



Australian  
National  
University

# Bushfire smoke – Public Health Communication during the Black Summer and beyond

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A wide-angle photograph of a beach scene. In the foreground, a fire burns brightly in a dark, low-profile fire pit. The fire is orange and yellow, with a small black log resting on top. The beach is sandy and stretches out towards the ocean. Several people are visible on the beach: one person is running or jumping in the middle ground, and others are standing further back. The ocean has white-capped waves breaking onto the shore. The sky is filled with large, grey, dramatic clouds, with a sliver of blue visible near the horizon. A long, thin, white kite with a long tail is flying high in the sky. The text is overlaid in the center of the image, in a white, italicized, sans-serif font.

*We acknowledge and celebrate the First Australians  
on whose traditional lands we meet, and pay our  
respects to the elders past, present and emerging*



**The Washington Post**

By **Andrew Freedman**

November 13, 2019

## Australia's bush fires could last for months, with new rounds of dire conditions expected



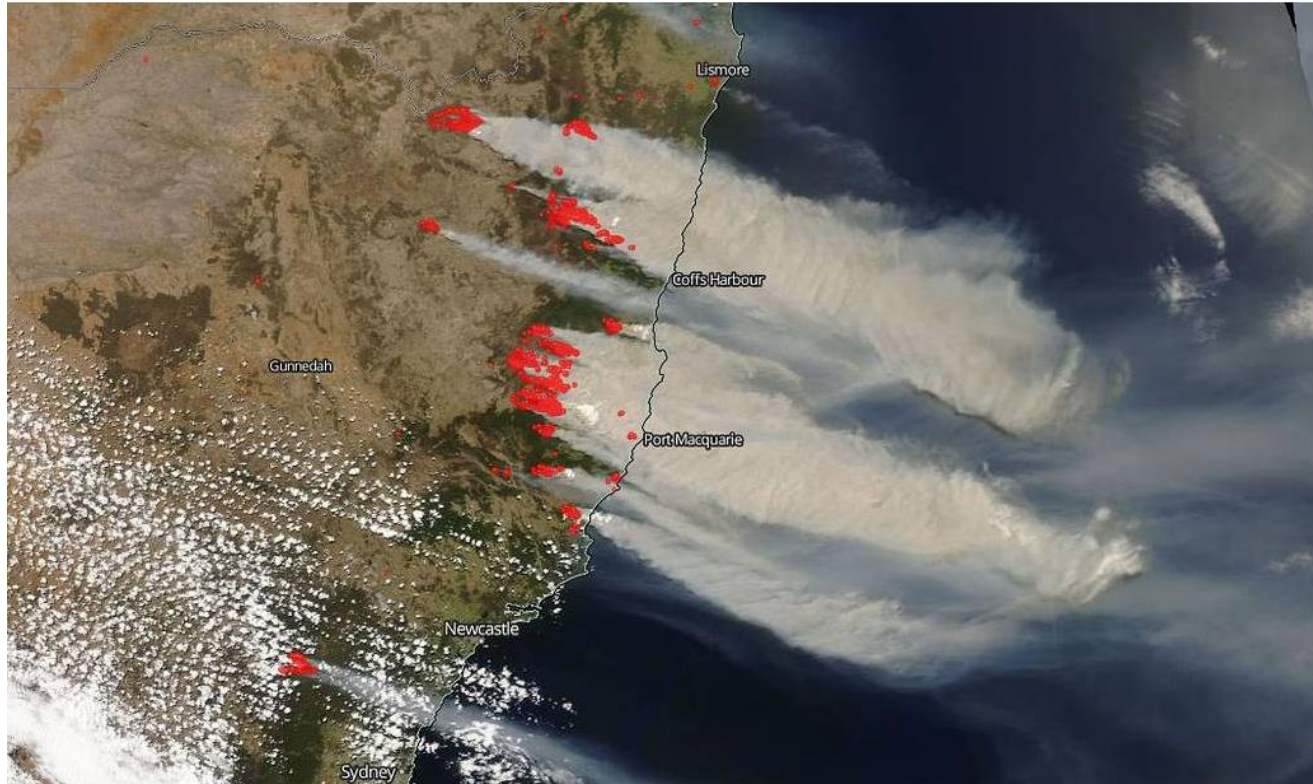
## Terrifying moment Qantas plane is forced to abort its landing because of thick smoke from bushfires





Nov. 9, 2019

## Bushfires on East Coast of Australia Out of Control



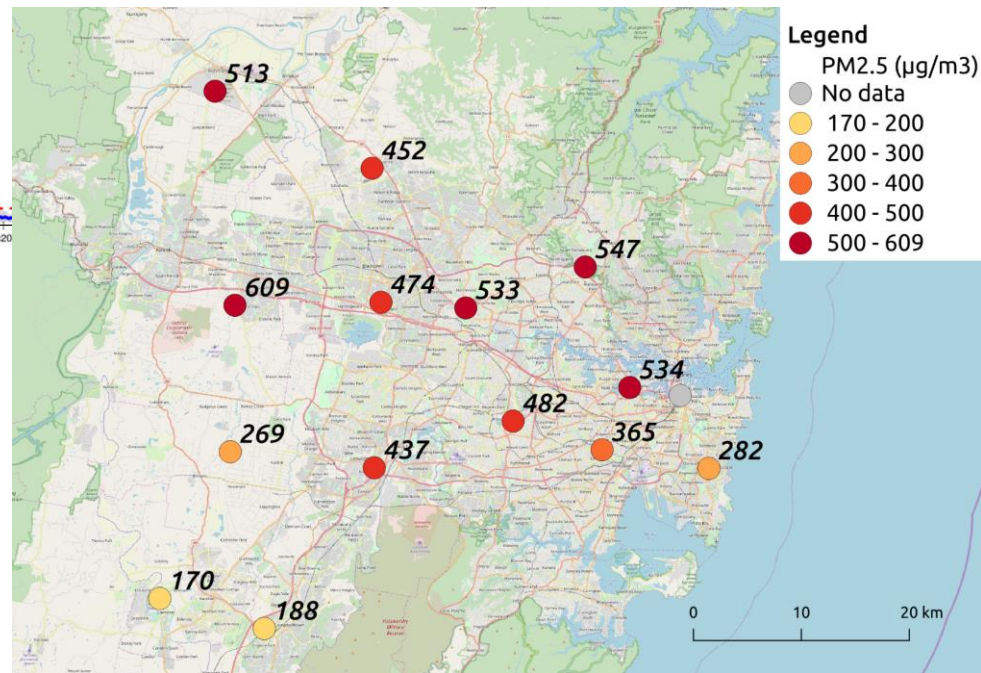
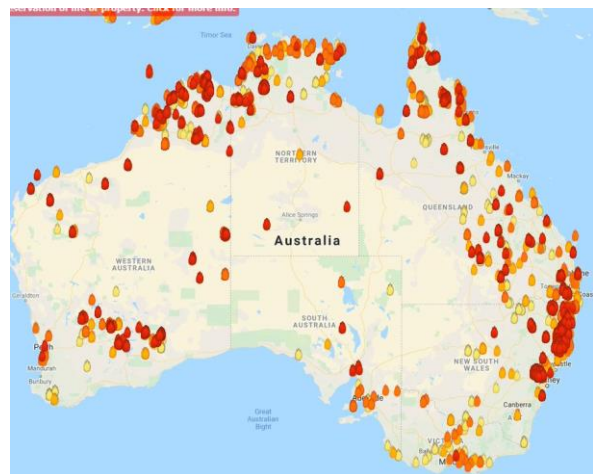
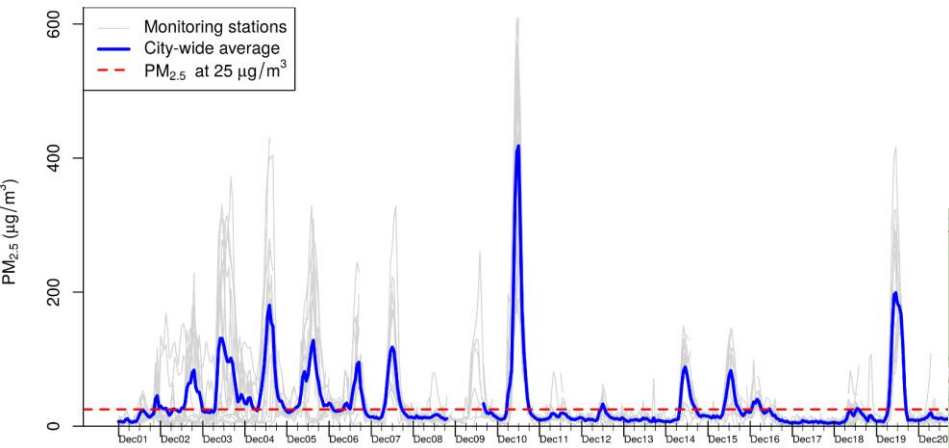


## Sydney news: Sydney air quality reach 'hazardous' level due to smoke haze

Updated 30 Oct 2019, 10:28am



PHOTO: Helicopter footage of Sydney recorded this morning. (ABC News)



(Vardoulakis et al. 2020)

### Smoky air (PM<sub>2.5</sub>) health advisory categories

Health advisory categories	PM <sub>2.5</sub> (24 hour) µg/m <sup>3</sup>	Potential health effects without following advice or actions	Cautionary health advice/actions**
Good	0-8.9	N/A – Below the relevant air quality standard	None
Meets air quality standard	9-25.9	N/A – Meets the relevant air quality standard	No tailored advice necessary
Unhealthy for sensitive groups	26-39.9	Symptoms may occur in sensitive groups	<p><b>Sensitive groups<sup>#</sup> should reduce prolonged or heavy physical activity. Where possible, these people in the community should also limit the time spent outdoors</b></p> <p>Anyone with a heart or lung condition should take their medication as prescribed by their doctor. People with asthma should follow their asthma action plan. Anyone with concerns about their health should seek medical advice from their doctor. Anyone experiencing wheezing, chest tightness or difficulty breathing should seek urgent medical attention</p>
Unhealthy for all	40-106.9	<p>Increased likelihood of effects for sensitive groups</p> <p>Symptoms may occur in the general population</p>	<p><b>Everyone should <u>reduce</u> prolonged or heavy physical activity</b></p> <p><b>Sensitive groups<sup>#</sup> should <u>avoid</u> prolonged or heavy physical activity altogether</b></p> <p>Anyone with a heart or lung condition should take their medication as prescribed by their doctor. People with asthma should follow their asthma action plan. Anyone with concerns about their health should seek medical advice from their doctor. Anyone experiencing wheezing, chest tightness or difficulty breathing should seek urgent medical attention</p>
Very unhealthy for all	107-177.9	<p>Significant likelihood of effects for sensitive groups</p> <p>Symptoms among general population common</p>	<p><b>Everyone should <u>avoid</u> prolonged or heavy physical activity</b></p> <p><b>Sensitive groups<sup>#</sup> should <u>avoid</u> all physical activity outdoors</b></p> <p>Anyone with a heart or lung condition should take their medication as prescribed by their doctor. People with asthma should follow their asthma action plan. Anyone with concerns about their health should seek medical advice from their doctor. Anyone experiencing wheezing, chest tightness or difficulty breathing should seek medical attention</p>
Hazardous high	>177.9	<p>Serious likelihood of effects for sensitive groups</p> <p>Symptoms among general population very common</p>	<p><b>Everyone should <u>avoid</u> all physical activity outdoors</b></p> <p><b>Sensitive groups<sup>#</sup> should <u>temporarily relocate</u> to a friend or relative living outside the affected area. If this is not possible, <u>remain indoors and keep activity levels as low as possible</u></b></p> <p>Anyone with a heart or lung condition should take their medication as prescribed by their doctor. People with asthma should follow their asthma action plan. Anyone with concerns about their health should seek medical advice from their doctor. Anyone experiencing wheezing, chest tightness or difficulty breathing should seek medical attention</p> <p>Anyone experiencing symptoms which may be due to smoke exposure should consider taking a break away from the smoky conditions</p>
Hazardous extreme	> 250	<p>Serious likelihood of effects for sensitive groups</p> <p>Symptoms among general population very common</p>	Cautionary health advice and actions are the same as for Hazardous high above



# Vulnerable groups

- Young children
- The elderly
- Those with respiratory illness
- Those with cardiovascular illness
- Those with diabetes
- Pregnant women
- Outdoor workers
- Homeless people
- Lower socioeconomic groups

## Florey air quality station



**PM<sub>2.5</sub> concentration:** 64.64

**Health advisory:** Unhealthy all

*Last update: 1:00 PM 29 November 2019*

## Civic air quality station



**PM<sub>2.5</sub> concentration:** 77.5

**Health advisory:** Unhealthy all

*Last update: 1:00 PM 29 November 2019*

## Monash air quality station



**PM<sub>2.5</sub> concentration:** 110.12

**Health advisory:** Very unhealthy all

*Last update: 1:00 PM 29 November 2019*

DECEMBER 20 2019 - 4:23PM

**The Canberra Times**  
TO SERVE THE NATIONAL CITY

# Smoke pollution advice impractical: expert

Jodie Stephens

National



# Health Advice



**ANUPopulationHealth** @ANUPopHealth · 10 Dec 2019

Professor @SotirisVard spoke with @canberratimes about the smokey air that persists again today. Read the story here: [bit.ly/2YDIUvN](https://bit.ly/2YDIUvN)

@scienceANU @ANU\_Climate @LancetCountdown



Bushfire smog advice: stay in, avoid outside exercise  
If you must wear a mask, get one that works  
[canberratimes.com.au](https://canberratimes.com.au)



## Is breathing smoky air really the same as smoking several cigarettes a week?

By Isaac Nowroozi and Alexandra Alvaro

Posted Thu 9 Jan 2020 at 6:48am, updated Thu 9 Jan 2020 at 2:53pm

NEWS





# Will Sydney's bushfire smoke pollution have long-term health effects?

HEALTH | ANALYSIS 11 December 2019

By [Ruby Prosser Scully](#)

**NewScientist**



Sydney residents are taking precautions against air pollution  
Bloomberg/Getty Images

HEALTH

## How to maintain your fitness and keep active as our air quality plummets

ABC Health & Wellbeing / By health reporter Olivia Willis

Posted Wed 18 Dec 2019 at 6:06am

**ABC NEWS**



# Eden: 28 Dec 2019



# Eden: 31 Dec 2019





# Eden to Canberra: 2 Jan 2020



## Air quality and pollution city ranking

02 January 2020, 15:39

Major city	US AQI
1  <u>Canberra, Australia</u>	510
2  Delhi, India	455
3  Ulaanbaatar, Mongolia	412
4  Lahore, Pakistan	272
5  Shenyang, China	244
6  Kathmandu, Nepal	235
7  Kolkata, India	194
8  Mumbai, India	177



# Communication

ABC NEWS



Up Next: People Leaving Melbourne Unhappily Now Facing \$5,000 Fine >

ABC NEWS

## Health concerns amid prolonged air pollution from fires

Duration: 03:10 3/01/2020

**Sotiris Vardoulakis** @SotirisVard · 5 Jan  
6. KEEP WELL & FOLLOW NEWS/ADVICE: Stay away from the [#heat](#) & [#smoke](#), keep well hydrated, eat plenty of fruits & veggies (don't eat junk). Most importantly quit smoking. Antioxidant supplements (vitamin C & E) may help. Follow local news/advice [@ACTHealth](#), [@ACT\\_ESA](#), [@ACTRFS](#). 6/6

1 36 47

**Sotiris Vardoulakis** @SotirisVard · 5 Jan  
5. TRUST YOUR SENSES: When you smell/see [#smoke](#), air pollution is HAZARDOUS. If you have itchy eyes, cough, running nose reduce activities, stay indoors, take lozenges/eye drops. If you feel difficulty breathing, wheezing, tight chest seek urgent medical attention / call 000. 5/6

46 49

**Sotiris Vardoulakis** @SotirisVard · 5 Jan  
4. FACEMASKS: Use P2/N95 professional [#facemask](#) if you have to be outdoors. Fit the mask tightly around mouth&nose. Replace mask when it becomes dirty/moist. Remove mask if you feel faint/unwell. Surgical masks offer little protection. There are no professional masks for kids.4/6

2 47 57

**Sotiris Vardoulakis** @SotirisVard · 5 Jan  
3. MEDICATION: Those with heart/lung conditions are more sensitive to [#smoke](#). Keep sufficient supplies of your regular medication. Follow your asthma/medical plan (keep your inhaler with you). Talk to your doctor if you feel unwell, before making changes to your medical plan. 3/6

1 38 48

**Sotiris Vardoulakis** @SotirisVard · 5 Jan  
2. AVOID STRENUOUS PHYSICAL ACTIVITY OUTDOORS. Don't go for your usual jog. Go to gym/indoor swimming pool. Visit air-conditioned libraries, cinema, shopping centres. Time your activities in a way that reduces your exposure to [#smoke](#). Go for a walk when air quality is better. 2/6

35 47

**Sotiris Vardoulakis** @SotirisVard · 5 Jan  
Six things you can do to protect yourself from [#bushfire](#) [#smoke](#): 1. STAY INDOORS: Create a clean air space in your home, close doors & windows (fill gaps with towels/tape), use air conditioning (not evaporative coolers) on recirculate mode, use air purifier with HEPA filter. 1/6

1 119 131



# 10 **YOU** CAN DO TO **PROTECT** **YOURSELF** AND **OTHERS** FROM **BUSHFIRE** SMOKE **THINGS**



A stylized graphic on the left side of the poster. It features a thick, black silhouette of a tree branch that curves upwards and to the right. A small, green, leafy branch grows from the main branch. In the background, there are soft, grey, billowing shapes representing smoke or clouds. At the bottom left, there are small, grey silhouettes of buildings.

# ASK FOR HELP

<https://rsph.anu.edu.au/ask>

TAKE CARE OF YOUR AND OTHER'S  
**MENTAL HEALTH**  
AFTER **BUSHFIRES**

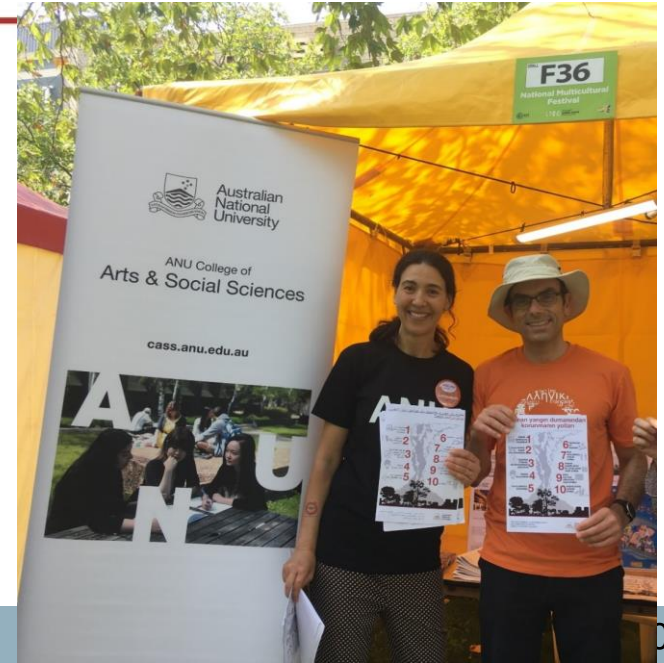


# Translating resources to save lives

15 SEPTEMBER 2020

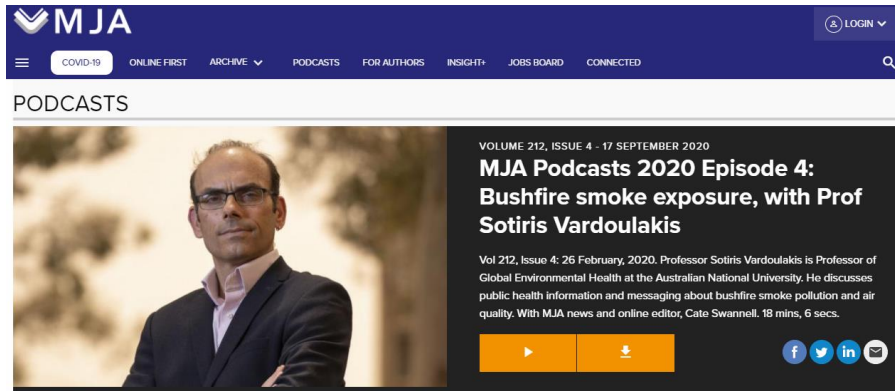
## WHAT IS **BUSHFIRE SMOKE** AND HOW HARMFUL **IS IT?**

ควันไฟป่าคืออะไรและอันตรายแค่ไหน



# Podcasts for Health Professionals

## Medical Journal of Australia



<https://www.mja.com.au/podcast/212/4/mja-podcasts-2020-episode-4-bushfire-smoke-exposure-prof-sotiris-varoulakis>

## Australian Healthcare & Hospitals Association



**AHHA** @AusHealthcare · Feb 18

AHHA introduces a two-part podcast series discussing the impact of bushfires on Australia's health. In the 1st episode, environmental health expert [@SotirisVard](#) [@scienceANU](#) discusses the impact of bushfire smoke on our health [@DeebleInstitute](#) [@ANUmedia](#) [soundcloud.com/ahhapodcast/bu...](https://soundcloud.com/ahhapodcast/bu...)





# Health Evidence

- Air quality monitoring
- Lung function effects
- Pregnancy outcomes
- Mental health impacts
- Bushfire health survey

## Air Quality Monitoring Research Bushfire Emergency Response



The National Centre for Epidemiology and Population Health established a monitoring research facility for bushfire emergency response, led and funded by the ANU College of Health and Medicine.



Research » Projects » Bushfire Health Survey

## Bushfire Health Survey



Effects of bushfire smoke on health and wellbeing of the ACT and surrounding community

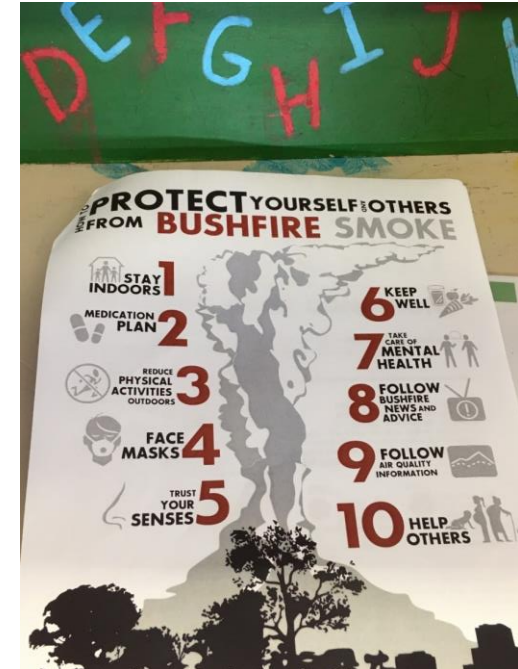
#MC2020



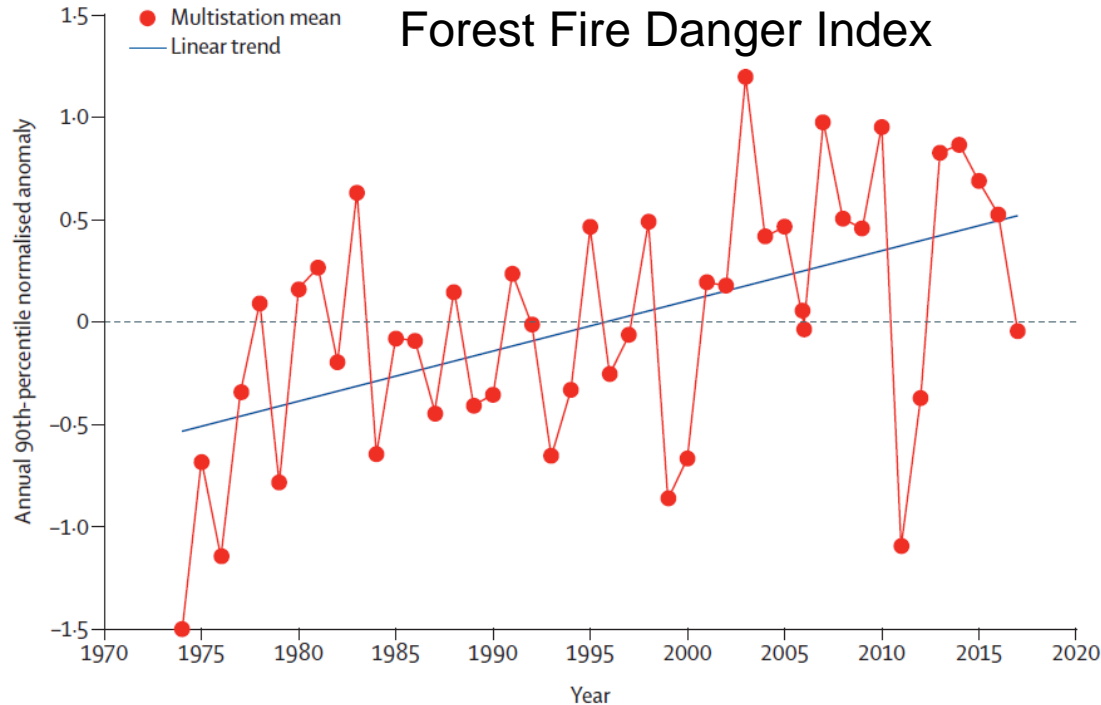
# Authors needed for bushfire smoke children's book



Erin Walsh



# Climate Change





1 min video snapshot on how climate change has contributed to Australia's unprecedented 2019/20 fire season & how we can respond. Join us at [#ClimateUpdateMelb](#) on 12/3 w experts from [@RMIT\\_CUR](#) [@RMIT](#) & [@ourANU](#) [@LaurenARickards](#) [@ProfMarkHowden](#) [@SotirisVard](#) [bit.ly/2TKP9vH](https://bit.ly/2TKP9vH)



## Sustainable Development Goals



<https://www.sciencedirect.com/journal/science-of-the-total-environment/special-issue/10SB8XK0FZQ>



# Advocacy – Bushfire Impact Working Group

- Royal Commission into National Natural Disaster Arrangements
- Senate Inquiry into lessons to be learned in relation to the Australian bushfire season 2019-20



# Engagement

 COVID19 About us Jobs & Opportunities Advocacy News & Publications Blog Events

Preventing chronic  
disease by promoting  
exercise and healthy food



## News

Australians are having to become air-quality smart, like being sun smart

15th Jan 20



**Asthma Australia** @AsthmaAustralia · 8 Jun

We know that during the Black Summer [#bushfires](#), anxiety levels were heightened - impacted not only peoples [#asthma](#) but their overall health and well-being.

Read survey findings here [bit.ly/3h6l8Ar](https://bit.ly/3h6l8Ar)

Read more about emotions triggering asthma [bit.ly/2Yemqlc](https://bit.ly/2Yemqlc)

**Bushfire Smoke Impact Survey: Key Finding 3**

**PERIODS OF BUSHFIRE  
SMOKE EXPOSURE  
INCREASES ANXIETY AND  
DEPRESSION IN PEOPLE  
WITH ASTHMA**

# Bushfire smoke: urgent need for a national health protection strategy

More nuanced health advice is needed to protect populations and individuals from exposure to bushfire smoke

**B**ushfires have always been a feature of the natural environment in Australia, but the risk has increased over time as fire seasons start earlier, finish later, and extreme fire weather (ie, very hot, dry and windy conditions that make fires fast moving and very difficult to control) becomes more severe with climate change.<sup>1-3</sup> The 2019–20 bushfires in Australia, particularly in New South Wales, Victoria, Queensland and the Australian Capital Territory, have caused at least 33 fatalities, extensive damage to property and destruction of flora and fauna, and have exposed millions of people to extreme levels of air pollution. Bushfire smoke, as well as smoke from prescribed burns, contains a complex mixture of particles and gases that are chemically transformed in the atmosphere and transported by the wind over long distances.<sup>4</sup> In this context, a major public health concern is population exposure to atmospheric particulate matter (PM) with a diameter < 2.5 µm (PM<sub>2.5</sub>), which can penetrate deep into the respiratory system, inducing oxidative stress and inflammation,<sup>5</sup> and even translocate into the bloodstream.<sup>6</sup>

Such exposure can adversely affect health outcomes. Mortality rates have been found to increase in Sydney on days with high bushfire smoke pollution.<sup>7</sup> Hospital admissions, emergency department attendances, ambulance call-outs and general practitioner consultations, particularly for respiratory conditions, all increase during periods of severe PM<sub>2.5</sub> levels from bushfires.<sup>8-11</sup> The risks from air pollution are amplified when combined with high temperatures during heatwaves, with an increased effect on mortality.<sup>12</sup>

## VIEWPOINT

**Sotiris Vardoulakis, PhD**  
National Centre for Epidemiology and Population Health, Research School of Population Health, Australian National University, Canberra, Australia.

**Guy Marks, PhD**  
South Western Sydney Clinical School, University of New South Wales, Sydney, Australia; and Woolcock Institute for Medical Research, University of Sydney, Sydney, Australia.

**Michael J. Abramson, PhD**  
School of Public Health and Preventive Medicine, Monash University, Melbourne, Australia.

## Lessons Learned from the Australian Bushfires Climate Change, Air Pollution, and Public Health

There is increasing scientific consensus that climate change is the underlying cause of the prolonged dry and hot conditions that have increased the risk of extreme fire weather in Australia.<sup>1,3</sup> With persistent droughts and record-breaking temperatures (2019 was Australia's warmest and driest year on record, <http://www.bom.gov.au/climate/current/annual/aus/>), it is unlikely that the extreme bushfires and smoke haze in Australia during the "Black Summer" (at the end of 2019 and the beginning of 2020) will be a one-off event. In recent years, other parts of the world, including California, Southern Europe, Southeast Asia, and the Amazon, have also been affected by catastrophic wildfires. We should be better prepared for more frequent and intense bushfire and wildfire events.<sup>3,4</sup>

The immediate response to wildfires aims to prevent loss of life and may involve evacuation of people living in areas under threat. Although often necessary, evacuations can have health consequences for those who are displaced, particularly the poor and elderly, as was the case after the large-scale evacuations because of Hurricane Katrina in the US.

Away from the forests and towns devastated by the fires, millions of people have been exposed to unprecedented levels of smoke blanketing large parts of eastern Australia over days and even weeks. Sydney, Melbourne, and Canberra, cities with typically good air quality, have experienced record levels of air pollution. The air pollution has been compared with that of the most polluted Asian megacities, and the hazards of personal exposure to bushfire smoke have been compared with the hazards of smoking tobacco. Although

## Commentary



## Reflections on the Catastrophic 2019–2020 Bushfires

Bin Jalaludin,<sup>1,2,\*</sup> Fay Johnston,<sup>1,3</sup> Sotiris Vardoulakis,<sup>4</sup> and Geoffrey Morgan<sup>1,5</sup>

While fire is an inherent part of the Australian landscape, the bushfires that occurred in eastern Australia from September 2019 to early February 2020 were unprecedented (Figure 1). Bushfires across the nation burned more than 12.6 million hectares (an area slightly bigger than Belgium, Denmark, and the Netherlands combined), emitted about 430 tonnes of carbon dioxide into the atmosphere (about three-quarters of the country's total annual carbon dioxide emissions), directly caused at least 33 deaths and over one billion animals were killed (<https://www.abc.net.au/news/science/2020-03-05/bushfire-crisis-five-big-numbers/1200716>).

In Sydney, the largest city in Australia with a population of about 5.2 million, levels of particulate matter ≤ 2.5 µm in aerodynamic diameter (PM<sub>2.5</sub>, also known as fine particles) exceeded 700 µg/m<sup>3</sup> and the average maximum 24-h PM<sub>2.5</sub> levels from November 2019 to January 2020 (the worst months for the fires) was about 64 µg/m<sup>3</sup> (<https://www.dpie.nsw.gov.au/air-quality/search-for-and-download-air-quality-data>). In a national poll conducted in early January 2020, just over half the respondents (57%) reported experiencing some kind of direct impact from the bushfires, with New South Wales showing the most effects. In the same

DOI: <https://doi.org/10.1136/bmj-2020-031111>

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Sotiris Vardoulakis<sup>1</sup>   
Bin B Jalaludin<sup>2</sup>  
Geoffrey G Morgan<sup>3</sup>  
Ivan C Hanigan<sup>3,4</sup>  
Fay H Johnston<sup>5</sup>

# Summary

- **Communication:** Factsheets, translations, podcasts, media → 8M audience!
- **Engagement:** ACT Health, NSW Health, Commonwealth, PHAA, UnionsACT
- **Leadership & Advocacy**
  - Real-time local air quality data and forecasts
  - Specific, consistent, and accessible health advice
  - National Air Pollution & Health Protection Expert Committee
  - National Strategy for Climate Change and Health
- **Evidence:** Rapid research projects, surveys, publications, funding applications
- **Education:** Student projects, teaching, workshops, seminars
- **Solidarity:** Local community, schools, Aboriginal groups, vulnerable groups





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**After the fires**  
what do they mean for Australia?

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- Bin Jalaludin (UNSW), Geoff Morgan (USyd), Ivan Hanigan (USyd), Fay Johnston (UTAS), Guy Marks (UNSW), Michael Abramson (Monash), David Bowman (UTAS)
- All study participants, local schools, volunteers, and interviewees

# Thank you!

