Impacts of ambient air quality on acute asthma hospital admissions during the COVID-19 pandemic in Oxford City

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(on behalf of OxAria and TRANSITION Clean Air Network study teams)
Design, setting and methods

- **Study Design**
  - Retrospective time-series study
  - Jan 2015 – Dec 2020

- **Study population**
  - Adults >18 years living in Oxford City (OX1 – OX4)

- **Methodology:**
  - Poisson linear regression analysis (single and multi-pollutant models)

Oxford postcode districts OX1, OX2, OX3 and OX4.
Air quality trends (Jan 2015-Dec 2020) in Oxford City

(a)

(b)

Figure (a) Time-series (2015 – 2020) of monthly mean observed pollutant concentrations at urban background site in Oxford, (b) box plots of the daily averaged air pollutant concentrations in 2020 versus 2015 – 2019.
Effect of COVID-19 lockdown measures on air quality and asthma admissions among adults living in Oxford

Normalized time series of monthly asthma admissions and air pollutant concentrations 2015 – 2020.

Incidence rate ratio (IRR) for adult asthma admissions and air pollutant concentrations

<table>
<thead>
<tr>
<th>Pollutants</th>
<th>Single-pollutant model</th>
<th>Multi-pollutant model</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>IRR</td>
<td>95% CI</td>
</tr>
<tr>
<td>NO₂</td>
<td>1.040</td>
<td>1.009 – 1.072</td>
</tr>
<tr>
<td>PM₂.₅</td>
<td>1.029</td>
<td>1.006 – 1.053</td>
</tr>
<tr>
<td>PM₁₀</td>
<td>1.018</td>
<td>0.999 – 1.038</td>
</tr>
<tr>
<td>Temperature</td>
<td>0.980</td>
<td>0.950 – 1.020</td>
</tr>
<tr>
<td>Relative Humidity</td>
<td>1.010</td>
<td>0.990 – 1.020</td>
</tr>
</tbody>
</table>
Conclusions

- Ambient NO$_2$ and PM$_{2.5}$ air pollution was associated with an increased risk of asthma-related hospital admissions in this study setting.

- Improvements in air quality during COVID-19 lockdown periods may have contributed to a substantially reduced acute asthma disease burden.

- Large-scale measures to improve air quality have potential to protect vulnerable people living with chronic asthma in urban areas.