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## Long-Term exposure to NO<sub>2</sub> and Stroke Mortality in Portugal: an ecological study from 2001 to 2021

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**Background:** Air pollution is an important contributing factor for many pathologies, including stroke. Nitrogen dioxide (NO<sub>2</sub>), an air pollutant, has been associated in multiple studies with strokes' mortality.

**Aim:** This study aims, for the first time, to estimate the number of deaths by stroke due to long-term, ambient exposure to nitrogen dioxide in Portugal for the years 2001-2021.

**Methods:** An ecological study was considered, including data for NO<sub>2</sub> outdoor concentration from Portugal. Mortality data by stroke was obtained divided in 5-year groups. It was also obtained life expectancy for each year to calculate the years of life lost (YLL). The hazard ratio (HR) was obtained from literature (1.009, CI 1.003-1.016). The population attributable fraction (PAF) of YLL by stroke due to ambient NO<sub>2</sub> long-term exposure was calculated.

**Results:** The annual average NO<sub>2</sub> concentration in Portugal decreased from its peak in 2001 of 29.4 to 12.2 µg/m<sup>3</sup> in 2021. The YLL by stroke decreased from an estimated 57452 to 31204 from 2001 to 2021. The PAF of YLL by stroke due to ambient NO<sub>2</sub> long-term exposure reached its peak in 2001, when an estimated 5.2% of all the YLL by stroke, corresponding to 3029 YLL, were due to NO<sub>2</sub> exposure and a bottom in 2021, when 2.2%, corresponding to 682 YLL, were due NO<sub>2</sub> exposure.

**Conclusions:** The policies and legislation implemented to curb down NO<sub>2</sub> seem to have had an effect in Portugal. A reduction in NO<sub>2</sub> emissions was achieved, having a significant impact on YLL by stroke in Portugal, suggesting that curbing the NO<sub>2</sub> emissions down had a positive effect on mortality by stroke in Portugal. To further enhance our knowledge on the real impacts of NO<sub>2</sub>, further studies must be conducted to estimate the morbidity associated with NO<sub>2</sub> on stroke as well as in other diseases.

**Key messages:**

- Pollution by nitrogen dioxide decreased significantly from 2001 to 2021.
- Around 20000 years of life were lost just in Portugal due to nitrogen dioxide between 2001 and 2021.