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# A Methodology for Assessing the Association between Ambient PM2.5 Concentrations and Paediatric Acute Respiratory Infection Admissions in Abidjan, Côte d'Ivoire

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## Abstract

Acute respiratory infections (ARIs) are a leading cause of paediatric hospitalisation in sub-Saharan Africa. In Abidjan, Côte d'Ivoire, rapid urbanisation contributes to ambient air pollution, but the specific impact of fine particulate matter (PM2.5) on young children's health remains inadequately quantified. This methodology article details a protocol for assessing the correlation between daily ambient PM2.5 concentrations and hospital admissions for ARIs in children under five years in Abidjan. The objective is to provide a reproducible analytical framework for similar urban settings with limited data resources. The design is an ecological time-series analysis. Paediatric ARI admission data will be sourced from major public hospitals. Modelled gridded PM2.5 concentration data will be spatially matched to hospital catchment areas. The core statistical analysis employs a generalised additive model with a Poisson link function, controlling for long-term temporal trends, day of the week, and meteorological variables such as temperature and humidity. Sensitivity analyses are incorporated to assess model robustness. As a methodology paper, it presents no empirical results. The proposed analytical output will quantify the relative risk of paediatric ARI admission per specified increment in PM2.5 concentration, illustrating the direction and strength of any association. The described methodology provides a rigorous and adaptable framework for investigating air pollution-health relationships in data-scarce environments. Its application can generate crucial local evidence on the paediatric health burden attributable to PM2.5 in Abidjan. Researchers in similar contexts should adopt and adapt this methodology, prioritising high-quality data linkage and appropriate control for confounders. Resultant findings should be communicated to urban planners and public health authorities to inform targeted air quality interventions. methodology, particulate matter, PM2.5, acute respiratory infections, paediatrics, time-series analysis, Abidjan, Côte d'Ivoire. This work provides a structured methodological protocol for environmental epidemiology in a low-resource, high-exposure urban African setting, aiming to standardise approaches for generating local evidence on air pollution impacts.

**Keywords:** *Time-series analysis, Paediatric epidemiology, Particulate matter, Sub-Saharan Africa, Acute respiratory infections, Environmental exposure, Hospital admissions*

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