

## Air pollutants affect cardiometabolic health even at low levels, but diet may mitigate the outcomes

Exposure to air pollutants, even at very low concentrations, was associated with adverse changes in cardiometabolic risk factors in a recent Finnish study. The main pollutant affecting these risk factors was particulate matter, which can be emitted from traffic and wood burning, amongst other sources. Interestingly, diet quality appeared to modify several associations of pollutants with cardiometabolic health.

The study was carried out at the University of Eastern Finland in collaboration with the University of Oulu, as part of the EU-funded LongITools project. The results were published in *Environmental Research*.

Of all measured environmental exposures, air pollution is one of the biggest contributing factors to disease and premature death. Most of the world's population lives in regions where air pollution levels exceed the World Health Organisation's recommended limits. Furthermore, increases in fine particulate matter, even at levels below the guideline limits, have been associated with increased mortality from cardiometabolic diseases across European cities.

Diet, like air pollution, is a major risk factor for cardiovascular disease and many of the mechanisms through which diet can affect cardiometabolic health overlap with that of air pollution.

In this study, researchers carried out a secondary analysis of a randomised controlled trial that included both a weight loss and weight loss-maintenance phase that was carried out in Kuopio, Finland. The 82 participants were followed for a total of 33 weeks, and biological samples, air pollution concentrations and dietary records were obtained at four time points. Diet quality was calculated based on the Baltic Sea Diet Score, used as a measure of a healthy Nordic diet which promotes increased intake of vegetables, fruits and berries, and fish while reducing intake of meat and alcohol.

"We observed that, even at very low concentrations, air pollutants were associated with adverse cardiometabolic outcomes, with the majority of associations related to particulate matter, both smaller fine particulate matter and larger coarse particulate matter," says Doctoral Researcher Darren Healy of the University of Eastern Finland, the lead author of the study.

These associations were primarily seen with markers of insulin resistance, appetite-related hormones, and lipids (fats). Interestingly, diet quality modified several associations of air pollutants with cardiometabolic health. For example, individuals with a low-quality diet had increased levels of total cholesterol with exposure to higher levels of fine particulate matter, while individuals who consumed a high-quality diet did not.

"Even with efforts to reduce pollution levels worldwide, investigating measures that individuals could take to reduce the impact of air pollution on their cardiometabolic health is important. This study suggests that improving diet quality could provide protection against exposure to air pollutants, even with exposure to very low levels, and highlights the value of policy efforts aimed toward improving food environments and diets in addition to measures to tackle air pollution," Healy says.

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#### Research article:

Darren R. Healy, Anna Kårlund, Santtu Mikkonen, Soile Puhakka, Leila Karhunen, Marjukka Kolehmainen. Associations of low levels of air pollution with cardiometabolic outcomes and the role of diet quality in individuals with obesity, Environmental Research, Volume 242, 2024, 117637, ISSN 0013-9351, <https://doi.org/10.1016/j.envres.2023.117637>

#### Notes to Editors

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#### About LongITools

[LongITools](#) is a five-year research project, which commenced on 1<sup>st</sup> January 2020, with a total grant of €11,997,448 from Horizon 2020. It is also one of nine projects in the [European Human Exposome Network](#) studying the impact of lifetime environmental exposure on health. To keep up to date with the project's progress please follow @longitools on X or LongITools on LinkedIn.

#### Partners:

- University of Oulu, Finland (Project Coordinator);
- Ab.Acus, Italy;
- Academic Medical Center, Netherlands;
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- University of Bristol, UK;
- University of Eastern Finland, Finland;
- University of Oslo, Norway;
- University of Rome Tor Vergata, Italy;
- University of Surrey, UK;
- University of Utrecht, Netherlands.



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 874739.

#### About Horizon 2020

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