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Scoping Review of Ambient Particulate Matter Exposure and Chronic Kidney Disease

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Objectives: This study aims to uncover research gaps and seek to highlight specific circumstances of the relationships between ambient particulate matter and CKD risk.

Methods:

This study employed a scoping approach based on Arksey and O'Malley's framework to provide a comprehensive overview of current knowledge about the interplay between air pollutants and CKD risk. The initial search focused on MEDLINE/PubMed to obtain a general overview of the required material. This was followed by a search on citation internet databases such as Environmental Science Index, Scopus, Web of Science, and CINAHL.

Results: There were 29 final inclusion papers among 7,469 relevant research papers on CKD and long-term exposure to air particle matter, including 27 online publications and 2 grey literature works. Almost half of the included papers were cross-sectional (40%). There are certain common aspects shared by all of the studies. In general, compared to heart or lung disease, we find that evaluations of environmental determinants of health in air pollution related to CKD are much more limited in published reports. PM2.5 has been examined the most and revealed that it is linked to CKD's aetiology and progression. However, there are varying levels of risk associated with different sources, geographic heterogeneity, and other factors impacting the magnitude of PM2.5.

Conclusions: Previous research highlights a strong pattern of the potential impact of ambient fine particulate matter in CKD risk, especially PM2.5. At the same time, there are no explicit models of the mechanistic effect governing the complex relations between environmental factors and CKD health. There is a pressing need to investigate this relation and develop predictive models that may be retroactively trained used prospectively. Real time forecasts of the environmental and CKD health relationship may offer unique insights into the biological and mechanistic effects underpinning nephrological disturbances.