

4 PRESCRIBED BURNING IS BAD FOR HUMAN HEALTH



FACTS ABOUT PRESCRIBED BURNING AND WILDFIRE IN SOUTH-WEST FORESTS

The impact of poor air quality on the health of the general population is well described, and pollution from prescribed burning carries the same risks. The more serious health impacts on fire-fighters and first responders are not considered in this fact sheet.

As described in Box 1, particulate matter resulting from bushfires, causes **health problems**, with larger particles (PM_{10}) contributing directly to airway inflammation and exacerbation of throat and lung disease, and smaller particles ($PM_{2.5}$), which enter the bloodstream, causing vessel inflammation with narrowing causing heart attacks, strokes or worsening of metabolic problems. $PM_{2.5}$ is critical for two reasons: first, it cannot be seen and second, people may not know they are at risk because often they have no symptoms from their blood vessel disease. Evidence shows there is no safe threshold of exposure to either PM_{10} or $PM_{2.5}$ (Borchers et al.¹; Zosky et al. 2021²).

Using *National Environment Protection Measure for Ambient Air Quality (Air NEPM)* reports for Western Australia from 2002–2017, Borchers estimated deaths, hospital admissions and emergency department attendance due to elevated $PM_{2.5}$ concentrations from prescribed burning. The estimated increases were:

- 21 premature deaths from prescribed burning (95% confidence interval 8–35)
- ~140 hospitalisations for cardiovascular and respiratory problems
- ~63 emergency department visits with asthma.

The total estimated health costs attributable to prescribed burning were \$97.1 million, with 2017 having the greatest annual health cost estimated at \$24.1 million.

Knowing a prescribed burn is about to happen does not help prevent health problems. Warnings to stay indoors, aimed at individuals with, for example, lung disease, are uncertain in impact. Recommendations to get additional treatment carries its own risks. Importantly, many people with heart or vascular disease are asymptomatic. Therefore, the only way to reduce the health impacts of poor air quality is to reduce the pollution release at the source.

As well as the federal *Environment Protection and Biodiversity Conservation Act 1999* not being applied

Box 1. Air pollution standards for bushfire smoke

Bushfire smoke, like other forms of air pollution, includes gases and particulate matter. Particulate matter is a complex mixture of solid and liquid particles and is classified according to size:

PM_{10} – particles smaller than 10 microns in diameter. These contribute to visible smoke haze, can irritate the eyes, throat and lungs but are too large to enter the bloodstream.

$PM_{2.5}$ – particles smaller than 2.5 microns in diameter. These are too small to see and when breathed in, will penetrate deep into a person's lungs and enter the bloodstream.

Standards laid out in the *Air NEPM* are legally binding on each level of Australian government.

The standards are:

Pollutant	Maximum concentration	
	Daily average	Yearly average
PM_{10}	50 $\mu\text{g}/\text{m}^3$	25 $\mu\text{g}/\text{m}^3$
$PM_{2.5}$	25 $\mu\text{g}/\text{m}^3$	8 $\mu\text{g}/\text{m}^3$

Each state and territory is required by the *Air NEPM* to annually report all breaches of this standard, including the sources of pollution.

to Department of Biodiversity, Conservation and Attractions' (DBCAs) prescribed burning program, alarmingly, neither is the *Air NEPM*³. The *Air NEPM* classifies bushfires and prescribed burns as exceptional events that are not assessed. In the period 2018–2021, there were more exceedances of the daily PM_{10} and $PM_{2.5}$ standards (Box 2) by prescribed burns (135), than by bushfires (31) and all other causes (109), making it clear that prescribed burns greatly affect south-western Australia's air quality.

The exemption from the *Air NEPM* is presumably because it is wrongly perceived that the prescribed burning program saves human lives and property. However, the health impact suggests exactly the opposite.

Box 2. PM₁₀ and PM_{2.5} data

Western Australia has 12 sites for monitoring PM₁₀ and/or PM_{2.5}. Five are in the Perth metropolitan area (Armadale, Caversham, Duncraig, Quins Rocks, South Lake); the remainder are in Albany, Bunbury, Busselton, Collie, Geraldton, Kalgoorlie and Mandurah. The number of exceedances observed in daily PM₁₀ and PM_{2.5} observations for the years 2018–2021^{4,5,6,7} attributed to wildfires and prescribed burns (PB) are:

Year	PM ₁₀		PM _{2.5}	
	Wildfire	PB	Wildfire	PB
2018	5	15	3	17
2019	5	5	7	11
2020	1	11	4	25
2021	2	17	4	34

All prescribed burn exceedances were recorded at Perth metropolitan sites or Albany, Bunbury, Busselton, Collie and Mandurah, except on one day in April 2021, when a PM_{2.5} exceedance was attributed to prescribed burning at Geraldton.

The table above shows that there is an order of magnitude more days when bad air quality is attributed to prescribed burning than to wildfires.



Smoke haze over Perth.

Source: Environmental Protection Authority <https://www.epa.wa.gov.au/policies-guidance/air>

People with the following conditions are most at risk from bushfire smoke:

- Asthma, chronic obstructive pulmonary disease and other lung conditions
- Heart and cardiovascular disease: contributing to heart attacks and heart failure
- Metabolic disease: with worsening diabetes and high blood pressure
- Pregnancy: with increased risk of premature birth, lower birth weight, pre-eclampsia and gestational diabetes
- Older people who have many co-morbidities
- Children: more affected, because of developing airways and breathing more air per kilogram body weight than adults.



Young boy having asthma attack

Source: Designed by Freepik www.freepik.com

Conclusions

Currently, the health impacts from prescribed burning are an order of magnitude worse than those from wildfire. This alone should guide a review of the current prescribed burning regime, and a re-think of how better to protect people, property and biodiversity.

References

- 1 Borchers Arriagada, N, Palmer, AJ, Bowman, DMJS & Johnston, FH (2020) Exceedances of national air quality standards for particulate matter in Western Australia: sources and health-related impacts. *Med. J. Aust.* 2020, **213** (6), 280-281. <https://www.mja.com.au/journal/2020/213/6/exceedances-national-air-quality-standards-particulate-matter-western-australia>
- 2 Zosky, GR, Vander Hoorn, S, Abramson, MJ, Dwyer, S, Green, D, Heyworth, J, Jalaludin, BB, McCrindle-Fuchs, J, Tham, R & Marks, GB (2021) Principles for setting air quality guidelines to protect human health in Australia. *Med. J. Aust.* 2021, **214** (6).
- 3 *National Environment Protection (Ambient Air Quality) Measure*, latest version 18 May 2021. National Environment Protection Council Act 1994. <https://www.legislation.gov.au/F2007B01142/latest/versions>
- 4 Department of Water and Environmental Regulation (2022) 2021 *Western Australian air monitoring report*, Annual report under the national Environment protection (Ambient Air Quality) measure. October 2022.
- 5 Department of Water and Environmental Regulation (2021) 2020 *Western Australian air monitoring report*, Annual report under the national Environment protection (Ambient Air Quality) measure. October 2021.
- 6 Department of Water and Environmental Regulation (2020) 2019 *Western Australian air monitoring report*, Annual report under the national Environment protection (Ambient Air Quality) measure. October 2020.
- 7 Department of Water and Environmental Regulation (2019) 2018 *Western Australian air monitoring report*, Annual report under the national Environment protection (Ambient Air Quality) measure. October 2019.