

Regional Differences Of Coal Workers Pneumoconiosis Prevalence In The United States: 40 Years After Implementation Of The 1969 Federal Coal Mine Health And Safety Act

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Rationale:

High death rates attributable to coal workers' pneumoconiosis (CWP) and safety issues led to the enactment of the 1969 Federal Coal Mine Health and Safety Act. As a result of the Act, CWP prevalence declined from 11.2% for the period 1970–1974 to 2.0% for 1995–1999. However, CWP has increased to 3.3% for 2005–2006. The study objective was to assess whether these increases in disease reflect increased exposures over recent decades.

Methods:

The observed CWP prevalence was calculated for 12,408 underground coal miner participants in the Coal Workers' Health Surveillance Program for the period 2005–2009, stratified by the Mine Safety and Health Administration (MSHA) geographical districts. The predicted prevalence was estimated using the published Attfield-Morrison exposure response model, which composed of dust exposure, tenure, miner's age, and coal rank. Chi-square testing was performed to compare the observed versus predicted CWP prevalence.

Results:

Observed prevalence was significantly higher than predicted (10.1% versus 4.2%; PR = 2.4; P < 0.001) in southern West Virginia, western Virginia, and eastern Kentucky (central Appalachia) and significantly lower than predicted in other regions (1.6% versus 3.6%; PR = 0.4; P < 0.001). The central Appalachian region had a significantly older workforce (median age = 48 versus 44 years; P < 0.001) with greater mining tenure (median tenure = 25 versus 9 years; P < 0.001) compared to other regions. The central Appalachian region also had a lower number of employees per mine (median 73 versus 273 workers per mine; P < 0.001); a lower average of coal seam height (median seam height = 60 versus 79 inches; P < 0.001); and slightly more annual hours worked per miner (median = 2280 versus 2265 hours; P = 0.856) compared to other regions. Unexpectedly however, MSHA compliance mine dust exposure data revealed a lower average measured dust concentration in central Appalachia compared with other regions (median measured dust concentration = 0.68 versus 0.99 mg/m³; P < 0.001).

Conclusions:

The observed CWP prevalence substantially exceeded predicted levels in central Appalachia. However, the increased prevalence was not explained by the measured levels of dust exposures. Smaller mine size and higher exposure to crystalline silica (reflected by lower seam height) were likely contributing factors. A greater vigilance in controlling dust and enhanced attention to training and resources for safety and health in small mines are needed.

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