

**Quick**

# Best Practices Guide

to consider

## Air-related Human Health

in your Area

For South African Air Quality Officers and Environmental Health Practitioners



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## BACKGROUND

- » South Africa has new air quality legislation since 2005
- » Includes new National Standards for monitoring of ambient air pollutants
- » There is a need for monitoring and evaluation of air-related health impacts as well
- » Air Quality Officers and Environmental Health Practitioners agreed they need best practices to put health on the air quality management (AQM) agenda
- » This Quick Guide was developed

## OVERVIEW OF THE GUIDE

- » Air quality and human health
  - The links between them
  - What do we know in South Africa?
- » Why a Quick Guide?
- » How does human health fit into AQM?
- » Best practices to consider air quality and human health in your area
- » Useful websites



**Abbreviations:** AQM, air quality management

# AIR QUALITY AND HUMAN HEALTH

Air pollution comprises e.g.:

- » **Outdoor (ambient) pollution:** fossil fuel burning (e.g. Power generation, cars); industrial non-fossil fuel emissions; natural emissions; pesticides etc
- » **Indoor pollution:** burning coal, wood, paraffin for heating, cooking, lighting

Adverse health effects range from

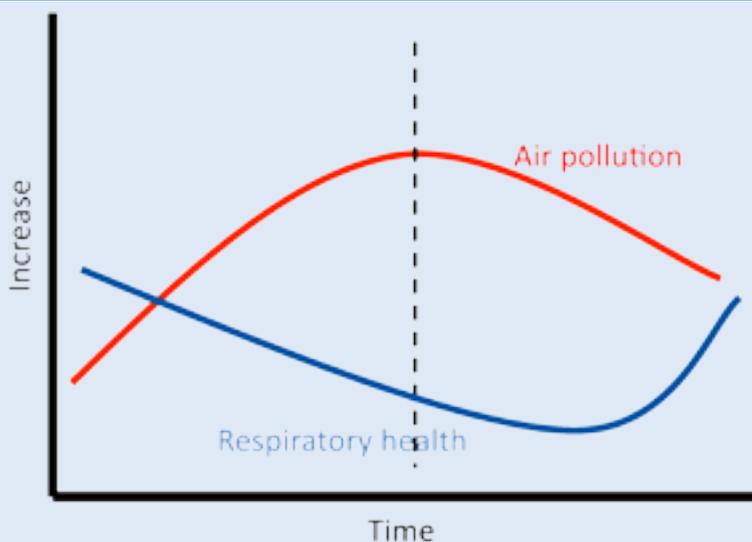
- » Nausea, difficulty breathing to ...
- » ... birth defects, immuno-suppression, cancer



## AIR QUALITY MONITORING AND EVALUATION...

- » Aims to protect the receiving environment, including human health
- » Is fundamental for assessing population exposure
- » Aims to reduce or eliminate respiratory & other diseases through implementing effective air pollution mitigation measures

### What should air quality monitoring and evaluation aim to do?



*As air pollution decreases, respiratory health should improve.*

## IN SOUTH AFRICA

- » Air-related health outcomes include acute respiratory tract infections (e.g. pneumonia), chronic respiratory diseases (e.g. asthma) and other lung diseases (e.g. tuberculosis).
- » Indoor air pollution and urban air pollution are risk factors causing our burden of disease.
- » In 2007, outdoor air pollution was estimated to cause 3.7% of national mortality from cardiopulmonary disease, and 5.1% of mortality attributable to cancers of the trachea, bronchus and lungs in adults older than 30 years.
- » Indoor air pollution is a major problem, with ~ 20% of South African households exposed to smoke from burning solid fuels estimated to cause 2 489 deaths in 2000.
- » Several studies have considered the impacts of air pollution on human health. These include:
  - Vaal Air Pollution Study in the 1990s
  - Zwi Highveld Study in the 1990s
  - Birth to Twenty Study in Johannesburg
  - South Durban Health Study in 2005
  - Vaal Comparative Study in 2010
  - Child Highveld Priority Area Study in 2010



**Contact** [cwright@csir.co.za](mailto:cwright@csir.co.za)  
for more details about these studies



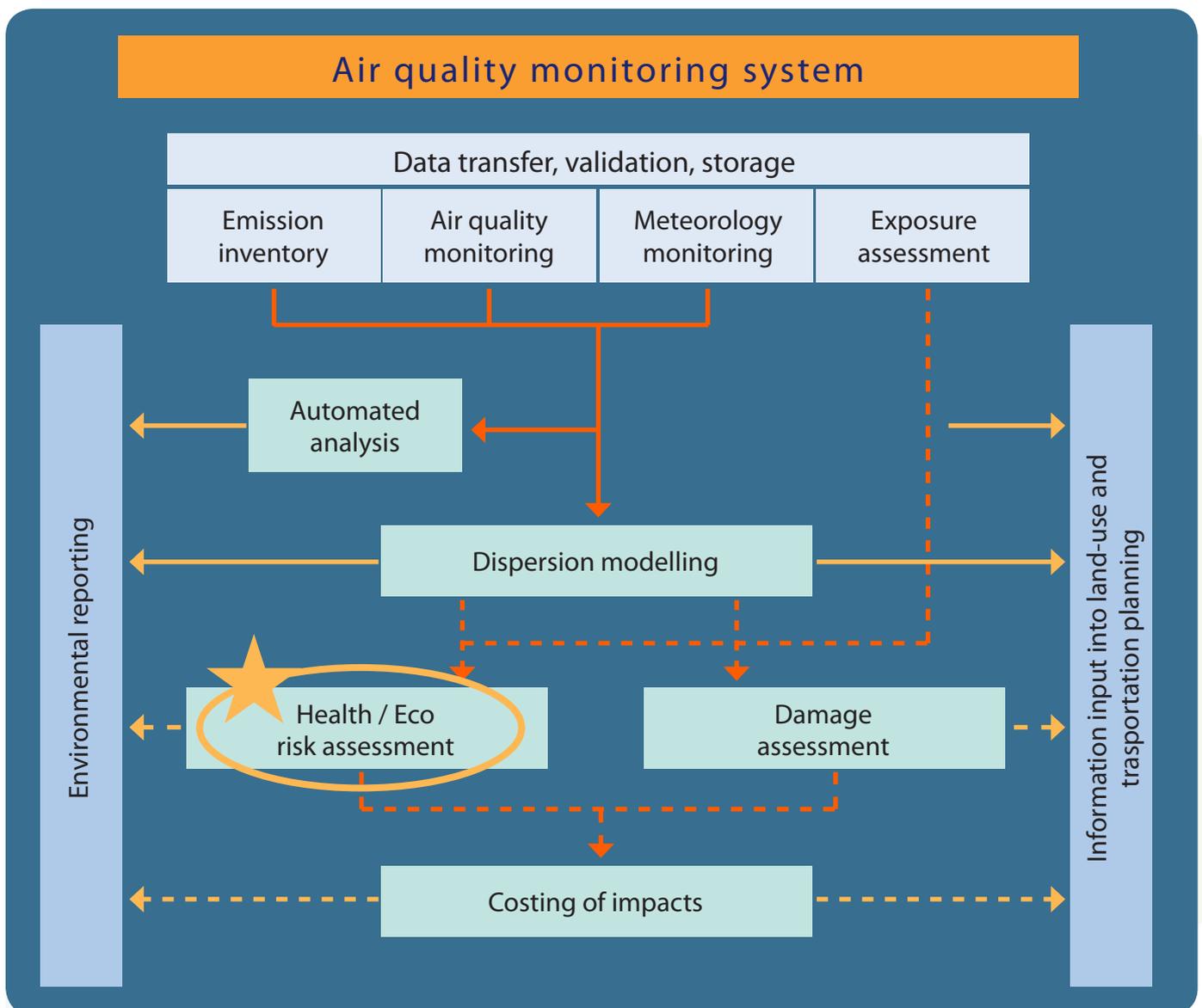
## WHY A QUICK GUIDE?

Air quality management aims to improve air quality for the benefit of the environment and people's health

Complete the 6 best practices or steps in this Quick Guide, and you can consider the ambient air and air-related health among the communities living in the local municipalities you manage

# BACKGROUND: HOW DOES HUMAN HEALTH FIT INTO AQM?

This is the Air Quality Management System proposed for implementation by the City of Tshwane. The star indicates where human health may be considered in AQM.



**Source:** Air Quality Management Plan for the City of Tshwane 2006-2008 Executive Summary (redrawn)

# BEST PRACTICES TO CONSIDER AIR QUALITY AND HUMAN HEALTH IN YOUR AREA

1 Assess ambient AQ against National Standards for criteria pollutants

2 Consider incidence of and mortality from acute respiratory tract infections (ARTIs) in children under 5 years of age

3 Consider incidence of and mortality from pneumonia in children under 5 years of age

4 Process your AQ complaints register data

5 Assess the percentage of households using coal, wood and kerosene

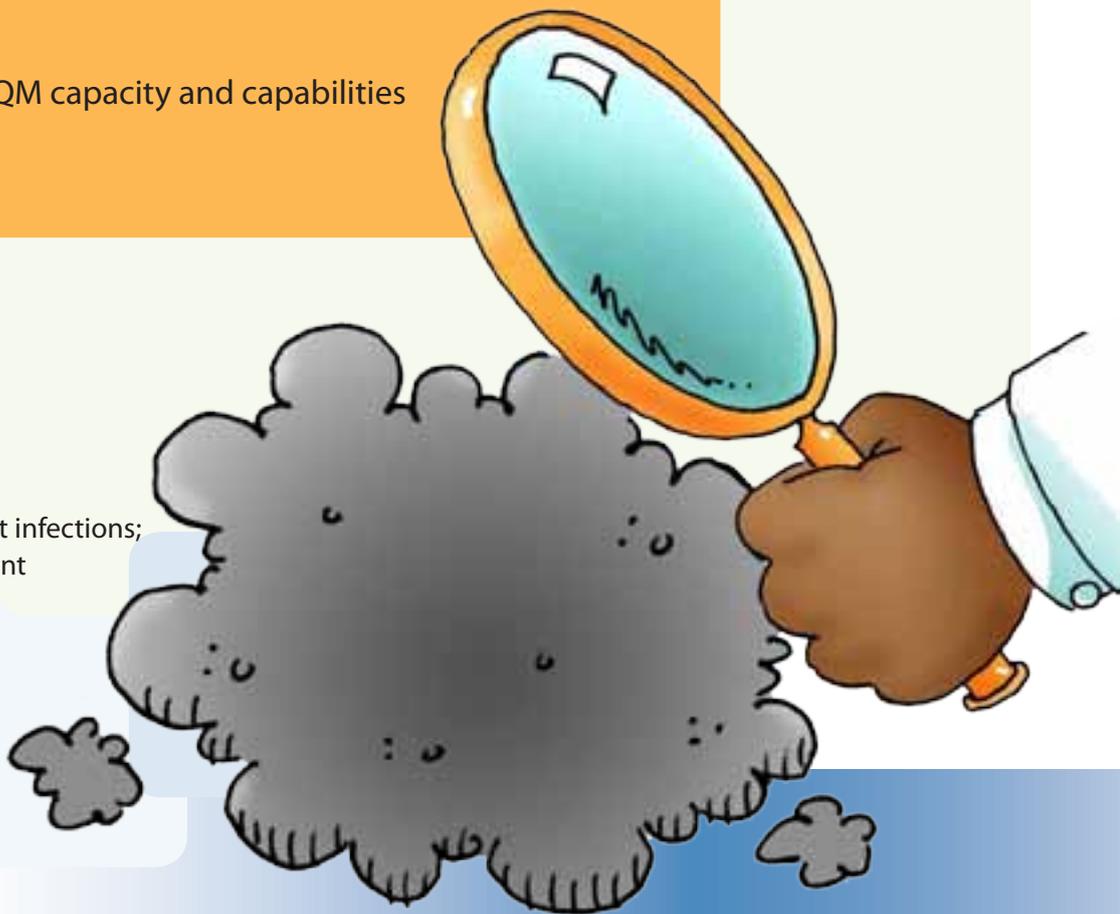
6 Consider AQM capacity and capabilities

## Abbreviations:

AQ, air quality;

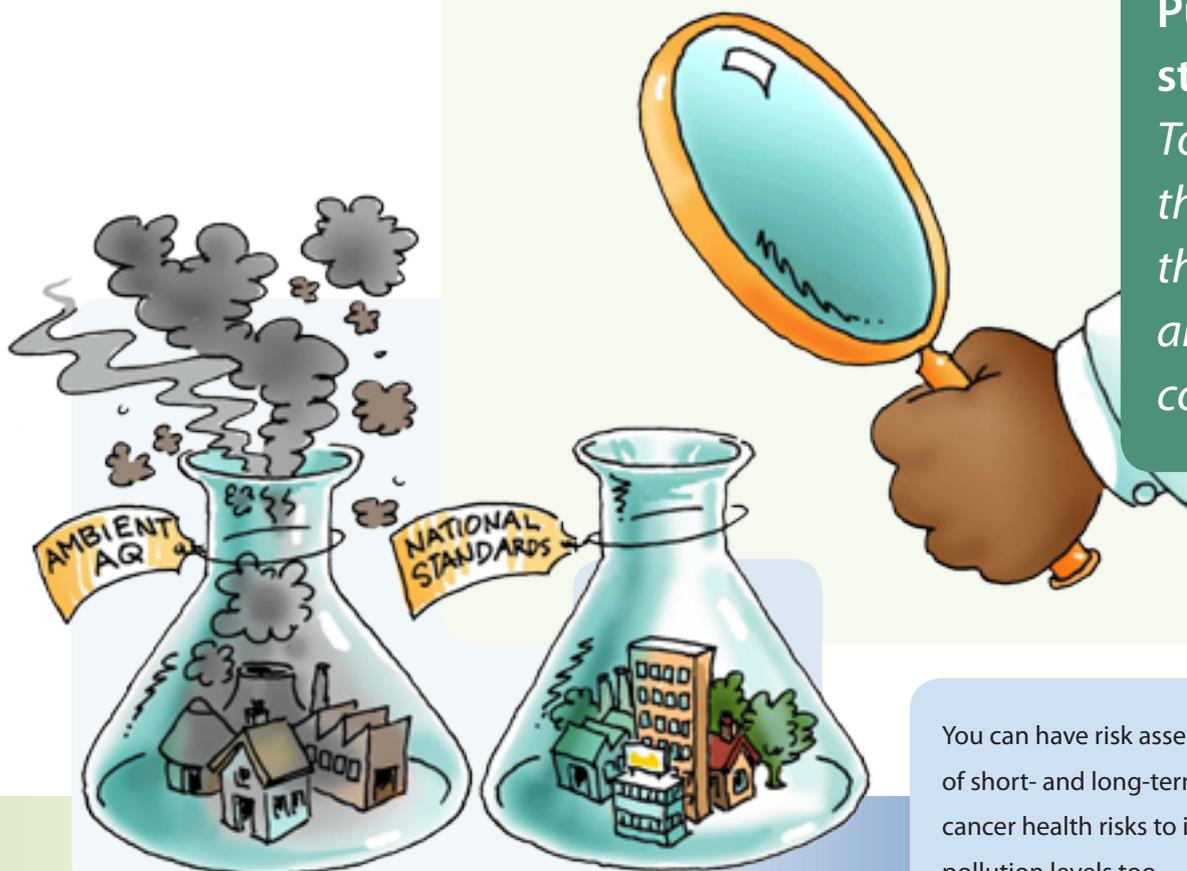
ARTIs, acute respiratory tract infections;

AQM, air quality management



# 1 ASSESS AMBIENT AIR QUALITY AGAINST NATIONAL STANDARDS FOR CRITERIA POLLUTANTS

- » National standards were set using epidemiological studies on the impacts of human health from air pollution
- » By comparing your monitored ambient air quality data against national standards, you can gauge an estimate of air pollution exposure for your community
- » Exceedances of national standards indicates possible health risks and impacts
- » For full details on how to prepare your monitored ambient air quality data, visit SAAQIS ([www.saaqis.org.za](http://www.saaqis.org.za)) and download the National Ambient Air Quality Standards document.
- » The National Ambient Air Quality Standards are given on the following page.



**Purpose of step 1:**  
*To understand the quality of the ambient air in your community*

You can have risk assessors calculate the risk of short- and long-term, cancer and non-cancer health risks to individuals for ambient pollution levels too.

**Contact** [roosthui@csir.co.za](mailto:roosthui@csir.co.za)

# 1 ASSESS AMBIENT AIR QUALITY AGAINST NATIONAL STANDARDS FOR CRITERIA POLLUTANTS

Averaging Period	Concentration	Frequency of Exceedence	Compliance Date
<b>National Ambient Air Quality Standards for Sulphur Dioxide (SO<sub>2</sub>)</b>			
10 minutes	500 ug/m <sup>3</sup> (191 ppb)	526	Immediate
1 hour	250 ug/m <sup>3</sup> (134 ppb)	88	Immediate
24 hours	125 ug/m <sup>3</sup> (48 ppb)	4	Immediate
1 year	50 ug/m <sup>3</sup> (19 ppb)	0	Immediate
<i>The reference method for the analysis of sulphur dioxide shall be ISO 6767</i>			
<b>National Ambient Air Quality Standards for Nitrogen Dioxide (NO<sub>2</sub>)</b>			
1 hour	200 ug/m <sup>3</sup> (106 ppb)	88	Immediate
1 year	40 ug/m <sup>3</sup> (21 ppb)	0	Immediate
<i>The reference method for the analysis of nitrogen dioxide shall be ISO 7996</i>			
<b>National Ambient Air Quality Standards for Particulate Matter (PM<sub>10</sub>)</b>			
24 hours	120 ug/m <sup>3</sup>	4	Immediate – 31 December 2014
24 hours	75 ug/m <sup>3</sup>	4	1 January 2015
1 year	50 Ug/m <sup>3</sup>	0	Immediate – 31 December 2014
1 year	40 ug/m <sup>3</sup>	0	1 January 2015
<i>The reference method for the determination of the particulate matter fraction of suspended particulate matter shall be EN 12341</i>			
<b>National Ambient Air Quality Standards for Ozone (O<sub>3</sub>)</b>			
8 hours (running)	120 ug/m <sup>3</sup> (61 ppb)	11	Immediate
<i>The reference method for the analysis of ozone shall be UB photometric method as described in SANS 12964</i>			
<b>National Ambient Air Quality Standards for Benzene (C<sub>6</sub>H<sub>6</sub>)</b>			
1 year	10 ug/m <sup>3</sup> (3.2 ppb)	0	Immediate – 31 December 2014
1 year	5 ug/m <sup>3</sup> (1.6 ppb)	0	1 January 2015
<i>The reference methods for the sampling and analysis of benzene shall either be EPA compendium method TO-14 A or method TO-17</i>			
<b>National Ambient Air Quality Standards for Lead (Pb)</b>			
1 year	0.5 ug/m <sup>3</sup>	0	Immediate
<i>The reference method for the analysis of lead shall be ISO 9855</i>			
<b>National Ambient Air Quality Standards for Carbon Monoxide (CO)</b>			
1 hour	30 mg/m <sup>3</sup> (26 ppm)	88	Immediate
8 hour (calculated on 1 hourly averages)	10 mg/m <sup>3</sup> (6.7 ppm)	11	Immediate
<i>The reference method for analysis of carbon monoxide shall be ISO 4224</i>			

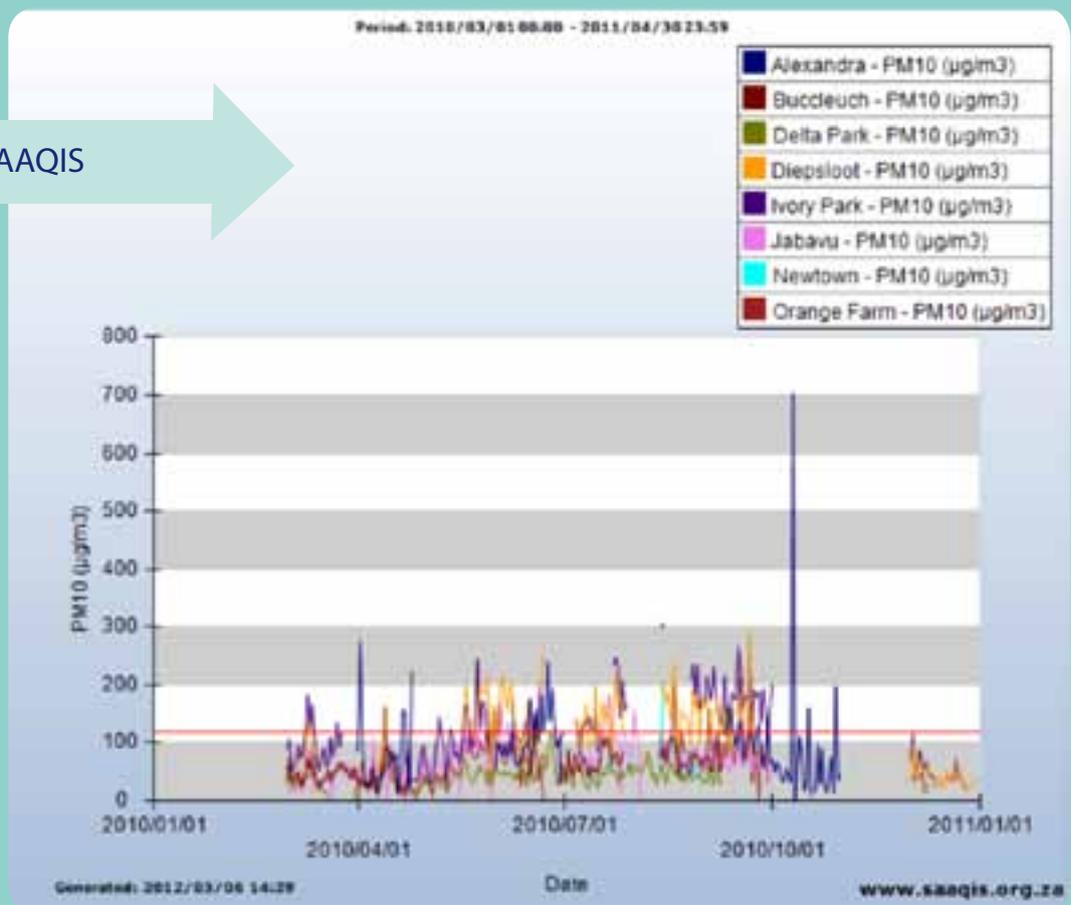
Source: Government Gazette 24 December 2009



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## ASSESS AMBIENT AIR QUALITY AGAINST NATIONAL STANDARDS FOR CRITERIA POLLUTANTS

Example from SAAQIS





## 2 CONSIDER INCIDENCE OF AND ANNUAL MORTALITY FROM ARTIS IN CHILDREN UNDER 5 YEARS OF AGE

**Purpose of step 2:**  
*To understand the incidence of acute respiratory tract infections among children in your area*

- » National estimates are available at the World Health Organization website [www.who.int](http://www.who.int)
- » Provincial estimates are available in the South Africa Demographic and Health Survey report <http://www.mrc.ac.za/bod/sadhs.htm>
- » Contact your Provincial Department of Health for up-to-date rates
- » If estimates for your area are higher than the national average, this may indicate a reason for concern

**Abbreviations:** ARTIs, acute respiratory tract infections



## 3 3 CONSIDER INCIDENCE OF AND ANNUAL MORTALITY FROM PNEUMONIA IN CHILDREN UNDER 5 YEARS OF AGE IN YOUR AREA

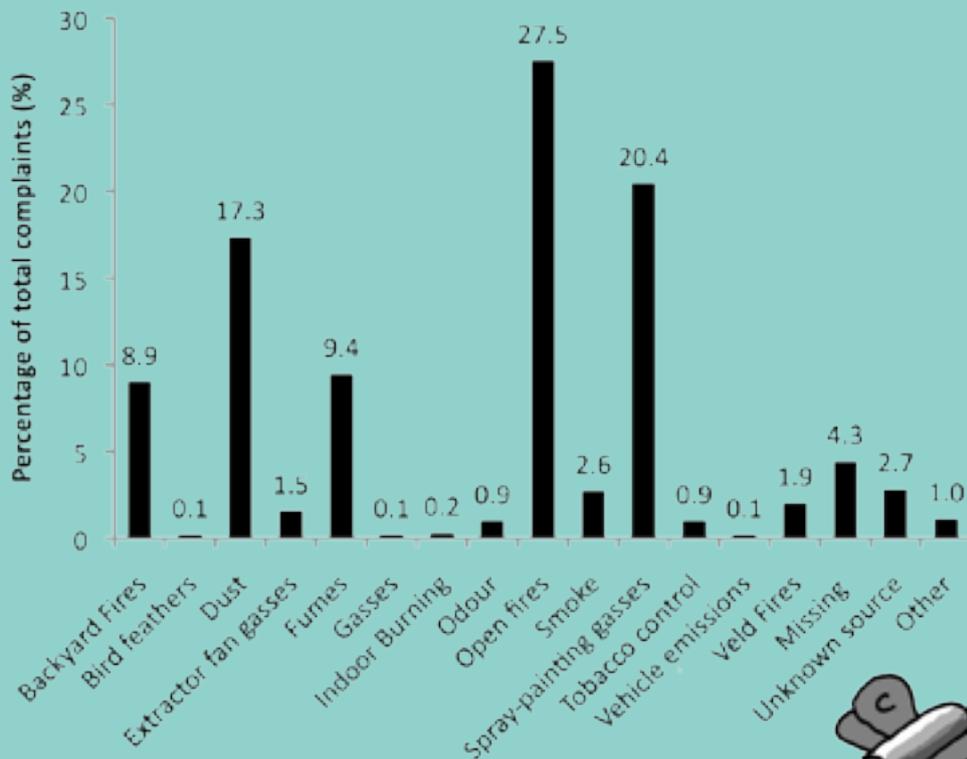
**Purpose of step 3:**  
*To understand the incidence of pneumonia among children in your area*

- » National estimates are available at the World Health Organization website [www.who.int](http://www.who.int)
- » 2004 Provincial estimates are available from the Health Information Systems Programme (HISP): <http://indicators.hst.org.za/healthstats/209/data>
- » Contact your Provincial Department of Health for up-to-date rates
- » If estimates for your area are higher than the national average, this may indicate a reason for concern

# 4

## PROCESS YOUR AQ COMPLAINTS REGISTER DATA

Using your database of complaints relating to air quality made by the public, categorise each complaint and generate a graph to identify what type of complaint is most often made



Example from the City of Tshwane - % of total complaints made using 5 years of records

### Purpose of

### step 4:

*To understand the air pollution-related perceptions of your community*



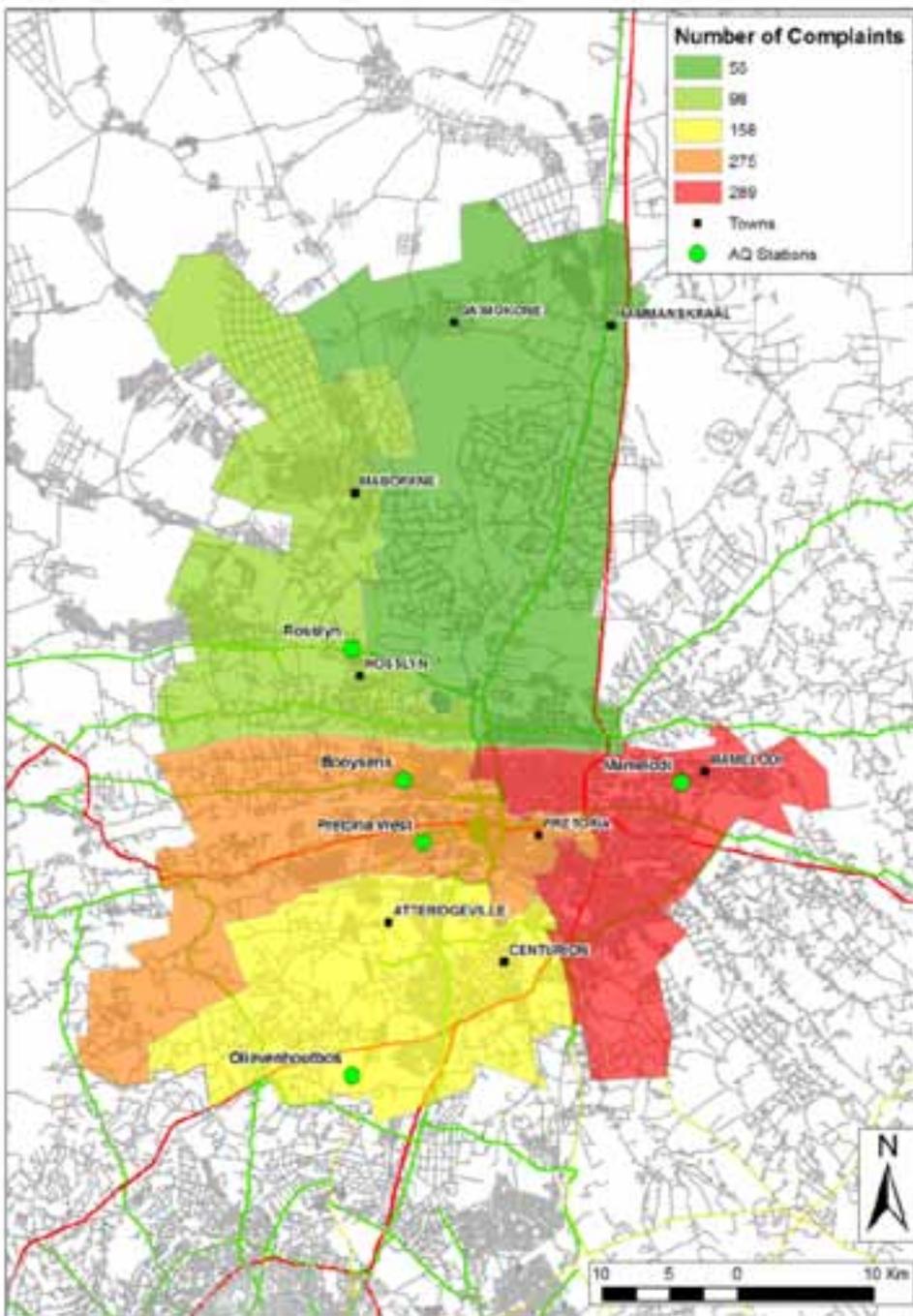
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## PROCESS YOUR AQ COMPLAINTS REGISTER DATA

### Where are the complaints?

With the help of a Geographical Information Systems (GIS) technician, have these complaints mapped across your area.

It will be helpful to know the predominant wind direction in your area to understand where the air pollution may be coming from.



# 4

## PROCESS YOUR AQ COMPLAINTS REGISTER DATA

Tap into local NGOs incident / complaint registers – Here is an example from South Durban



# 5 5

## ASSESS THE PERCENTAGE OF HOUSEHOLDS USING COAL, WOOD AND KEROSENE

- » Domestic energy or fuel use, depending on the type of fuel used, is a significant source of indoor and outdoor air pollution
- » Provincial estimates are included in the General Household Survey reports <http://www.statssa.gov.za/ghs/index.asp>
- » The 2010 report may be accessed here: <http://www.statssa.gov.za/publications/P0318/P0318June2010.pdf>

**Purpose of step 5:**  
*To understand the domestic fuel energy use in your community*



# 6

## CONSIDER AQM CAPACITY

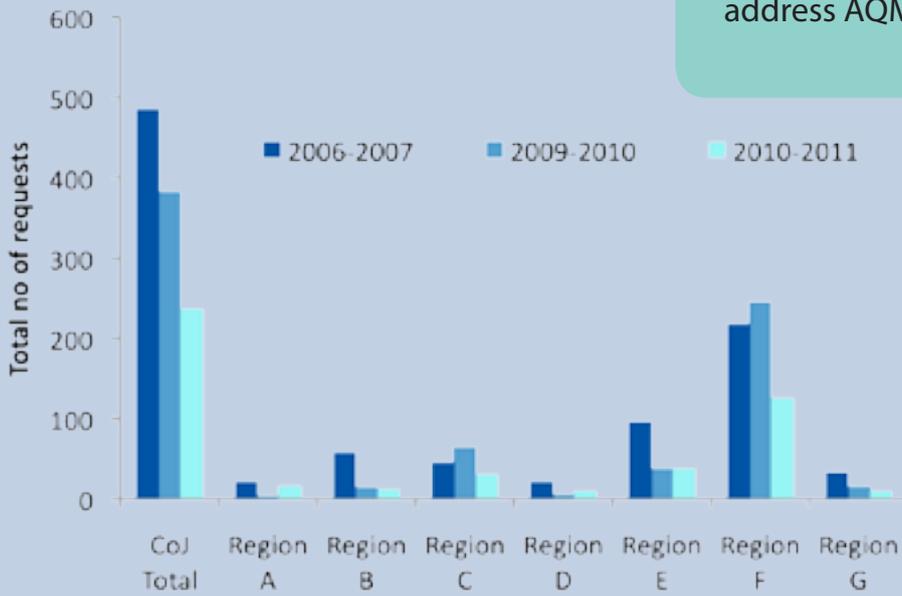
**Purpose of step 6:**  
*To understand the air quality management capacity available in your area*



# 6

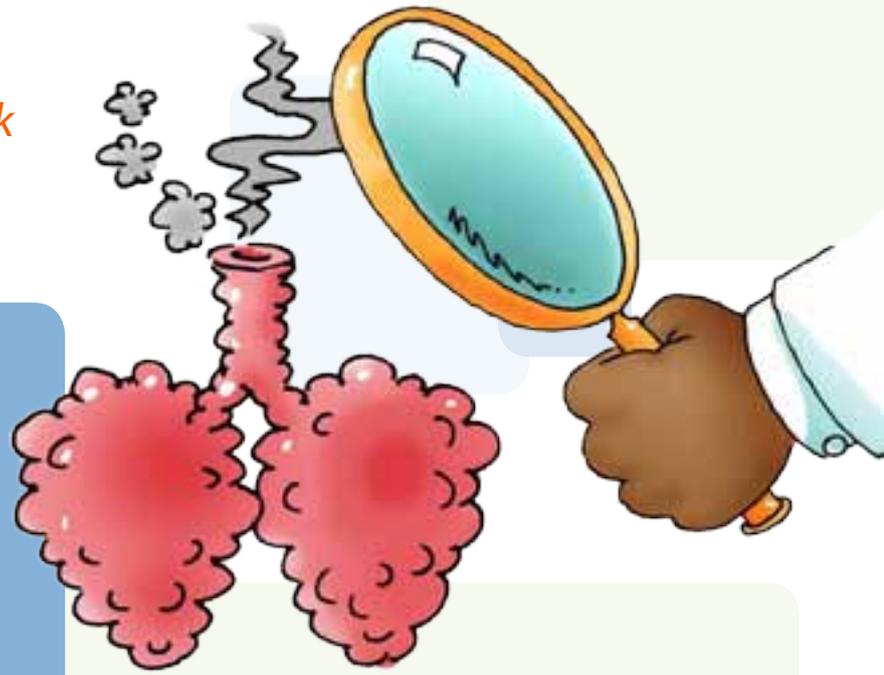
## CONSIDER AQM CAPACITY

This graph shows the requests for AQM service in the City of Joburg by region. This information helps determine whether you have sufficient capacity to address AQM in your area.



**Abbreviation:**  
AQM, air quality management

*So, now that you have worked through the best practices, think about these questions....*



- » Are you meeting the National Standards for criteria pollutants?
- » Does the public know who to log air-related requests and complaints with? Have you publicized the contact details?
- » Do you log health symptoms when the public logs a complaint?

## PROBING QUESTIONS FOR YOU

- » Do you have enough capacity to handle all received requests?
- » Is domestic fuel use a major source of air pollution in your area and if so, what can be done to reduce it?
- » Are incident rates for acute respiratory tract infections and pneumonia in under 5 year olds being recorded at your local clinics? If not, should they be?
- » Are incident rates for acute respiratory tract infections and pneumonia in under 5 year olds in your area higher than the National average?

## USEFUL WEBSITES

[www.saaqis.org.za](http://www.saaqis.org.za)

[www.environment.gov.za](http://www.environment.gov.za)

[http://www.who.int/topics/air\\_pollution/en/](http://www.who.int/topics/air_pollution/en/)

<http://www.unep.org/>

<http://www.highveldair.co.za/home/>

[http://www.environment.gov.za/vaal/vaal\\_home.html](http://www.environment.gov.za/vaal/vaal_home.html)

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