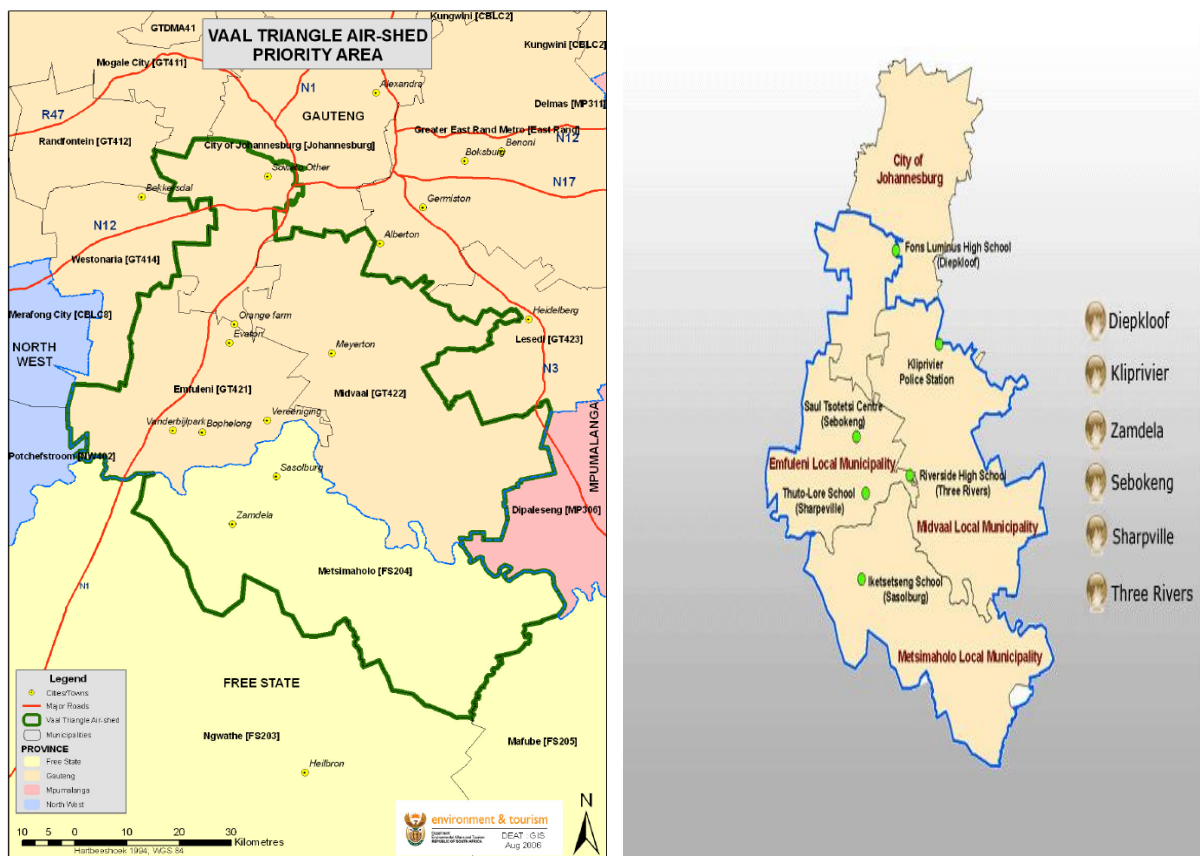


A survey of the respiratory health status of 10-year-old children exposed to air pollution in the Vaal Triangle priority area

Industrial development in the Vaal Triangle began as early as 1877 when coal reserves were discovered. Currently, the area houses several sources of air pollution, including heavy industries, refineries, and a power station, motor vehicles as well as households still utilising coal as an energy carrier. Therefore, the perception that air quality in the area is poor and that people's health is adversely affected has existed since the beginning of the nineties.

Studies conducted in the Vaal Triangle have found a relatively high prevalence of upper and lower respiratory diseases, especially in children. The sources of air pollution in the Vaal Triangle, together with the potential for exceedances of air quality guidelines, led to the area being declared as an Airshed Priority Area on 21 April 2006 by the Minister of Environmental Affairs and Tourism. This declaration implies that the area will be closely monitored as far as air pollution is concerned.



The Vaal Triangle Airshed Priority Area.

In 1990, a study was done in the Vaal triangle (Vaal Triangle Air pollution and Health Study-VAPS) to study the exposure and effects of outdoor as well as indoor air pollution on the health of schoolchildren (between the ages of 8 and 12). Results showed that 65% of participants suffered from upper respiratory diseases and 29% from lower respiratory disease.

The change, if any, of the respiratory health status of schoolchildren currently living in the Vaal Triangle, compared to the health status of schoolchildren who participated in the VAPS, over the past 20 years, is not known. Therefore, this year a study was done to compare 10-year-old children living in the Vaal Triangle today with schoolchildren of the same age in the 1990s.

The main objectives of this study were to:

- determine the current respiratory health status of 10-year-olds
- conduct an inter-comparative study to the VAPS to determine the differences if any, in respiratory health of 10-year-olds
- determine the association between risk factors and respiratory health outcomes.

Study population and sampling

The study population consisted of 10-year old children from six schools in the Vaal Triangle, including schools surveyed in the VAPS of 1990. The focus was on children 10 years of age, because at this age children normally do not yet smoke cigarettes and they are still developing physiologically. They are therefore considered more vulnerable. Furthermore, the selected age group was consistent with the VAPS study, which looked at 8-12 year old children.

Six schools from the area were selected with an average of 100 10-year old learners per school. Three of these schools were from those that participated in the VAPS, while the other three were randomly selected from previously disadvantaged schools in each of the three towns, i.e. Vereeniging, Vanderbijlpark and Sasolburg (one from each town). The three schools were selected on the basis of having more or less the same number of learners as those used in the VAPS and the current study. The required sample size at a 90% confidence level was calculated to be 333 learners.



Approach

Each school was contacted telephonically with consent attained from the Department of Education and all of the principals of the participating schools. Meetings were set up with each principal to acquire written consent to conduct the study as well as to distribute the questionnaires. The schools were given two weeks to distribute and retrieve the questionnaires. The questionnaires were distributed amongst the teachers; then handed out to the children and completed by the parents or guardians of the child.

There were in total 800 questionnaires handed out to all the schools with them being printed out in English (250), Afrikaans (100) and Sesotho (450). Once the questionnaires were returned, they were sorted and filtered to ascertain the response rate and sample size. Once the questionnaires were arranged, 426 questionnaires remained whereby in excess of half of the questions were answered, leading to a response rate of 53.3%.

Project status

Double entry of questionnaires is being done now and data entry checks are being used to determine the percentage error. Data capturing is being done using EpiData. A statistician was consulted during sample selection and will again be consulted during data analysis. It is anticipated that data analysis will make use of EpiData Analysis as well as Stata release 10, a statistical software package.

While this year's study was happening, it was discovered that the 1990 VAPS data were lost; therefore the VAPS data had to be initially filtered out for 10-year-olds and then re-captured. The VAPS questionnaires were divided into the three towns and refined further with reference to the school by the aid of previously coded information on each of the questionnaires. Double entry of the VAPS questionnaires is almost complete; thereafter capturing of the 2010 questionnaires will be done.

How will these data help?

Categorical data will be summarised by means of frequencies and percentages. Prevalence of respiratory diseases will be determined. Data will be tested for association with risk or environmental factors using Pearson's chi-square test or, where applicable, Fisher's exact test. The crude (unadjusted) odds ratios (ORs) along with their 95% confidence intervals (CIs) will also be determined.

Prevalence of upper and lower respiratory diseases will be compared to that found during the VAPS. Risk factors for these diseases will be identified and compared to those of 1990.

The results of the current study will add invaluable information about the respiratory health status of children in the Vaal Triangle and how this has changed over the past 20 years. This information may be used by decision makers in their air quality management strategies for the Vaal Triangle Priority Area, since at least four of the six hotspot areas within the priority area, is covered by the current study area.

For more information, please contact:

Jino Mundackal, CSIR Environmental Health Research Group
Tel: 012 481 3056, jmundackal@csir.co.za