over, 1990-1999

State	No. of Deaths		Crude Mortality		Age-Adjusted Mortality		YPLL to Life Expectancy			
	Deaths	Rank	Rate	Rank	Rate	Rank	Total	Rank	YPLL/death	Rank
Alabama	3	8	0.09	8	0.09	8	31	17	10.3	25
Alaska	-	-	-	-	-	-	-	-	-	-
Arizona	1	18	0.03	20	0.03	21	21	20	20.8	9
Arkansas	1	18	0.05	15	0.04	16	8	28	8.4	27
California	8	4	0.03	20	0.04	16	134	4	16.7	13
Colorado	2	14	0.07	12	0.08	10	47	13	23.6	6
Connecticut	-	-	-	-	-	-	-	-	-	-
Delaware	-	-	-	-	-	-	-	-	-	-
District of Columbia	-	-	-	-	-	-	-	-	-	-
Florida	4	5	0.03	20	0.03	21	85	6	21.4	7
Georgia	11	2	0.20	4	0.26	3	151	3	13.7	20
Hawaii	-	-	-	-	-	-	-	-	-	-
Idaho	-	-	-	-	-	-	-	-	-	-
Illinois	2	14	0.02	27	0.02	27	104	5	52.1	1
Indiana	1	18	0.02	27	0.02	27	14	23	14	19
Iowa	1	18	0.05	15	0.04	16	14	23	14.1	17
Kansas	1	18	0.05	15	0.05	15	8	28	8.3	29
Kentucky	1	18	0.03	20	0.03	21	48	11	47.5	2
Louisiana	1	18	0.03	20	0.03	21	48	11	47.5	2
Maine	-	-	-	-	-	-	-	-	-	-
Maryland	1	18	0.03	20	0.03	21	14	23	14.1	17
Massachusetts	3	8	0.06	13	0.06	14	34	16	11.4	24
Michigan	3	8	0.04	18	0.04	16	83	7	27.5	5
Minnesota	3	8	0.08	9	0.09	8	57	8	18.8	11
Mississippi	-	-	-	-	-	-	-	-	-	-
Missouri	1	18	0.02	27	0.02	27	8	28	8.3	29
Montana	-	-	-	-	-	-	-	-	-	-
Nebraska	-	-	-	-	-	-	-	-	-	-
Nevada	-	-	-	-	-	-	-	-	-	-
New Hampshire	1	18	0.11	7	0.13	5	29	18	29.2	4
New Jersey	-	-	-	-	-	-	-	-	-	-
New Mexico	-	-	-	-	-	-	-	-	-	-
New York	1	18	0.01	30	0.01	30	21	20	21.1	8
North Carolina	43	1	0.75	1	0.78	1	577	1	13.4	21
North Dakota	-	-	-	-	-	-	-	-	-	-
Ohio	1	18	0.01	30	0.01	30	21	20	20.8	9
Oklahoma	2	14	0.08	9	0.07	12	14	23	7.2	31
Oregon	-	-	-	-	-	-	-	-	-	-
Pennsylvania	4	5	0.04	18	0.04	16	50	9	12.5	22
Rhode Island	1	18	0.13	6	0.11	7	8	28	8.4	27
South Carolina	11	2	0.39	2	0.43	2	174	2	15.8	14
South Dakota	-	-	-	-	-	-	-	-	-	-
Tennessee	-	-	-	-	-	-	-	-	-	-
Texas	4	5	0.03	20	0.03	21	50	9	12.5	22
Utah	-	-	-	-	-	-	-	-	-	-
Vermont	1	18	0.22	3	0.22	4	14	23	14.3	16
Virginia	3	8	0.06	13	0.07	12	28	19	9.4	26
Washington	-	-	-	-	-	-	-	-	-	-
West Virginia	2	14	0.14	5	0.12	6	35	15	17.5	12
Wisconsin	3	8	0.08	9	0.08	10	46	14	15.4	15
Wyoming	-	-	-	-	-	-	-	-	-	-

- indicates no deaths listed.

NOTE: See appendices for source description, methods, and ICD codes.

SOURCE: National Center for Health Statistics multiple cause of death data. Population estimates from U.S. Bureau of the Census.

Table 4-6. Byssinosis: Most frequently recorded industries on death certificate, U.S. residents age 15 and over, selected states and years, 1990-1999

CIC	Industry	Number of Deaths	Percent
142	Yarn, thread, and fabric mills	39	48.2
961	Non-paid worker or non-worker or own home/at home	7	8.6
060	Construction	4	4.9
041	Coal mining	3	3.7
010	Agricultural production, crops	2	2.5
151	Apparel and accessories, except knit	2	2.5
351	Motor vehicles and motor vehicle equipment	2	2.5
392	Not specified manufacturing industries	2	2.5
831	Hospitals	2	2.5
901	General government, n.e.c.	2	2.5
	All other industries	15	18.5
	Industry not reported	1	1.2
	TOTAL	81	100.0

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

NOTE: Percentages may not total to 100% due to rounding. See appendices for source description, methods, and ICD codes, industry and occupation codes, and list of selected states and years.

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

Table 4-7. Byssinosis: Most frequently recorded occupations on death certificate, U.S. residents age 15 and over, selected states and years, 1990-1999

COC	Occupation	Number of Deaths	Percent
749	Miscellaneous textile machine operators	11	13.6
738	Winding and twisting machine operators	8	9.9
518	Industrial machinery repairers	7	8.6
914	Housewife/Homemaker	7	8.6
616	Mining machine operators	4	4.9
744	Textile sewing machine operators	4	4.9
473	Farmers, except horticulture	2	2.5
633	Supervisors, production occupations	2	2.5
637	Machinists	2	2.5
739	Knitting, looping, taping, and weaving machine operators	2	2.5
754	Packaging and filling machine operators	2	2.5
889	Laborers, except construction	2	2.5
	All other occupations	26	32.1
	Occupation not reported	2	2.5
	TOTAL	81	100.0

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

NOTE: Percentages may not total to 100% due to rounding. See appendices for source description, methods, and ICD codes, industry and occupation codes, and list of selected states and years.

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

Byssinosis: Mortality

Table 4-8. Byssinosis: Proportionate mortality ratio (PMR) adjusted for age, sex, and race by usual industry, U.S. residents age 15 and over, selected states and years, 1990-1999

CIC	Industry	Number of Deaths	PMR	95% Confidence Interval	
				LCL	UCL
142	Yarn, thread, and fabric mills	39	22.26	15.79	30.41

CIC - Census Industry Code n.e.c. - not elsewhere classified LCL - lower confidence limit UCL - upper confidence limit

NOTE: See appendices for source description, methods, and ICD codes, industry and occupation codes, and list of selected states and years.

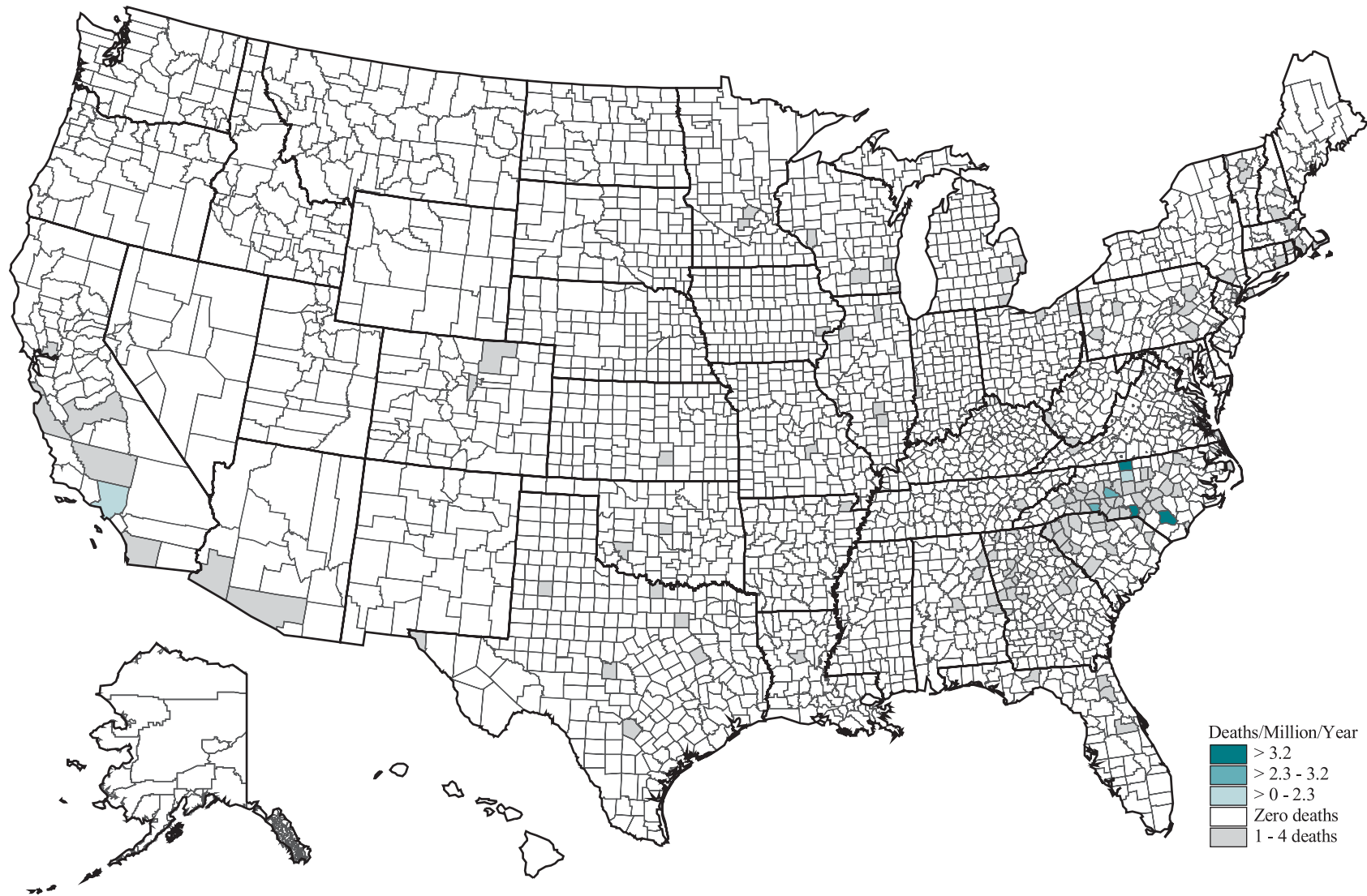
SOURCE: National Center for Health Statistics multiple cause of death data.

Table 4-9. Byssinosis: Proportionate mortality ratio (PMR) adjusted for age, sex, and race by usual occupation, U.S. residents age 15 and over, selected states and years, 1990-1999

COC	Occupation	Number of Deaths	PMR	95% Confidence Interval	
				LCL	UCL
749	Miscellaneous textile machine operators	11	35.76	17.88	63.97
518	Industrial machinery repairers	7	28.07	11.28	57.89
738	Winding and twisting machine operators	8	27.50	11.85	54.14

COC - Census Occupation Code n.e.c. - not elsewhere classified LCL - lower confidence limit UCL - upper confidence limit
NOTE: See appendices for source description, methods, and ICD codes, industry and occupation codes, and list of selected states and years.
SOURCE: National Center for Health Statistics multiple cause of death data.

86 **Figure 4-3. Byssinosis: Age-adjusted mortality rates by county, U.S. residents age 15 and over, 1980-1999**



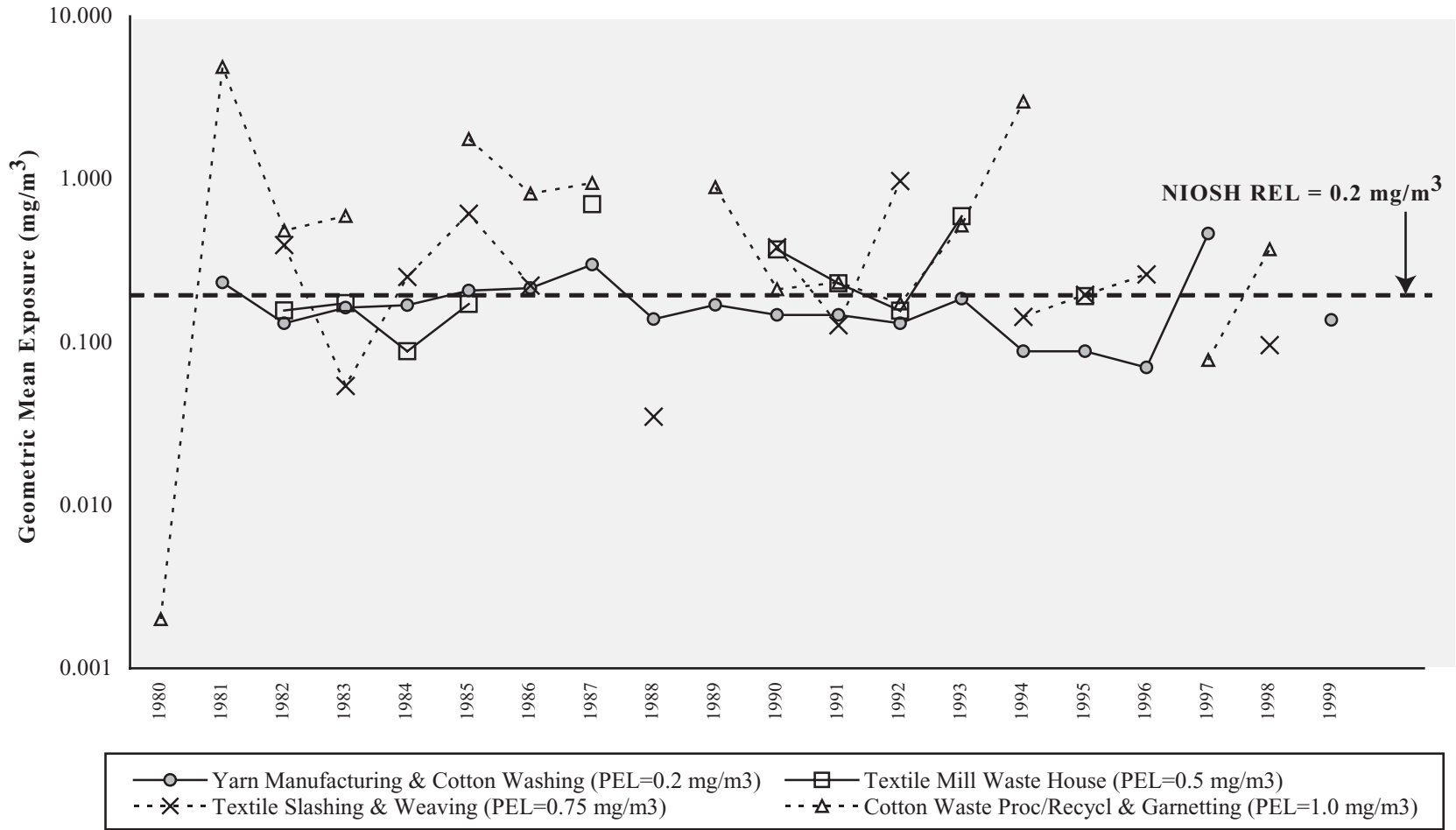
NOTE: Age-adjusted rates are not calculated for those counties with 1-4 deaths. See appendices for source description, methods, and ICD codes.
SOURCE: National Center for Health Statistics multiple cause of death data. Population estimates from U.S. Bureau of the Census.

Table 4-10. Byssinosis: Counties with highest age-adjusted mortality rates (per million population), U.S. residents age 15 and over, 1985-1999

County	State	Age-Adjusted Rate	Crude Rate	Number of Deaths	% Female
Richmond County	North Carolina	18.95	20.87	11	54.5
Bladen County	North Carolina	12.38	14.69	5	60.0
Rockingham County	North Carolina	4.25	4.78	5	60.0
Gaston County	North Carolina	2.98	2.84	6	16.7
Guilford County	North Carolina	1.97	1.84	8	12.5
Los Angeles County	California	0.06	0.05	5	20.0
Overall United States		0.07	0.06	193	29.0

NOTE: Only counties with at least 5 deaths from the disease of interest are included. See appendices for source description, methods, and ICD codes.
SOURCE: National Center for Health Statistics multiple cause of death data. Population estimates from U.S. Bureau of the Census.

Figure 4-4. Cotton dust: Geometric mean exposures by cotton process, OSHA samples, 1980-1999



REL - recommended exposure limit mg/m³ - milligrams per cubic meter

NOTE: The OSHA PEL is 0.2 mg/m³ for yarn manufacturing and cotton washing operations, 0.5 mg/m³ for textile mill waste house operations or for dust from lower grade washed cotton used during yarn manufacturing, 0.75 mg/m³ for textile slashing and weaving operations, and 1.0 mg/m³ for cotton waste processing operations or waste recycling (i.e., sorting, blending, cleaning, and willowing) and garnetting. See appendices for source description, methods, and agents.

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

Table 4-11. Cotton dust: Geometric mean exposures and percent exceeding designated occupational exposure limits by cotton process, OSHA samples, 1980-1999

Process		1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Yarn Manufacturing & Cotton Washing (PEL = 0.2 mg/m ³)	GM (mg/m ³)	-	0.233	0.131	0.163	0.169	0.208	0.215	0.300	0.139	0.170	0.147	0.147	0.131	0.185	0.088	0.088	0.070	0.465	-	0.137
	No. of samples	0	7	67	130	54	70	46	17	35	8	17	88	104	39	36	31	6	4	0	7
	% > PEL	-	57.1	28.4	28.5	40.7	52.9	45.7	70.6	28.6	37.5	23.5	25.0	28.8	35.9	13.9	12.9	0.0	100.0	-	14.3
	% > REL	-	57.1	28.4	28.5	40.7	52.9	45.7	70.6	28.6	37.5	23.5	25.0	28.8	35.9	13.9	12.9	0.0	100.0	-	14.3
Textile Mill Waste House or Dust from Lower-Grade Cotton Washing During Yarn Manufacturing (PEL = 0.5 mg/m ³)	GM (mg/m ³)	-	-	0.157	0.174	0.088	0.172	-	0.703	-	-	0.371	0.230	0.156	0.593	-	0.192	-	-	-	-
	No. of samples	0	0	5	10	8	7	0	4	0	0	1	7	8	17	0	4	0	0	0	0
	% > PEL	-	-	0.0	20.0	0.0	14.3	-	100.0	-	-	0.0	14.3	0.0	70.6	-	50.0	-	-	-	-
	% > REL	-	-	40.0	20.0	25.0	28.6	-	100.0	-	-	100.0	28.6	25.0	94.1	-	50.0	-	-	-	-
Textile Slashing and Weaving (PEL = 0.75 mg/m ³)	GM (mg/m ³)	-	-	0.396	0.054	0.252	0.616	0.223	-	0.035	-	0.383	0.127	0.978	-	0.143	0.196	0.261	-	0.096	-
	No. of samples	0	0	12	16	7	9	4	0	2	0	3	11	4	0	3	4	5	0	6	0
	% > PEL	-	-	25.0	6.3	14.3	11.1	0.0	-	0.0	-	0.0	0.0	100.0	-	0.0	0.0	0.0	-	0.0	-
	% > REL	-	-	83.3	18.8	71.4	100.0	50.0	-	0.0	-	100.0	45.5	100.0	-	66.7	75.0	80.0	-	33.3	-
Cotton Waste Processing/ Recycling & Garnetting (PEL = 1.0 mg/m ³)	GM (mg/m ³)	0.002	4.90	0.485	0.597	-	1.77	0.818	0.949	-	0.896	0.212	0.233	0.173	0.521	3.00	-	-	0.078	0.372	-
	No. of samples	1	3	4	8	0	4	13	7	0	2	2	16	10	5	1	0	0	2	2	0
	% > PEL	0.0	100.0	25.0	37.5	-	50.0	23.1	42.9	-	0.0	0.0	0.0	0.0	20.0	100.0	-	-	0.0	0.0	-
	% > REL	0.0	100.0	100.0	50.0	-	75.0	100.0	100.0	-	100.0	50.0	50.0	30.0	80.0	100.0	-	-	0.0	100.0	-

- indicates incalculable field

PEL - permissible exposure limit

REL - recommended exposure limit

GM - geometric mean

mg/m³ - milligrams per cubic meter

NOTE: The NIOSH REL is 0.2 mg/m³. See appendices for source description, methods, and agents.

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

Byssinosis: Cotton Dust Exposure

Table 4-12. Cotton Dust: Number of samples, geometric mean exposures, and percent exceeding designated occupational exposure limits by industries with elevated byssinosis mortality, OSHA samples, 1990-1999

Byssinosis Mortality, Selected States and Years, 1990-1999				Number of Samples	GM (mg/m ³)	% > PEL	% > REL
CIC	Industries with elevated PMRs and most frequently recorded on death certificates	Number of Deaths	PMR				
142	Yarn, thread, and fabric mills	39	22.26	404	0.133	23.3	31.9
	All other industries	41		64	0.086	17.2	31.3
	TOTAL			468	0.125	22.4	31.8

CIC - Census Industry Code PEL - permissible exposure limit REL - recommended exposure limit PMR - proportionate mortality ratio
 GM - geometric mean mg/m³ - milligrams per cubic meter

NOTE: The OSHA PEL is 0.2 mg/m³ for yarn manufacturing and cotton washing operations, 0.5 mg/m³ for textile mill waste house operations or for dust from lower grade washed cotton used during yarn manufacturing, 0.75 mg/m³ for textile slashing and weaving operations, and 1.0 mg/m³ for cotton waste processing operations or waste recycling (i.e., sorting, blending, cleaning, and willowing) and garnetting. The NIOSH REL is 0.2 mg/m³. See appendices for source description, methods, ICD codes, industry codes, agents, and list of selected states (and years) for which usual industry has been reported.

SOURCE: Occupational Safety and Health Administration (OSHA) Integrated Management Information System. National Center for Health Statistics multiple cause of death data.

Table 4-13 (page 1 of 3). Cotton dust: Geometric mean exposures and percent exceeding designated occupational exposure limits by OSHA region, state and process, OSHA samples, 1980-1999

OSHA Region	All years		1980 - 1989				1990 - 1994				1995 - 1999			
	No. of Samples	GM (mg/m ³)	No. of Samples	GM (mg/m ³)	% > PEL	% > REL	No. of Samples	GM (mg/m ³)	% > PEL	% > REL	No. of Samples	GM (mg/m ³)	% > PEL	% > REL
Region 1	7	0.044	0	-	-	-	3	0.139	0.0	0.0	4	0.019	0.0	0.0
Massachusetts	3	0.139	0	-	-	-	3	0.139	0.0	0.0	0	-	-	-
Cotton Waste Proc/Recycl & Garnetting	3	0.139	0	-	-	-	3	0.139	0.0	0.0	0	-	-	-
New Hampshire	4	0.019	0	-	-	-	0	-	-	-	4	0.019	0.0	0.0
Yarn Manufacturing & Cotton Washing	2	0.121	0	-	-	-	0	-	-	-	2	0.121	0.0	0.0
Undetermined Process	2	0.003	0	-	-	-	0	-	-	-	2	0.003	-	0.0
Region 2	10	1.093	10	1.093	50.0	90.0	0	-	-	-	0	-	-	-
New Jersey	9	2.119	9	2.119	55.6	100.0	0	-	-	-	0	-	-	-
Textile Mill Waste House	1	0.965	1	0.965	100.0	100.0	0	-	-	-	0	-	-	-
Cotton Waste Proc/Recycl & Garnetting	8	2.338	8	2.338	50.0	100.0	0	-	-	-	0	-	-	-
Puerto Rico	1	0.003	1	0.003	-	0.0	0	-	-	-	0	-	-	-
Undetermined Process	1	0.003	1	0.003	-	0.0	0	-	-	-	0	-	-	-
Region 3	4	0.029	4	0.029	0.0	25.0	0	-	-	-	0	-	-	-
Maryland	1	0.014	1	0.014	-	0.0	0	-	-	-	0	-	-	-
Undetermined Process	1	0.014	1	0.014	-	0.0	0	-	-	-	0	-	-	-
Pennsylvania	3	0.038	3	0.038	0.0	33.3	0	-	-	-	0	-	-	-
Textile Mill Waste House	1	0.260	1	0.260	0.0	100.0	0	-	-	-	0	-	-	-
Cotton Waste Proc/Recycl & Garnetting	1	0.072	1	0.072	0.0	0.0	0	-	-	-	0	-	-	-
Undetermined Process	1	0.003	1	0.003	-	0.0	0	-	-	-	0	-	-	-

See footnotes at end of table.

Table 4-13 (page 2 of 3). Cotton dust: Geometric mean exposures and percent exceeding designated occupational exposure limits by OSHA region, state and process, OSHA samples, 1980-1999

OSHA Region	All years		1980 - 1989				1990 - 1994				1995 - 1999			
	No. of Samples	GM (mg/m ³)	No. of Samples	GM (mg/m ³)	% > PEL	% > REL	No. of Samples	GM (mg/m ³)	% > PEL	% > REL	No. of Samples	GM (mg/m ³)	% > PEL	% > REL
Region 4	909	0.136	470	0.154	30.2	37.2	367	0.123	22.1	29.7	72	0.096	13.9	29.2
Alabama	83	0.230	37	0.282	56.8	56.8	46	0.196	19.6	41.3	0	-	-	-
Yarn Manufacturing & Cotton Washing	62	0.196	33	0.223	54.5	54.5	29	0.168	31.0	31.0	0	-	-	-
Textile Mill Waste House	3	0.154	1	0.115	0.0	0.0	2	0.179	0.0	50.0	0	-	-	-
Textile Slashing & Weaving	1	0.449	0	-	-	-	1	0.449	0.0	100.0	0	-	-	-
Cotton Waste Proc/Recycl & Garnetting	17	0.431	3	4.898	100.0	100.0	14	0.256	0.0	57.1	0	-	-	-
Georgia	196	0.156	131	0.160	43.5	46.6	53	0.146	24.5	28.3	12	0.156	41.7	41.7
Yarn Manufacturing & Cotton Washing	177	0.168	120	0.175	47.5	47.5	46	0.147	28.3	28.3	11	0.184	45.5	45.5
Textile Mill Waste House	4	0.159	1	0.098	0.0	0.0	3	0.187	0.0	0.0	0	-	-	-
Textile Slashing & Weaving	11	0.086	6	0.089	0.0	33.3	4	0.111	0.0	50.0	1	0.026	0.0	0.0
Cotton Waste Proc/Recycl & Garnetting	2	0.376	2	0.376	0.0	100.0	0	-	-	-	0	-	-	-
Undetermined Process	2	0.003	2	0.003	-	0.0	0	-	-	-	0	-	-	-
Mississippi	1	0.050	1	0.050	0.0	0.0	0	-	-	-	0	-	-	-
Yarn Manufacturing & Cotton Washing	1	0.050	1	0.050	0.0	0.0	0	-	-	-	0	-	-	-
North Carolina	495	0.124	250	0.129	21.2	28.0	208	0.128	21.6	27.9	37	0.076	8.1	18.9
Yarn Manufacturing & Cotton Washing	380	0.132	189	0.144	24.9	24.9	166	0.131	24.1	24.1	25	0.074	12.0	12.0
Textile Mill Waste House	27	0.118	15	0.087	0.0	13.3	11	0.201	9.1	36.4	1	0.037	0.0	0.0
Textile Slashing & Weaving	53	0.161	31	0.141	12.9	51.6	16	0.255	25.0	68.8	6	0.096	0.0	33.3
Cotton Waste Proc/Recycl & Garnetting	22	0.202	9	0.255	22.2	55.6	9	0.172	0.0	33.3	4	0.170	0.0	50.0
Undetermined Process	13	0.003	6	0.003	-	0.0	6	0.003	-	0.0	1	0.003	-	0.0
South Carolina	118	0.156	47	0.202	21.3	40.4	51	0.115	27.5	33.3	20	0.184	10.0	45.0
Yarn Manufacturing & Cotton Washing	78	0.123	26	0.130	15.4	15.4	43	0.125	30.2	30.2	9	0.098	0.0	0.0
Textile Mill Waste House	12	0.247	9	0.224	44.4	55.6	0	-	-	-	3	0.332	66.7	66.7
Textile Slashing & Weaving	20	0.403	12	0.489	16.7	83.3	0	-	-	-	8	0.302	0.0	87.5
Cotton Waste Proc/Recycl & Garnetting	5	0.521	0	-	-	-	5	0.521	20.0	80.0	0	-	-	-
Undetermined Process	3	0.003	0	-	-	-	3	0.003	-	0.0	0	-	-	-
Tennessee	16	0.011	4	0.645	25.0	100.0	9	0.003	0.0	0.0	3	0.003	0.0	0.0
Yarn Manufacturing & Cotton Washing	1	7.400	1	7.400	100.0	100.0	0	-	-	-	0	-	-	-
Cotton Waste Proc/Recycl & Garnetting	3	0.286	3	0.286	0.0	100.0	0	-	-	-	0	-	-	-
Undetermined Process	12	0.003	0	-	-	-	9	0.003	-	0.0	3	0.003	-	0.0

See footnotes at end of table.

Table 4-13 (page 3 of 3). Cotton dust: Geometric mean exposures and percent exceeding designated occupational exposure limits by OSHA region, state and process, OSHA samples, 1980-1999

OSHA Region	All years		1980 - 1989				1990 - 1994				1995 - 1999			
	No. of Samples	GM (mg/m ³)	No. of Samples	GM (mg/m ³)	% > PEL	% > REL	No. of Samples	GM (mg/m ³)	% > PEL	% > REL	No. of Samples	GM (mg/m ³)	% > PEL	% > REL
Region 5	8	3.415	7	3.479	71.4	71.4	1	3.000	100.0	100.0	0	-	-	-
Illinois	7	3.479	7	3.479	71.4	71.4	0	-	-	-	0	-	-	-
Yarn Manufacturing & Cotton Washing	2	0.200	2	0.200	0.0	0.0	0	-	-	-	0	-	-	-
Textile Mill Waste House	2	7.421	2	7.421	100.0	100.0	0	-	-	-	0	-	-	-
Cotton Waste Proc/Recycl & Garnetting	3	14.092	3	14.092	100.0	100.0	0	-	-	-	0	-	-	-
Michigan	1	3.000	0	-	-	-	1	3.000	100.0	100.0	0	-	-	-
Cotton Waste Proc/Recycl & Garnetting	1	3.000	0	-	-	-	1	3.000	100.0	100.0	0	-	-	-
Region 6	77	0.281	75	0.283	54.7	62.7	2	0.212	0.0	50.0	0	-	-	-
Texas	77	0.281	75	0.283	54.7	62.7	2	0.212	0.0	50.0	0	-	-	-
Yarn Manufacturing & Cotton Washing	62	0.278	62	0.278	61.3	61.3	0	-	-	-	0	-	-	-
Textile Mill Waste House	4	0.139	4	0.139	0.0	25.0	0	-	-	-	0	-	-	-
Textile Slashing & Weaving	1	0.410	1	0.410	0.0	100.0	0	-	-	-	0	-	-	-
Cotton Waste Proc/Recycl & Garnetting	10	0.380	8	0.439	37.5	87.5	2	0.212	0.0	50.0	0	-	-	-
Region 7	19	0.493	1	0.740	0.0	100.0	18	0.482	66.7	88.9	0	-	-	-
Kansas	18	0.482	0	-	-	-	18	0.482	66.7	88.9	0	-	-	-
Textile Mill Waste House	17	0.593	0	-	-	-	17	0.593	70.6	94.1	0	-	-	-
Undetermined Process	1	0.014	0	-	-	-	1	0.014	-	0.0	0	-	-	-
Missouri	1	0.740	1	0.740	0.0	100.0	0	-	-	-	0	-	-	-
Cotton Waste Proc/Recycl & Garnetting	1	0.740	1	0.740	0.0	100.0	0	-	-	-	0	-	-	-
Region 8	4	0.714	4	0.714	0.0	100.0	0	-	-	-	0	-	-	-
Colorado	2	0.570	2	0.570	0.0	100.0	0	-	-	-	0	-	-	-
Cotton Waste Proc/Recycl & Garnetting	2	0.570	2	0.570	0.0	100.0	0	-	-	-	0	-	-	-
Utah	2	0.896	2	0.896	0.0	100.0	0	-	-	-	0	-	-	-
Cotton Waste Proc/Recycl & Garnetting	2	0.896	2	0.896	0.0	100.0	0	-	-	-	0	-	-	-
Region 9	1	1.958	0	-	-	-	0	-	-	-	1	1.958	100.0	100.0
Hawaii	1	1.958	0	-	-	-	0	-	-	-	1	1.958	100.0	100.0
Yarn Manufacturing & Cotton Washing	1	1.958	0	-	-	-	0	-	-	-	1	1.958	100.0	100.0
TOTAL	1,039	0.153	571	0.180	33.8	42.4	391	0.133	24.0	32.5	77	0.091	14.3	28.6

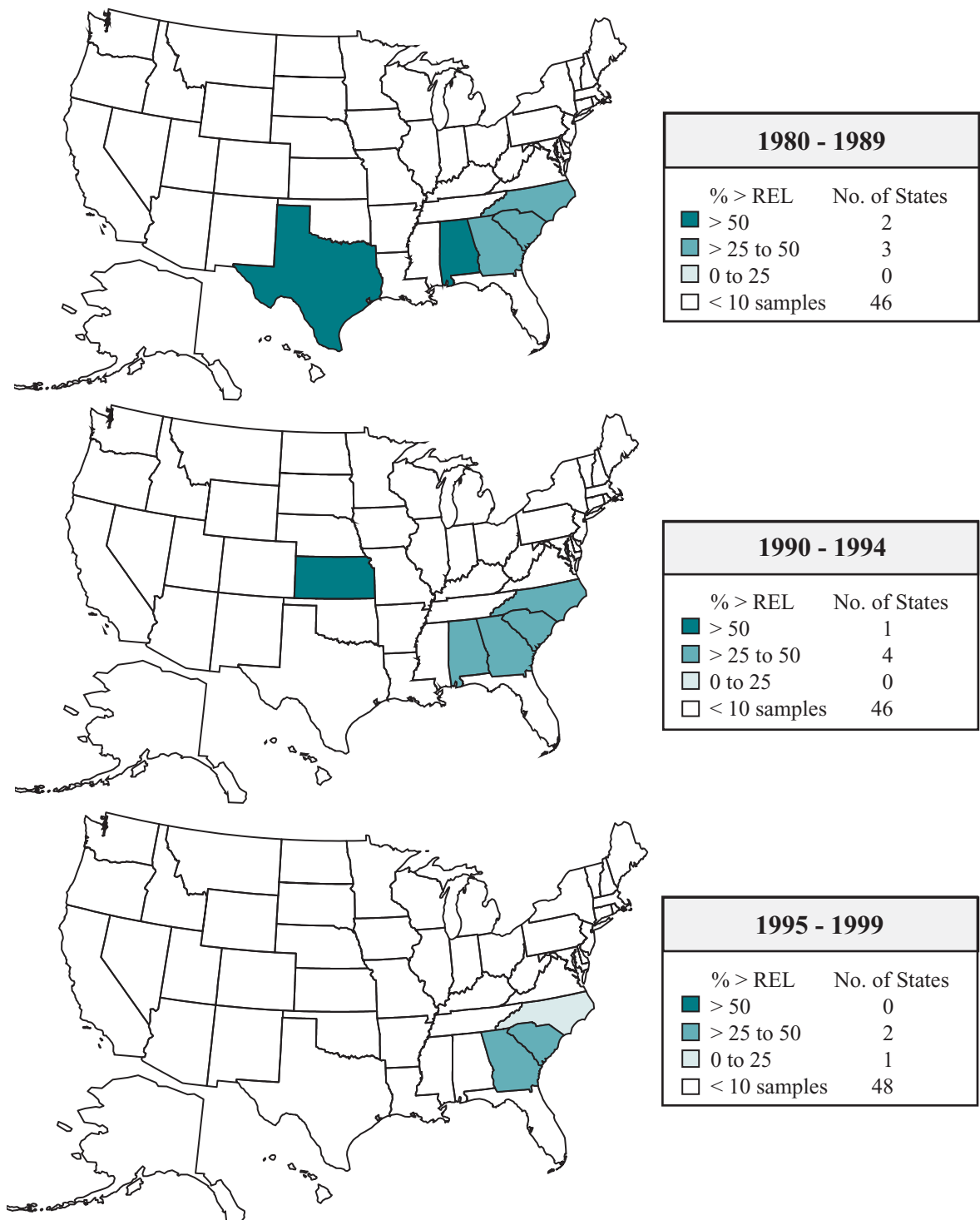
- indicates incalculable field PEL - permissible exposure limit REL - recommended exposure limit GM - geometric mean mg/m³ - milligrams per cubic meter

NOTE: The OSHA PEL is 0.2 mg/m³ for yarn manufacturing and cotton washing operations, 0.5 mg/m³ for textile mill waste house operations or for dust from lower grade washed cotton used during yarn manufacturing, 0.75 mg/m³ for textile slashing and weaving operations, and 1.0 mg/m³ for cotton waste processing operations or waste recycling (i.e., sorting, blending, cleaning, and willowing) and garnetting. The NIOSH REL is 0.2 mg/m³. See appendices for source description, methods, and agents.

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

Byssinosis: Cotton Dust Exposure

Figure 4-5. Cotton dust: Percent of exposures exceeding the NIOSH recommended exposure limit by state, OSHA samples, 1980-1999



REL - recommended exposure limit

NOTE: The NIOSH REL is 0.2 mg/m³. See appendices for source description, methods, and agents.

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