

Science for Environment Policy

Long-term exposure to air pollution associated with an increased risk of type-2 diabetes

Long-term exposure to air pollution may increase the risk of developing type-2 diabetes, a Swiss study has found. The results also suggest that the association between type-2 diabetes and air pollution occurs at concentrations below World Health Organization (WHO) air quality guidelines.

Air pollution has been linked with high blood pressure as well as heart and respiratory disease. Heart disease and type-2 diabetes have many risk factors in common and previous laboratory studies have found a link between blood vessel inflammation, which can be caused by air pollution, and type-2 diabetes.

For this study, part of the EU [SAPALDIA project](#)¹, the researchers examined whether there was a relationship between air pollution and type-2 diabetes. They used data on 6392 people aged 29 to 73 years who were already part of a larger, on-going study looking at the effects of air pollution on heart and lung diseases in Switzerland.

The researchers used information from interviews with the participants from a survey conducted in 2002. They looked at the participants' lifestyles, and the state of their health, such as whether they had been diagnosed with diabetes, high blood pressure or respiratory problems. They also looked at the results of blood tests, taken at the time, to confirm whether a participant had diabetes. Of the 6392 participants, 315 (5.5%) had type-2 diabetes. Diabetics were older, more overweight, more likely to have high blood pressure, smoked more, and were less well-educated than non-diabetics. The researchers also estimated the participants' exposure to road traffic and rail noise at their home address, as noise has previously been associated with type-2 diabetes.

To estimate long-term exposure to outdoor air pollution at each participant's home address, the researchers used data from monitoring sites to model levels of PM₁₀ (particulate matter up to 10 micrometres in size) representing general outdoor pollution and nitrogen dioxide (NO₂) representing traffic-related pollution, for the one-to-ten year period prior to the 2002 survey.

The average PM₁₀ exposure of the participants was 22.3 µg/m³ (micrograms per cubic metre), compared with WHO guidelines of 20 µg/m³. The researchers found that air pollution was positively correlated with type-2 diabetes, even when traffic-related noise exposure, health, lifestyle factors and socioeconomic status were taken into account. Importantly, for PM₁₀ this association was found to be true even at concentrations below WHO air quality guidelines.

The researchers found that, after adjusting for other factors that could affect diabetes risk, for each 10 µg/m³ increase in PM₁₀, there was a 40 % increase in the prevalence of diabetes; and for each 10 µg/m³ increase in NO₂, there was a 19% increase in the prevalence of diabetes.

Although this study was unable to include a participant's exposure to air pollution at work or away from home, the results add to evidence that long-term exposure to air pollution may cause type-2 diabetes.



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1.SAPALDIA (Swiss Study on Air Pollution and Lung Disease in Adults) cohort study, supported by the European Commission. See <http://www.sapaldia.ch/en/>