Urban Air Quality and Its Health Implications: A Multi-Perspective Literature Review

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Abstract

Urban air quality is a critical environmental and public health issue, particularly in rapidly developing cities. This literature review synthesizes findings from five peer-reviewed studies selected through a structured search in databases such as Scopus and ScienceDirect, using keywords like *urban aerosol*, *UHI*, *air pollution*, and *health impacts*. Inclusion criteria focused on studies from 2015–2023 examining the interrelationship between the Urban Heat Island (UHI) phenomenon, meteorological variables, and air quality in urban settings. Quality appraisal followed the PRISMA guidelines.Using a qualitative synthesis method, the review compares evidence from Jakarta, Kuala Lumpur, Yogyakarta, and global contexts. The findings reveal that UHI contributes to higher surface temperatures and atmospheric stability, intensifying $PM_{2.5}$, NO_2, and O_3 concentrations. Meteorological factors such as humidity, wind speed, and atmospheric pressure significantly influence pollutant dispersion. Heterogeneity among studies—measured in terms of geographic scope, pollutant focus, and methodological approach—is presented in a structured comparative table.Respiratory diseases such as asthma and acute infections are more prevalent in high-density areas with poor air quality. The COVID-19 lockdown offered a natural experiment showing how reduced human activity improves air quality. Predictive modeling, particularly with artificial neural networks (ANN), achieved forecasting accuracies up to 88.86%.The review concludes with evidence-based recommendations for urban planners and public health authorities: enhance green infrastructure, promote public transport to reduce emissions, and adopt AI-powered forecasting tools to anticipate air pollution spikes. These strategies support Sustainable Development Goals (SDG) 11 and 13, fostering resilient and climate-adaptive cities.

Keywords: Urban aerosol; Urban heat island; Air Quality; Air pollution; Environtmental health