

Air pollution in India is associated with higher risk of cardiovascular disease

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The association between ambient and household air pollution and carotid intima-media thickness (CIMT), a marker of atherosclerosis, has been explored for the first time in a population of a low-and-middle income country by a team led by the Barcelona Institute for Global Health (ISGlobal), an institution supported by "la Caixa." The study, performed in a periurban area in southern India, shows that people most exposed to fine particles have a higher CIMT index, which means they are at higher risk of developing cardiovascular diseases such as stroke or heart attack.

Previous studies indicate that inflammation and atherosclerosis are most likely responsible for the association between long-term exposure to air pollution and cardiovascular disease and mortality. Atherosclerosis is characterised by an accumulation of fat, cholesterol and other substances along the wall of the arteries, and a non-invasive way to identify it is by measuring the thickness of the innermost layers of the carotid artery (CIMT) with ultrasound. To date, studies associating CIMT with air pollution exposure were limited to [high-income countries](#) or to moderate

levels of air pollution.

Now, the CHAI project team has published a new study that explores such an association in India, a lower middle income country with high levels of air pollution. The study, published in *International Journal of Epidemiology*, was performed with 3,372 participants from a periurban region of Hyderabad, Telangana, in southern India. The research team measured CIMT and estimated exposure to air pollution using an algorithm called land use regression (LUR) frequently used to predict the amount of fine particles (suspended particles with a diameter under 2.5 μm) in high-income countries. The participants also provided information on the type of cooking fuel they used.

The results indicate that high annual exposure to ambient [fine particles](#) was associated with a higher CIMT, particularly in men, participants above 40 years of age, or those with cardiometabolic risk factors.

Sixty percent of participants used biomass cooking fuel. Otavio Ranzani, ISGlobal researcher and first author of the study, explains that "people using biomass fuel for cooking had a higher CIMT, particularly women who cooked in unventilated spaces." In addition, "women had a higher CIMT than men, which could be due to the fact that they spend more time in the kitchen, breathing air polluted by biomass fuel," he says.

Annual average exposure to PM_{2.5} was 32.7 $\mu\text{g}/\text{m}^3$, far above the maximum levels recommended by the WHO (10 $\mu\text{g}/\text{m}^3$).

Cathryn Tonne, ISGlobal researcher and coordinator of the study and of the CHAI project, says that "this study is relevant for countries which, like India, are experiencing a rapid epidemiological transition and a sharp increase in the prevalence of hypertension, diabetes and obesity. In addition, the country is affected by high levels of air pollution,

both ambient and indoors."

"Our findings highlight the need to perform more studies on air pollution in low- and middle-income countries, since the conclusions may differ considerably from studies in high income countries due to differences in population characteristics and air [pollution](#) levels and sources," adds Tonne.

More information: Otavio T Ranzani et al, Association between ambient and household air pollution with carotid intima-media thickness in peri-urban South India: CHAI-Project, *International Journal of Epidemiology* (2019). [DOI: 10.1093/ije/dyz208](#)

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