Sydney Air Quality Study Stage 2

Department of Planning and Environment

NSW GOVERNMENT

The Sydney Air Quality Study is a multi-year research program. The study was designed to provide information on the state of air quality and health burden of air pollution in the NSW Greater Metropolitan Region, while supporting the improvement of current and future air quality. The program was led by the NSW Department of Planning and Environment (the department), in collaboration with the NSW Environment Protection Authority (the EPA) and the NSW Ministry of Health.

The Stage 2 – heath impact assessment report presents new findings of health cost analyses.

What are air pollutants and where do they come from?

Air pollutants can be found anywhere because they come from human-made and natural sources (e.g. dust, pollen, bushfires and motor vehicles). Particles are also known as 'particulate matter' or PM, they are measured by their diameter and come in various sizes. Air pollution includes: PM_{10} – coarse particles less than 10 micrometres (μm) and $PM_{2.5}$ – fine particles less than 2.5 μm.

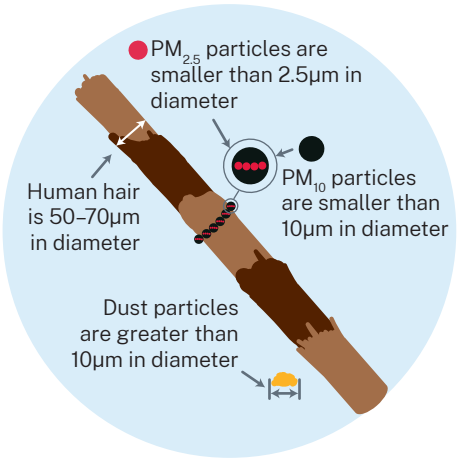

Figure 1 Know your particles

Which particles have the greatest effect on health?

Determining the health risks caused by air pollution is critical in the development of effective policies. $PM_{2.5}$ has the greatest effects on human health. Long-term exposure to $PM_{2.5}$ can cause heart and lung disease.

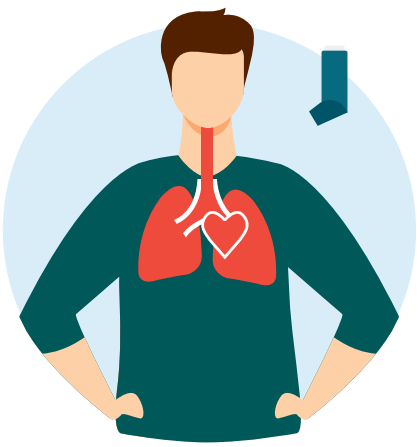

Figure 2 Effects of $PM_{2.5}$

$PM_{2.5}$ and PM_{10} can cause heart and lung disease. They are invisible to the eye and can be inhaled into the lungs. $PM_{2.5}$ particles are so small they can travel through the lungs and into the bloodstream.

The elderly, children and people with existing heart and lung problems are most at risk.

How was the study done?

The Sydney Air Quality Study draws on data and information from the NSW Air Quality Monitoring Network and the NSW Greater Metropolitan Region air emissions inventory. In this study, an air quality modelling framework was established to study how air quality varies over time and space, and to assess how major sources contribute to air pollution in the metropolitan region. The report can be viewed on our Sydney Air Quality Study webpage.

What did we find out?

Modelled $PM_{2.5}$ concentrations and pollution exposure

The annual average $PM_{2.5}$ concentrations were modelled for the Greater Metropolitan Region. Human-made sources (see table on page 4) contributed to higher $PM_{2.5}$ pollution in the Upper Hunter, Sydney, Newcastle and Wollongong regions (Figure 3).

Exposure modelling provides an estimate of the level of air pollutants people were exposed to. Human-made sources contributed 48% to population exposure to $PM_{2.5}$ concentrations (Figure 4).

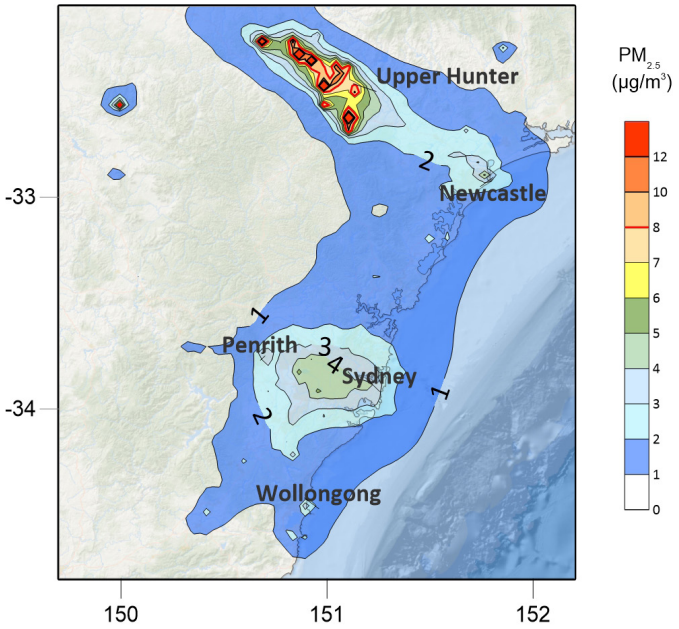

Figure 3 Average concentrations of human-made $PM_{2.5}$ represented in micrograms per cubic metre (µg/m³) predicted by the air quality model.

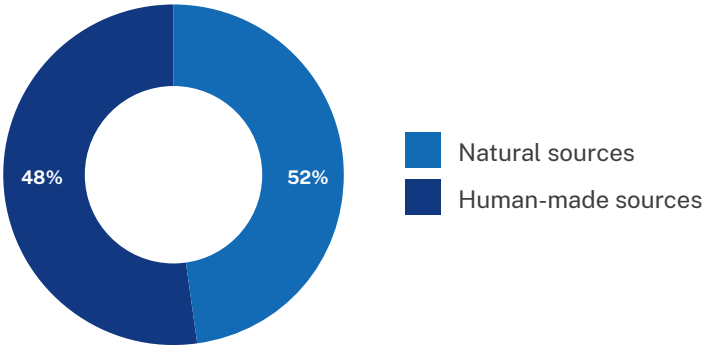

Figure 4 Percentage contribution of natural and human-made sources to the population's exposure to $PM_{2.5}$.

Health cost of long-term exposure to human-made $PM_{2.5}$

The impacts of long-term exposure to $PM_{2.5}$ were valued around $5 billion (in 2021 Australian dollar value).

Major human emission source and associated health costs*

Major human-made emission sources		Health costs (million)	Health costs from one tonne of emissions
Wood heaters	Residential wood heaters	$2,046 million	$302,151
Industry	EPA-licensed premises (e.g. coal mines and steel works)	$1,011 million	$67,625
On-road motor vehicles (exhaust)	Exhaust from petrol and diesel vehicles	$614 million	$663,566
On-road motor vehicles (non-exhaust)	Non-exhaust emissions from road and diesel vehicles	$218 million	$264,880
Power stations	Coal-power and gas-power generations	$346 million	$218,703
Non-road diesel and marine	Unregistered non-road vehicles and equipment (e.g. dump trucks, bulldozers, locomotives and ships)	$302 million	$65,265
Domestic–commercial	Domestic activities (e.g. residential lawn mowing and portable fuel containers)	$331 million	$304,176
All human-made sources cost $4,827 million			

*Note: Health cost is estimated based on years of life lost and all dollar values are 2021 Australian dollar values.

More information

For more information please visit environment.nsw.gov.au/sydney-air-quality-study

Financial health costs from one tonne of emissions

- on-road motor vehicles (exhaust) emission cost about $663,000
- residential wood heater and domestic–commercial (e.g. residential lawn mowing and portable fuel containers) emissions each cost about $300,000

What are we doing to protect people across NSW?

Clean air is important for our health. Air pollution is a local, regional and global issue. The choices and actions of governments and people can improve our communities.

In early 2022, the NSW Government released the NSW Clean air strategy 2021–30 which presents a whole-of-government approach to improve air quality and health outcomes for people who live and work in cities and regions across NSW.

Cover photo: Mona Vale Beach (Khalia Monk/DPE); Page 2: Kayaking Sydney Harbour National Park (Rosie Nicolai/DPE); Page 3: Collins Flat beach, Sydney Harbour National Park (Natasha Webb/DPE). Published by: Environment and Heritage, Department of Planning and Environment, Locked Bag 5022, Parramatta NSW 2124. Phone: 1300 361 967 (environment and national parks enquiries); Email: info@environment.nsw.gov.au; Website: www.environment.nsw.gov.au. EHG2022/0557 (March 2023)