Traffic related air pollution in urban environments

A/Prof Vicki Kotsirilos AM

MBBS, FASLM, FACNEM, Honorary RACGP fellow

Medical writer, GP, lecturer

Adjunct A/Prof University of Western Sydney

Formerly adjunct A/Professors with Monash & La Trobe Universities

Respect to our Elders

I'd like to acknowledge our First Nations people, the traditional owners & custodians of Country throughout Australia, & their connections to land, waters & community.

And pay our respects to the Elders past, present & future.

Grandmother's Country by Gabriella Possum Nungarrayi

Thank you to the organiser:

Jane Waldock

Metropolitan Transport Forum

A warm welcome to special guests and Council representatives .

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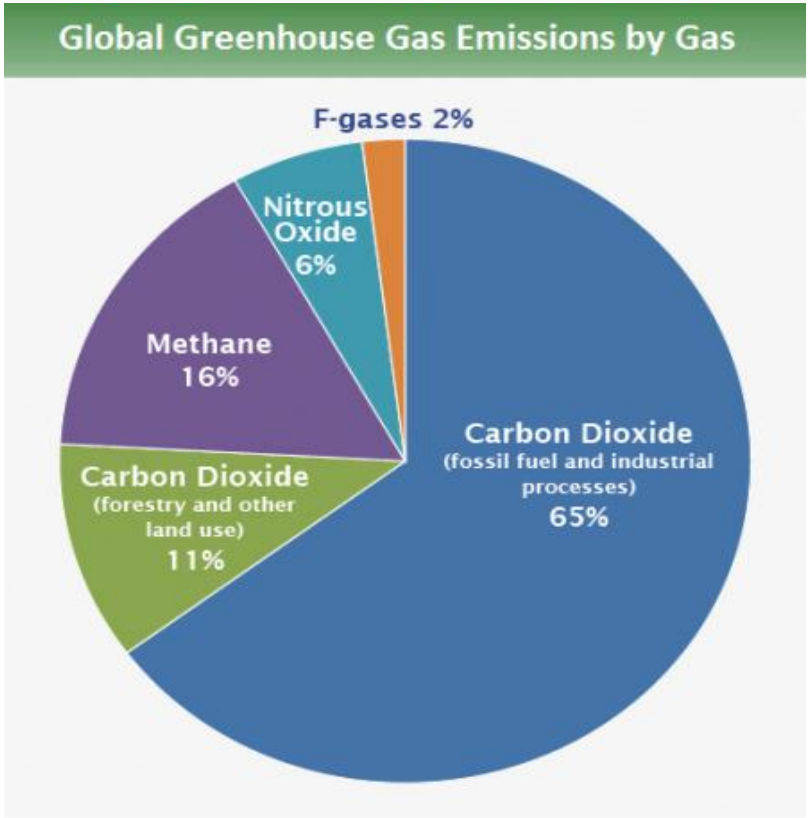
- How Council can make a difference to the health of the community

Why focus on Air Pollution?

1. Every human being deserves to breathe clean air → contributes to health problems!

2. Air pollution contributes to Global Greenhouse Gas emissions & climate change



https://www.epa.gov/sites/production/files/2016-05/global_emissions_gas_2015.png

← same sources of Air pollution

Sources of Air Pollution

- **Vehicle emissions from combustion processes -petrol, diesel**
- Industrial activities such as brickworks, refineries, iron & steel making, quarrying, cement plants, & paper mills
- Wood burning – wood fires, hazard reduction, back burning
- Bushfires
- Dust storms
- Coal-fired power stations
- Mining/smelters eg coal, Gold [releases↑mercury into env], Cu, Pb, Zn, & silver mines
- Agricultural eg ammonia from heavily fertilized fields & livestock

National Pollution Inventory http://www.npi.gov.au/resource/particulate-matter-pm10-and-pm25

CSIRO Submission no 48 to Senate Community Affairs References Committee, Parliament of Australia, *Impacts on Health of Air Quality in Australia, p8*

Sources of Air pollution

-Multiple sources of air pollution

Image source

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Vehicle emissions
[Traffic related Air Pollution TRAP]

→ contribute to multiple gases & chemicals

72% CO emissions
70% NOx emissions
28% volatile organic compounds (VOC)
31% $PM_{2.5}$
27% PM_{10}
6% SO_2

Diesel particulates, ozone, CO, NO, NO_2, SO_2
Particulate Matters 2.5 (PMs 2.5) & PMs 10
Ultrafine Particles UFPs
combustion particles eg VOCs,
metals, sulfates, nitrates & black carbon **CLASS 1 carcinogen**

Source Vic EPA Vehicle emissions and air quality &
https://www.resources.nsw.gov.au/sites/default/files/2022-09/fact-sheet-dpm-personal-exposure-monitoring-and-exceedance-notification-draft.pdf

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HOT SPOT IN URBAN ENVIRONMENTS – high vehicle congestion

SHOPPING CENTRES, DROP OFFS EG SCHOOL & CHILDCARE eg idling

Image source

Depending on weather conditions→↑ pollution

eg no wind, heat waves, warmer temperatures, cloud cover, smoke canopy....

Image source

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World Health Organisation air quality guidelines:

"*…there is little evidence to suggest a threshold below which no adverse health effects would be anticipated*".

World Health Organization. Air Quality Guidelines for Particulate Matter, Ozone, Nitrogen Dioxide and Sulfur Dioxide: Global Update 2005. Geneva (CHE): WHO; 2006. https://go.galegroup.com/ps/i.do?p=AONE&sw=w&u=googlescholar&v=2.1&it=r&id=GALE%7CA174061909&sid=classroomWidget&asid=acec1d40

https://www.nejm.org/doi/full/10.1056/NEJMsb2011009?query=TOC

Victorian Environmental Protection Authority (EPA)

"There is well established scientific evidence that traffic related air pollution, even at concentrations well below the current air quality standards, is associated with adverse health effects."

EPA Submission Regarding Mordialloc Freeway Environmental Effects Statement (EES) https://s3.ap-southeast-2.amazonaws.com/hdp.au.prod.app.vic-engage.files/7915/4501/3669/Submission_98_EPA_Victoria.pdf

EPA's submission uploaded as an attachment [Accessed 27 January 2019].

National Ambient Air Quality (Government) standards

The National Environment Protection Measure for Ambient Air (Air NEPM)

sets national standards for the 6 key air pollutants

Average 24 hour & annual readings for

PM's 10 & 2.5, CO, NO2, O3, SO2

+ Lead + visibility reducing particles

National Environment Protection (Ambient Air Quality) Measure

https://www.nepc.gov.au/nepms/ambient-air-quality

Schedule 2 Standards and Goal

Table 1: Standards for Pollutants

Column 1 Item	Column 2 Pollutant	Column 3 Averaging period	Column 4 Maximum concentration standard
1	Carbon monoxide	8 hours	9.0 ppm
2	Nitrogen dioxide	1 hour 1 year	0.08 ppm 0.015 ppm
3	Photochemical oxidants (as ozone)	8 hours	0.065 ppm
4	Sulfur dioxide	1 hour 1 day	0.10 ppm 0.02 ppm
5	Lead	1 year	0.50 µg/m^3
6	Particles as PM_{10}	1 day 1 year	50 µg/m^3 25 µg/m^3
7	Particles as $PM_{2.5}$	1 day 1 year	25 µg/m^3 8 µg/m^3

Note There are no maximum allowable exceedances.

Table 1A: Standards for SO_2 from 2025

Column 1 Pollutant	Column 2 Averaging period	Column 3 Maximum concentration
Sulfur dioxide	1 hour	0.075 ppm

Table 2: Goal for Particles as $PM_{2.5}$ from 2025

Column 1 Pollutant	Column 2 Averaging period	Column 3 Maximum concentration
Particles as $PM_{2.5}$	1 day 1 year	20 µg/m^3 7 µg/m^3

For the purposes of this Measure the following definitions shall apply:

(1) Lead sampling must be carried out for a period of 24 hours at least every sixth day.

(2) Measurement of lead must be carried out on Total Suspended Particles (TSP) or its equivalent.

↑ **20/7micrograms per cubic metre**

National Environment Protection (Ambient Air Quality) Measure

https://www.nepc.gov.au/nepms/ambient-air-quality

https://www.legislation.gov.au/F2007B01142/latest/text

https://www.epa.vic.gov.au/for-community/airwatch/airwatch-table-data-page

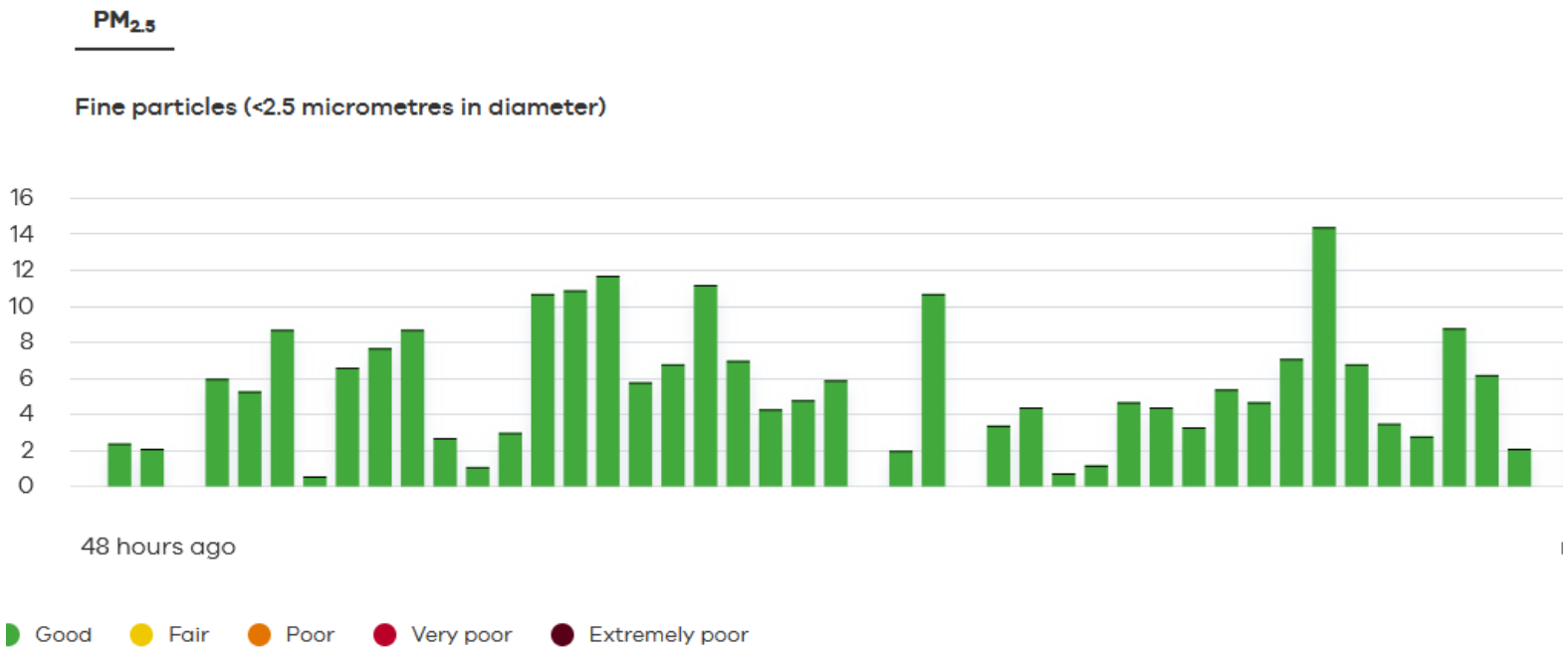
Where does this data come from?

The Brighton air monitoring site is located off Lindsay Street, Brighton.

It is between the Sandringham train line and a road with light residential traffic. The Nepean Highway, with heavy traffic, is 1.5 km to the east.

at Brighton

The graph shows pollutant concentrations over the last 48 hours, calculated at one-hour averages. Using the labels above the graph shows each pollutant measured at this station. Find out more about our **air quality categories**.



Air quality monitoring data across Victoria

Data from all of EPA's monitoring sites is available here.

https://www.epa.vic.gov.au/for-community/airwatch?siteId=d56ede8c-637a-41e9-a055-f53198e9456a

What are ‘Safe levels of pollutants?

Relevant studies [eg AUS, USA, EUR] demonstrate PM 2.5 concentrations well below current air quality standards →

harmful effects on health

Eg studies demonstrate exposure to PM2.5 as low as 5-10 µg/m3 can be harmful **20/7 µg/m3**

Barnett A. It’s safe to say there is no safe level of air pollution. Australian and New Zealand Journal of Public Health. 2014;38:5:407-408

https://onlinelibrary.wiley.com/doi/full/10.1111/1753-6405.12264

https://www.nejm.org/doi/full/10.1056/NEJMsb2011009?query=TOC

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TRAP –impact on health

https://www.unimelb.edu.au/__data/assets/pdf_file/0006/4498161/Expert-Position-Statement_Vehicle-emissions_FINAL.pdf

THE UNIVERSITY OF MELBOURNE

Melbourne Climate Futures

Health impacts associated with traffic emissions in Australia.

Expert Position Statement

Vehicle emissions

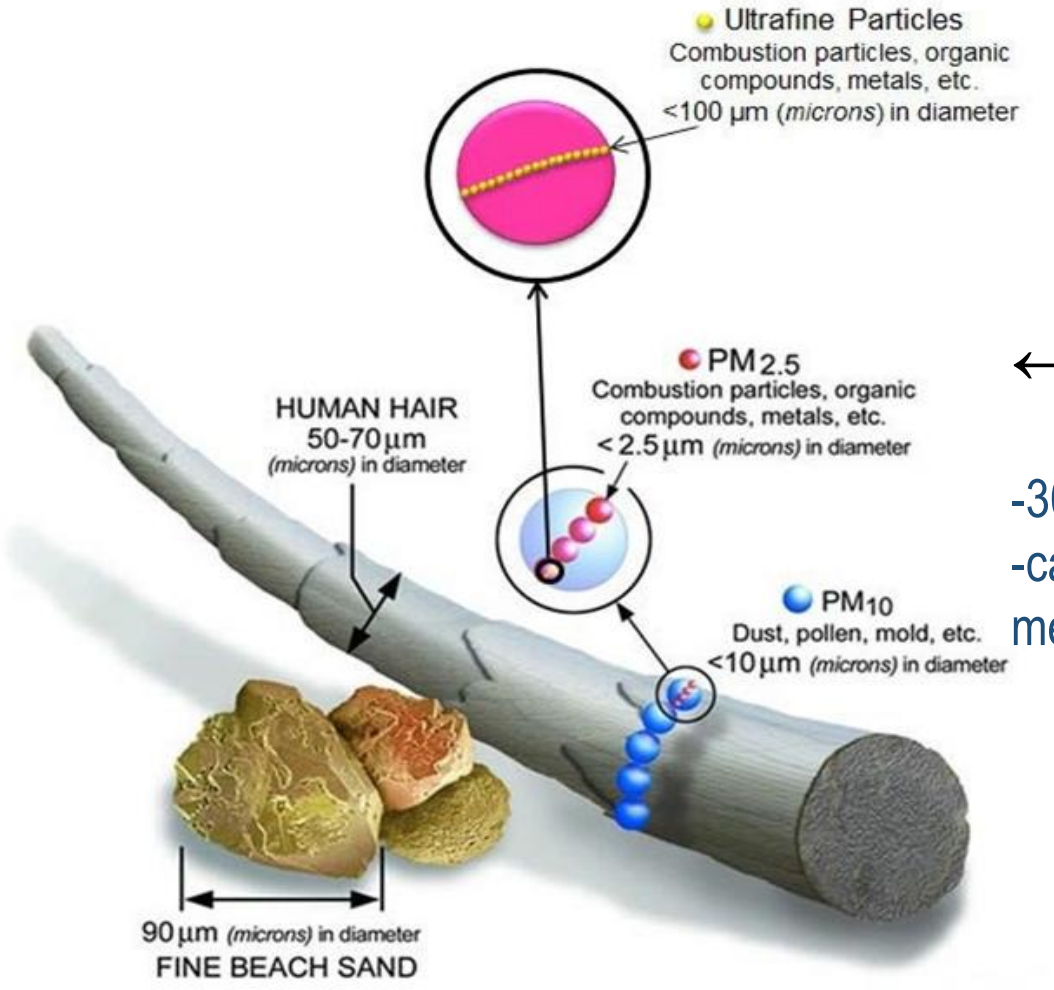
- In Australia, it is estimated that TRAP is contributing to

>11,000 premature adult deaths/year due to combined PM2.5 & NO2, according to Melb Uni research

- ↑risk of morbidity & mortality

Systematic Review and Meta-analysis of Selected Health Effects of Long-Term Exposure to Traffic-Related Air Pollution

PMs: sizes of particulate matter compared to human hair



←Ultrafine Particles < 0.1µm

-combustion particles, VOCs, metals etc

←PM 2.5 Fine particles

≤ 2.5 micrometres in diameter

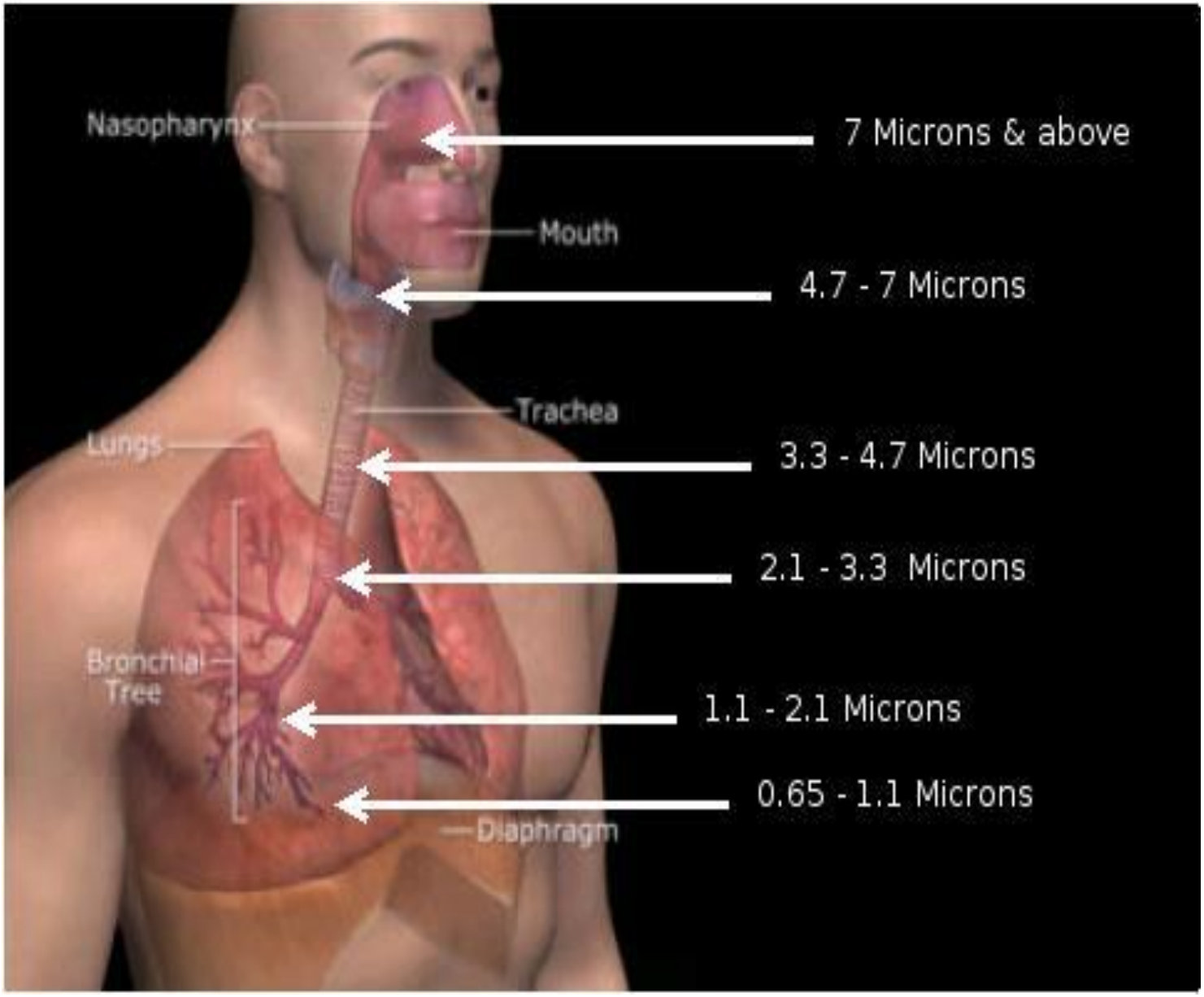
-30x smaller than the width of hair

-carry harmful combustion particles, VOCs, metals etc

←PM10 Coarse particles <10µm micrometres in diameter

-dust, pollen, mould…

Source https://now.tufts.edu/articles/toxic-air-we-breathe



Dean E. Schraufnagel, et al. **Air Pollution and Noncommunicable Diseases. A Review by the Forum of International Respiratory Societies' Environmental Committee, Part 1: The Damaging Effects of Air Pollution** February 2019 Volume 155, Issue 2, Pages 409–416 https://journal.chestnet.org/article/S0012-3692(18)32723-5/fulltext

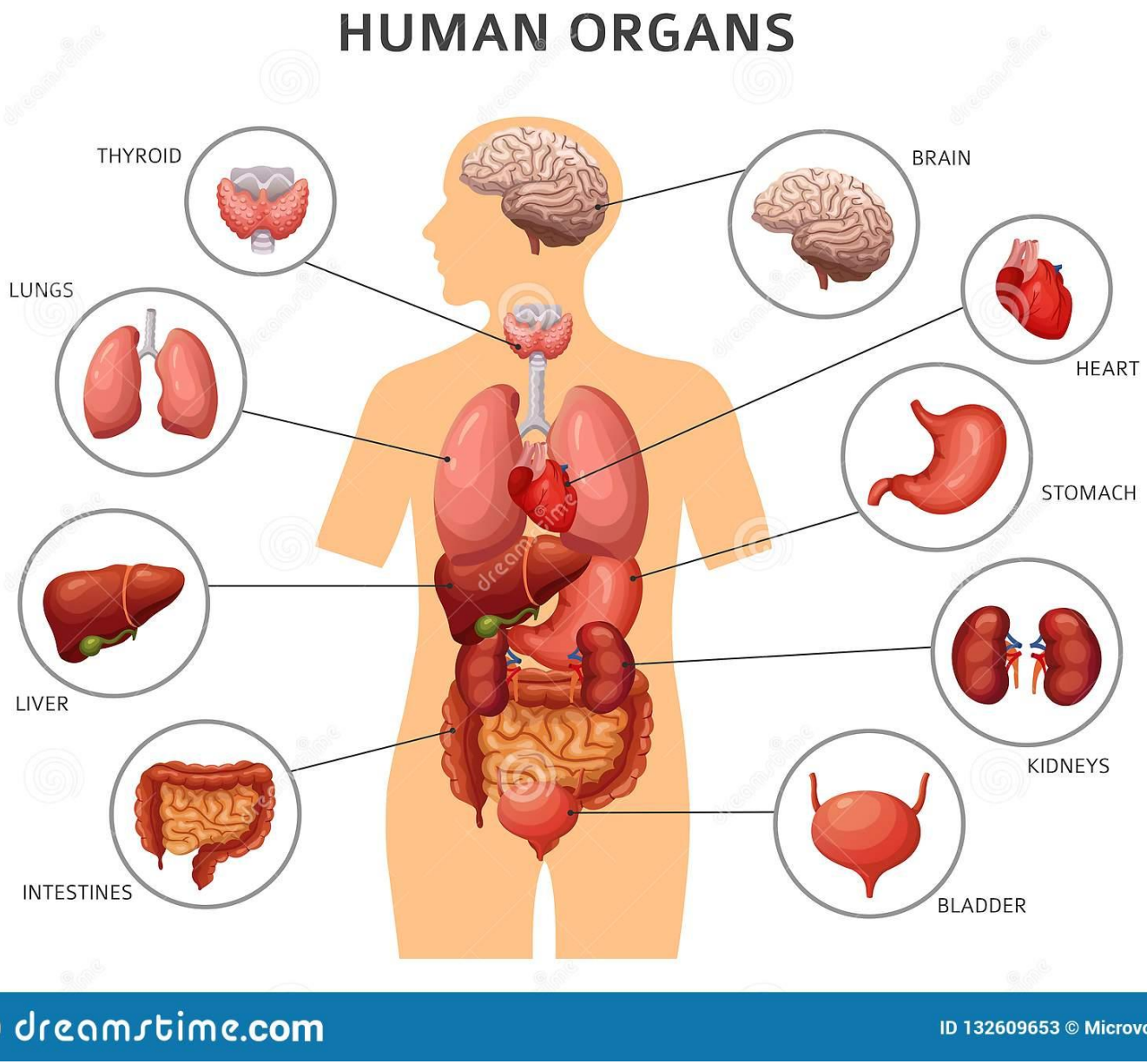


Image source

PM2.5's → cause or are associated with:

Hime, H., C. Cowie, and G. Marks, ***Review of the health impacts of emission sources, types and levels of particulate matter air pollution in ambient air in NSW, N.E.P. Authority and E.H.B. NSW Ministry of Health, Editors. 2015, Woolcock*** Institute of Medical Research, Centre for Air Quality and Health Research and Evaluation (CAR).

- ↑ **mortality** - premature death, cardiac arrests
- **Cardiovascular diseases** – stroke, heart disease, heart attacks & heart failure, thrombophlebitis
- **Chronic respiratory diseases** - asthma, lung disease, COPD,..
- ↑ **risk of lung & chest infections** e.g. bronchitis, pneumonia
- **Poor lung development in children**
- **Exacerbations of asthma, allergies** - sneezing, coughing, eye & sinus irritation, headaches
- **Lung cancer & other cancers**
- **Stroke, Neurological disorders in adults & children**
- **Cognitive & Memory impairment, Dementia**
- **Psychiatric disorders** – depression, psychosis, anxiety, suicide
- **Renal disease**
- **Diabetes, Obesity - Inflammation** – likely mechanism
- **Infertility -** poor sperm quality & quantity, miscarriage
- **Pregnancy exposure** - low birth weight, hypothyroidism

Asthma & reduced lung function

Children exposed to NO2, NOx & PM2.5 from traffic air pollution → reduced lung function & ↑ risk of asthma

Air pollution →↑ risk of infection

Short term ↑ may →

- ↑risk of lower respiratory infections in children & adults
- ↑ hospitalisations from infections
- ↑ of common infections eg respiratory syncytial virus RSV & influenza
- ↑ risk of pneumonia in children

Benjamin D. Horne, Elizabeth A Joy; Michelle G Hofmann; Per H Gesteland; John B Cannon, Jacob S Lefler, Denitza P Blagev; E. Kent Korgenski, Natalie Torosyan, Grant I Hansen, David Kartchner; et al. Short-term Elevation of Fine Particulate Matter Air Pollution and Acute Lower Respiratory Infection Published Online: April 13, 2018 https://doi.org/10.1164/rccm.201709-1883OC https://www.atsjournals.org/doi/10.1164/rccm.201709-1883OC

HEI Collaborative Working Group on Air Pollution, Poverty, and Health in Ho Chi Minh City[1], Le TG, Ngo L, Mehta S, Do VD, Thach TQ, Vu XD, Nguyen DT, Cohen A. Effects of short-term exposure to air pollution on hospital admissions of young children for acute lower respiratory infections in Ho Chi Minh City, Vietnam. Res Rep Health Eff Inst. 2012 Jun;(169):5-72; discussion 73-83. https://www.ncbi.nlm.nih.gov/pubmed/22849236

Nhung NTT, Amini H, Schindler C, Kutlar Joss M, Dien TM, Probst-Hensch N, Perez L, Künzli N. Short-term association between ambient air pollution and pneumonia in children: A systematic review and meta-analysis of time-series and case-crossover studies. Environ Pollut. 2017 Nov;230:1000-1008. doi: 10.1016/j.envpol.2017.07.063. Epub 2017 Jul 25. https://www.ncbi.nlm.nih.gov/pubmed/28763933

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Susceptible groups

- **Children**
- **Pregnant women**
  - **Pre & peri-natal exposure**
- **Elderly**
- **Pre-existing health conditions**
  - Respiratory diseases e.g. asthmatics, COPD;
  - Cardiac disease e.g. CVD, heart failure

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Proximity to freeway
Closer →↑ more harmful

- Communities living next to or near highways or freeways
- Outdoor workers eg road workers, traffic officers, drivers, cyclists, pedestrians, …

- **Living Near Highways and Air Pollution | American Lung Association** https://www.lung.org/our-initiatives/healthy-air/outdoor/air-pollution/highways.html
- **Health Effects Institute** https://www.healtheffects.org/ & https://www.healtheffects.org/air-pollution/traffic-related-air-pollution
- **Issue air-pollution-and-its-health-impacts-changing-panorama** | The Medical Journal of Australia Volume 177 https://www.mja.com.au/journal/2002/177/air-pollution-and-its-health-impacts-changing-panorama

↑ Indoor pollution from outdoor traffic related air pollution (TRAP)

- Indoor Air Quality Study of residential dwellings in Melbourne
- Dwellings in close proximity to major roads < 50 metres recorded highest levels of indoor air pollutants

- Eg outdoor NO_2 & roadway → ↑indoor NO_2

Sarah J. Lawson*, Ian E. Galbally, Jennifer C. Powell, Melita D. Keywood, Suzie B. Molloy, Min Cheng, Paul W. Selleck. **The effect of proximity to major roads on indoor air quality in typical Australian dwellings.** Atmospheric Environment, April 2011, Volume 45, Issue 13, p. 2252-2259.https://doi.org/10.1016/j.atmosenv.2011.01.024
http://adsabs.harvard.edu/abs/2011AtmEn..45.2252L

Close proximity - Lung cancer risk < 100 metres Lancet Oncology 2013 Europe

- MA 'ESCAPE project' · 17 cohort studies N=312,944 people
- 9 European countries
- → ↑ exposure to PM from vehicle emissions causes a significant ↑ risk of lung cancer among people living within 100 metres of a major road!

Dr Ole Raaschou-Nielsen, PhD, Zorana J Andersen, PhD, Rob Beelen, PhD, Evangelia Samoli, PhD, Massimo Stafoggia, MSc, Gudrun Weinmayr, PhD, et al. **Air pollution and lung cancer incidence in 17 European cohorts: prospective analyses from the European Study of Cohorts for Air Pollution Effects (ESCAPE)** **The Lancet Oncology** Volume 14, ISSUE 9, P813-822, August 01, 2013 Published:July 10, 2013DOI:https://doi.org/10.1016/S1470-2045(13)70279-1
https://www.thelancet.com/journals/lanonc/article/PIIS1470-2045(13)70279-1/fulltext

Proximity to freeways Lung cancer
continued

Statistically significant association b/n risk for lung cancer

PM_{10} Hazard ratio [HR] 1·22 per 10 µg/m^3 &

$PM_{2·5}$ HR was 1·18 per 5 µg/m^3 NB 20/7

&

↑ 4000 vehicle-km per day within 100 m of the residence →↑ lung cancer HR 1·09 (9%)

- Freeways in AUST attract >70K-135K vehicles/day

Dr Ole Raaschou-Nielsen, PhD, Zorana J Andersen, PhD, Rob Beelen, PhD, Evangelia Samoli, PhD, Massimo Stafoggia, MSc, Gudrun Weinmayr, PhD, et al. **Air pollution and lung cancer incidence in 17 European cohorts: prospective analyses from the European Study of Cohorts for Air Pollution Effects (ESCAPE)** **The Lancet Oncology** Volume 14, ISSUE 9, P813-822, August 01, 2013 https://www.thelancet.com/journals/lanonc/article/PIIS1470-2045(13)70279-1/fulltext

Source: https://www.google.com/search?q=CYCLING+ALONG+FREEWAY&client=firefox-b-d&source=lnms&tbm=isch&sa=X&ved=0ahUKEwiD9_zBgbHiAhXSheYKHfxmDKIQ_AUIDigB&biw=1366&bih=654#imgrc=x9aPTwyj4BulIM:

[Image source]

Close proximity – exercise eg Cyclists

SR & MA N=25 studies→

- ↓ PEFR
- ↑ airway inflammation
- ↓pulmonary function
- ↓immune function
- ↑CVD
- **Exercise -larger inhalation rates & commuting time**

- Qin F, Yang Y, Wang ST, Dong YN, Xu MX, Wang ZW, Zhao JX. **Exercise and air pollutants exposure: A systematic review and meta-analysis.** Life Sci. 2019 Feb 1;218:153-164. doi: 10.1016/j.lfs.2018.12.036. https://www.ncbi.nlm.nih.gov/pubmed/30582950

Proximity to traffic – Drivers!

Lancet Public Health 2017

- SR of 39 studies:
- **↑ risk commuters using motorised transport**
- **– motorbike, vehicle drivers**

National Asthma Council

- **Air purifiers & Car Air filters**

https://www.nationalasthma.org.au/living-with-asthma/resources/patients-carers/factsheets/car-air-filters

Cepeda M, Schoufour J, Freak-Poli R, Koolhaas CM, Dhana K, Bramer WM, Franco OH. **Levels of ambient air pollution according to mode of transport: a systematic review.** Lancet Public Health. 2017 Jan;2(1):e23-e34. doi: 10.1016/S2468-2667(16)30021-4. https://www.ncbi.nlm.nih.gov/pubmed/29249477

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Australian population projected to grow

- Current population 26.66 million – 2023
- Projected to reach >30 million people by 2033

Australian Bureau of Statistics (ABS)

Reference

https://www.abs.gov.au/ausstats/abs@.nsf/latestProducts/3222.0Media%20Release12017%20(base)%20-%202066

Population growth →
↑ Total Vehicle Count

Traffic congestion on Melbourne's Eastern Freeway
ABC News 15 Oct 2018 Source https://www.abc.net.au/news/2018-10-15/traffic-congestion-on-melbournes-eastern-freeway/10376828

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Summary of research

- STRONG EVIDENCE that air pollution →
  harmful to health – affects all organs

1. Dose dependent [even below current Govt standards]

- No safe level of pollution; harm at levels < 20/7 µg/m3
- Eg studies show harm to PM2.5 from 5-10-20-25 µg/m3
- WHO, EPA, multiple position papers & studies

2. Duration of exposure.
   - LONG TERM EXPOSURE: Cancer, CVD & Lung diseases
   - WEEKS OF EXPOSURE: Pregnancy – low birth-weight
   - SHORT TERM EXPOSURE: Allergies, Sinus congestion, Acute asthma, Heart attacks, Sudden death!
3. Susceptible groups – children, pregnancy, elderly, unwell..
4. Proximity to road <50-100 metres;
5. ↑ Total Vehicle Numbers eg >4000 vehicles→ lung cancer

Source image https://www.theguardian.com/australia-news/2019/dec/04/will-wearing-a-face-mask-protect-me-from-bushfire-smoke-explainer

P2 masks

From face masks to air purifiers: what actually works to protect us from bushfire smoke? The Conversation December 12, 2019
https://theconversation.com/from-face-masks-to-air-purifiers-what-actually-works-to-protect-us-from-bushfire-smoke-128633

NAC Air Purifiers

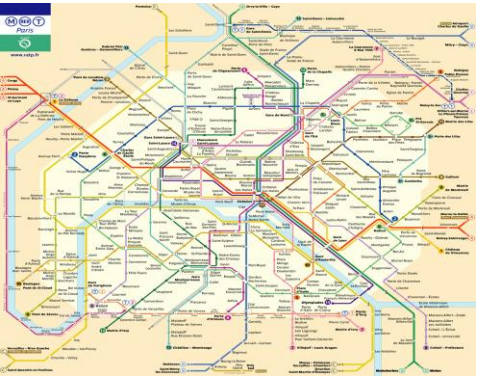
https://www.sensitivechoice.com/product-category/air-treatment/air-purifiers/

Solutions:

http://theconversation.com/green-for-wellbeing-science-tells-us-how-to-design-urban-spaces-that-heal-us-82437

Italy smog: Milan and Rome ban cars as pollution rises

28 December 2015 Share



←eg Paris underground train network

1ST WORLD COUNTRIES

It's the only way forward': Madrid bans polluting vehicles from city centre

From Friday, only vehicles producing zero emissions will be allowed to drive freely in downtown Madrid – making it a pollution pioneer in Europe

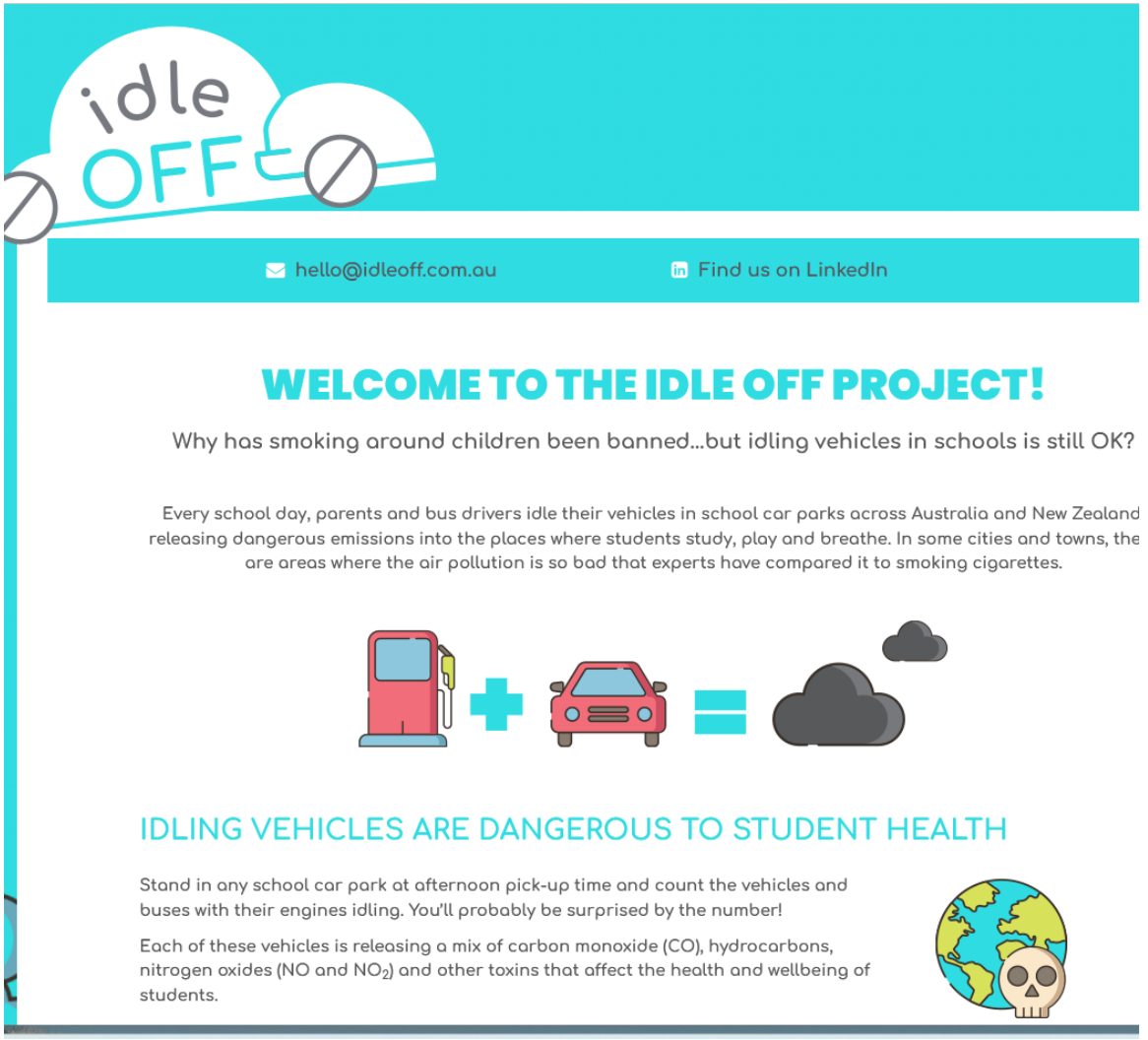
Solutions

- Improve vehicle emission standards: eg shift to electric vehicles
  - UK has pledged to ban the sale of all petrol, diesel & hybrid cars within 15 years
- Anti-idling laws
- Barriers & setbacks for schools, childcare centres
- Tighter standards for air pollutants to protect health of community in line with current research – there is no safe level! https://www.nejm.org/doi/full/10.1056/NEJMsb2011009?query=TOC
- Coal fired power station pollution-post combustion Rx of flue gases →
- Green energy e.g. wind & solar based electricity

IDLE OFF CAMPAIGN

Dr Clare Walter

https://www.idleoff.com.au/



What can Councils do

1. **Education of community** - newsletter's, social media, website - short clear messages, write to school principles for newsletters
2. **Recognise hot spots** eg 2 minute drop off centres, shopping- idling - educating parents likely to respond by turning off motor if they know the tailpipe emissions may be contributing to their child's asthma
3. **Promote anti-idling campaign to schools**
4. **Plant trees ++++** non allergic trees eg plane tree is highly allergic - use leafy evergreen shrubs & trees
5. **Educate community about value of trees in relation to shade and air pollution**
   (not climate change as it's divisive)
6. **Encourage walkability and public transport** – safe walking paths & bikes movement/ incidental exercise
7. **Pedestrian & bike tracks on quieter roads if possible** - reduces exposure to tailpipe emissions
8. **Transport Strategies & plans-** Victorian Govt sustainable transport strategies – promote active transport e.g. grow railway network, electric buses, promote walkability, cycling..
9. **Beware, multi-development & high rises** new higher-density zones around train & tram stations, focusing on taller residential buildings in "activity centers" won't reduce pollution →↑population→ vehicles **everyone wants a car in Melbourne** **Wind tunnel effect eg high rises** - increases pollution
10. **Raise community awareness why it's important to mitigate air pollution with focus on health concerns -** solutions eg shared car solutions

12. **Development of council guidelines, Infrastructure:**

eg Bayside City Council reaffirmed its commitment to preserving mature tree canopy cover through the endorsement of the Urban Forest Strategy (UFS) in 2022. This strategy aims to address the challenges posed by urbanisation, tree loss, and the evolving impacts of climate change.

Trees neighbourhood https://www.thelancet.com/journals/lanplh/article/PIIS2542-5196(25)00022-1/fulltext

Air Pollution Mitigation

Trees and Vegetation provide an important removal mechanism for pollutants and is important in providing acceptable urban living conditions.

Trees mitigate air pollution

Image source

Open spaces anywhere in urban areas & cities should now become opportunities for revegetation with trees for the health of our community.

Human survival is dependent on Trees

for the supply of oxygen & capture of carbon dioxide

The basics of photosynthesis:

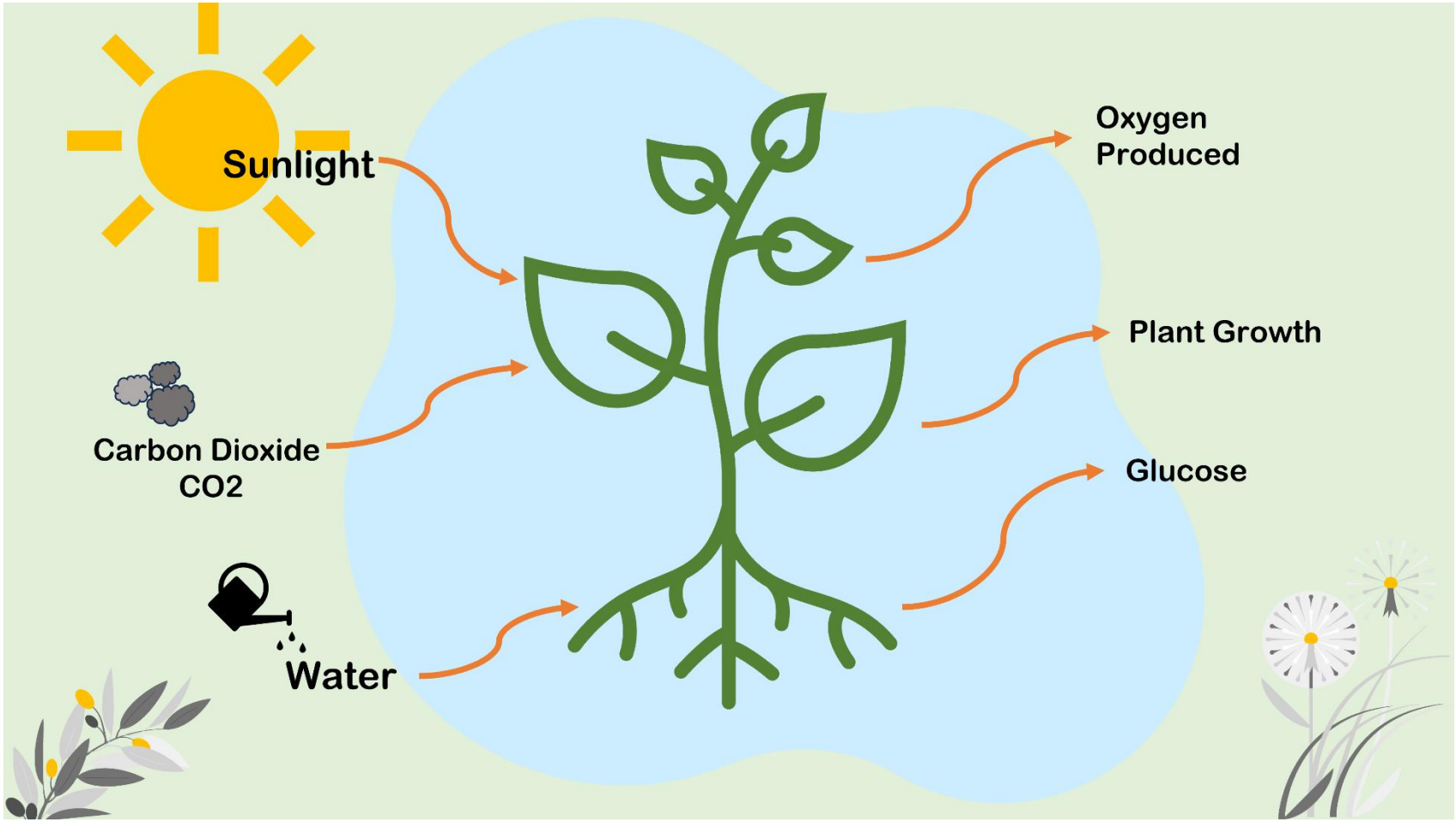


Image source

Human body relies on O2 & CO2 exchange

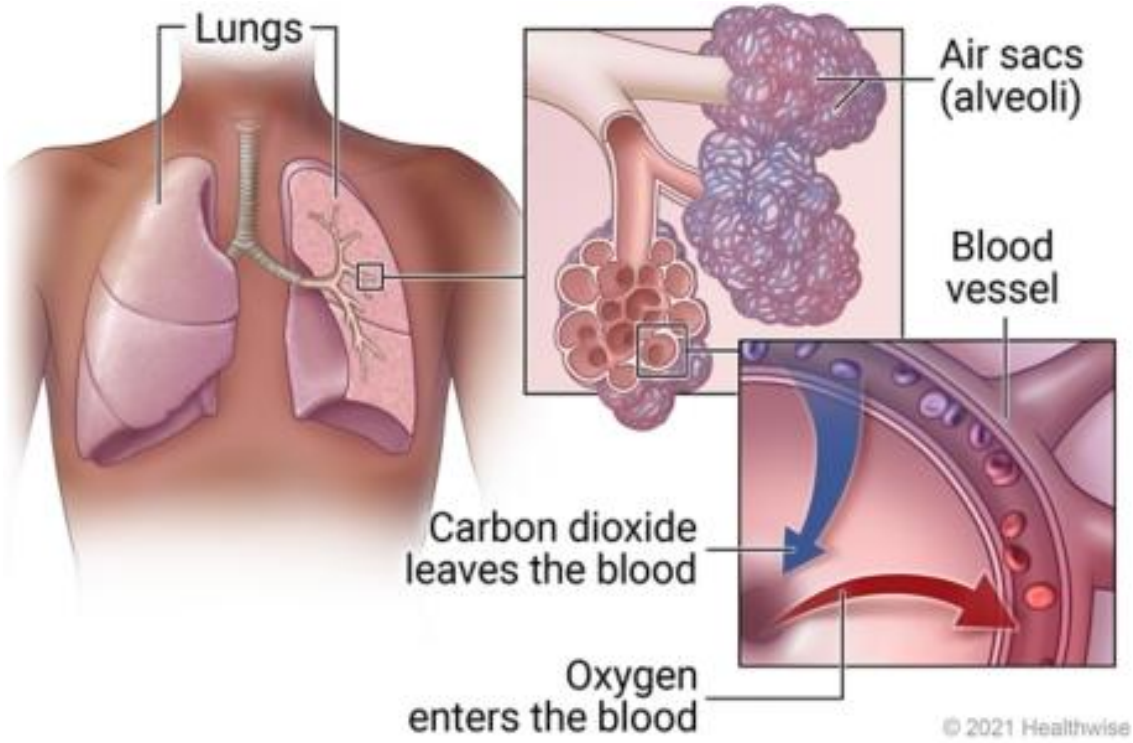
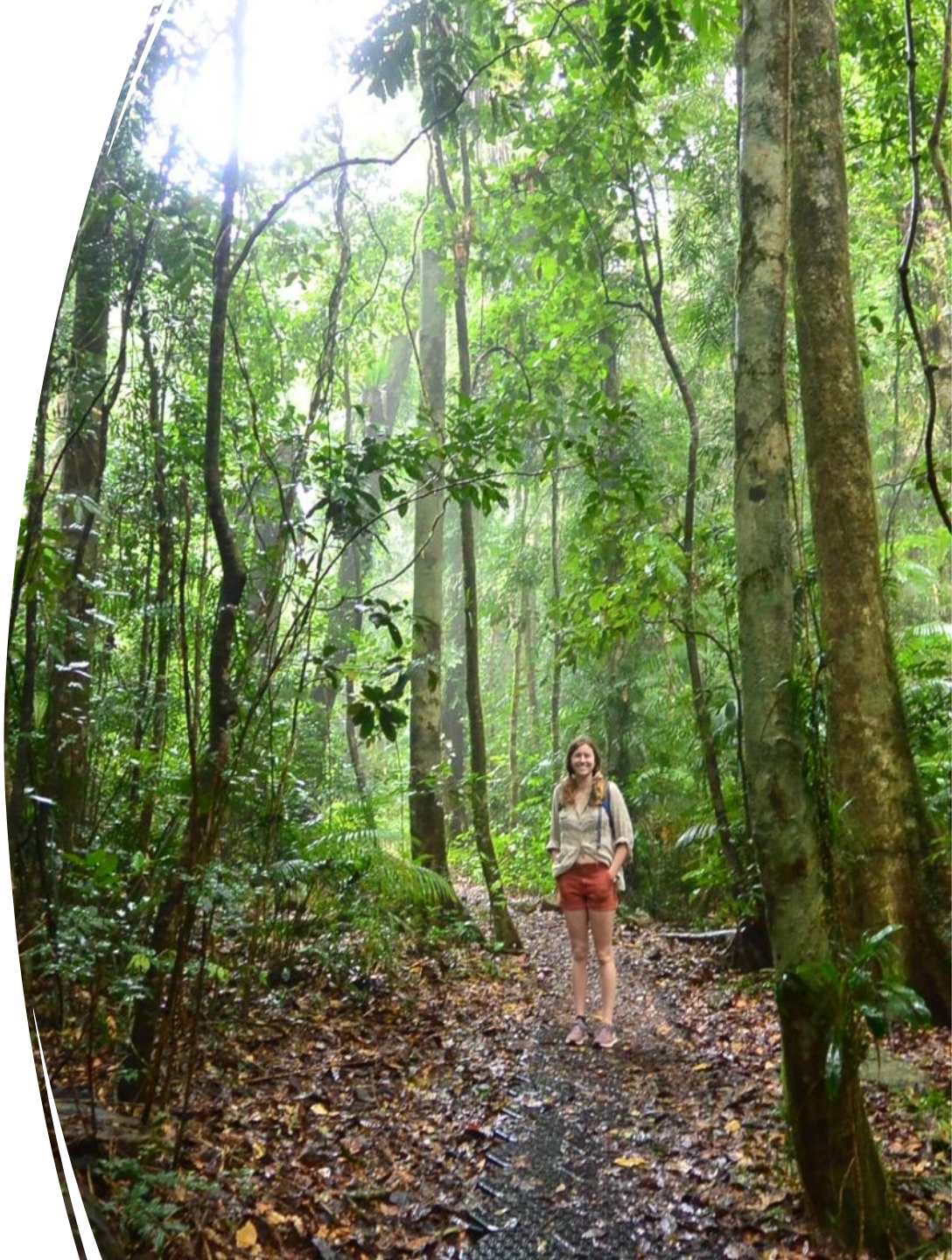


Image source

Trees capture CO2

- The earths forests absorb around ¼ of all CO2 humans expel into the atmosphere & store as carbon.




Trees cool our
communities
-the health benefits

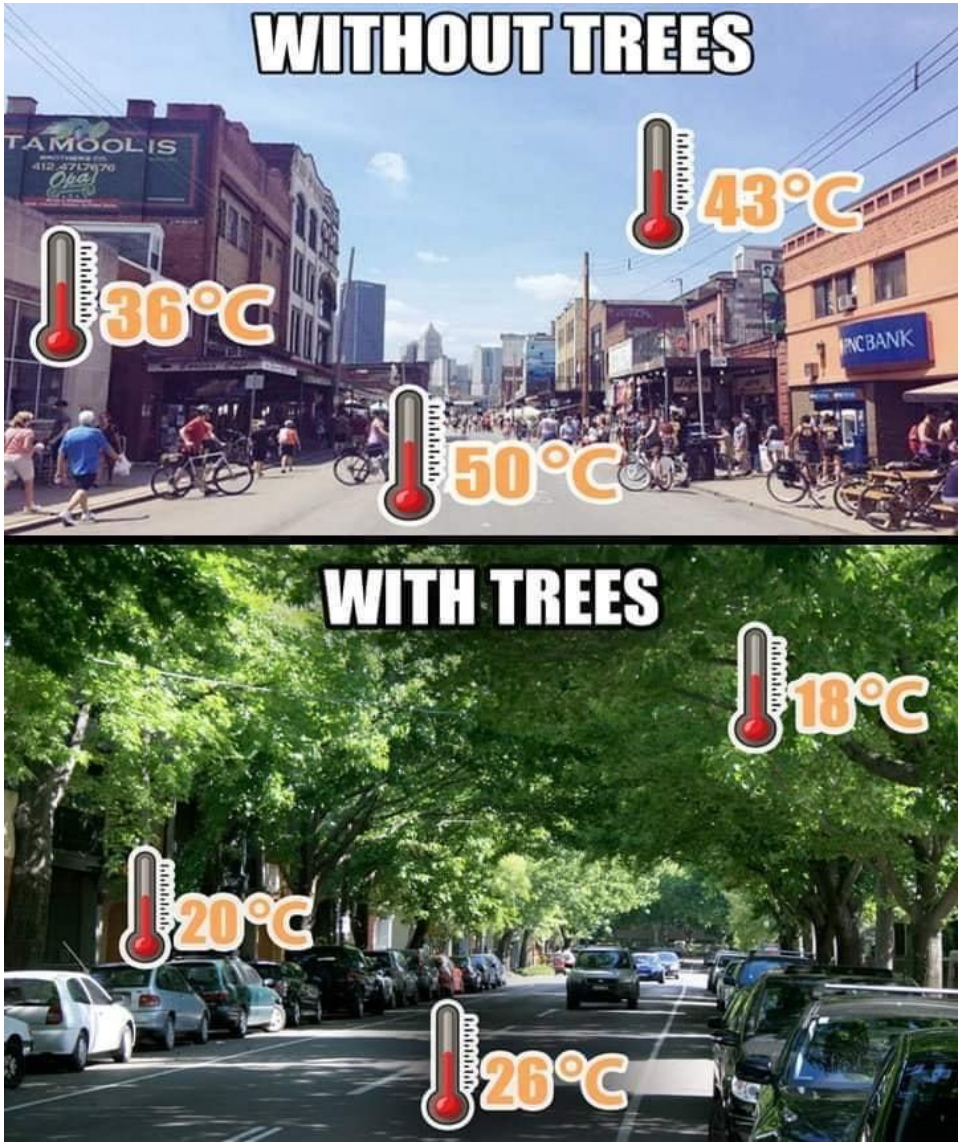
Trees cool our streets in urban environments during heatwaves Image source

Urban Heat Island effect

Source: These maps tell us we need to cool our sweltering streets | Pursuit by The University of Melbourne (unimelb.edu.au)

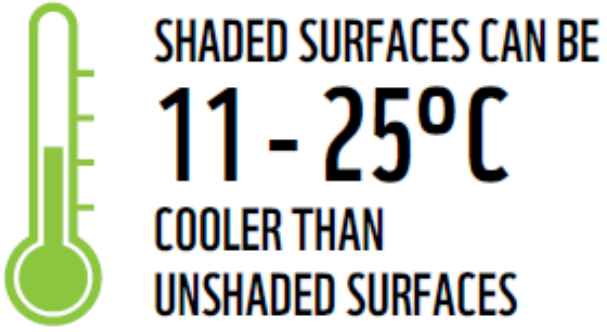
d asphalt can reach 75°C during heatwaves, whereas shaded asphalt remains relatively cool. Pictures: Getty Images

Trees cool our streets by up to 25 degrees



Urban designing incorporating more trees and green spaces for vegetation is crucial to help keep urban areas & cities cool.

Image source



NEW urban designs are crucial!

Urban heat island effect

- Trees reduce heat related heat stroke, ambulance calls and premature deaths in vulnerable communities during heatwaves..

Hot homes increase health related problems

Most of the 1007 people surveyed about their response to heatwaves:

- Some people suffered household tensions & impacted their relationships.
- 14.2% said they had experienced heat stress needing to consult a doctor or seek medical care.
- 94.2% of people could not sleep in heatwaves → sleep deprivation, fatigue, poor functioning the next day, inability to work or study.
- Suffered financial stress.
- Some people were unable to seek medical attention when they needed it during hot weather due to the cost of health care & access to healthcare particularly if they lived alone.

Reference: ACOSS Summer Heat Survey 2024

Hot homes increase health related problems

- Especially for people more sensitive to heat, such as the elderly, people with disability or chronic health conditions, infants & children.
- First Nations people and people living in social or private rental.
- Even for people who have air conditioning and/or fans, most struggle to cool their homes because these appliances do not function efficiently, do not cool the entire home, or because they cost too much to run.
- Outdoor activities or workers.

ACOSS Summer Heat Survey across Australia 2024, 1007 people [majority 35-79 yo] ACOSSHeatSurveyReport2024.pdf

Heat Stroke

Heatwaves without protection from the heat, can cause heat exhaustion that can turn into heatstroke/strain an emergency. It means the body can no longer manage the heat & the core temperature rises too high.

Heat Exhaustion

- high internal body temperature (>38°C)
- reduced amount of sweating because of insufficient fluid in the body
- nausea
- vomiting
- headache
- fainting

Heat Stress

- feeling uncomfortable from heat
- weakness
- tiredness
- cramps
- dizziness

Heat Stroke

- very high internal body temperature (>40.5°C)
- confusion
- reduced alertness
- red, hot dry skin

Heat Stroke can quickly become life-threatening

Image source Doctors for the Environment of Australia

Trees encourage outdoor physical activity

- Trees aid healthy development in children eg tree climbing for strength, agility & spatial awareness
- Only 20% of Australian children climb trees cf 65% parent's generation

Image source

Playgrounds

- A community survey in NSW found that playground users want more shade, and shade of trees are preferred over built structures.

Image source

+ Vicki Kotsirilos


Trees boost physical and mental health

Blue-green spaces over lockdowns

- A Study found spending time in Open spaces & Nature eg beaches/parks helps 'buffer' the negative mental health effects of lockdowns during the COVID pandemic, which helped with coping & is associated with more +ve emotions

Exercising outdoors is more beneficial to health than indoors

Contact with blue-green spaces during the COVID-19 pandemic lockdown beneficial for mental health,
Science of The Total Environment, Volume 756, 2021,
https://www.sciencedirect.com/science/article/abs/pii/S004896972037515X

Australian Influenza Surveillance Report - 2021 Influenza Season in Australia
https://www1.health.gov.au/internet/main/publishing.nsf/Content/cda-surveil-ozflu-flucurr.htm#current

Green spaces & leafy suburbs, trees, parklands →improves health –mental & physical

- Spending at least 120 minutes a week in nature is associated with good health and wellbeing
- A study found communities who lived within a 1 km of a nature reserve suffered fewer mental illnesses.
- **Encourages outdoor activity**→↑exercise, nature & bird watching for relaxation **& community cohesion.**
- Tree canopy cover →↓risk of all-cause mortality,CVD, heart attacks.
- **Improves psychological well being.** Parklands & green spaces help people to exercise & relax in nature.
- **Improves air quality** breathing clean air rather than polluted air.
- **↓ air pollution** → ↓ incidence of respiratory diseases, asthma.
- **Certain leafy green trees also trap & filter pollens** on windy days.
- Children living in areas with more street trees have lower prevalence of asthma.

Resources

- TREES: THE FORGOTTEN HEROES FOR OUR HEALTH WWF Doctors for the Environment Australia March 2023
  https://www.dea.org.au/trees_the_forgotten_heroes_of_our_health

- http://www.melbourne.vic.gov.au/community/greening-the-city/Pages/greening-the-city.aspx

Green spaces & leafy suburbs, trees, parklands References

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- https://theconversation.com/planting-more-trees-could-reduce-premature-heat-related-deaths-in-european-cities-by-a-third-new-research-198960
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