QUICK GUIDE

Assessing Air Pollution and Health Impacts in South Africa for Environmental Health Professionals

Background: What is Air Pollution?

Air pollution refers to the presence of harmful substances in the air we breathe. These include gases (like nitrogen dioxide, ozone, carbon monoxide), particulate matter (PM_{10} and $PM_{2.5}$), and volatile organic compounds (VOCs), which originate from vehicles, industry, burning of waste, household fuel use, and natural sources like dust and veld fires.

Health Impacts of Air Pollution:

Exposure to air pollutants, even at low concentrations, is associated with a wide range of short- and long-term health effects:

- Respiratory diseases (asthma, bronchitis, lung infections)
- Cardiovascular conditions (stroke, heart disease)
- Cancers (especially lung cancer)
- Developmental and birth outcomes
- Premature mortality

Young children, the elderly, and people with pre-existing health conditions are particularly vulnerable.

South African Policy & Response:

South Africa has made notable policy strides:

- National Environmental Management:
  Air Quality Act (2004): Establishes a framework for air quality management
- National Ambient Air Quality Standards (NAAQS):
  Sets legally binding thresholds for pollutants like PM_{10}, $PM_{2.5}$, NO_2, SO_2, CO, and O_3
- Air Quality Management Plans (AQMPs):
  Required for metros and district municipalities
- Designation of Priority Areas (e.g., Vaal Triangle, Highveld):
  Targets emission reductions in high-risk zones
- Domestic fuel burning interventions, air quality licensing, and emissions inventories are also supported

Despite these efforts, implementation gaps and enforcement challenges remain, and air pollution continues to pose a public health burden.

How to Assess Air Pollution and Health Impacts: A Practical Guide

Step 1: Use Monitored Air Quality Data

- What to collect:
  Hourly/daily $PM_{2.5}$, PM_{10}, NO_2, SO_2, O_3, CO levels from government monitoring stations (available on the South African Air Quality Information System – SAAQIS)
- What to compare against:
  - National Ambient Air Quality Standards for legal compliance
  - WHO Air Quality Guidelines (2021) for health-protective benchmarks
- Tip: Note patterns over time (e.g., seasonal peaks), spatial differences, and exceedances

Step 2: Review Available Health Data

- What to use:
  Clinic and hospital records, district health information (e.g., DHIS2), mortality data from Stats SA, burden of disease studies
- Focus on:
  - Asthma, chronic bronchitis, pneumonia
  - Cardiovascular diseases
  - Low birth weight or infant mortality
- Tip: Note patterns over time (e.g., seasonal peaks), and spatial differences

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Step 3: Analyse Air Quality Complaints

- Sources:
  Municipal complaint logs, environmental hotlines, community forums
- What to look for:
  Common sources (burning, dust, odours), frequency, affected areas, and community concerns
- Tip: High complaint volumes can indicate chronic exposure or public distress

Step 4 Understand Local Fuel Use Patterns

- What to collect:
  - Household surveys (e.g., Census, Community Surveys)
  - Energy profiles from municipalities or Stats SA
- Focus on:
  Use of wood, coal, paraffin, waste burning in homes or informally
- Tip: Fuel type and usage indoors is a major contributor to household air pollution

Putting It All Together:

Use a multi-indicator approach to map local air pollution exposure and health risk:

Indicator	Source	Interpretation
$PM_{2.5}$/PM_{10} levels	SAAQIS	Exceedance = risk to health
Health conditions	DHIS2, hospitals	Look for spatial/seasonal patterns
Complaints	Municipal logs	Identify pollution hotspots
Fuel use	Surveys, local data	Target for interventions

Key Considerations for Environmental Health Practitioners:

- Engage communities when interpreting complaints and fuel use
- Use WHO guidelines as aspirational targets even when national standards are met
- Prioritise interventions in vulnerable communities (children, informal settlements)
- Support clean energy transitions through education and local advocacy

For More Information:

- South African Air Quality Information System (SAAQIS): https://saaqis.environment.gov.za
- WHO Air Quality Guidelines (2021): https://www.who.int/publications/i/item/9789240034228
- National Framework for Air Quality Management (2023 update)

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