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The burden of lung cancer attributable to ambient PM2.5 exposure: a systematic literature review

Mariana Corda

M Corda^{1,2}, M Clemente³, J Oliveira¹, J Morgado³, H Redondo⁴,
P Charalampous^{5,6}, JA Haagsma⁶, S Pires⁴, C Martins^{2,3}, R Assunção¹

¹CiiEM, Egas Moniz School of Health and Science, Monte de Caparica, Almada, Portugal

²Comprehensive Health Research Center, NOVA National School of Public Health, NOVA University Lisbon, Lisbon, Portugal

³NOVA National School of Public Health, NOVA University Lisbon, Lisbon, Portugal

⁴Risk Benefit Research Group, National Food Institute, Technical University of Denmark, Lyngby, Denmark

⁵Institute of Health and Society, Université Catholique de Louvain, Brussels, Belgium

⁶Department of Public Health, Erasmus MC, University Medical Center Rotterdam, Rotterdam, Netherlands

Contact: mcorda@egasmoniz.edu.pt

Background: Lung cancer is recognized as one of the most common causes of cancer morbidity and mortality worldwide and is the second cause of death with highest years of life lost in highly developed regions. Ambient exposure to particulate matter (PM2.5) is the leading global environmental risk factor. Long-term exposure to PM2.5 is associated with several health outcomes, including lung cancer, ischemic heart disease, and chronic obstructive pulmonary disease.

Aim: To review and estimate the impact attributable to PM2.5 exposure due to lung cancer.

Methods: A systematic review and a meta-analysis were conducted to determine whether long-term exposure to PM2.5 increases the risk of lung cancer and to derive exposure-response relationships between PM2.5 and lung cancer. The literature search was performed in databases (i.e., Pubmed/Scopus) and studies published from January 1, 2010 onwards were considered. Studies describing the association between long-term exposure to the pollutant under research and the incidence, prevalence, and mortality of lung cancer, considering a relative measure of association were included, with no restriction in geographical area.

Results: In the literature review, 2215 articles were considered for the first step of data synthesis, all articles were screened, considering the screening of titles (first step), abstracts (second step) and full-text (third step) considering the inclusion criteria. In a second step the data was extracted from the included articles (n = 129) and considering the variables related to the characteristics of the study and the study population, exposure, and outcome measurement, and details of risk of bias assessment.

Conclusions: These findings provide data to synthesize effect size estimates using a Meta-Regression - Bayesian, Ensemble, Regularized, Trimmed (MR-BRT) model, important to provide evidence data on the impact of air pollution on human health, which is crucial for decision-making.

Key messages:

- Long-term exposure to PM2.5 increases lung cancer risk so the estimating of the impact of the exposure is an urgent need to provide evidence-based data for air quality improvement.
- Meta-analysis aims to establish a relation between PM2.5 exposure and the burden of lung cancer.