

SA Health

Adbri - Air quality and health

July 2024



**Government
of South Australia**

SA Health

Outline

- > Particulate matter (PM):
 - Definition and different sizes
 - Impact on health
 - Vulnerable population
- > How does PM cause the health impacts
- > Health studies

Particulate matter - PM

- > PM can include chemicals, metals, soil or dust particles, and allergens (pollen or mould spores).
- > Particle size is a major determinant of how serious the health effect will be, especially for lung diseases and effects on the heart - **PM10 and PM2.5**.



Size comparisons for PM particles

PM – size matters

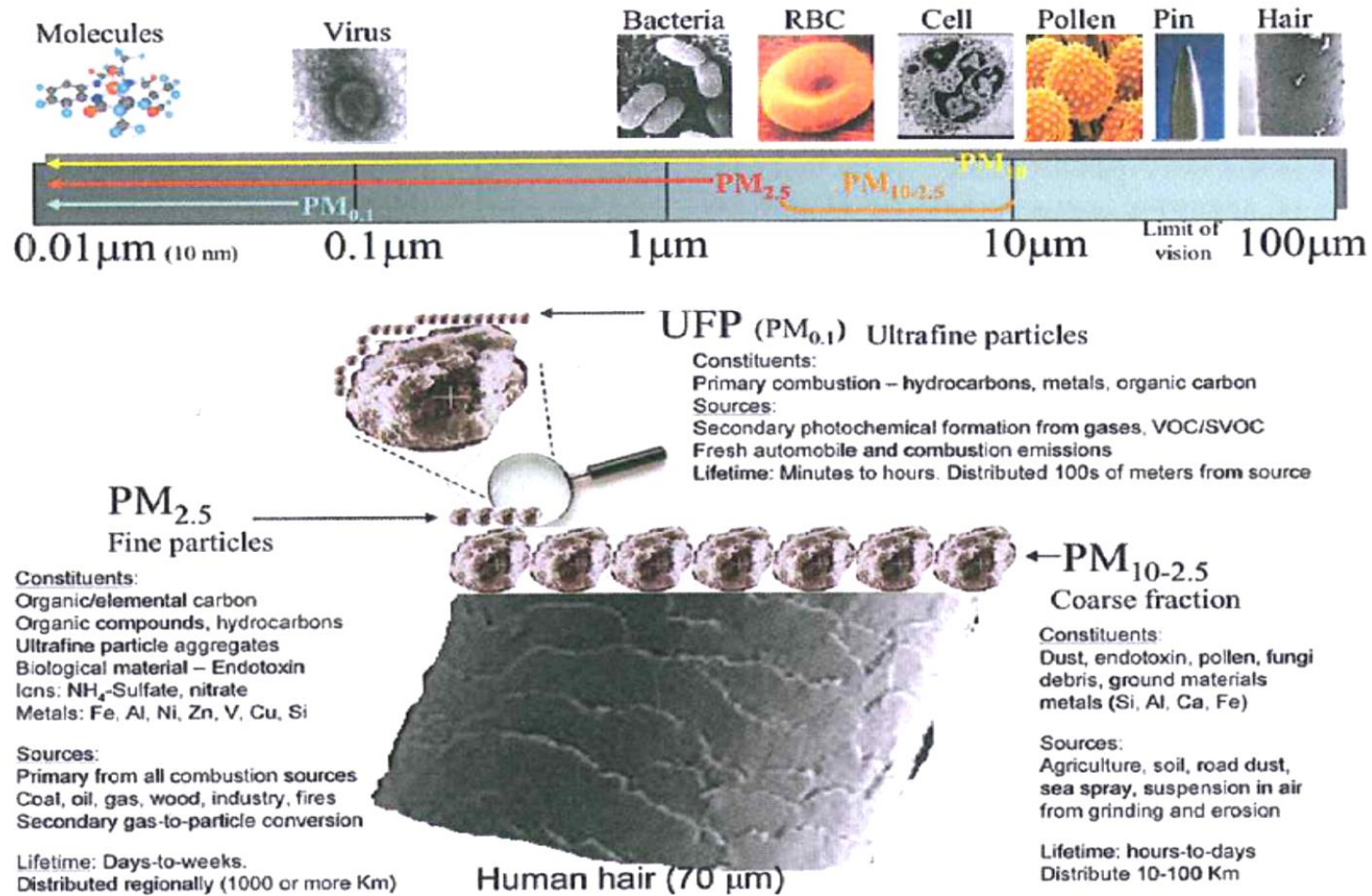
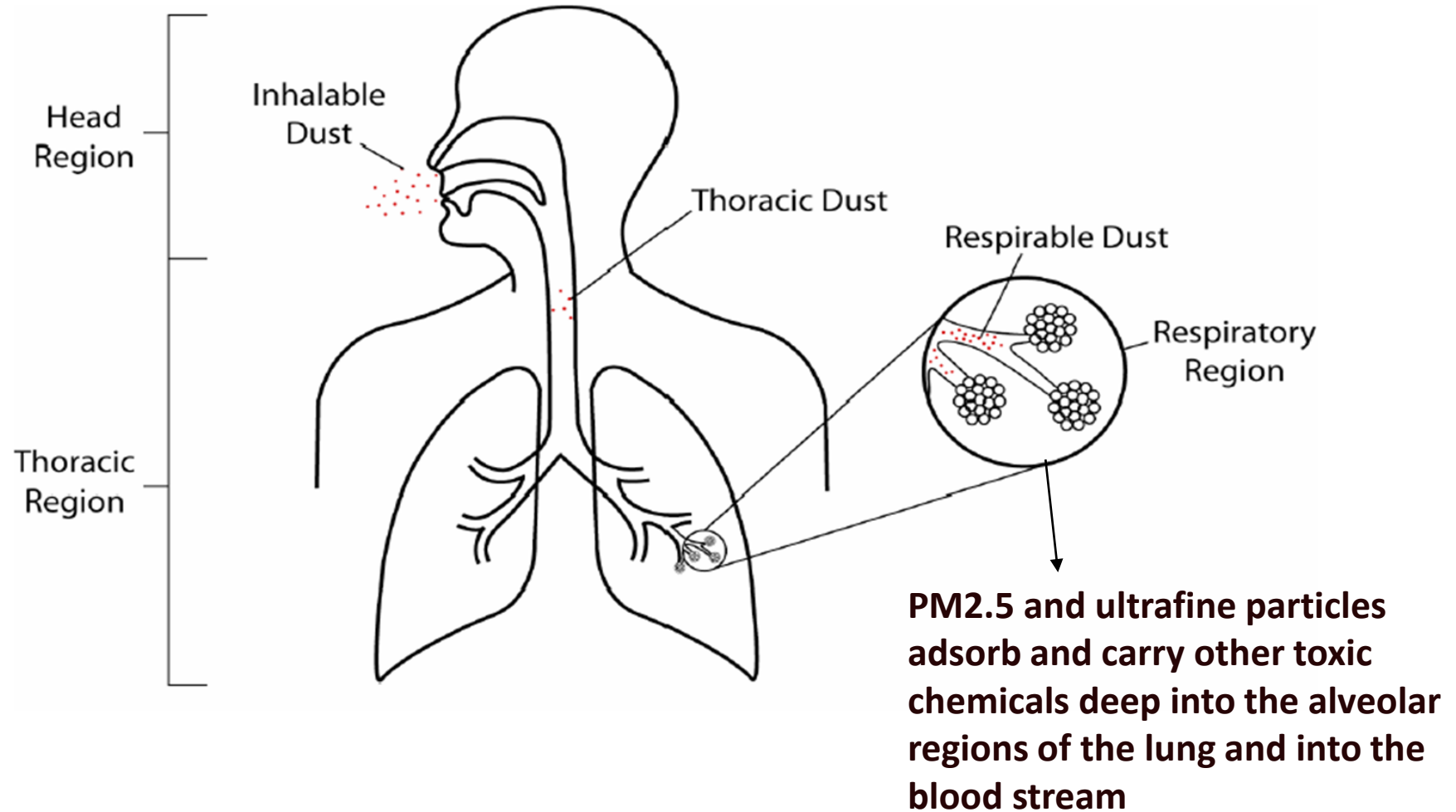


Figure 1 Size, sources and composition of PM air pollution

RBC, red blood cell; SVOC, semi-volatile organic carbons; UFP, ultra-fine particles; VOC, volatile organic carbons.

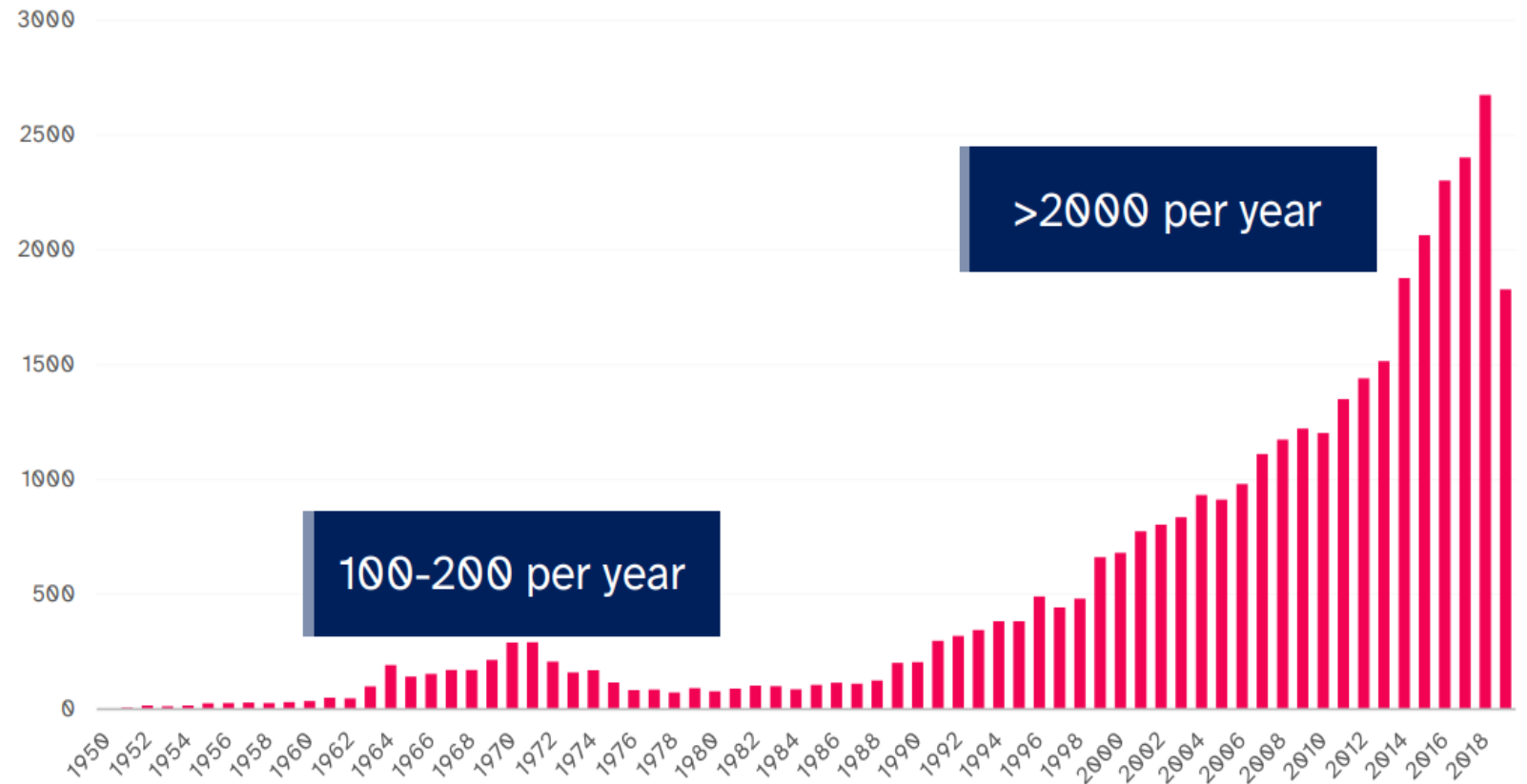
Exposure to PM



PM and health

- > **Total suspended particulate (TSP)** - particles that have diameters less than 50 μm (or sometimes 100 μm). These are generally trapped in our noses and throats, so they do not reach the lungs; however, they may cause irritation, nuisance and soiling of surfaces
- > **PM10 and PM2.5:**
 - Short term exposure (hours, days and weeks):**
 - Some studies have shown health effects associated with short term exposures i.e. hours but health outcomes for daily exposures have been better studied (and stronger associations for PM2.5 than PM10)
 - **PM2.5** - increased ED visits and hospital admissions for heart or lung causes, acute and chronic bronchitis, asthma attacks, and other respiratory symptoms in people with pre-existing heart and respiratory conditions
 - **PM10** - worsening of existing respiratory diseases, including asthma and COPD
 - Long-term exposure (months to years):**
 - **PM2.5** (and PM10 noting associations are stronger for PM2.5) – includes development of cardiovascular and respiratory diseases, reduced lung function, impaired lung growth, increased rate of disease progression, lung cancer, cognitive decline, reduction in life expectancy - premature death, particularly in people who have chronic heart or lung diseases
- > **Research in this area is ongoing**

Research on air pollution

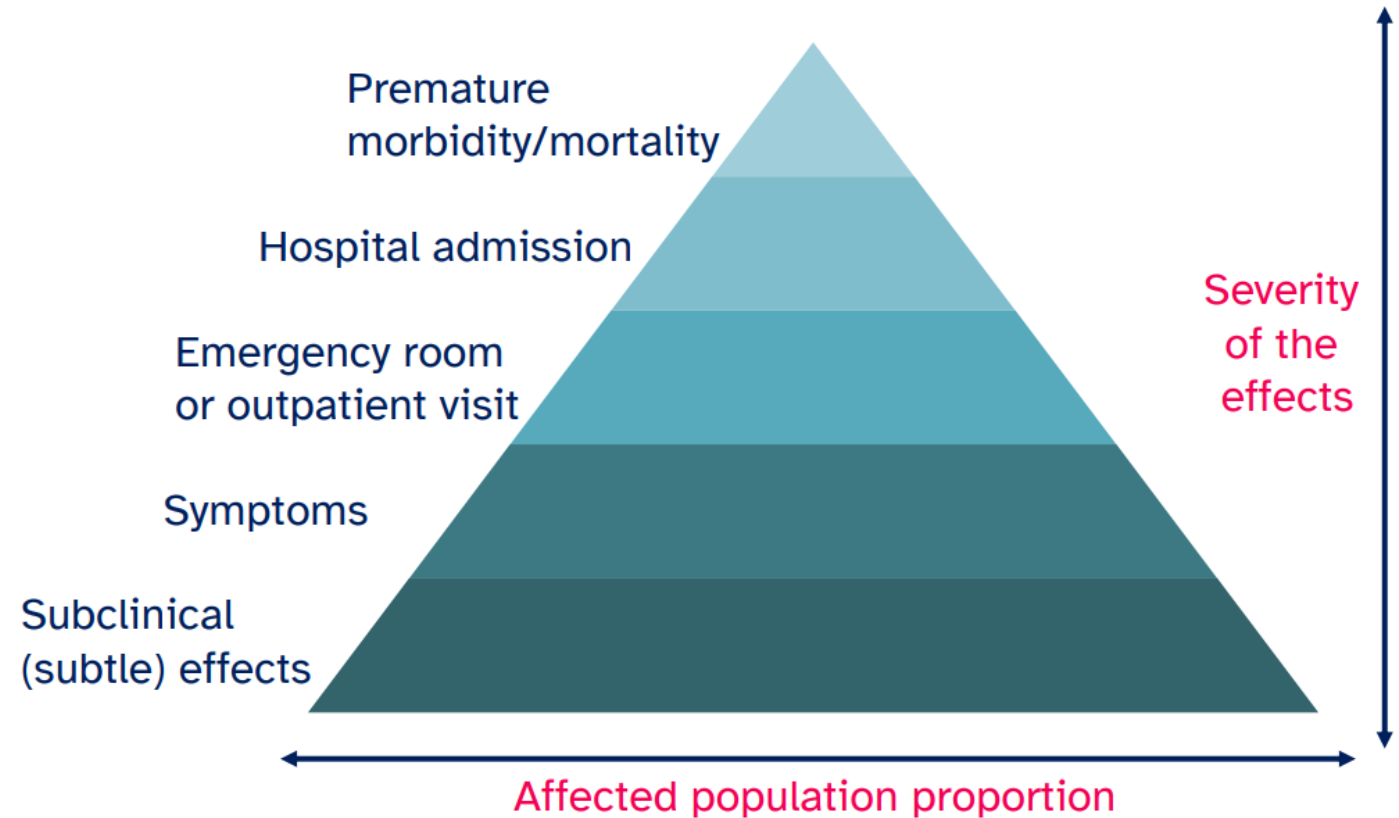


Publications per year using key words "air pollution" and "health" in PubMed 1950-2018

Source: WHO, 2024. Air pollution and health: an introduction for health workers
<<https://openwho.org/courses/air-pollution-health-workers>>

PM and health

Health effects of air pollution



Adapted from American Thoracic Society, 2000

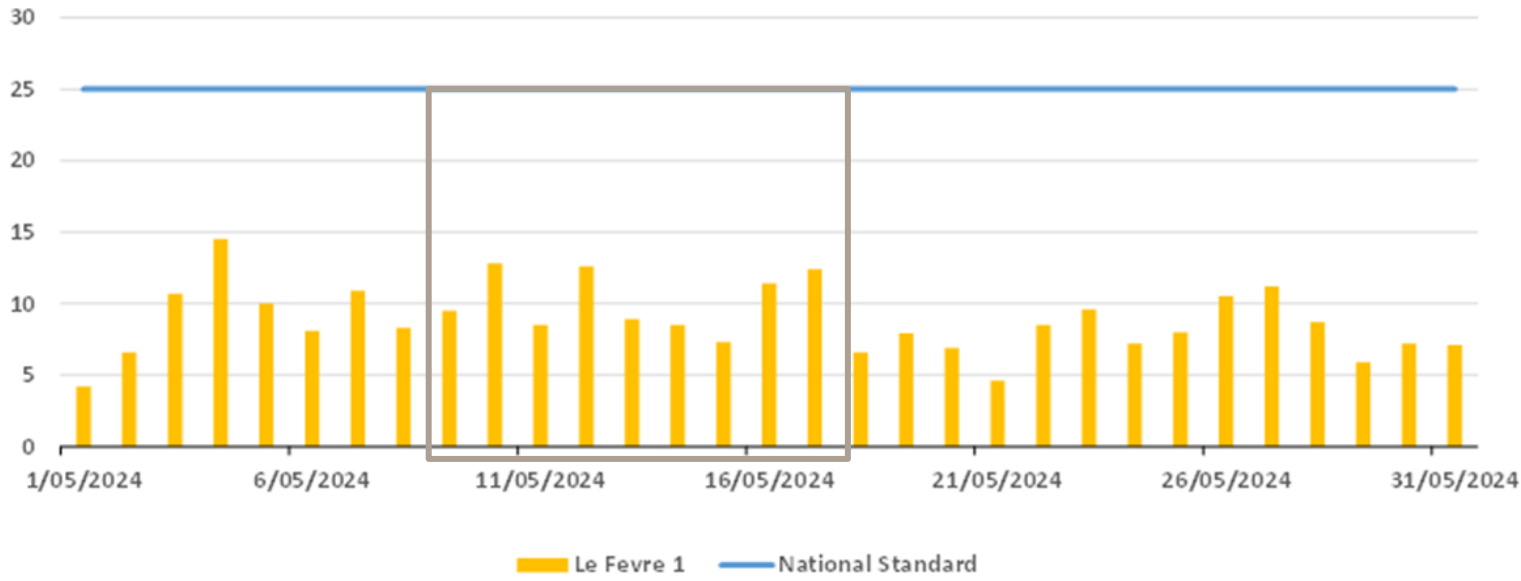
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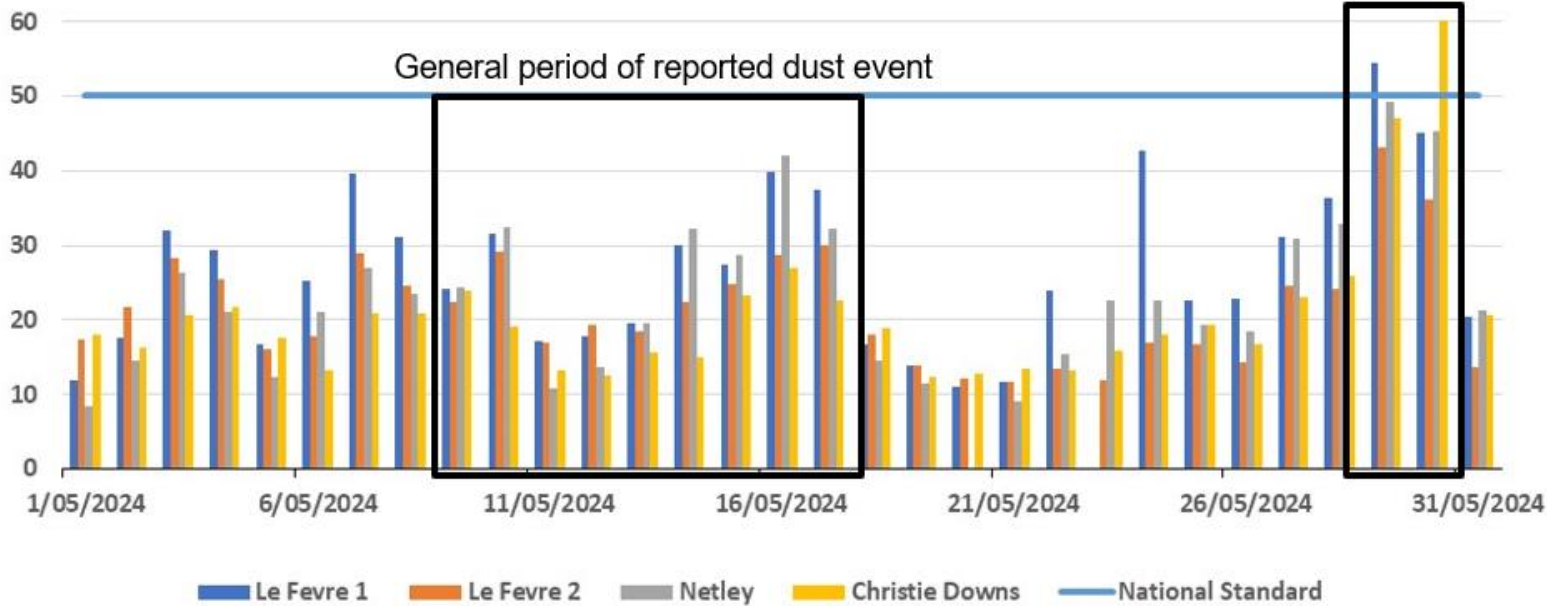
Vulnerable population

- > Children, pregnant women, older adults (>65 years), and individuals with pre-existing heart and lung disease
- > **Highly sensitive populations** e.g. children and older adults (>65 years) *who also have pre-existing heart and/or lung/respiratory disease*
- > People who may be exposed to increased PM in their occupation

Daily PM_{2.5} (µg/m³) - May 2024



Daily PM₁₀ (µg/m³) - May 2024



Particulate matter and health - questions

Q: What are the impacts on breathing (lung issues), reports of residents coughing up black gunk, itchy eyes, increasing incidence of asthma, disgusting smell in the air (what is the cause of the smell)?

Q: What are the long-term impacts on young children's development and on allergies?

Q: What is to be done about anxiety and physical health issues from living with the dust

Q: What are the health standards for ingestion of cement particles by community members that came from the clinker shed on the 13th – 14th May 2024?

Q: What is the chemical breakdown of the dust samples analysed by the EPA?

Particulate matter and health questions cont.

Q: What are the impacts on local environment including black dust building up in gutters, on roofs, on cars, solar panels, heavy dust particles on vegetable gardens, dust in water tanks, using water from tanks for drinking and on gardens (vegetables)?

Q: Is there any testing being done on soil, rainwater tanks and the Port River for dust contamination?

Q: What is in Clinker and are there health implications on the amount produced in the atmosphere for people living on Lefevre Peninsula?

Health studies

> Advantages:

- Document disease and/or exposures
- Demonstrate a relationship between exposure and disease
- Can be used to help educate and prevent future disease

> Disadvantages:

- What is the question we want answered?
- The results may not give you the answer you want
- It takes time and money

> Limitations:

- Sample size
- Availability of health data
- Science builds on evidence, one study is rarely enough to convince the scientific community

A. *What do you want to know?*

That is, what is your *question or concern*?

Sample responses:

- How much soot from the power plant are we breathing?
- Is there too much illness in our community?
- Why are people sick?
- Is the mold in the school making our kids sick?

B. *Why do you want to know?* That is, what is your *goal*?

Sample responses:

- Stop the development
- Prove we were right
- Clean up the site
- Get compensation



Summaries of existing health studies

Industry, air quality, cigarette smoke and rates of respiratory illness in Port Adelaide – 1999:

> Purpose:

- Look at the presence of self-reported asthma, bronchitis/ emphysema, wheezing, night cough and smoking in Port Adelaide;
- Relationship between these symptoms and the presence of industry, tobacco smoke, indoor appliances and air quality

> Method:

- Residential and health surveys
- **Area 1** - little industry, **Area 2** - cement works, **Area 3** - most industrialised, including a soda plant and the State's principal power generation facility

> Outcomes:

- Higher rates of certain respiratory conditions in males, esp. children and adults aged >25 years:
 - High industry – area 3
 - Indoor sources and habits - associated with smoking and unflued gas heaters

Summaries of existing health studies

The association between air pollution and lung cancer in the North West of Adelaide: a case control study and air quality monitoring – 2004:

> Purpose:

- Determine whether residential exposure to industry is a risk factor for lung cancer in NW Adelaide

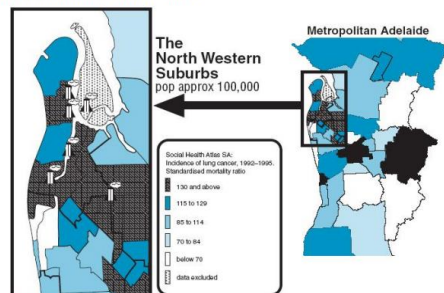
> Method:

- 142 lung cancer patients and 415 age, gender matched population controls were interviewed using an event history calendar

> Outcomes:

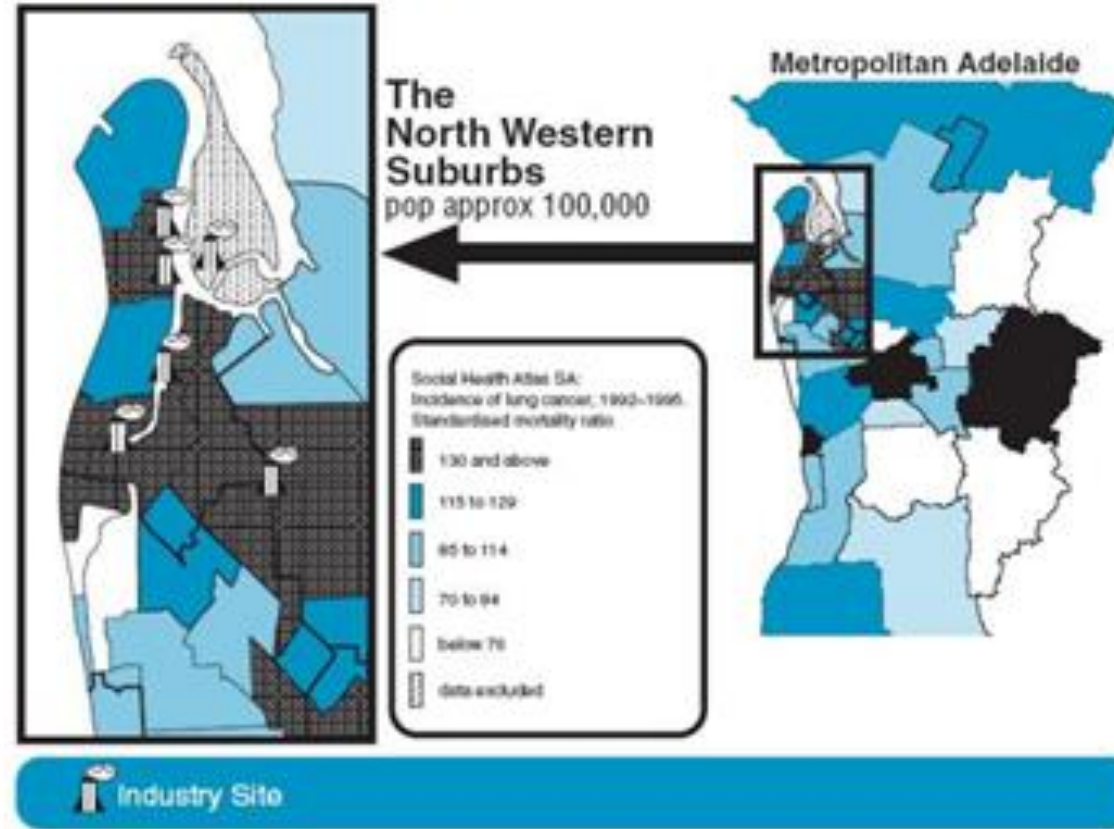
- Air monitoring suggested no public health risk at the time
- Suggested cigarette smoking likely to be the main cause of high lung cancer mortality in suburbs of NW Adelaide at the time

Figure 1-1: Lung Cancer Incidence¹ and Industry Location in the North West of Metropolitan Adelaide from 1992 to 1995.



Summaries of existing health studies

Figure I-1: Lung Cancer Incidence¹ and Industry Location in the North West of Metropolitan Adelaide from 1992 to 1995.



Health studies - questions

Q: There was a health study conducted on the Lefevre Peninsula in 1980. Has there been some longitudinal work done in relation to this or another study on residents living on the peninsula? Can this be done?

Q: Is AdBri doing any specific health studies (in conjunction with SA Health) within the fallout zone from the recent dust event? Can this be made a condition of their licensing with EPA (in conjunction with SA Health)?



AirRater

Helping people with asthma, hay fever or other lung conditions to better manage their symptoms and improve their quality of life



A service that focuses on pollution and smoke



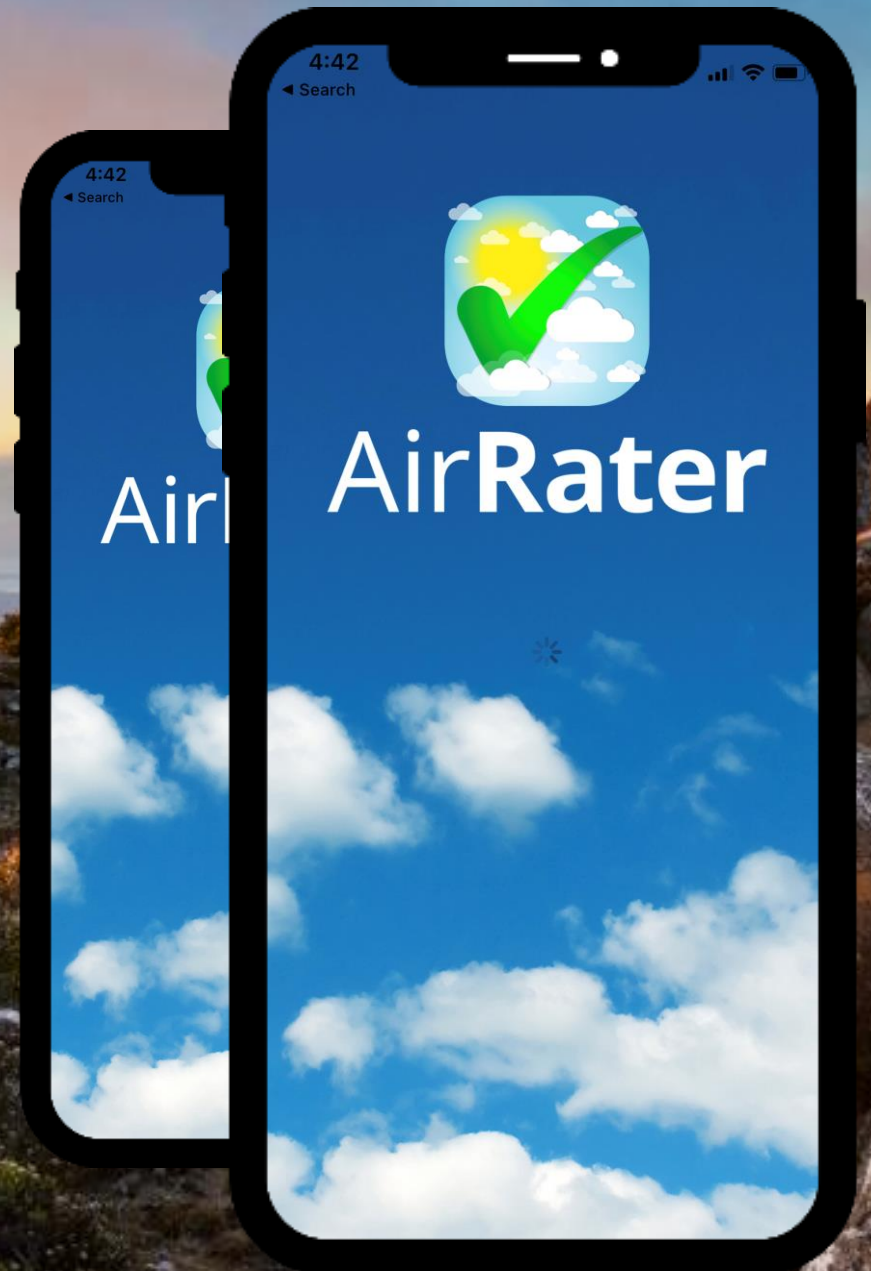
Used by governments for public health surveillance

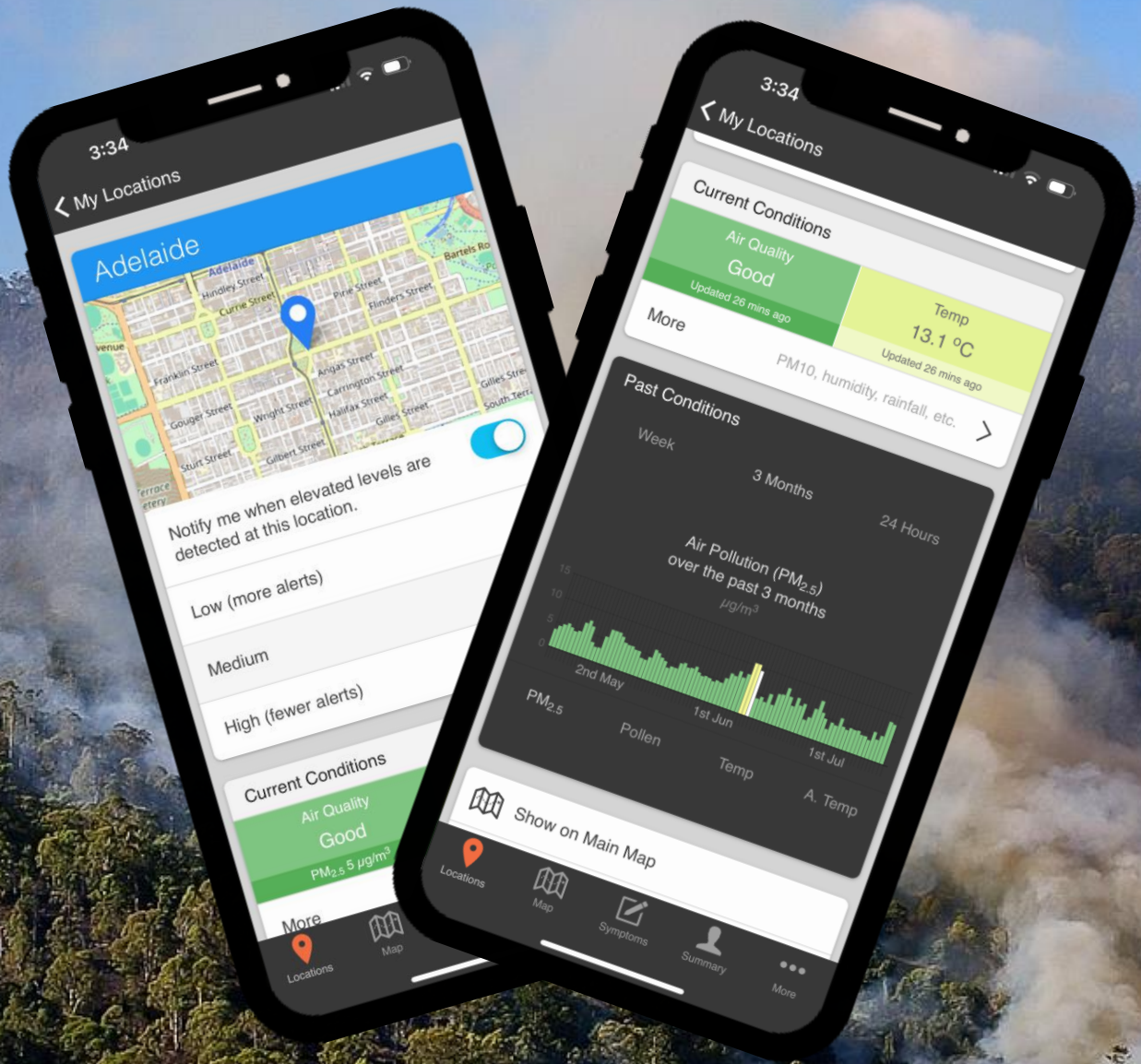


AirRater service described in several federal and state inquiries



UNIVERSITY of
TASMANIA
AUSTRALIA





AirRater

Developed and launched in 2015,
now has over 100,000 users
Australia-wide

Provides real-time information
on local air quality and pollen
(where available)

Backed by world leaders in
environmental health research

Free download and use



Available on the
App Store



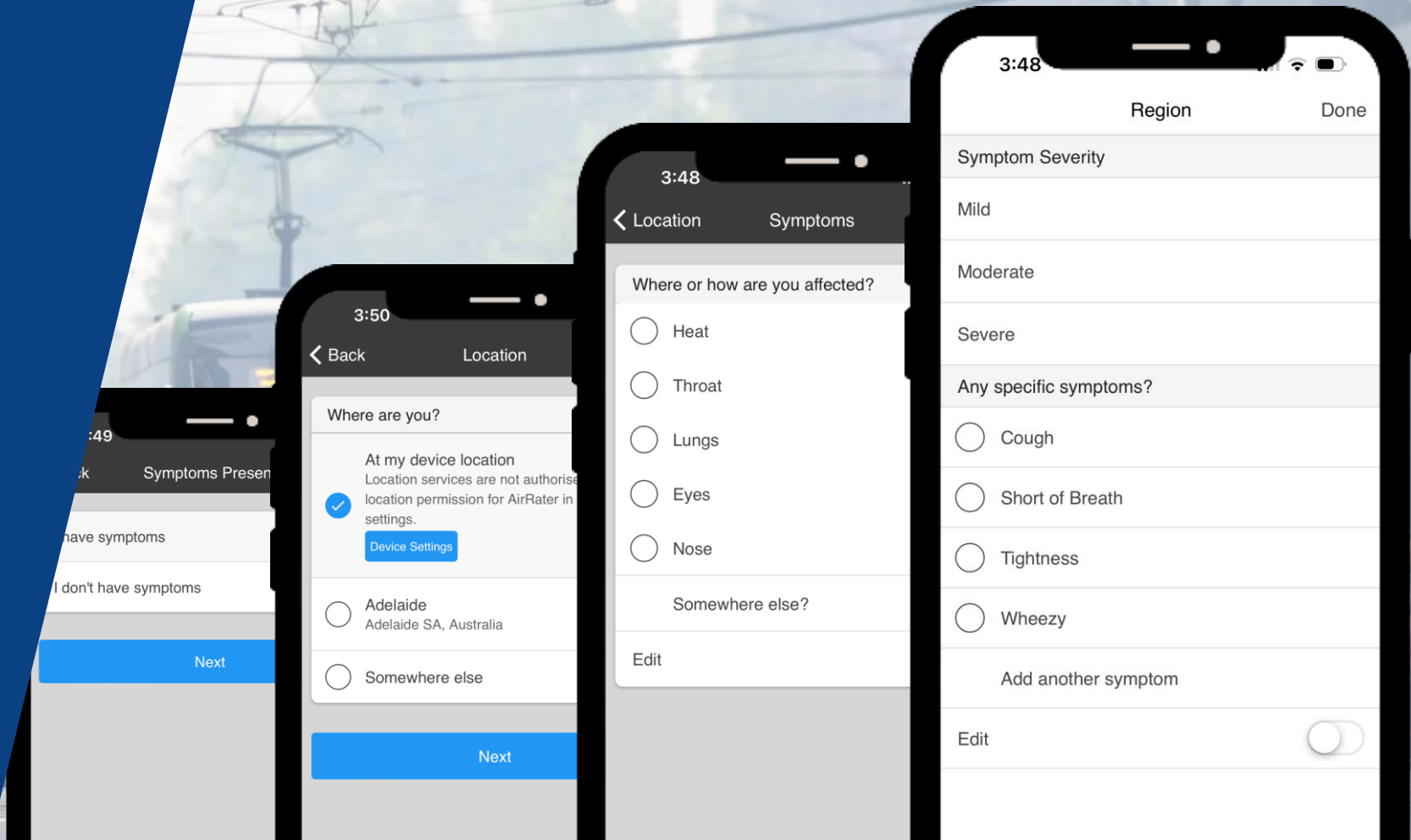
GET IT ON
Google Play

Report your Symptoms

Track where you were when you had symptoms

What time of day your symptoms occurred

What type of symptoms you had





Personalised Health information

Personalised Health information

Identifies your triggers
(smoke, pollution, pollen, heat)

Notifications when triggers
are present