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An Integrated Agent-Based Framework for Assessing Air Pollution Impacts

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ABSTRACT

Air pollution has considerable impact on human health and the wellbeing. Thus many regions of the world have established air pollution standards to ensure a minimum level of air quality. Precise assessment of the health and socio-economic impacts of air pollution is, however, a complex task; indeed, methods based within an epidemiological tradition generally underestimate human risk of exposure to polluted air. In this study, we introduce an agent-based modeling approach to ascertaining the impact of changes in particulate matter (PM₁₀) on mortality and frequency of hospital visits in the greater metropolitan region of Sydney, Australia. Our modeling approach simulates human movement and behavioral patterns in order to obtain an accurate estimate of individual exposure to a pollutant. Results of our analysis indicate that a 50% reduction in PM₁₀ levels (relative to the baseline) could considerably lower mortality, respiratory hospital admissions and emergency room visits leading to reduced pressure on health care sector costs and placing lower stress on emergency medical facilities. Our analysis also highlights the continued need to avoid significant increases in air pollution in Sydney so that associated health impacts, including health care costs, do not increase.

KEYWORDS

Agent-Based Models; Air Quality; Air Pollution

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