MMWR™
Morbidity and Mortality Weekly Report
Weekly April 29, 2005 / Vol. 54 / No. 16

Workers' Memorial Day — April 28, 2005

Workers' Memorial Day, April 28, was established in 1989 as an international day of remembrance for workers who died or were injured on the job. This day also commemorates the 34th anniversary of the National Institute for Occupational Safety and Health and the Occupational Safety and Health Administration, both of which were created by the U.S. Occupational Safety and Health Act.

On average, in the United States, nearly 11,000 workers are treated in emergency departments each day, and approximately 200 of these workers are hospitalized (*1*). An estimated 6,300 private-sector workers require time away from their jobs (*2*), 15 workers die from their injuries (*3*), and 134 die from work-related diseases (*4*). These losses account for nearly $73 billion in workers' compensation (*5*). International and national prevention practices during the preceding 3 decades have reduced these losses, but morbidity and mortality from occupational hazards are still a major social and economic burden.

This issue of *MMWR* includes reports on occupational safety and health in recognition of Workers' Memorial Day. Additional information about this day is available at http://www.ilo.org/public/english/protection/safework and http://www.aflcio.org/issuespolitics/toolkit/fliers.cfm. Information on workplace safety and health is available at http://www.cdc.gov/niosh/homepage.html or by telephone, 800-356-4674.

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Silicosis Mortality, Prevention, and Control — United States, 1968–2002

Silicosis is a preventable occupational lung disease caused by inhaling dust containing crystalline silica (*1*); no effective treatment for silicosis is available. Deaths from inhalation of silica-containing dust can occur after a few months' exposure (*1*). Crystalline silica exposure and silicosis have been associated with work in mining, quarrying, tunneling, sandblasting, masonry, foundry work, glass manufacture, ceramic and pottery production, cement and concrete production, and work with certain materials in dental laboratories. To describe patterns of silicosis mortality in the United States, CDC analyzed data from the National Institute for Occupational Safety and Health (NIOSH) National Occupational Respiratory Mortality System (NORMS) for 1968–2002. This report summarizes the results of that analysis, which indicated a decline in silicosis mortality during 1968–2002 and suggested that progress has been made in reducing the incidence of silicosis in the United States. However, silicosis deaths and new cases still occur, even in young workers. Because no effective treatment for silicosis is available, effective control of exposure to crystalline silica in the workplace is crucial.

NORMS contains national mortality data obtained annually since 1968 from the National Center for Health Statistics (NCHS) for asthma, chronic obstructive pulmonary disease, silicosis, pneumoconiosis, tuberculosis, and other respiratory diseases and conditions (*2*). For this report, silicosis deaths were identified during 1968–2002, the most recent years for which complete data were available, and include any death

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DEPARTMENT OF HEALTH AND HUMAN SERVICES
CENTERS FOR DISEASE CONTROL AND PREVENTION

The *MMWR* series of publications is published by the Coordinating Center for Health Information and Service*, Centers for Disease Control and Prevention (CDC), U.S. Department of Health and Human Services, Atlanta, GA 30333.

SUGGESTED CITATION
Centers for Disease Control and Prevention. [Article Title]. MMWR 2005;54:[inclusive page numbers].

certificates for which an *International Classification of Diseases* (ICD) code* for silicosis was listed as either the underlying or contributing cause of death. Death rates (per million persons aged ≥15 years) were age-adjusted to the 2000 U.S. standard population. The age-adjusted mortality rates were mapped by county by using geographic information system software. Codes for usual occupation or industry were available for 1985–1999 from 26 states†. The proportionate mortality ratio (PMR§) for silicosis was calculated by occupation and industry. For this analysis, PMR was adjusted by age, sex, and race, and 95% confidence intervals (CIs) were calculated by using Poisson regression analysis.

During 1968–2002, of approximately 74 million death certificates, silicosis was recorded as the underlying or contributing cause of death on 16,305; a total of 15,944 (98%) deaths occurred in males. From 1968 to 2002, the number of silicosis deaths decreased from 1,157 (8.91 per million persons aged ≥15 years) to 148 (0.66) (Figure 1), corresponding to a 93% decline in the overall mortality rate. The racial distribution of persons who died from silicosis was approximately 88% (14,310 decedents) white, 12% (1,925) black, and <1% (70) other race. Since 1995, on average, 30 deaths per year have been recorded among persons aged 15–64 years.

During 1968–2002, the age-adjusted silicosis mortality rate was elevated in several counties in western states (Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, and Washington), eastern states (Georgia, Kentucky, New York, North Carolina, Maine, Ohio, Pennsylvania, Tennessee, Vermont, Virginia, and West Virginia), and central states (Illinois, Kansas, Michigan, Minnesota, Missouri, Oklahoma, South Dakota, Vermont, and Wisconsin). San Juan County, Colorado, had the highest age-adjusted mortality rate (524 per million persons aged ≥15 years) (Figure 2).

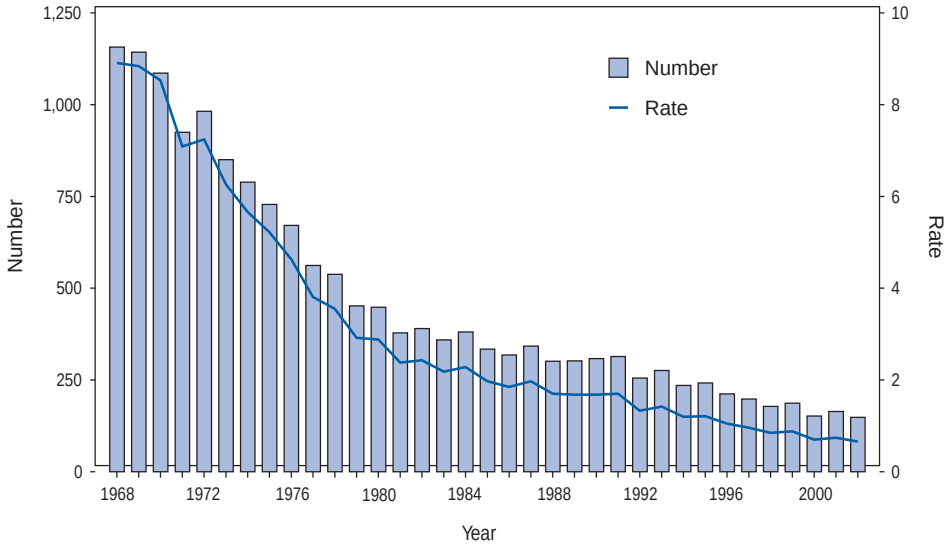
For usual industry and occupation codes, a total of 1,400 silicosis deaths were reported in the 26 states for one or more selected years during 1985–1999. Metal mining had the highest PMR (39.2; CI = 32.9–46.8) among industries (Table). Among occupations, miscellaneous metal and plastic-

* ICD-8 code 515 (1968–1978), ICD-9 code 502 (1979–1998), and ICD-10 code J62 (1999–2002) (*3*).

† Alaska, Colorado, Georgia, Hawaii, Idaho, Indiana, Kansas, Kentucky, Maine, Missouri, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, North Carolina, Ohio, Oklahoma, Rhode Island, South Carolina, Tennessee, Utah, Vermont, Washington, West Virginia, and Wisconsin.

§ Defined as the observed number of deaths from silicosis in a specified occupation or industry divided by the expected number of silicosis deaths. The expected number of deaths was calculated by using the total number of deaths in the Bureau of Census Industry Code or Census Occupation Code of interest multiplied by a proportion defined as the number of cause-specific deaths for the condition of interest in all industries/occupations, divided by the total number of deaths in all industries/occupations.

FIGURE 1. Number of silicosis deaths and age-adjusted mortality rate*, by year — National Occupational Respiratory Mortality System, United States, 1968–2002



* Per million persons aged ≥15 years.

processing machine operator had the highest PMR (90.1; CI = 51.5–146.3).

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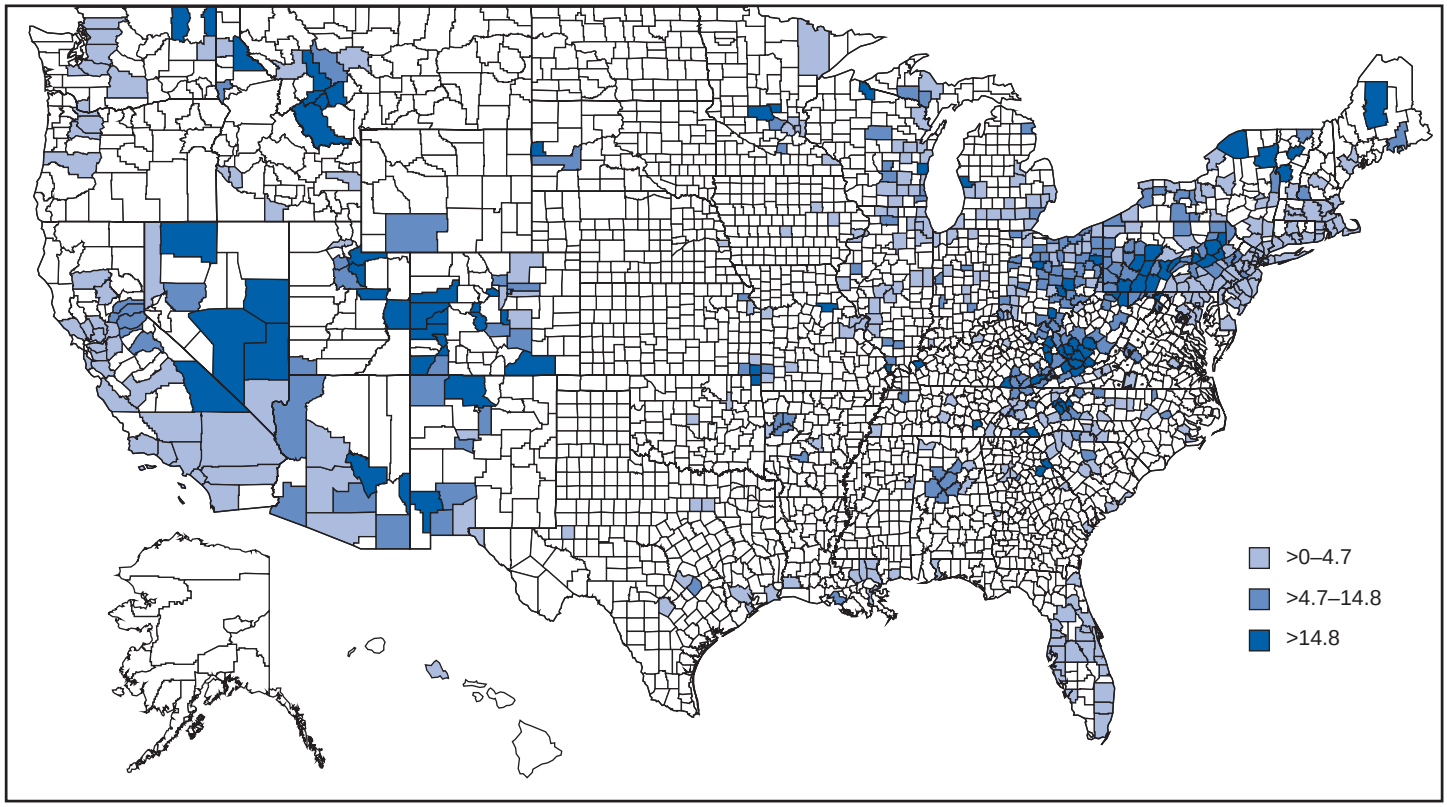
Editorial Note: The greatest death toll from silicosis in the United States occurred with excavation of Hawk's Nest Tunnel, critical to the construction of a hydroelectric plant in West Virginia during 1930–1931. Approximately 5,000 workers bored through Gauley Mountain to create the tunnel; an estimated 2,500 worked inside. A subsequent study determined that silicosis claimed the lives of at least 764 workers at Hawk's Nest Tunnel (*4*). By the end of 1937, a total of 46 states had passed laws relevant to workers with silicosis.

FIGURE 2. Geographic distribution of age-adjusted silicosis mortality rates*, by county — National Occupational Respiratory Mortality System, United States, 1968–2002



* Per million persons aged ≥15 years. Rates were not calculated for counties with fewer than five deaths.

TABLE. Top 10 significantly elevated proportionate mortality ratios (PMRs*) for silicosis, by industry and occupation code† — National Occupational Respiratory Mortality System, 26 states§, 1985–1999

Code	Description	No. of deaths¶	PMR	(95% CI**)
Industry				
040	Metal mining	128	39.2	(32.9–46.8)
262	Miscellaneous nonmetallic mineral and stone products	79	32.2	(25.7–40.4)
261	Pottery and related products	30	31.3	(21.1–44.6)
050	Nonmetallic mining and quarrying, except fuel	80	30.4	24.3–38.1)
271	Iron and steel foundries	84	20.2	(16.3–25.2)
252	Structural clay products	30	16.9	(11.4–24.2)
041	Coal mining	101	5.6	(4.6–6.9)
300	Miscellaneous fabricated metal products	27	4.8	(3.1–7.0)
682	Miscellaneous retail stores	14	4.0	(2.2–6.7)
270	Blast furnaces, steelworks, rolling, and finishing mills	91	3.4	(2.8–4.2)
Occupation				
725	Miscellaneous metal and plastic-processing machine operators	16	90.1	(51.5–146.3)
675	Hand molders and shapers, except jewelers	27	40.8	(26.8–59.4)
787	Hand molding, casting, and forming occupations	12	32.3	(16.6–56.3)
768	Crushing and grinding machine operators	29	30.8	(20.7–44.2)
719	Molding and casting machine operators	43	19.3	(14.0–26.0)
046	Mining engineers	5	16.4	(5.3–38.2)
616	Mining machine operators	208	12.1	(10.6–13.9)
617	Mining occupations, not elsewhere classified	12	11.2	(5.8–9.6)
613	Supervisors, extractive occupations	9	10.9	(5.0–20.6)
599	Construction trades, not elsewhere classified	16	7.5	(4.3–12.1)

* Defined as the observed number of deaths from silicosis in a specified occupation or industry divided by the expected number of silicosis deaths. The expected number of deaths was calculated by using the total number of deaths in the Bureau of Census Industry Code or Census Occupation Code of interest multiplied by a proportion defined as the number of cause-specific deaths for the condition of interest in all industries/occupations, divided by the total number of deaths in all industries/occupations.
† 1990 U.S. Census codes.
§ Alaska, Colorado, Georgia, Hawaii, Idaho, Indiana, Kansas, Kentucky, Maine, Missouri, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, North Carolina, Ohio, Oklahoma, Rhode Island, South Carolina, Tennessee, Utah, Vermont, Washington, West Virginia, and Wisconsin.
¶ Among persons aged ≥15 years.
** Confidence interval.

The findings in this report indicate a decline in silicosis mortality during 1968–2002. Two main factors are likely responsible for this trend. First, many of the deaths in the early part of the study period occurred among persons whose main exposure to crystalline silica dust probably occurred before introduction of national compliance standards for silica dust exposure (the Mine Safety and Health Administration [MSHA] and the Occupational Safety and Health Administration use permissible exposure limits [PELs] based on the American Conference of Governmental Industrial Hygienists threshold limit value). These limits began to be applied in the early 1970s and included indirect control through regulation of mixed mine dust in underground coal mines by using the MSHA formula¶ (*5*). These regulatory limits, coupled with other recommendations such as that by NIOSH in 1974 (i.e., recommended exposure limit [REL] to respirable crystalline silica shall not exceed 0.05 mg/m^3) (*6*), likely has led to reduced silica dust exposures since the 1970s. Ancillary preventive measures (e.g., respiratory protection, posting warning signs, and recordkeeping or reporting occupational illnesses) might also have reduced personal exposures. The second major factor relates to declining employment in heavy industries (e.g., mining industry from 989,400 employees in 1980 to 512,200 in 2002), where silica exposures were prevalent.

Despite the reductions in mortality associated with silicosis, silica overexposure remains widespread, indicating a need for hazard surveillance and developing work place–specific interventions. An estimated 121,100 workers were exposed to equal to or greater than the NIOSH REL in 1993 (*7*). The industries with the largest number of workers exposed include research and testing services (46,200 workers), masonry (20,400), heavy construction (12,200 [excluding highway construction]), and iron and steel foundries (8,600). Industries with fewer workers include painting and paper hanging (5,100), structural clay products (2,100), metal services (1,300), and cut stone (700) (*7*). By industry, metal mining had the highest PMR for 1985–1999. At least 12% of metal mining exposures exceeded the MSHA PEL during 1990–1999 (*8*). Findings from the Sentinel Event Notification Systems for Occupational Risks indicated that 58% of reported cases of silicosis from Michigan, New Jersey, and Ohio occurred in workers in primary metal industries (*9*).

¶ (10 mg/m^3) / (% quartz) and direct control of crystalline silica as respirable quartz in metal/non-metal mining using the formulas: (10 mg/m^3) / (% quartz + 2) for general industry or (250 mppcf) / (% quartz + 5) for the construction industry.

Additional industries with elevated PMRs involved miscellaneous nonmetallic and stone products and pottery and related products. The pottery industry deals with silica-containing clay, which is the raw material for manufacturing crockery, pottery, and flint.

The geographic patterns of silicosis offer some guidance for intervention. By county, the greatest age-adjusted mortality rates were clustered in western states, northeastern states, and north Atlantic states. The mortality rates in counties in these states were often associated with mining or construction industries. For example, the high age-adjusted death rate in Lawrence County, South Dakota (38.3 per million persons aged ≥15 years), might be associated with gold mining in that area. A study of 3,328 gold miners exposed to silica in South Dakota reported an increased risk for silicosis (*9*).

The findings in this report are subject to at least five limitations. First, accuracy of the coding of usual industry and occupation on death certificates was not verifiable because individual work histories are not listed on death certificates. Second, codes for usual industry and occupation were available only for the period 1985–1999 for 26 states; thus, these data might not be nationally representative. Twenty-four states do not provide decedents' employment data to NCHS. Third, the state of residence at death is not always the state in which decedents' exposures occurred. Fourth, no exposure information is listed on death certificates. Therefore, no silica exposure-response relationship was evaluated. Finally, physicians might have misclassified or underreported silicosis deaths.

Despite these limitations, NORMS can provide useful information on silicosis by location, industry, and occupation, suggesting ways to target preventive intervention. The decreased silicosis mortality trends suggest that considerable progress has been made toward elimination of silicosis since 1968. However, silicosis deaths and new cases are still occurring, even in young workers in the United States. Because no effective treatment for silicosis is available, primary prevention (i.e., engineering or other control of exposure) should be maintained or improved to reduce worker morbidity and mortality.

Acknowledgments

The findings in this report are based, in part, on contributions by JM Wood, MS, G Syamlal, MPH, Div of Respiratory Disease Studies, National Institute for Occupational Safety and Health, CDC.

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Update: Hydrogen Cyanamide–Related Illnesses — Italy, 2002–2004

Hydrogen cyanamide* is used in agriculture as a plant growth regulator and is applied to many deciduous plants to stimulate uniform budbreak after dormancy, resulting in uniform flowering and maturity. Hydrogen cyanamide is highly toxic, and adverse health effects from contact include severe irritation and ulceration of the eyes, skin, and respiratory tract (*1,2*). The substance also inhibits aldehyde dehydrogenase and can produce acetaldehyde syndrome (e.g., vomiting, parasympathetic hyperactivity, dyspnea, hypotension, and confusion) when exposure coincides with alcohol use. After Dormex® (Degussa AG, Trostberg, Germany), a pesticide product containing hydrogen cyanamide (49% by weight), was introduced in Italy in 2000, a total of 23 cases of acute illness associated with exposure to this chemical were identified in early 2001 (*3*). This led to a temporary suspension of sales and usage of Dormex on February 23, 2002, and strengthening of protective measures, as specified on the pesticide label when sales were resumed on June 20, 2003. This report describes 28 additional cases of hydrogen cyanamide–related illness that occurred during 2002–2004, 14 of which occurred after sales resumed. These illnesses suggest that the preventive measures

* Chemical Abstracts Service no. 420-04-2.