

THE IMPACT OF AIR POLLUTION ON HUMAN HEALTH IN THE THREE AIR POLLUTION PRIORITY AREAS IN SOUTH AFRICA

Prepared by Chantelle Howlett-Downing and Caradee Y Wright

Executive Summary

This policy brief synthesises key findings from the South African Medical Research Council's multi-site epidemiological study, supported by the Clean Air Fund. It highlights the urgent health risks of air pollution in South Africa's Priority Areas (Highveld, Vaal Triangle, and Waterberg-Bojanala) and outlines actionable recommendations for policy and practice.

Key Highlights

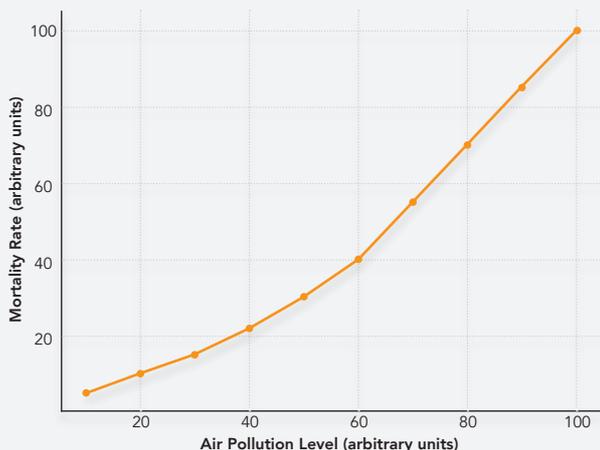
- Children are the most vulnerable to air pollution impacts.
- Industrial emissions are the primary drivers of PM_{2.5}, NO₂, and SO₂ hotspots.
- Winter months present the highest pollution-related health risks.
- Strong evidence links air pollution to tuberculosis (TB) and pneumonia.
- Effective policy action can reduce premature deaths and health inequities.

Background and Context

Ambient air pollution is a leading environmental health risk globally. In South Africa, the designated Priority Areas, Highveld, Vaal Triangle, and Waterberg-Bojanala, consistently exceed national air quality standards. These regions combine high industrial activity with vulnerable populations, making the health impacts especially severe.

Key Findings

- PM_{2.5} and NO₂ exposure are consistently associated with increased mortality and morbidity, especially from respiratory diseases and TB.
- A 10 µg/m³ increase in PM_{2.5} corresponds to a 14–19% higher mortality risk.



- NO₂ is strongly linked to pneumonia and respiratory deaths.
- SO₂ and O₃ are associated with seasonal and district-specific health risks, particularly in winter months.
- Children, youth, and older adults remain the most vulnerable groups.

Policy Implications

The evidence underscores the urgent need for stricter enforcement of air quality standards, expanded monitoring, and integration of air pollution considerations into health and energy policy. Wintertime peaks highlight the importance of addressing household fuel use, while health risks linked to TB and pneumonia demand alignment with broader health system preparedness.

Recommendations

- Strengthening enforcement of National Ambient Air Quality Standards in Priority Areas.
- Expand air quality monitoring networks and improve public data transparency.
- Invest in cleaner energy alternatives and household energy transitions.
- Establish early warning systems for severe air pollution episodes.
- Integrate pollution reduction into health system preparedness for TB and respiratory diseases.
- Conduct regular health impact assessments to inform adaptive policymaking.

Limitations and Data Gaps

Persistent data gaps in monitoring and health surveillance present challenges. Meteorological data were not consistently available, potentially affecting seasonal analyses. Despite these limitations, robust triangulation across multiple models and regions provides reliable findings.

Conclusions

Air pollution in South Africa's Priority Areas poses a significant but preventable health risk. Coordinated action across environmental, health, and energy sectors can reduce premature deaths, improve health equity, and align national development with climate and sustainability goals.

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