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RESULTS FROM 37 YEARS OF MORTALITY EXPERIENCE AMONG US UNDERGROUND COAL MINERS

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Objectives Evaluate the mortality experience of 8889 underground coal miners over 36–38 years.

Methods Underlying cause of death was assessed in miners enrolled between 1969 and 1971 from 31 U.S. mines and evaluated with life-table analysis. Poisson models were fitted to evaluate cumulative exposure to coal-mine dust (CMD; mg-year/m³) controlling for smoking, age, coal-rank region, and calendar year.

Results Elevated mortality among 5925 deaths was observed for non-malignant respiratory disease (SMR 1.76, 95% CI 1.65 to 1.87), including pneumoconiosis (SMR 77.68, 95% CI 70.24 to 85.69), but not for COPD (SMR 1.08, 95% CI 0.97 to 1.21). Protective effects were seen for mortality from all causes, all cancer and heart and circulatory diseases. Excess mortality was seen for multiple myeloma among non-white (SMR 2.84, $n=6$) but not white miners (SMR 0.93, $n=22$), and for conductive-heart disorders (SMR 1.64, 95% CI 1.39 to 1.92). A linear exposure-response association with CMD was observed for pneumoconiosis (RR 1.005, 95% CI 1.003 to 1.006, $p<0.0001$); COPD among former/non-smokers (RR 1.0045, 95% CI 1.0016 to 1.0075; $p=0.0026$), but not current smokers (RR 1.0005, 95% CI 0.9982 to 1.0027; $p=0.6915$) and for multiple myeloma among non-white miners (RR 1.0221, 95% CI 1.0064 to 1.0380; $p=0.0058$) but not white miners (RR 1.0014, 95% CI 0.9939 to 1.0090; $p=0.7133$). No excess mortality or trend in E-R was observed for lung or stomach cancer.

Conclusions Our findings expand upon previous results showing that CMD exposure leads to increased mortality from respiratory disease, even in the absence of smoking. A healthy worker effect was seen for some but not all cancer and heart-disease related mortality; an unexpected excess of multiple myeloma among non-white miners was observed.