# Case 1

## *The school children are all getting sick …*

*Threats to the health of the population from environmental hazards are continually emerging. Impacts range from relatively small-scale local problems, such as a smoky chimney next door, to issues affecting the health of the entire planet, such as global warming. In this case you will develop your understanding of environmental health threats and your role in responding to them.*

**Learning Objectives**

- Increase your understanding of the contribution of air quality to health
- Increase your awareness of the common causes of outdoor air pollution and their associated health effects within our community
- Be aware of how to report your concerns if an environmental threat may be present
- Understand your role as an advocate for your patients in raising environmental health concerns

**Clinical Summary**

Past Medical History:
Nil

Past Surgical History:
Nil

Allergies:
Nil

Meds:
Nil

Social History:
Nil

**Case Notes:**

You are a busy GP working in Launceston. A lot of your caseload seems to be related to respiratory illness. You are aware that wood heaters are the predominant form of heating in Launceston and that the smoke generated from the heaters, combined with inversion layers that trap the smoke particles in the lower atmosphere, make air pollution an ongoing problem. Additionally, there is a factory in the middle of town, a block from the local primary school, which has a smoke stack that seems to produce lots of smoke too. It seems to you that the wood smoke might be contributing to the respiratory illness caseload in your practice. But is there any evidence that there is a smoke problem in Launceston? Is smoke really a cause of respiratory illness?

**Air pollution:**

There are hundreds of pollutants that are mixed into the air we breathe. The National Environment Protection Measure (Air NEPM) establishes national ambient air quality standards for six major air pollutants that affect local air quality and are indicative of general ambient air quality. The standards in the Air NEPM are designed to protect human health and wellbeing.

Particulate Matter (PM10)
High levels of particle pollution are experienced in many areas around Tasmania during the cooler months. Monitoring is conducted by the Department of Primary Industries, Water and Environment at two sites in the State - at Ti Tree Bend in Launceston and at Prince of Wales Bay in Hobart.

Ozone (O3)
In the lower atmosphere ozone is both a pollutant and a greenhouse gas. Monitoring for ozone is not conducted in Tasmania.

Carbon monoxide (CO)
Monitoring for CO was conducted at the Prince of Wales monitoring station in Hobart, from 2001 to 2004, but was discontinued because the levels were very low.

Nitrogen dioxide ($NO_2$)
Routine monitoring for $NO_2$ is not conducted in Tasmania.

Sulphur dioxide ($SO_2$)
Sulphur dioxide reacts easily with other substances to form harmful compounds, such as sulfuric acid, sulfurous acid and sulfate particles. Routine monitoring for $SO_2$ is not conducted in Tasmania, except near Zinifex Smelter at Risdon in Hobart. Concentrations are very low.

Lead (Pb)
Lead is known to be harmful to human health and its use is restricted to products that are not used for food or drink. Monitoring for lead is not conducted in Tasmania, as its removal from petrol has made airborne levels extremely low, all around Australia.

As industrialisation has progressed, outdoor air pollution from industrial plants, power plants, motor vehicles, and wood heating has worsened. The major air pollutants that

can cause health effects are carbon monoxide, nitrogen dioxide, lead, and particulate matter. Ozone, formed by reactions between nitrogen dioxide and ultraviolet radiation, is also a health problem at certain levels.

**Particulate matter:**

Particulate matter is the general term used to describe the mixture of solid particles and liquid droplets in outdoor air. Some of these particles are large or dark enough, or are present in high enough concentrations, to be seen as soot or smoke. Others are so small they can only be detected with an electron microscope.

Particulate matter is classified by size. Particles greater than 2.5 microns in aerodynamic diameter are called 'coarse' particles, whereas those less than 2.5 microns are classified as 'fine' particles.

Atmospheric particulate matter is composed of a complex mixture of organic and inorganic components that originate from multiple sources. Fine particles result from fuel combustion by motor vehicles, power plants and industrial facilities, as well as from residential fireplaces and wood stoves. Vehicles travelling on unpaved roads, volcanoes, and crushing and grinding operations form coarse particles.

**Should I be concerned about particulate matter?**

Yes. Historically, particulate matter was recognised as a serious health threat during the 1930s and 1940s in the USA and in the 1950s in London. High levels of particulate matter were associated with dramatic increases in mortality and morbidity among the general population. Inhaled particulate matter can be deposited in the respiratory system and is associated with numerous health effects, including increased hospital admissions and emergency department attendances for heart and lung disease, increased respiratory symptoms and disease, aggravation of asthma, decreased lung function and premature death, especially in those aged over 65 years.

Groups especially at risk from particulate matter include the elderly, people with cardiopulmonary disease, and children.

**Issues to Consider:**

a) What advice would you give people at risk from particulate matter about what to do on smoky days?

**Case Notes:**

Is anything being done about air quality in Tasmania?

**Maintaining air quality:**

Prevention of health effects from air pollution involves dealing with the causes:

- Reducing emissions from motor vehicles and increasing the use of cars with modern low-pollution engines
- Emission controls on industry
- Reducing the use of fossil fuels
- Reducing all forms of burning – wood fires, and agricultural and forestry burning

However, to ensure success with these measures, accurate monitoring and analysis of air pollution is required. The National Environmental Protection Council (NEPC) is Australia's authority responsible for setting air quality standards. The standards are called the National Environmental Protection Measures (NEPMs). In 1998, the NEPC agreed that NEPMs for ambient air quality were necessary to set basic standards for air quality to which all Australians were entitled. Details of the development of the air quality standards are outlined in Australia's National Environmental Health Strategy.

Click here to view the National Environmental Health Strategy

Maintaining good air quality for the benefit of human health is largely the responsibility of State government. Effective reduction in pollution has been achieved via the enforcement of national standards, and state legislation that requires permits to be issued, plans to be submitted and sufficient care to be taken. Air quality maintenance is an ongoing task.

The State government has enacted environmental protection legislation and specific legislation that aims to improve air quality. Other policies specific to air quality are being developed. The key legislation in respect of air quality is the *Environmental Management and Pollution Control Act 1994*.

The *Environment Protection (DSFBA) Regulations 1993* specify emission limits and certification requirements for woodheaters sold in Tasmania. These Regulations will be replaced by new regulations, probably during 2005. To view the regulations see the Tasmanian Legislation web site: www.thelaw.tas.gov.au (Use the search engine on this site to locate the Regulations).

State and local government control the air emissions of industrial activities through permits and environment protection notices. Currently, emissions from industries, otherwise known as point source emissions, are regulated under the general provisions of the *Environmental Management and Pollution Control Act 1994* and the *Land Use Planning and Approvals Act 1993*.

Point source pollution is pollution that is emitted at a discrete, identifiable location,

usually via a smoke stack and which can be readily measured. Where a point source of pollution might cause environmental nuisance or material or serious environmental harm, limits are to be set on the permissible concentrations and/or loads of pollutants present in discharges to the atmosphere.

Sources of pollution, such as wood heating, back yard burning, lawn mowers and cars are individually small but numerous and can be significant sources of air pollution. They may also cause localised air pollution problems. Large scale open burning for forest regeneration, waste removal, ecological management and fuel reduction has an impact on local air quality. Motor traffic is a major source of air pollution in Australian cities. Little monitoring of typical motor exhaust emission pollutants had been conducted in Tasmania. Visible exhaust emissions of longer duration than 10 seconds are prohibited under the *Vehicle and Traffic (Vehicle Standards) Regulations 2001*.

The Air NEPM Monitoring Plan for Tasmania specifies how Tasmania plans to monitor, assess and report air quality for the purposes of the National Environment Protection Measure for Ambient Air Quality. The proposed TAQS will assess compliance with the Air NEPM Standards in Tasmania and will specify strategies for achieving compliance within the Air NEPM by 2008. The *Environment Protection Policy (Air Quality) 2004* requires the development of the TAQS.

**Issues to Consider:**

a) Wood heaters are a major contributor to air pollution in Tasmania. Do you think GPs have a role in counselling patients about the use of wood heaters and less polluting alternatives?
b) Do you think that GPs have a role in advocating for cleaner air and tougher air quality standards?

## Summary:

This case illustrates one of the many links between environmental quality and health – the impacts of air quality on health. As a result of completing this case you should have an awareness of the framework within which air quality is regulated in Australia, be more aware of the influence of air pollution on health, and have a better understanding of the systems surrounding air quality monitoring within Tasmania.

## References and Further Reading:

EnHealth Council of Australia. Environmental Health Risk Assessment. 2001.

Tasmanian Department of Primary Industries, Water and Environment. Air quality website. www.dpiwe.tas.gov.au

National Enviromental Protection Council. National Environmental Health Strategy. 1999.