

# Science for Environment Policy

## Concern over health effects of air pollution linked to personal and environmental factors in seven European cities

**Subjective perception of air pollution can have important implications in terms of health-protective behaviours and citizen and stakeholder engagement in cleaner-air policies.** A recent study, conducted under the EU-funded PASTA<sup>1</sup> project, has analysed the link between level of concern over health effects of air pollution and personal and environmental factors in seven European cities. Overall, 58% of participants were worried over health effects of air pollution, with large differences between cities. On a city scale, average levels of concern over health effects of air pollution had a good correlation with average NO<sub>2</sub> levels and a lower correlation with average PM<sub>2.5</sub> levels. Individual level of concern was found to be linked to gender, having children in the household, levels of physical activity, and NO<sub>2</sub> levels at the home address. These findings can be used to inform future policymaking.

**Air pollution is a major cause of morbidity and mortality.** Globally, it is estimated to cause 6.5 million deaths each year<sup>2</sup>. The problem is especially critical in cities, as many air pollutants peak in urban areas, and rapid urbanisation means that up to 75% of Europe's population now lives in cities<sup>3</sup>. Citizen awareness of air pollution and its risks are key to mobilising resources and implementing the changes necessary to improve air quality and reduce the burden on health<sup>4</sup>. However, few studies to date have used concern over health effects of air pollution as a measure of citizen awareness and risk perception.

The PASTA researchers set out to assess whether there is an association between objective air pollution exposure and subjective concern over health effects of air pollution. Data were collected via an online questionnaire from 7 622 adults across seven European cities: Antwerp (Belgium), Barcelona (Spain), London (UK), Orebro (Sweden), Rome (Italy), Vienna (Austria), and Zurich (Switzerland). Participant levels of concern were assessed against air pollution levels at their home address, which were derived from Europe-wide NO<sub>2</sub> and PM<sub>2.5</sub> maps with high (100 m) resolution. Levels of concern were also assessed against personal characteristics, such as gender, age, education level, dependent children, access to car, and physical activity level.

The results revealed that, on average, 58% of participants were worried about the health effects of air pollution. According to the researchers, this finding is significant as it indicates a higher prevalence of concern than previous studies. However, it is important to note that there were large differences between cities (Antwerp 78%, Barcelona 81%, London 64%, Orebro 11%, Rome 72%, Vienna 43%, Zurich 33%). Individual concern was significantly linked to gender, having children at home, and physical activity level (with men, participants with children, and those with higher levels of physical activity tending to exhibit increased concern over health effects of air pollution). At the city level, mean levels of concern over health effects had a good correlation with mean NO<sub>2</sub> levels and a lower correlation with mean PM<sub>2.5</sub> levels. At the individual level, levels of NO<sub>2</sub> at a participant's home address were significantly linked to concern over health effects, while PM<sub>2.5</sub> levels were not. It is worth noting that NO<sub>2</sub> is a primary indicator of traffic pollution and concern over health effects may be associated with concern over other traffic-related problems (e.g. noise, congestion), although this possibility was not addressed in the research.

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25 October 2018  
Issue 515

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**Source:** Dons, E., Laeremans, M., Anaya-Boig, E. *et al.* (2018). Concern over health effects of air pollution is associated to NO<sub>2</sub> in seven European cities. *Air Quality, Atmosphere & Health* 11(5), 591-599.  
DOI: <https://doi.org/10.1007/s11869-018-0567-3>

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1. Physical Activity through Sustainable Transport Approaches (PASTA) was funded by the 7<sup>th</sup> Framework Programme of the European Commission. See: <http://pastaproject.eu/>

2. Cohen, A. J. *et al.* (2017). Estimates and 25-year trends of the global burden of disease attributable to ambient air pollution: an analysis of data from the Global Burden of Diseases Study 2015. *The Lancet*, 389: 1907-1918.  
[https://doi.org/10.1016/S0140-6736\(17\)30505-6](https://doi.org/10.1016/S0140-6736(17)30505-6)

3. Khreis H. *et al.* (2016). The health impacts of traffic-related exposures in urban areas: understanding real effects, underlying driving forces and co-producing future directions. *Journal of Transport & Health*, 3: 249-267.  
<https://doi.org/10.1016/j.jth.2016.07.002>

4. Landrigan P. J. *et al.* (2017). *The Lancet Commission on pollution and health.* *The Lancet*.  
[https://doi.org/10.1016/S0140-6736\(17\)32345-0](https://doi.org/10.1016/S0140-6736(17)32345-0)

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**To cite this article/service:** "Science for Environment Policy": European Commission DG Environment News Alert Service, edited by SCU, The University of the West of England, Bristol.

This multicentre study has a number of strengths. It covers seven European cities of differing size, geographical region and air-pollution levels, and includes samples of similar sizes for each city. Participants were well balanced between males and females, and air pollution was estimated in a harmonised way over country borders, using Europe-wide maps. However, since participants were recruited through workplaces, project outreach activities, and social media, and the survey was fully administered online, there may have been some selection bias.

The researchers suggest that there may be benefits to considering subjective perceptions of air pollution, in addition to objective air pollution measures. For example, subjective concern could be leveraged to improve protective behaviours (e.g. minimising exposure to air pollution through choices of travel route or decisions about residential location) and to engage stakeholders and members of the public in support of cleaner-air policies.

