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Long-term exposure to ambient ozone and lung function decline over 20 years in a prospective cohort of adults: The ECRHS study

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Little is known whether long-term exposure to ozone has detrimental effects on lung function in adults. We explored the association between long-term exposure to ozone and decline in lung function over 20 years in 3014 adults from 17 centres in nine countries participating in the population-based, European Community Respiratory Health Survey.

Forced expiratory volume in 1 second (FEV1) and forced vital capacity (FVC) were measured by spirometry when participants were 35 (1990-1994), 44 (1999-2003), and 55 (2010-2014) years old. Annual mean of daily maximum running 8-hour average ozone concentrations were assigned to participants' residential addresses at the time of each lung function measurement. Association between lung function change and ozone concentration was analysed by adjusted linear mixed effects regression models adjusting for co-pollutants and greenness.

An (interquartile range) increase of 7 $\mu\text{g}/\text{m}^3$ annual concentration of ozone was associated with a faster decline in FEV1 -2.08 mL/year (95% confidence interval (-2.79, -1.36)) and FVC -2.86 mL/year (95% CI (-3.73, -1.99)). These associations were robust across different models, including adjustments for co-exposure to PM2.5, NO2, and greenness. These associations were more pronounced in residents of northern Europe, those with better education backgrounds or of advanced age. There were no consistent associations with the FEV1/FVC ratio.

Exposure to elevated ambient ozone concentrations was associated with a faster decline of spirometric lung function over 20 years in middle-aged European adults.