Pollution exposure associated with multimorbidity risk

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Air pollution in Shanghai, China. Credit: Photoholgic, Unsplash, CC0 (creativecommons.org/publicdomain/zero/1.0/)

Exposure to the air pollution known as fine particulate matter (PM2.5) is associated with an increased risk of having a cluster of multiple chronic

diseases, according to a new study published this week in the open-access journal *PLOS Global Public Health* by Kai Hu of University of St. Andrews, UK, and colleagues.

Previous studies have provided abundant evidence on the association between air pollution and individual chronic diseases. Although chronic diseases tend to cluster due to shared biological or environmental risk factors, there has been a limited understanding of how air pollution might promote the accumulation of multiple chronic diseases.

In the new study, the researchers used data on 19,098 respondents of the China Health and Retirement Longitudinal Study (CHARLS) surveys from 2011 to 2015, as well as historical satellite data on PM2.5 exposure over 15 years. Participants were people aged 45 to 85 from 125 cities across China.

When the team modeled the associations between self-reported chronic disease diagnosis and PM2.5 exposure, the data revealed four distinct groups of multimorbidity, with patients sorting into respiratory, musculoskeletal, cardio-metabolic, or healthy clusters. The analysis showed that a 1μg/m^3 increase in cumulative exposure to PM2.5 over 15 years was associated with a 2.4 percent (95% CI 1.02-1.03) increased chance of belonging to the respiratory cluster, a 1.5 percent (95% CI 1.01-1.02) increased chance of belonging to the musculoskeletal cluster, and a 3.3 percent (95% CI 1.03-1.04) increased chance of belonging to the cardio-metabolic cluster. However, the models also showed a U-shaped association, with both lower and higher PM2.5 exposure associated with increased multimorbidity. The increased multimorbidity at the low end of the spectrum may be due to differences in rural-urban living and economic development, the authors hypothesized.

The results are limited by the fact that only 4 years of health data were available, but the authors concluded that current PM2.5 levels are

harmful to human health among the majority of Chinese adults, and that for most low and middle income countries, efforts to reduce PM2.5 would likely be associated with a substantial reduction in the burden of multiple diseases.

The authors add: "Both lower and higher historical PM2.5 exposure is associated with faster multimorbidity accumulation. However, higher exposure to PM2.5 is associated with a higher risk of developing cardio-metabolic and respiratory multimorbidity (dominated by lung disease), whereas lower PM2.5 exposure is associated with a higher likelihood of musculoskeletal multimorbidity."