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A Mixed Methods Study of Roadway Proximity and Childhood Asthma Exacerbations in the Industrial Zone of Durban, South Africa

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Abstract

The industrial zone of Durban, South Africa, has high levels of air pollution. Traffic-related air pollution is a suspected risk factor for childhood asthma, but integrated evidence from this specific setting is limited. This study investigated the association between residential proximity to major roadways and the frequency and severity of asthma exacerbations in children attending primary schools within Durban's industrial zone. A concurrent mixed methods design was employed. The quantitative component comprised a cross-sectional analysis of school health records and a spatial analysis of residential addresses relative to major roads. The qualitative component involved semi-structured interviews with caregivers and school health personnel to explore lived experiences and management practices. Quantitatively, children living within 200 metres of a major roadway had a 40% higher reported incidence of severe asthma exacerbations requiring medical intervention compared to those living further away. Qualitatively, caregivers described increased symptom severity, notably nocturnal coughing and wheezing, which they frequently linked to heavy traffic and visible air pollution. Proximity to major roadways is associated with an increased risk of severe asthma exacerbations in children within this industrial setting. Qualitative data illustrate the perceived burden on families. Urban planning should consider implementing buffer zones between major roads and residential areas or schools. Public health initiatives should include targeted asthma management programmes for high-risk communities and enhanced air quality monitoring. childhood asthma, traffic-related air pollution, environmental health, mixed methods, South Africa, industrial pollution, public health This study provides integrated, context-specific evidence linking roadway proximity to asthma outcomes in a high-risk African industrial setting, supporting the need for locally relevant environmental health policies.

Keywords: *Childhood asthma, Traffic-related air pollution, Roadway proximity, South Africa, Mixed methods research, Environmental epidemiology, Asthma exacerbation*

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