The air and viruses we breathe: assessing the effect the PM2.5 air pollutant has on the burden of COVID-19

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Evidence suggests an association between air pollutant exposure and worse outcomes for respiratory viral diseases, like COVID-19. However, does breathing polluted air over many years affect the susceptibility to SARS-CoV-2 infection or severity of COVID-19 disease, and how intense are these effects? As climate change intensifies, air pollutant levels may rise, which might further affect the burden of respiratory viral diseases. We assessed the effect of increasing exposure to PM2.5 (particulate matter $\leq$ 2.5 microns in diameter) on SARS-CoV-2 susceptibility or COVID-19 severity and projected the impact on infections and hospitalisations over two years. Simulations in a hypothetical, representative population show that if exposure affects severity, then hospital admissions are projected to increase by 5-10% for a one-unit exposure increase. However, if exposure affects susceptibility, then infections would increase with the potential for onward transmission and hospital admissions could increase by over 60%. Implications of this study highlight the importance of considering this potential additional health and health system burden as part of strategic planning to mitigate and respond to changing air pollution levels. It is also important to better understand at which point PM2.5 exposure affects SARS-CoV-2 infection through to COVID-19 disease progression, to enable improved protection and better support of those most vulnerable

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