The State of Air Quality Issues in Sub-Saharan Africa: A Systematic Review

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Abstract

Air pollution poses a critical but under-characterized health threat in Sub-Saharan Africa (SSA), where rapid urbanization intensifies exposure risks despite limited systematic research evaluation.

We systematically reviewed air quality studies across SSA (2010-2024) using PubMed, Scopus, Google Scholar, and CrossRef databases. Search terms included "Air Pollution" OR "Air Quality" AND "Sub-Saharan Africa." From 206 identified studies, 20 met inclusion criteria. Research was geographically concentrated in Ghana, South Africa, Nigeria, Ethiopia, and Tanzania, leaving vast SSA regions underrepresented. Health-focused studies dominated, particularly respiratory and cardiovascular outcomes. Monitoring increasingly utilized low-cost sensors and satellite data, though calibration and long-term coverage challenges persisted. Limited long-term health data, insufficient household exposure research, weak monitoring infrastructure, and lack of effective policy interventions constrain progress.

Air quality research in SSA is growing but remains fragmented and geographically imbalanced. Strengthening monitoring networks, expanding household pollution research, and fostering international collaborations are essential for evidence-based policy development and sustainable environmental management.

Introduction

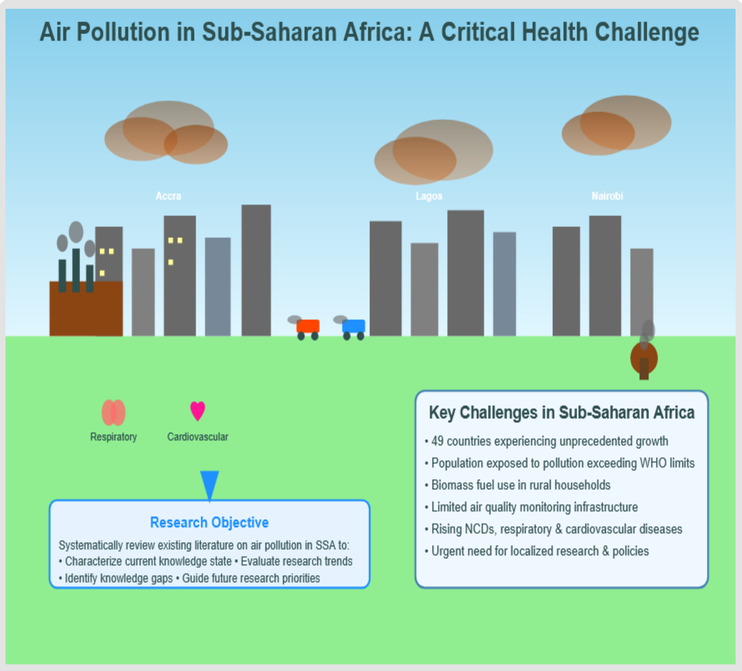


Figure 1: Air Pollution Sources and Health Impacts Across Sub-Saharan Africa"

Methodology

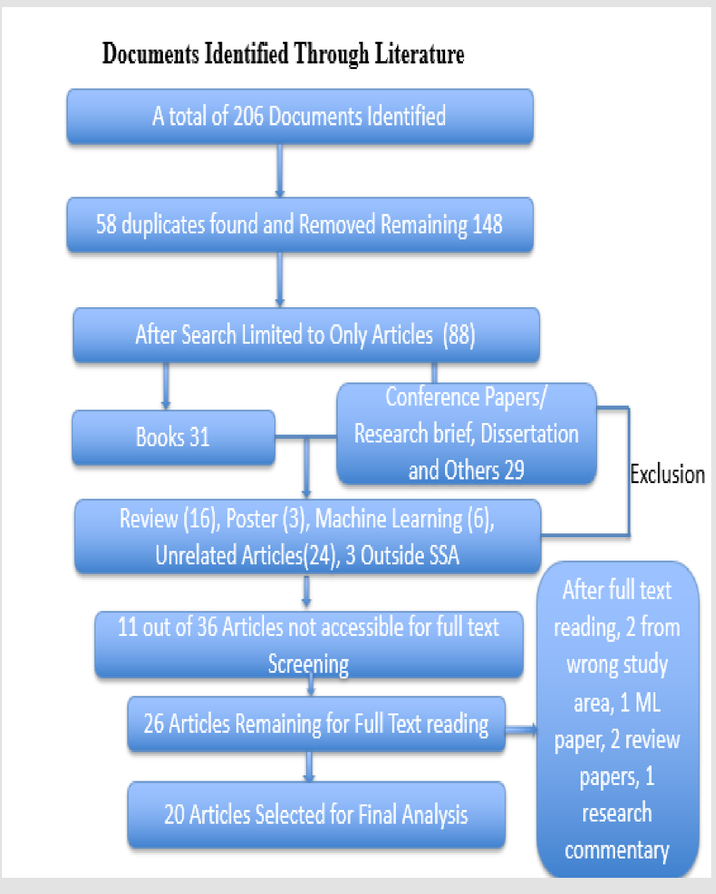


Figure 3: *Description of the primary literature search process Using PRISMA Framework*

Results

Geographic/Regional distribution.

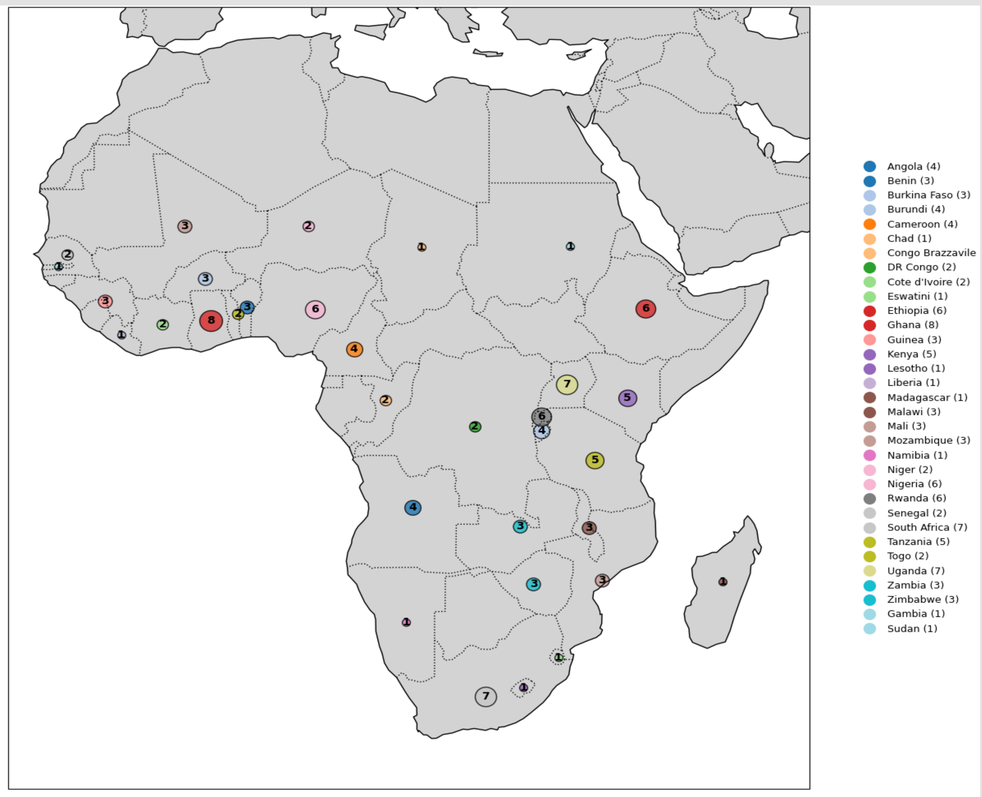


Figure 3: Geographic Distribution of Papers.

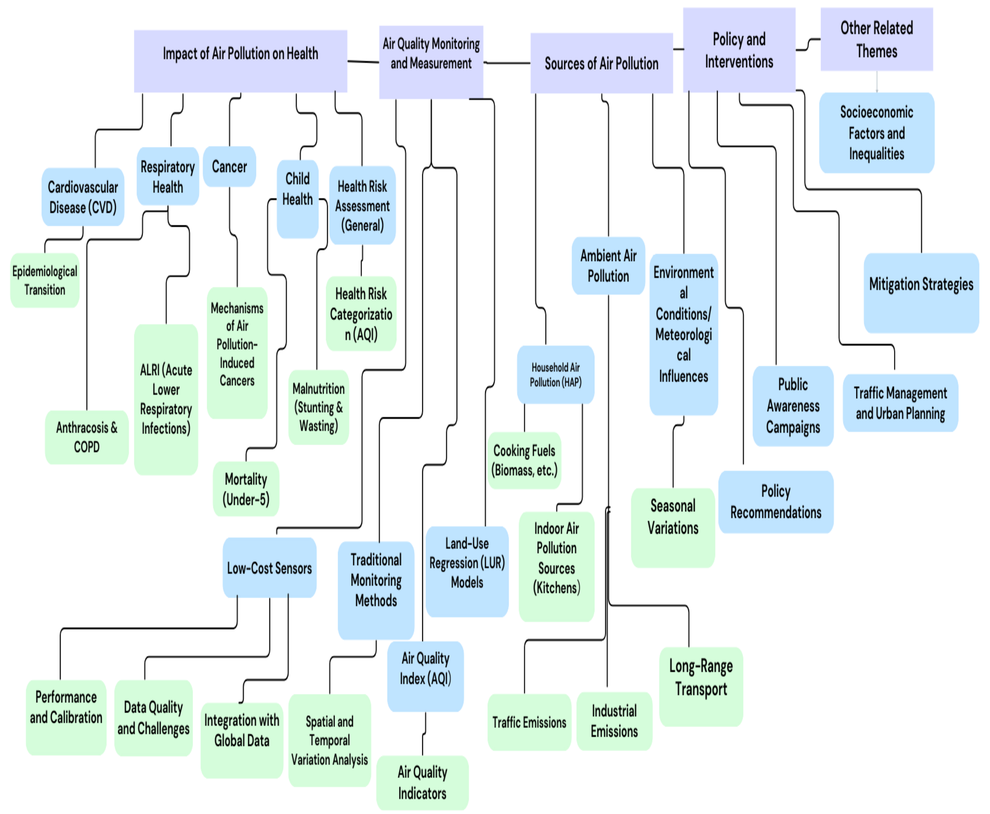
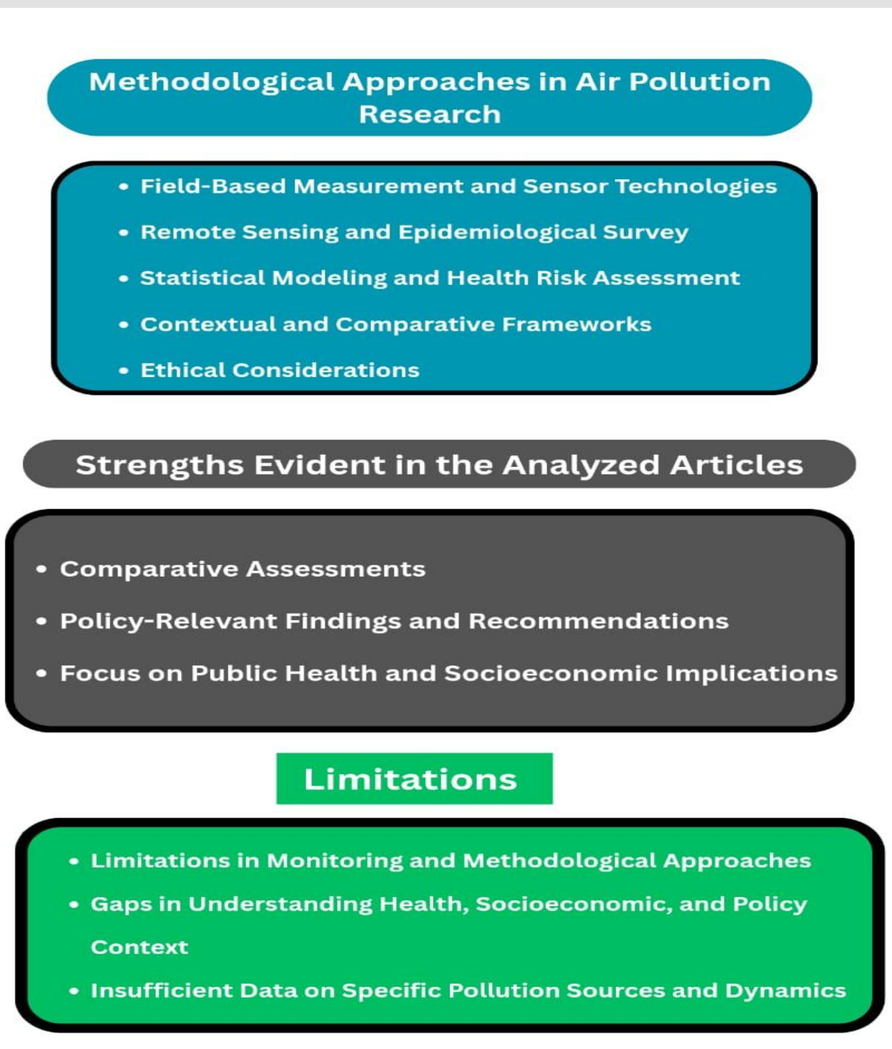


Figure 4: Hierarchical Representation of the thematic analysis



Conclusion

- All pollution is a major environmental and public health challenge in Sub-Saharan Africa (SSA).
- Research and monitoring remain **limited and unevenly distributed**, with most studies centered in Ghana , Soth Africa, Nigeria and Ethiopia.
- Indoor air pollution from household biomass use is underexplored compared to outdoor pollution.
- Advances in low-cost sensors and remote sensing improve monitoring, but **data gaps** and standardization challenge persist.
- Tracking air pollution in SSA requires multidisciplinary, region-specific, and collaborative approach, combining science, policy, health, and community action.

Recommendations

- Strengthen air quality monitoring by expanding reliable stations, improving low-cost sensor calibration, and addressing rural data gaps.
- Advance on long term health impacts, with emphasis on respiratory, cardiovascular, and child health outcomes.
- Develop and enforce policies that aligns with WHO standards, targeting emissions from industry, transport, and household energy use.
- Promote clean energy alternatives such as LPG, solar, and improved cookstoves through subsidies and public-private partnership.
- Increase community awareness and participation via education campaigns and support for sustainable practices.
- Enhance regional and international collaboration through cross-border research, data sharing, and partnerships for funding and technical expertise.

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