WHAT IMPACT WILL WORSENING AIR POLLUTION HAVE ON THE BURDEN OF COVID-19?

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BACKGROUND

While evidence suggests association between air pollution and COVID-19 disease burden, it remains unclear whether breathing more polluted air over many years affects susceptibility to infection or only affects disease severity, with uncertainty around the intensity of these associations.

It has been estimated that anthropogenic emissions have contributed to up to 15%[1,2] of the over 753 million confirmed cases of SARS-CoV-2 and the over 6.8 million COVID-19-related deaths reported worldwide over the course of the pandemic.[3]

Moreover, as the world continues to warm, if air pollution levels increase, then so might the burden of respiratory infectious disease, including COVID-19.

METHODS

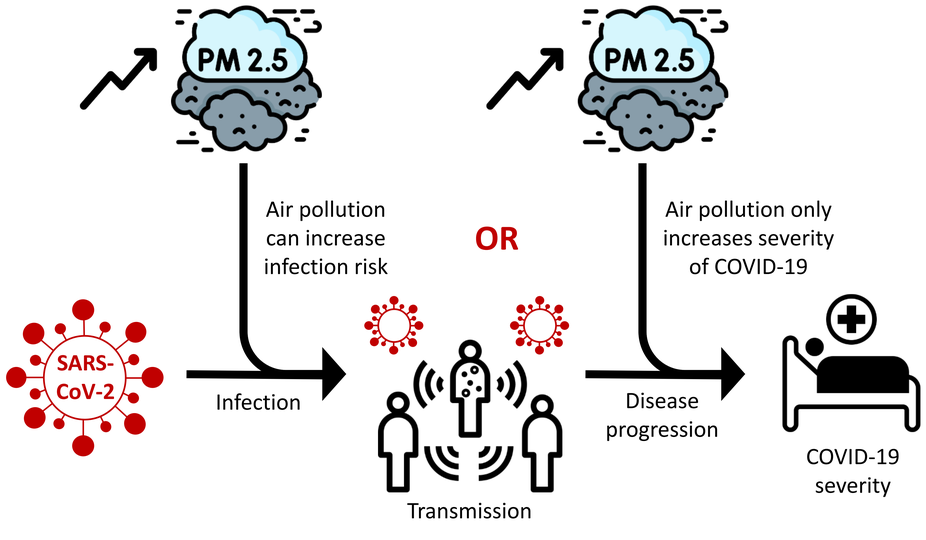
- We explore the potential impact of long-term exposure to increasing levels of particulate matter 2.5 microns or less in diameter ($PM_{2.5}$) assuming an effect on either:
  - SARS-CoV-2 susceptibility (13%[1]) or
  - COVID-19 disease severity (11%[4])

  by projecting SARS-CoV-2 infections and COVID-19-related hospital admissions over a 2-year period.
- Linear and log_{10} relationships between these associations were modelled.
- Simulations were conducted using a previously published SARS-CoV-2 transmission model[5] in a global setting capturing age and comorbidity risk, considering seasonality, emerging variants, and vaccination and treatment options.

REFERENCES

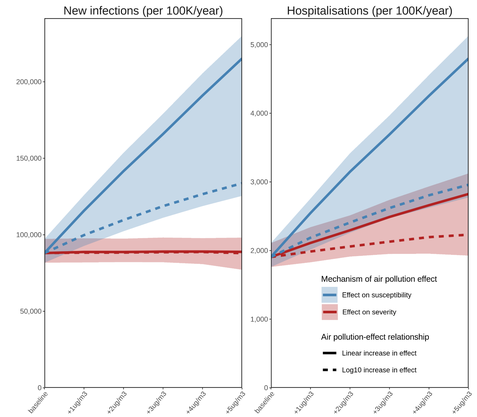
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If long-term exposure to **air pollution affects not only COVID-19 severity but also *susceptibility*** of becoming infected with SARS-CoV-2, then we will **see more hospitalisations.**



RESULTS

- We show that if long-term exposure to increasing air pollution only affects COVID-19 severity, then, as expected, the projected number of COVID-19-related hospitalisations would proportionally increase.
- However, if exposure directly affects susceptibility, then while infections would be higher, hospitalisations would also be even higher due to the potential for onward transmission.
- This aligns with associations between air pollution and other respiratory infections and their related health outcomes.[6]



CONCLUSIONS

The anticipated additional impact air pollution is having on the public health burden of respiratory infectious disease, like COVID-19, should be considered in strategic action plans to mitigate and adapt to changing air pollution levels.

It is important to better understand at which point air pollution affects SARS-CoV-2 infection acquisition through to COVID-19 disease progression, to enable improved protection and to better support those most vulnerable.

FUNDING ACKNOWLEDGEMENT

Funding for the study was provided by the Botnar Research Centre for Child Health (DZX2165) thanks to Melissa Penny.

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