RESEARCH LETTER

Progressive Massive Fibrosis Identified at Federally Funded Black Lung Clinics in the US

Progressive massive fibrosis (PMF) is the most severe and disabling form of coal workers' pneumoconiosis.[1] Between January 2013 and February 2017, 416 cases were identified in miners in 3 federally funded Black Lung Clinics in Virginia (Stone Mountain Health Services [SMHS]). To our knowledge, this is the largest reported cluster of PMF in the scientific literature.[1] In 2019, the Health Resources and Services Administration required patient-level data collection by each of the 15 federally funded Black Lung Clinics (located in 11 states) and established the Black Lung Data and Resource Center to facilitate epidemiologic analyses.[2] We provide an update on the burden of PMF in coal miners served by SMHS and describe PMF cases identified at all other US Black Lung Clinics.

Supplemental content

Methods | We defined a case of PMF as an International Labour Office classification of large opacity category A (>1 cm and ≤5 cm),

Table. Characteristics of US Coal Miners With Progressive Massive Fibrosis From 15 Federally Funded Black Lung Clinics in 11 States From February 2017-June 2023[a,b]

Characteristic	Stone Mountain Health Services (n = 651)[c]	All other Black Lung Clinics (n = 526)[d]
Demographic		
Age, mean (range), y[e]	66 (39-90)	64 (31-92)
Male sex, No. (%)	650 (99.9)	511 (99.8)
Non-Hispanic White, No. (%)[f]	562 (99.5)	373 (98.4)
Central Appalachian miners, No. (%)[g]	626 (96.2)	389 (74.0)
Occupational		
Coal mine employment, mean (SD), y	28 (9)	28 (9.9)
Mine type, No. (%)		
Underground	455 (73.4)	421 (80.5)
Surface	42 (6.8)	32 (6.1)
Both	123 (19.8)	70 (13.4)
Active miners, No. (%)	23 (4.1)	49 (14.1)
Radiographic		
Large opacity category, No. (%)[h]		
A	531 (81.6)	379 (72.1)
B	104 (16.0)	123 (23.4)
C	16 (2.5)	24 (4.6)
Small opacity major category, No. (%)[i]		
1	263 (40.8)	178 (33.8)
2	298 (46.2)	215 (40.9)
3	84 (13.0)	127 (24.1)
r-Type small opacities, No. (%)[j]	206 (31.6)	183 (34.9)

[a] Valid percentages are presented that exclude missing data from the denominator for calculations. Missingness for Stone Mountain Health Black Lung Clinic includes 86 miners missing race or ethnicity, 31 missing coal mine employment and mine type, 96 missing employment status, and 1 missing small opacity profusion. Missingness for all other clinics included 14 miners missing variables for sex, 147 missing race or ethnicity, 6 missing coal mine employment, 3 missing mine type, 179 missing employment status, and 2 missing small opacity shape and size classification.

[b] The 15 federally funded Black Lung Clinics are located in 11 states: Arizona, Colorado, Illinois, Kentucky, New Mexico, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia, and Wyoming.

[c] Cases of progressive massive fibrosis (PMF) from Stone Mountain Health Services identified between February 15, 2017, and June 30, 2023.

[d] Cases of PMF from all other Health Resources and Services Administration–funded Black Lung Clinics identified between July 1, 2019, and June 30, 2023.

[e] Calculated as age at radiography.

[f] Race was self-identified as American Indian/Alaska Native, Asian, Black/African American, Native Hawaiian or Other Pacific Islander, White/Caucasian, or more than 1 race. Ethnicity was self-identified as either Hispanic/Latino or not Hispanic/Latino.

[g] Defined as miners who reported working for most of their careers in Kentucky, Virginia, or West Virginia.

[h] A case of PMF was defined as category A (1 or more large opacities >10 mm in diameter, with a combined dimension of ≤50 mm), B (1 or more large opacities having the sum of longest dimension[s] exceeding 50 mm but not exceeding the equivalent area of the right upper lung zone), or C (1 or more large opacities, which combined exceeded the equivalent area of the right upper lung zone) according to International Labour Office (ILO) guidelines.

[i] Small opacities (≤1 cm) as defined by the ILO classification guideline for interpreting chest radiographs for pneumoconiosis.

[j] Miners were classified as having r-type small opacities if either the primary or secondary shape and size of their small opacities was indicated as r-type according to the ILO radiographic classification.

category B (≥5 cm but less than the equivalent area of the right upper lung zone), or category C (size greater than category B) pneumoconiosis in a coal miner with clinic-administered radiography during February 15, 2017, to June 30, 2023 (SMHS) or July 1, 2019, to June 30, 2023 (all other clinics).[2] Cases of PMF were identified in the Black Lung Data and Resource Center database, which began data collection for SMHS in 2017 and expanded to all other clinics in 2019. We conducted chart abstraction at SMHS to ensure cases identified since February 15, 2017, were not previously reported. This study was approved by the University of Illinois Chicago institutional review board with a waiver of informed consent.

Chest radiographs were classified by a B reader, a physician certified as proficient in classifying radiographs for pneumoconiosis. Background small opacity profusion was classified using 4 categories (0, 1, 2, and 3). We recorded profusion, shape, and size of small opacities in each case and calculated proportion of radiographs with rounded opacities 3 to 10 mm (r-type) as the primary or secondary small opacity type because these are associated with crystalline silica exposure.[3] Statistical analyses were performed with SAS version 9.4.

Results | A total of 1177 coal miners met the case definition for PMF, including 651 new cases at SMHS and 526 at all other Black Lung Clinics (**Table**). Among miners with PMF, 86% (n = 1008) resided in the central Appalachian states of Kentucky, Virginia, or West Virginia. Mean (SD) age was 65 (9) years, but 70 miners were younger than 50 years and 79 reported fewer than 15 years of coal mining employment. Most miners reported working underground for all or part of their career (1069 of 1177, 91%), and most were former miners (830 of 902 [data missing for 275], 92%) at radiography.

A total of 267 miners (23%) had category B or C large opacities and 724 (62%) had small opacity profusion scores of category 2 or higher. r-Type opacities were identified in 389 miners (33%).

Discussion | Using data from Black Lung Clinics in 11 states, 1177 cases of PMF were identified in coal miners, concentrated in central Appalachia. Some of these miners had r-type small opacities, category B or C large opacities, and relatively short tenures (<15 years), indications of exceptionally severe and rapidly progressive pneumoconiosis.

Study limitations include that the burden of PMF was underestimated because it was limited to miners treated at federally funded Black Lung Clinics and included relatively few working coal miners, who are primarily served by the Coal Workers' Health Surveillance Program. Also, radiographs were classified by a single B reader. Furthermore, patient symptoms and physiologic data were not available.

The high prevalence of r-type opacities implicates silica dust exposure as a key risk factor for PMF in coal miners,[4] underscoring need for effective control of silica exposures in US coal mines. In June 2023, the Mine Safety and Health Administration proposed a rule to reduce silica exposure limit in coal mines.[5] Currently, more than 50 000 US coal miners work at nearly 1000 mines. Urgent action is needed to protect them from this preventable and debilitating disease.

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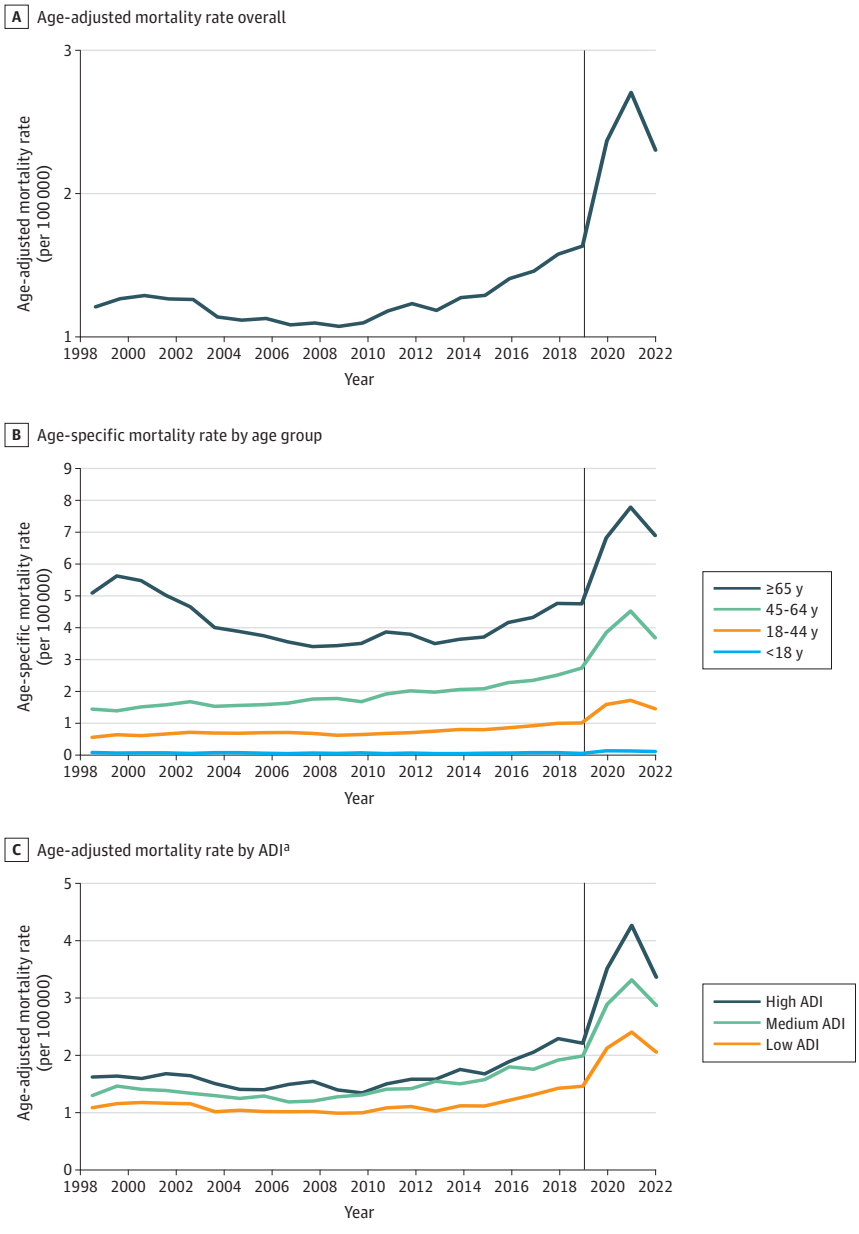
Mortality Due to Hyperglycemic Crises in the US, 1999-2022

Diabetic ketoacidosis (DKA) and hyperosmolar hyperglycemic state are 2 forms of hyperglycemic crisis presenting as acute complications of diabetes. These conditions represent a substantial source of morbidity and medical expenditure in the US, accounting for approximately 231 000 hospitalizations in 2019.[1] Prior research reported a declining mortality rate in these conditions from 1985 to 2002.[2] Given trends of worsening diabetes control and increasing diabetes-related complications beginning in the early 2010s, patterns of mortality due to hyperglycemic crises may have evolved over time.[3,4] This study analyzed trends in US mortality attributed to both DKA and hyperosmolar hyperglycemic state from 1999 to 2022.

Supplemental content

Methods | We examined CDC WONDER for multiple cause-of-death *International Statistical Classification of Diseases and*

Figure. Trends in Mortality Attributed to Hyperglycemic Crisis in the US, 1999-2022



[a] Area Deprivation Index (ADI) is a measure provided by the Neighborhood Atlas (https://www.neighborhoodatlas.medicine.wisc.edu/). Higher ADI corresponds to greater disadvantage. This resource uses 17 measures from 5-year data in the American Community Survey encompassing domains of education, employment, housing quality, and poverty. Additional detail is provided in the eMethods of Supplement 1. The vertical line at 2019 indicates the last year for which mortality data were available prior to the onset of the COVID-19 pandemic.