

Science for Environment Policy

PM_{2.5} air pollution strongly linked to increased risk of heart attacks

Long-term exposure to particulate matter pollution is strongly linked with heart attacks and angina, a new European study of over 100 000 people has shown. The results indicate that this association exists at levels below current European limits, and that the burden of disease due to particulate matter may have been largely underestimated.

In 2008, the EU adopted a new [Air Quality Directive](#) which merged existing legislation into a single directive. In response to evidence linking long-term exposure to particulate pollution with increased mortality, it included new concentration limits for PM_{2.5} (particulate matter with a diameter of less than 2.5 micrometres) of 25 micrograms per cubic metre ($\mu\text{g}/\text{m}^3$). These are to be met everywhere in the EU as from 1 January 2015.

Particulate [air pollution](#) is estimated by the World Health Organisation (WHO) to cause more than 3 million deaths per year worldwide. However, estimates of its effects on [public health](#) have been primarily based on data from North America.

In order to complement previous studies, the EU-funded ESCAPE project¹ was set up to study air pollution's impacts on human health in Europe specifically. The researchers used data from several European studies to investigate the effects of long-term exposure to PM_{2.5} pollution on acute coronary events, such as heart attacks and angina.

The data were collected from 100 000 people across five European countries (Denmark, Finland, Germany, Italy and Sweden), following each person for an average of 11.5 years. The study accounted and adjusted for a number of known risk factors for acute coronary events, such as smoking, existing illness and socioeconomic factors. Estimates of air pollution concentrations at participants' home addresses were calculated using mathematical models based on measurements taken over the course of a year.

The model results indicated that individuals were exposed to average annual concentrations of PM_{2.5} ranging from 7.3 $\mu\text{g}/\text{m}^3$ in Sweden to 31.0 $\mu\text{g}/\text{m}^3$ in Italy. The risk of coronary events was raised by 13% for each 5 $\mu\text{g}/\text{m}^3$ increase in annual PM_{2.5} concentration. During the study period, a total of 5 157 participants (around 5%) experienced acute coronary events.

Even at concentrations below existing EU limits, PM_{2.5} increased the risk of acute coronary events. This suggests that particulate matter pollution is a greater risk to health than previously thought. The study's authors conclude that these results, taken together with other findings from the ESCAPE project, present a strong case for further revising EU PM_{2.5} limits. This can better protect public health say the researchers, and point to the stricter WHO recommended limit for PM_{2.5} of 10 $\mu\text{g}/\text{m}^3$.

The authors also highlight the fact that previous studies mainly considered only mortality. This study, however, included non-fatal measures of coronary disease giving a clearer picture of the overall burden of disease due to particulate matter in Europe.



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