

## Exposure to Air Pollution in India is Associated with More Hypertension in Women

*The CHAI project assessed the link between fine particulate matter (PM<sub>2.5</sub>) and black carbon and blood pressure in over 5,500 people living in a peri-urban area near Hyderabad city*

Barcelona, June 25, 2019-. Long-term exposure to **air pollution** has been previously associated with a **higher risk of hypertension in high-income countries**, where air pollution levels are generally lower than in low- and middle-income countries. A team led by the Barcelona Institute for Global Health (ISGlobal), an institution supported by "la Caixa", set out to study this association in **India**, a lower middle-income country where burdens of air pollution and hypertension are projected to increase. The results show that **women exposed to higher levels of air pollution at residence have a higher hypertension prevalence**.

The [study](#), performed within the framework of the [CHAI project](#) and published in the journal *Epidemiology*, studied 5,531 adults from 28 peri-urban villages near Hyderabad city, in Southern India. The researchers measured **systolic and diastolic blood pressure** of participants and estimated their annual residential exposure to **fine particulate matter (PM<sub>2.5</sub>) and black carbon**. The participants also answered a survey to determine socio-economic status, lifestyle (including physical activity levels and salt intake), and household characteristics, including the **type of cooking fuel generally used** (biomass or clean).

Notably, **all study participants were exposed to fine particulate matter levels above the 10 µg/m<sup>3</sup> limit recommended by the World Health Organisation (WHO)**. Average exposure to PM<sub>2.5</sub> in this study was 33 µg/m<sup>3</sup>. Based on the blood pressure measurements, **almost half of participants (46%) were identified as hypertensive**, with high proportions of participants with undiagnosed and untreated hypertension.

The results show that **an increase of 1µg/m<sup>3</sup> in PM<sub>2.5</sub> exposure was associated with a 4% increase in hypertension prevalence in women**, as well as a higher systolic and diastolic blood pressure –an increase of 1,4 mmHg and 0.87 mmHg, respectively–. In men, the association observed was weaker.

**“Women spend most of their time near their households in this study area – 83% of their daily time as compared to 57% for men -, which could explain why we observe a stronger association in women than in men”, explains Ariadna Curto**, first author of the study.

The research indicates that long-term exposure to particulate matter is associated with a higher prevalence of hypertension, **regardless of the type of fuel used for cooking**. “Other studies have found that women that cook with solid fuels such as biomass tend to have higher blood pressure than those using clean fuels, although our data is not powered enough to support this, our study suggests that **the effects of outdoor air pollution on cardiovascular health may be independent from those of indoor air pollution**”, she stresses. “In the light of our lack of association

with black carbon, it is important to keep in mind that this is a peri-urban area, where the sources and chemical makeup of air pollution differ to urban areas mostly dominated by traffic sources”, adds Curto.

**Cathryn Tonne**, CHAI project and study coordinator, explains that the mechanisms by which air pollution could contribute to high blood pressure “include **inflammation and oxidative stress**, which may lead to changes in arterial function.”

“Although further epidemiological evidence is needed to confirm our findings, ideally through longitudinal studies, these data suggest that **public policies aimed at reducing air pollution will greatly benefit cardiovascular health**,” concludes Tonne.

## Reference

Curto A, Wellenius GA, Milà C, Sánchez M, Ranzani O, Marshall JD, Kulkarni B, Bhogadi S, Kinra S, Tonne C Ambient Particulate Air Pollution and Blood Pressure in Peri-urban India. Epidemiology 2019; 30(4): 492-500 <https://www.ncbi.nlm.nih.gov/pubmed/31162282>

## About ISGlobal

The Barcelona Institute for Global Health, ISGlobal, is the fruit of an innovative alliance between “la Caixa” and academic and government institutions to contribute to the efforts undertaken by the international community to address the challenges in global health. ISGlobal is a consolidated hub of excellence in research that has grown out of work first started in the world of health care by the Hospital Clínic and the Parc de Salut MAR and in the academic sphere by the University of Barcelona and Pompeu Fabra University. The pivotal mechanism of its work model is the transfer of knowledge generated by scientific research to practice, a task undertaken by the institute’s Education and Policy and Global Development departments. ISGlobal a member of the CERCA programme of the Generalitat de Catalunya.

## ISGlobal’s Press Office

Pau Rubio  
[pau.rubio@isglobal.org](mailto:pau.rubio@isglobal.org)  
0034 93 214 73 33 / 0034 696 912 841

Marta Solano  
[marta.solano@isglobal.org](mailto:marta.solano@isglobal.org)  
0034 93 214 73 33 / 0034 661 451 600

---

A partnership of:

