



Respiratory diseases, racial disparities, and residential proximity to coal power plants in Wisconsin, USA: a cross-sectional study

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Abstract

Background The burning of fossil fuels, including coal, is the primary source of greenhouse gas emissions driving anthropogenic climate change and its associated health harms: heat-related illnesses, arboviral diseases, trauma from extreme weather events, allergies, and chronic disease exacerbations. Coal-fired power plants (CFPP) supply 23% of electricity in the USA and 42% for the state of Wisconsin. Air pollution from CFPP has been associated with respiratory diseases, cancers, cardiovascular and neurological disorders, especially for vulnerable populations. In this cross-sectional study, we aim to measure associations between respiratory diseases and residential proximity to CFPP.

Methods We obtained cross-sectional, population-based health data for non-institutionalised, non-active-duty adults from the Survey of the Health of Wisconsin database from 2008 to 2013. Pulmonary function was measured by spirometry as a ratio of forced expiratory volume in one second (FEV1) to forced vital capacity (FVC). An average of three or more FEV1/FVC readings <80% was considered abnormal and indicative of an obstructive disorder. We used multivariate regression analyses to evaluate pulmonary function and distance from CFPP, controlling for sex, education, race/ethnicity, age, asthma, and total years smoking history.

Findings We included data from 2327 adults aged 21–74 years in analysis. Adults living in close proximity to one of 11 CFPP had worse pulmonary function than did adults living more than 35 km away from CFPP with an odds ratio of 1.24 (95% CI 0.90–1.70). Although not statistically significant, trends suggest higher odds of obstructive pulmonary diseases in those living within 35 km of CFPP. Protective factors, in addition to distance, were higher education and younger age. Risk factors identified were older age and having a history of smoking. Although Black residents made up 4.8% of the total sample population, they accounted for 13.3% of people living within 35 km of CFPP. Similarly, Hispanic residents accounted for 4.8% of those living within 35 km of CFPP but only made up 2.8% of the sample population.

Interpretation Wisconsin CFPP might be associated with worse pulmonary function in people living at or within 35 km of their locations, with possible consequences related to costly inhaler medications, health-care visits, and hospitalisations. When linked with socioeconomic factors, and race and ethnicity, closing down CFPP should be considered when addressing health disparities and environmental injustices. Affordable, clean energy solutions are readily available and just transitions have recently been demonstrated in North America. As nations recover from COVID-19, there is a profound opportunity for leaders across sectors to build healthier communities and prioritise climate action for health.

Funding Dr Elaine Kohler Summer Academy of Global Health Research and Wisconsin Partnership Program.

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Declaration of interests

We declare no competing interests.

Published Online
March 11, 2021

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