



BUSHFIRE SMOKE IMPACT SURVEY 2019-2020

Bushfire Smoke:
Are you coping?



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EXECUTIVE SUMMARY

Introduction

Between July 2019 and March 2020, Australia experienced an unprecedented number of bushfires known as the Black Summer Bushfires, particularly affecting populations in New South Wales, Queensland, the Australian Capital Territory, Victoria and South Australia. The bushfire smoke caused a public health emergency, adding to the direct bushfire impacts already felt by communities, which saw major sporting matches, flights and outdoor events cancelled due to poor air quality. Bushfire smoke contains high concentrations of fine particulate matter, which is harmful to human health. The effects of smoke are unevenly distributed across the population, with people with asthma or other chronic conditions, very young children, pregnant women and the elderly particularly vulnerable to the impacts.

At its worst the smoke resulted in the Air Quality Index reaching more than 25 times the hazardous level in Canberra on the 1st of January 2020¹. Between November 2019 and January 2020, the Air Quality Index reached greater than 10 times the hazardous rating on multiple occasions in certain areas of Sydney². It is estimated the bushfire smoke was responsible for more than 400 deaths, 2,000 respiratory hospitalisations and 1,300 presentations to the Emergency Department for asthma³.

Survey Aims and Methodology

In response to the unfolding public health emergency caused by poor air quality, Asthma Australia developed and disseminated a survey to give a voice to people with asthma, and the broader community, about their experiences during the prolonged periods of bushfire smoke exposure. It included both quantitative and qualitative questions to provide insights into who was affected and how. The survey was open for six weeks and for anyone to complete, regardless of their asthma status. It was disseminated via Asthma Australia networks and media articles.

Key findings overview

1

People with asthma were particularly vulnerable to the impacts of smoke exposure.

They were significantly more likely to report experiencing respiratory symptoms, needing to seek medical assistance and being sick for longer than a week. People with asthma reported higher rates of serious health outcomes including attending the Emergency Department, hospitalisation and requiring corticosteroid medication. These actions represent serious risk to the individuals and significant costs to the health system. Additionally, people with asthma were more likely to report the financial strain and social restriction as a result of the smoke exposure. These outcomes were despite people with asthma being more likely to report taking actions to reduce exposure to smoke.

2

Children and young people were disproportionately impacted by the smoke exposure.

Despite being less likely to report symptoms than other age groups, children and young people were more likely to report visiting their General Practitioner, attending the Emergency Department and being admitted to hospital as a result of smoke exposure, compared with other age groups.

3

The unprecedented levels and duration of exposure to bushfire smoke had significant impacts on mental health, including new and increased symptoms of anxiety and depression.

Participants reported symptoms of anxiety and depression were a direct result of smoke exposure, as well as an indirect result of being unable to spend time outdoors or exercise to manage poor mental health symptoms.

4 Sustained exposure to bushfire smoke reduced participation in everyday activities, particularly for people with asthma.

Participants reported having to take time off work and missing sport or social engagements.

5 People with asthma were twice as likely to experience financial stress as a result of the bushfire smoke compared to people without asthma.

This was caused by lost or reduced income as well as additional costs due to extra doctors' visits, additional medication and the costs of protective equipment. Some reported they were unable to take action to protect their health due to the cost.

6 The public health advice issued with the intention to minimise the impact of smoke on health did not appear to help during the 2019-2020 Black Summer Bushfire crisis.

Despite their efforts, people with asthma who reported taking steps to minimise smoke exposure and reduce the impact on their health, both before and during bushfire season, were still more likely to report respiratory symptoms, require medical attention and experience negative impacts on their quality of life. This unexpected finding may be because the smoke was present for unprecedented periods at hazardous levels, which participants reported they were unable to avoid regardless of actions taken.

Participants described the many challenges they faced attempting to avoid or minimise their exposure to smoke.

These findings highlight the devastating impact of bushfire smoke on individuals at high risk, and the need for better protection, particularly for vulnerable people.

Recommendations overview

The survey results indicate the main factors limiting the ability of individuals to avoid smoke during the Black Summer Bushfire crisis were the lack of relevant information, financial constraints and ineffective public health messaging. With fire seasons becoming longer and more intense, the health impacts of smoke must become a policy priority for all jurisdictions. Asthma Australia makes the following recommendations for action that will be necessary to reduce the impact of future periods of smoke on all Australians, particularly those with asthma or other vulnerabilities.

1

Health departments develop and implement an Air Smart campaign including:

- year-round information to improve environmental health literacy;
- funding for non-government health organisations to deliver air quality education;
- targeted information for people with asthma on actions to take to prepare for expected poor air quality events; and
- increased crisis response for periods of sustained poor air quality, such as during bushfires.

2

The Meeting of Environment Ministers develop a uniform approach to measuring and reporting air quality which consists of:

- a. separating out PM2.5 in reporting of air quality data;
- b. requiring PM2.5 to be reported as an hourly average;
- c. using consistent terminology and measures to describe categories of air quality; and
- d. introducing strong compliance and enforcement mechanisms to prevent non-compliance.



3 State and territory environmental agencies introduce more air quality monitoring stations, including in regional, rural and remote Australia, and consider the use of temporary air quality stations in further locations during times of extended periods of poor air quality.

4 Building standards be reviewed so that homes can be better protected against air pollution during periods of poor air quality.

5 An accreditation scheme be developed to identify public buildings which meet certain clean air criteria such as: they are well-sealed, have HEPA filter recycled air conditioning and can be easily accessed by community in times of poor air quality.

6 The Chief Medical Officer and State and Territory Chief Health Officers develop and release a national policy framework to guide institutional responses to air quality protection in early learning centres, schools, universities, workplaces, sporting associations and for outdoor events.

7 Health departments provide financial assistance to people with asthma for air purifiers:

- a. Health departments develop a scheme to provide subsidies or loans to people with asthma to help with the cost of renting or purchasing air purifiers.
- b. The Australian Government Department of Health provide financial assistance to people with asthma towards the energy costs associated with using air purifiers and air conditioning to avoid asthma flare ups by:
 - extending the 'Essential Medical Equipment Payment' to include asthma as an 'eligible medical condition'; and
 - adding air purifiers with a HEPA filter to the list of 'eligible medical equipment'.

8 The Australian Government Department of Health develop a strategy on access to and use of face masks by people with asthma during air pollution events, covering:

- a. Maintaining a stockpile of appropriate face masks and developing a strategy to distribute them to people in all areas affected by poor air quality, particularly people in high risk groups.
- b. Providing clear guidance on the optimal way to use face masks, including risks and limitations.

9 The Australian Government continue to support telehealth and expand services so people with asthma can access medical care in periods of poor air quality.

10 The Australian Government fund campaigns to increase awareness of Medicare rebates for mental health care and telehealth access to mental health care so people with asthma can access mental health support during periods of prolonged bushfire smoke.

INTRODUCTION

Bushfire Smoke and Asthma

Bushfires have always been a part of the Australian landscape. However, climate change is resulting in hotter days, more frequent heatwaves and longer and more intense fire seasons^{4,5}. This poses a serious risk to the health of Australians, as well as significant environmental and economic impacts⁶.

Bushfires produce large amounts of smoke, which contains high concentrations of fine particulate matter (PM2.5). PM2.5 are particles which are 2.5 micrometers and below in size, small enough to be inhaled into the lungs, causing inflammation, and to enter the blood stream affecting other bodily systems⁷. Anyone can be affected by bushfire smoke, with evidence showing there is no safe level of exposure to PM2.5⁸.

The impacts of bushfire smoke are stronger on certain population groups. Very young children, pregnant women, unborn children, the elderly, and people with asthma of all severities and people with pre-existing respiratory or heart conditions are particularly vulnerable to health implications.⁷

Research shows an increase in mortality, hospital admissions, emergency department presentations, ambulance callouts and general practitioner consultations during periods of smoke exposure from bushfires, particularly for respiratory issues^{9,10,11,12,13,14}. These associations are higher with exposure to PM2.5 from bushfire smoke compared to background urban air pollution, given people are exposed to very high levels of air pollution over a short period of time, compared to lower level, chronic exposure¹².

The Australia Bushfire Crisis 2019-2020

Between July 2019 and March 2020, Australia experienced an unprecedented number of bushfires, particularly affecting populations in New South Wales, Queensland, the Australian Capital Territory, Victoria and South Australia. More than 12.6 million hectares of land was burnt¹⁵, over 300 homes were destroyed and 33 lives were lost as a result of fire¹⁶. These are known as Australia's Black Summer bushfires.

The bushfire smoke caused a public health emergency, adding to the direct bushfire impacts already felt by communities, which saw major sporting matches, flights

and outdoor events cancelled due to poor air quality. Many Australians were exposed to prolonged periods of hazardous air pollution. All states and territories monitor air quality and display as an Air Quality Index (AQI) to indicate how clean or polluted the air is. Index measurements differ between states and territories. For example, the NSW Air Quality Index and advice is as follows¹⁷:

Table 1: NSW Environment Protection Agency Air Quality Index

Air Quality Index (AQI)	Rating	What does it mean?
0-33	Very good	Enjoy normal activities.
34-66	Good	Enjoy normal activities.
67-99	Fair	People sensitive to air pollution should reduce or reschedule strenuous outdoor activities. Others are not likely to be affected.
100-149	Poor	Sensitive groups should reduce or reschedule strenuous outdoor activities.
150-199	Very Poor	Sensitive groups should avoid strenuous outdoor activities. Other adults should reduce or reschedule strenuous outdoor activities.
200+	Hazardous	Sensitive groups should avoid all outdoor activities. Other adults should avoid strenuous activities.

At its worst, the smoke resulted in the Air Quality Index of 5,185 in Canberra on January 1 2020, more than 25 times the hazardous level¹⁸. In Sydney, the maximum concentration of PM2.5 reached poor, very poor or hazardous levels on 50 days in 2019, more than twice as many as any other year in the last decade (Figure 1)¹⁹. In certain areas of Sydney between November 2019 and January 2020, the Air Quality Index exceeded a rating of 2,500 multiple times, more than 10 times a hazardous rating (Figure 2)²⁰. A recently published study undertook a preliminary evaluation of the health burden from the increased particulate matter in Eastern Australia. It estimates the bushfire smoke was responsible for 417 excess deaths, more than 1,000 cardiovascular hospitalisations, more than 2,000 respiratory hospitalisations and 1,300 presentations to the Emergency Department for asthma during the 19 weeks of continuous fires¹⁷. There is no doubt the scale and duration of smoke exposure was beyond anything on record and the health impacts are likely to be similarly unprecedented as they continue to unfold.

During the Black Summer bushfires, requests from the community for support from Asthma Australia increased substantially. There was an increase in engagement on Asthma Australia's social media channels from November 2019 to January 2020; including a 300% increase on Twitter and a 500% increase on Facebook. In January 2020, Asthma Australia responded to a 60% increase in enquiries to their 1800 ASTHMA telephone support service compared to January 2019. Asthma Australia

educators reported an increase in people seeking advice about exposure reduction products such as masks and air cleaners. Similarly, referrals from health professionals to Asthma Australia's The COACH Program® increased during this period. At the height of the bushfire season, Asthma Australia received more than 20 referrals from health professionals a day, compared to a daily average of 9 in previous months. This primarily includes referrals from General Practitioners and Emergency Departments.

Figure 1: Number of days PM2.5 concentration reached poor, very poor or hazardous levels in Sydney 2009-2020

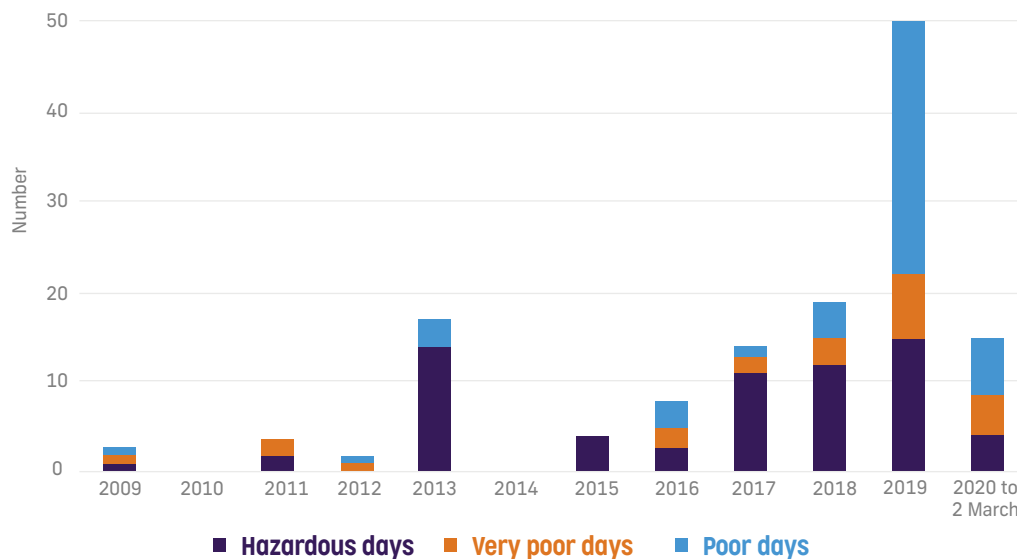
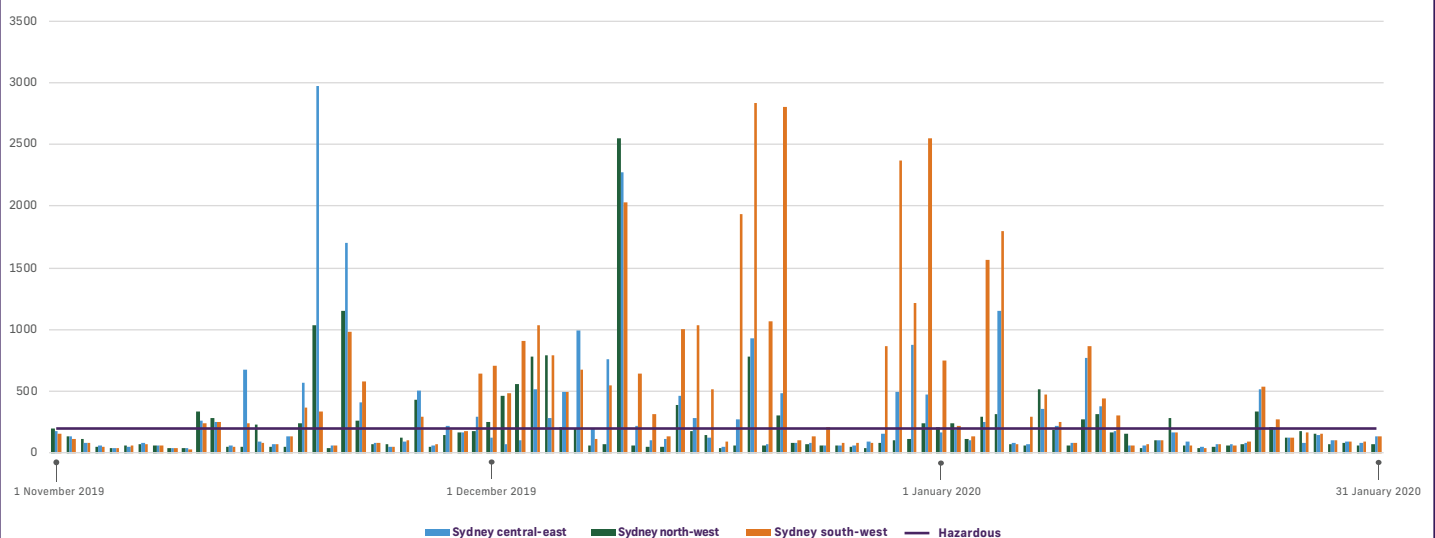


Figure 2: Air Quality Index in Sydney November 2019 – January 2020



AIM

In response to the unfolding bushfire crisis, Asthma Australia developed and disseminated a consumer survey to give a voice to the large number of people impacted by poor air quality across Australia, particularly those with or caring for someone with asthma. The survey aimed to allow Asthma Australia to:

- describe the lived experience of people with asthma, and the broader community, when exposed to unprecedented poor air quality,
- raise awareness of community vulnerability during times of poor air quality, and advocate for actions to address them, and
- inform and shape its key messages.

METHODOLOGY

Survey Design

The survey included both quantitative and qualitative questions, to provide insights into who was affected and how. It asked questions about asthma management, actions taken prior to bushfire season, whether people had experienced asthma symptoms or other health impacts from the bushfire smoke and what actions they took as a result. The survey also included open ended questions such as how people have felt during periods of intense bushfire smoke and what the government or organisations like Asthma Australia could do to reduce any health impacts. See Appendix 1 for the survey questions. The survey was open to anyone to complete, including people without known diagnosis of asthma.

Survey Dissemination and Collection

The survey was launched on the 19th December 2019 and closed on the 30th of January 2020. It was disseminated via Asthma Australia's Facebook, media articles, and emails to Asthma Australia's database. An online platform, Survey Monkey, was used to capture survey responses.



Data Analysis

Quantitative Data Analysis

A summary of descriptive statistics was produced to show the distribution of participants across Australia, their age group, history of asthma and asthma management behaviours. Descriptive statistics regarding the actions taken by participants before bushfire season, actions taken by participants to reduce exposure to smoke and the impact on medication use, health service utilisation and quality of life were produced, stratified by age group, history of asthma, location and month of survey completion. Comparison between groups was performed, using chi-squared test. In addition, potential associations between preventive actions taken by participants and the impact of the smoke on their health and quality of life were assessed. Those analyses were stratified by history of asthma and location. Differences between groups were considered to be significant according to the convention of $p < 0.05$. All analyses were performed using Stata 16.1 (Stata Corp, College Station, TX, USA).

The survey received 12,152 responses. It is important to note, however that within these 12,152 survey responses, not all questions were answered, and some participants did not complete the full survey. For the purpose of this analysis, definitive responses to each individual question were included, therefore the total number of participants for each individual question is varied.

Qualitative Data Analysis

The four open ended questions from the survey included in the qualitative analysis were as follows:

1. Please describe any challenges you faced in avoiding exposure to the smoke
2. Share your experience and how you have felt during the period of intense bushfire smoke
3. Has the smoke affected your health in any other way?
4. What could Asthma Australia, the government, or other organisations, do to reduce the impact of poor air quality on your day to day life? Possible options might include improving air quality monitoring to enable real time information, financial support for equipment or provision of air cleaners, but please add your own.

The open-ended text data from the survey were imported into MS Excel. Data were divided into participant groups and saved as separate spreadsheets. The participant groups were:

- People with asthma
- People caring for someone with asthma
- Age groups (either theirs or the person they care for): 0-17; 18-35; 36-55; 56+
- Bushfire affected or Bushfire unaffected areas [using Australia Tax Office list of Bushfire Affected Regions as at December 2019]

A random sampling technique was applied to each of the question fields above using the MS Excel spreadsheets.

For survey questions 1 and 2 as above, the first 30 responses were initially thematically coded by one researcher until data saturation was reached. Responses for a subset of participants were independently assigned codes by two researchers to increase the study rigour, prior to grouping of initial codes into axial codes. The Coding Framework appears in Appendix 2.

For survey questions 3 and 4 as above, a thematic count analysis was performed. Where the participant did not provide a response regarding other health effects, it was assumed that there were no perceived effects.

RESULTS

Respondent Characteristics

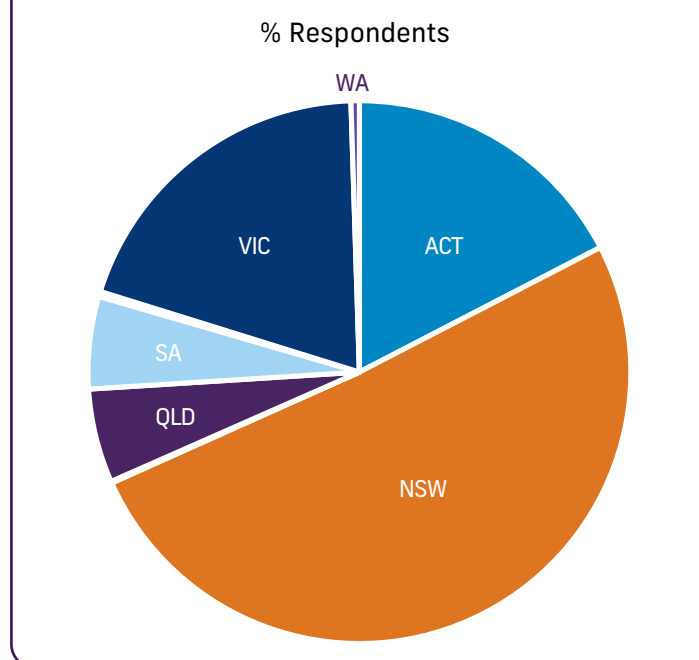
A total of 12,152 individuals participated in the survey between Dec 2019 (45% completed during the month of December) and Jan 2020 (55% completed during the month of January). The survey had a 70% completion rate. Most participants were from three most affected states namely NSW, VIC and ACT with NSW contributing half of participants (Figure 3). Children and adolescents accounted for 8% of participants, young adults (age 18-35 years) 29%, adults (aged 36-55) 36% and seniors (age 56+) accounted for 27% respectively (Appendix 3, Table 1). Over half of participants (61%) reported they had been diagnosed with asthma. Among people with asthma, 86% reported being prescribed regular preventer medication, and three quarters of these participants reported using their preventer daily (Appendix 3, Table 2). This is much higher than Pharmaceutical Benefits Scheme data which suggests only 17% of Australians fill their preventer prescriptions at a frequency consistent with daily use²².

Health Impacts: Symptoms, Medication Use and Health Service Utilisation

Prevalence of respiratory symptoms due to bushfire

A substantially high proportion (84%) of participants reported having respiratory symptoms due to bushfire smoke. While 94% of participants with asthma reported symptoms, it is notable that **respiratory symptoms were also reported in many participants without asthma (70%)** (Appendix 3, Table 3a). Among participants without asthma, the prevalence of respiratory symptoms was similar between age-groups while among people with asthma, fewer **children and adolescents reported symptoms compared to older age-groups**. Prevalence of respiratory symptoms was similar between states in people with asthma, but in those without asthma, **NSW and ACT showed higher figures than other states** (Appendix 3, Table 3b). The prevalence of respiratory symptoms was similar between those who completed the survey in Dec 2019 and those completed the survey in Jan 2020 (Appendix 3, Table 3c).

Figure 3: Distribution of participants by state



Actions taken to manage/relieve symptoms caused by bushfire smoke

Several different actions were taken to relieve asthma symptoms during the bushfire season (Appendix 3, Table 3a). Among people with asthma “increasing use of reliever inhaler” was the most common action taken (76%) followed by “increasing existing preventer dose/frequency” (41%), “visiting a GP” (23%) and “steroids use (oral or injection)” (16%). Nearly one fifth (18%) of people without asthma reported needing “increased reliever inhaler” and 13% reported visiting a GP as a result of asthma symptoms. Actions taken by participants were similar between states (Appendix 3, Table 3b).

People with asthma were more likely to report needing to take more serious action as a result of symptoms (Appendix 3, Table 3a). They were four times more likely to report “attended ED” or “hospitalised” compared to people without asthma, and nearly seven times more likely to report “steroid use (oral or injection)” .

Children and adolescents with asthma were significantly more likely to “attend ED” or “be hospitalised” compared to other age-groups, despite being significantly less likely to report symptoms, while it was similar between age-groups for other actions.

Figure 4: Distribution of participants by postcode

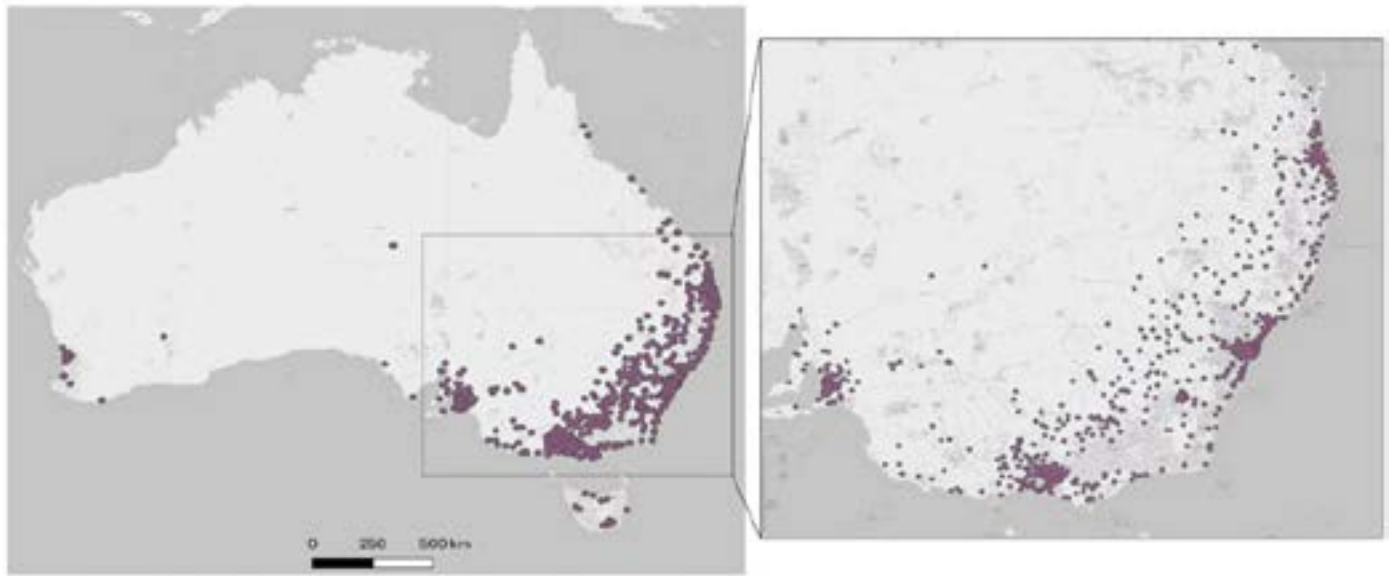
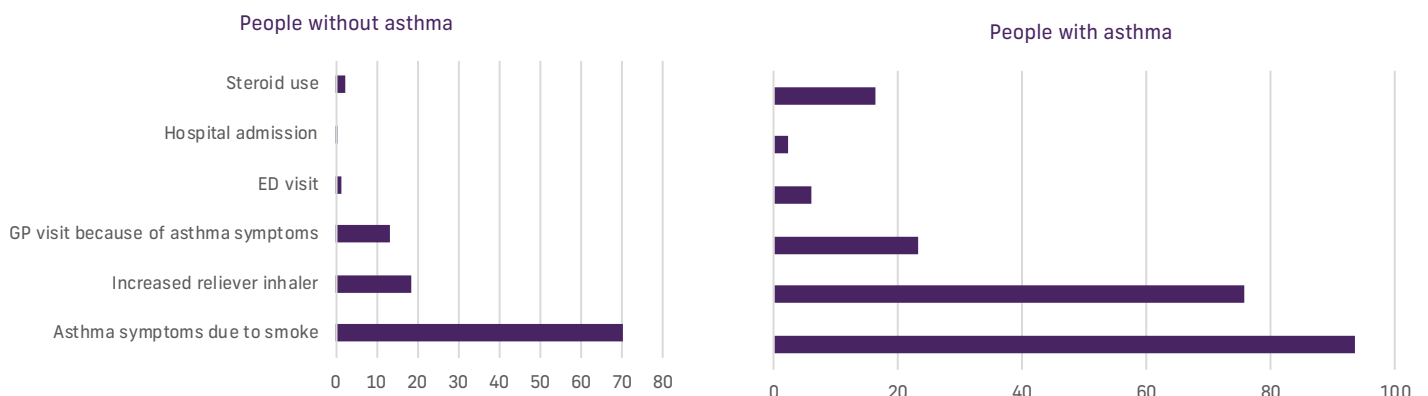


Figure 5: Impact on respiratory health stratified by asthma and age



Other health impacts

Participants reported other direct and indirect effects on their health, apart from respiratory effects. Direct physical symptoms pertained to the eyes, nose and throat as well as headaches, tiredness and chest infections. Participants aged over 56 were less likely to report these health impacts.

Many participants cited mental health effects including new or increased anxiety and depression. This was often perceived by participants to be an indirect result of bushfire smoke which prevented them from going out to exercise or walk the dog. Reporting of mental health issues was more common in the 18-35 age group, with one participant mentioning suicidal thoughts.

"It has affected my mental health. I have clinical depression and part of my self care plan is to spend some time outdoors in the sun each day. Haven't been able to do that much since the bushfire season started."

(18-35)

Other indirect effects on health included weight gain, loss of fitness (due to lack of outside activity), poorer sleep and effects on other body systems.

"Sleep has been poorer as I wake up coughing and my eyes are itchy." (Bushfire affected)

*"Aside from breathing difficulty, **sleeping has been a struggle** and only getting rest in recliner chair. Not sure how this is impacting my diabetes." (over 56)*

*"Yes, due to breathing difficulties and being unable to move around much, **fluid has built up around heart and lungs**. Needs higher doses of fluid tablets." (Carer)*

See Appendix 4, Health effects by respondent group.

Quality of life impacts

Impact of bushfire on quality of life

Exposure to prolonged periods of smoke exacted a significant toll on study participants. **People with asthma were significantly more impacted physically, financially and socially, compared to people without asthma** (Appendix 3, Table 4a). The most common impact was "reduced capacity in daily activities" which affected two thirds (66%) of participants with asthma and half (47%) of participants without asthma. One third (33%) of people with asthma reported being "sick for longer than a week" while this figure was one fifth (20%) in those without asthma. Adverse impact on social engagement was experienced by 35% people with asthma and 24% people without asthma. **Bushfire smoke also contributed to "financial stress" in 25% of people with asthma and 13% people without asthma.** Absence from school/work was more frequent in those with asthma (29%) than those without (15%). Overall, NSW and ACT appeared to be more affected than other states in most categories of impact on quality of life (Appendix 3, Table 4b).

Feelings and experiences during prolonged periods of smoke exposure

Some participants were accepting of the status quo stating "it is what it is" and suffered "little effect", but the **majority reported experiencing a vast array of negative emotions**. These can be divided into those relating to self (internalised) and those directed at others. **Self-directed emotions included anxiety, boredom/treading water, feeling confined or trapped, sad or depressed, exhausted, fearful, helpless, lonely and isolated, and stressed.**

A sizeable proportion of participants reported feeling anxious and this was across all respondent groups. Carers of small children, and others more generally were worried about long term effects of smoke. This was exacerbated for many by not being able to exercise which would normally assist with relaxing them:

*"I have been **worried and anxious**. About other Australians, and friends. About pets and livestock." (Bushfire affected)*

*"I have been **on edge**. Unable to exercise which increased my anxiety." (Bushfire affected)*

"Quite anxious, I worry about getting sicker with my asthma, **my work capabilities have been reduced.**"

"Increased concern about the long-term exposure to small children lungs and airways as we have been surround [sic] by thick smoke for nearly 2 weeks. **Terrified that my youngest may have an asthma attack** and during an emergency evacuation we could have been unable to seek medical help."

Likewise, a large proportion of participants mentioned feeling sad or depressed, or helpless and unable to change the situation:

"**Overwhelmingly sad and upset at loss of wildlife,** inability to be outdoors and exercise, not being able to see the sky." (No asthma)

"Not going outside has severely impacted my mood and made my depression significantly worse." (18-35)

"**I sometimes feel useless,** seeing how other people seem to be able to function normally when I'm struggling to do basic tasks." (Person with asthma)

"I felt devastated. I watched my exhausted husband working 17-hour days, day after day, and heard their grief at the destruction of our country and the calls of tortured animals. Tears from some who felt so incompetent [sic]." (No asthma)

Emotions participants felt towards others included anger, disappointment, and frustration, particularly at what they perceived was lack of action by the government but also healthcare professionals:

"**Frustrated, angry at inaction** and denial of leaders to address causes and lack of planning and support." (Carer)

"**Lack of communication and commitment by govt to its people** - this is unprecedented but it showed their inability to act without following policies and procedures and looking at budgets and economy." (No asthma)

"I feel our government isn't doing enough to support people fighting bushfires and those who are affected by them. I'm disappointed in our lack of leadership and acknowledgement about such a big issue."

(Bushfire unaffected)

"**I'm angry about how some people disregard the difficulty and danger of living with asthma at the moment** - even a GP who told me that I just need to take deeper breaths from my reliever puffer if I'm struggling, as if I just wasn't trying hard enough to breathe." (Person with asthma).



Responses to feelings

Participants also described how they responded to the feelings or the impact the situation had on them, and any actions they intended to carry out. Some wanted to relocate, some people with asthma noted how the situation had affected their asthma management, and others how they dealt with mental health issues:

"I don't want to live in Canberra anymore. I feel extreme anxiety that the ACT will be hit by active bushfires next." (no asthma)

"Ensuring I have my Ventolin and understanding the parameters of how I can use it before my asthma hits gives great peace of mind." (Over 56)

"It's also been awful for my mental health. I have had to increase my dose of sertraline to manage the anxiety." (Person with asthma)

"I've downloaded air quality and NSW fire apps to set up notifications so I stop checking compulsively. Since the worst days the air quality has been 'unhealthy', but the fear of pollution and smoke has decreased because this is better than it is most of the time and it doesn't even smell like smoke! You can't stay scared everyday for months." (bushfire unaffected)

Effectiveness of Public Health Messages

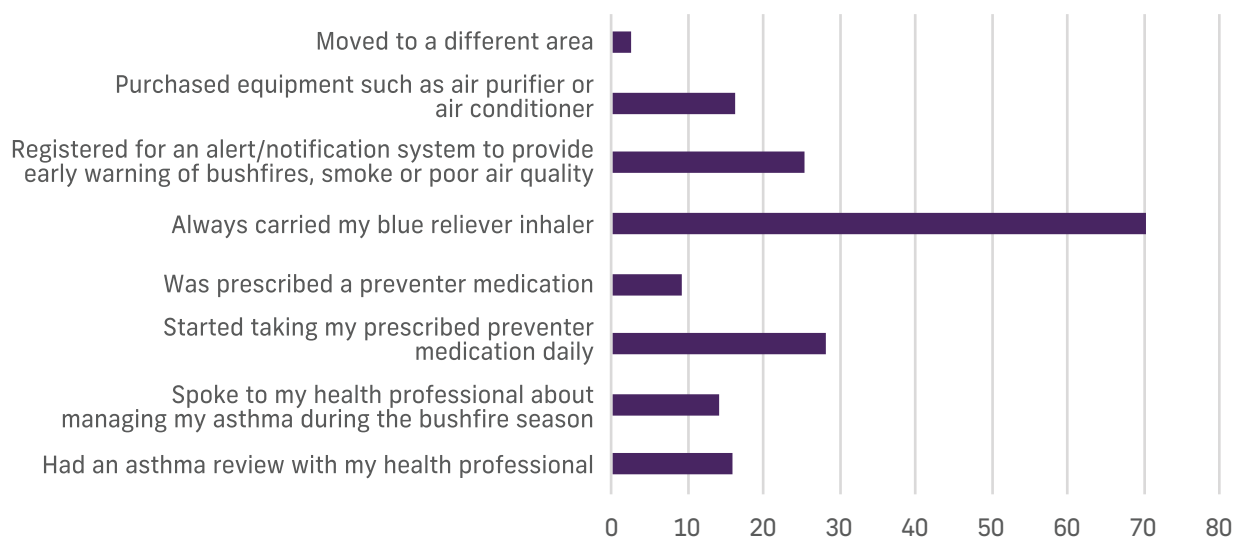
Actions taken just before bushfire season

Participants with asthma were asked about the actions they took just before bushfire season to prepare for potential impact on their asthma. **Most common actions included "always carried my blue reliever inhaler" (70%), "started taking my prescribed preventer medication daily" (28%) and "registered for an alert/notification system" (26%)** (Appendix 3, Table 5a). For these actions, there was no significant difference between age groups. However, children and adolescents were more likely to report they "had an asthma review with my health professional" compared to other age-groups. There were no differences between states for the following actions: "always carried my blue reliever inhaler" and "started taking my prescribed preventer medication daily", but participants in SA and QLD were less likely to "register for an alert/notification system" than those in other states (Appendix 3, Table 5b).

Actions taken to avoid or minimise exposure to smoke once present

During the bushfire season, participants took different actions to avoid or minimise exposure to smoke once it was present (Appendix 3, Table 6a). More than

Figure 6: Actions taken by participants with asthma prior to bushfire season

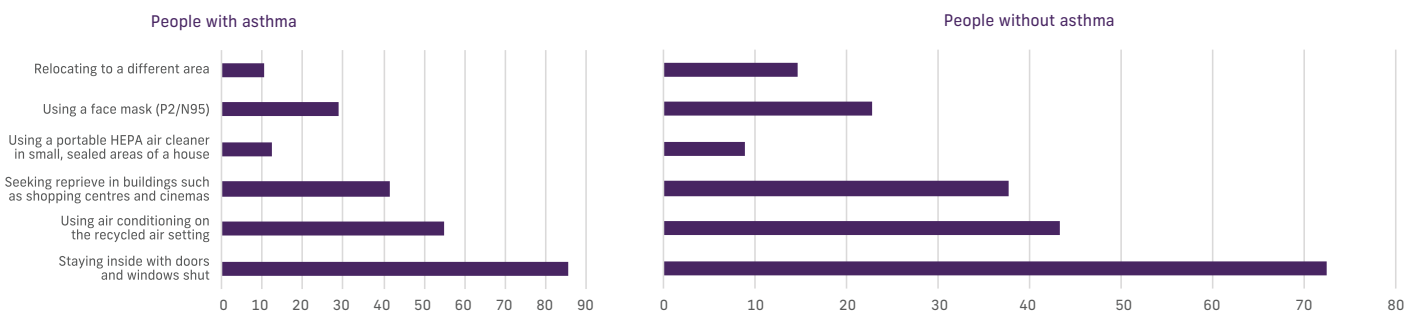


80% of participants with asthma reported that they “stayed inside with doors and windows shut”; this was 70% for participants without asthma. Fifty-five per cent of participants with asthma reported “using air conditioning on the recycled air setting” compared with 40% of those without asthma. On average, more than a quarter of people with asthma (29%) “used a face mask” with the 0-17 year age-group reporting the least use (17%), whereas 20% of those without asthma applied this intervention. Participants with asthma were more likely to report using all interventions compared to participants without asthma, except for “relocating to

a different area.” Fifteen percent (15%) of participants without asthma reported taking this action, compared to 11% of participants with asthma. Participants from the ACT were more likely to report employing the range of interventions above (Appendix 3, Table 6b).

People with asthma who reported taking their asthma preventer medication daily, were more likely to report taking action before bushfire season and to act during periods of smoke to reduce or minimise their exposure (Appendix 3, Table 7).

Figure 7: Actions taken to reduce or minimise exposure to smoke once present



Association between actions taken and impacts

Despite their efforts, participants who took the above steps before or during bushfire season to minimise their smoke exposure and health impacts were still more likely to report respiratory symptoms, requiring medical attention and impacts on their quality of life (Appendix 3, Table 8a, 8b, 8c, 9a, 9b, and 9c).

Challenges faced avoiding exposure to smoke

Participants emphasised that it was difficult to avoid exposure to bushfire smoke despite taking action. In describing the challenges faced in avoiding exposure to the smoke, participants talked about the ways in which they were exposed to the smoke, how they could mitigate against it, and the consequences on their day to day lives. Despite their best efforts, participants described how the smoke was unavoidable and how exposure to it was often out of their personal control, for example people whose occupations meant they needed to work outside:

"We were surrounded by bushfires, so no matter which way the wind blew, we copped the smoke." (Bushfire affected).

"Even working inside a shopping centre gave no relief as the smoke could still be smelt inside. It has been near impossible to avoid." (No asthma)

"Currently living by myself without a car so I have to walk everywhere which means I have to be out in the smoke almost every day walking to work and walking to get food and other shopping." (18-35)

"When smoke is intense on a day of high temperatures we are literally hunkered down in an incredibly hot stuffy house with no ability to use the evaporative cooling system. Even with windows shut, extra blackout curtains and pieces of cardboard on windows to try and keep heat and smoke out it still is 29-30 degrees inside and doesn't cool down overnight so it's extremely uncomfortable." (No asthma)

"My job is 80% outside. In order to feel safe I need to be inside during pollution events. My productivity is suffering."
(no asthma)

Exposure to smoke occurred at home, schools and work, as well as whilst commuting to work and undertaking normal day to day activities. Commuting involved both cars and public transport. In bushfire affected areas participants perceived there were no smoke free locations, such as shopping centres, to escape the smoke. It was also noted that as well as smoke, "thick ash fell over everything and covered my deck, verandahs, home, everything."

"Air quality at work has been very bad, with the air con system unable to filter out particles. I've been wearing a P2 mask all day at work but it gets hard to breathe by the afternoon, once the filter has been blocked by condensation from my breathing. I then have to choose between hard-to-breathe clean air, easy-to-breathe smoky air, or going home. Some days I can work from home but not when I need to use specific equipment or carry out tasks on-site. I've also had to cancel shifts."
(Person with asthma)

"Its a bit difficult as I walk most of the way to work with some public transport. I haven't had to use my inhaler but because of the smoke, I might need to invest in smoke prevention gear and visit the doctors."
(Person with asthma)

"Air quality at work has been very bad, with the air con system unable to filter out particles. I've been wearing a P2 mask all day." (Person with asthma)

"Had to go into city (Sydney) to attend Uni classes so was constantly exposed to smoke when walking between trains and Uni. Worked in a retail shop that is not in a shopping complex with shop doors open to outdoors environment. **Constantly breathing in smoke at work.**" (Carer with asthma)

"Moving from house to car, car to shops etc." (No asthma)

Participants described both personal options to escape smoke as well as external methods, such as reliance on council or other government initiatives. Personal methods included wearing masks, altering work hours, working from home or relocating. Regarding the use of masks, several participants noted the difficulty of accessing masks per se, and finding appropriate masks for children, although some found masks helpful:

"My 2.5 year old toddler is too young to put a mask on when we move between the house and car. We try to limit her time outside but it's difficult." (Carer 0-17)

"I am yet to find a P2 mask that properly seals on my face." (No asthma)

"Effective P2 mask with charcoal filter and exhalation valve helped." (over 56)

Several participants spoke of the need to move themselves or their children away from the smoke for health or safety reasons, or forced evacuation:

"Due to an increase in my asthma symptoms and having a newborn baby **after a month of smoke I have relocated to Perth indefinitely.**" (18-35)

"Concerned it was hard to avoid in our area, so **we have transferred her to family interstate who are not affected by smoke.**" (Carer)

"The area where I live is/was directly threatened by fire. Followed RFS Leave Early Advice I've been evacuated for 6 weeks." (Over 56)

External methods cited were those reliant on standards around building structures, sealing windows and taking time off work. Participants who were living in rental accommodation did not feel they had much control over the situation:

"My home is old so I have had to use wet towels at the doors and windows throughout the house. I used three fans and the new Air Purifier during the worst times of the South Coast fires around Bega as this is where I live." (Bushfire affected)

"Our rental is poorly sealed and the air conditioner is old." (18-35)

"No advice on how to draft proof the house without spending too much. Other family members not taking things more seriously e.g. leaving doors open." (No asthma)

"Still noticed my son's asthma deteriorate even by staying home in aircon because houses are not hermetically sealed." (Carer)

"As a school teacher, smoke entered my classroom from door being open and closed all day. No air con or air purifiers. Not good." (Bushfire affected)

BUSHFIRE SMOKE IMPACT SURVEY 2019-2020

The preparedness of schools and workplaces was questioned by several participants:

"Workplace (government building) could not keep smoke out & still had to attend." (Bushfire unaffected)

"Where I work (Royal Children's Hospital) smoke collects in corridors & outside surgical theaters."
(Person with asthma)

The impact of exposure was described first and foremost in terms of restriction in both routine activities such as activities of daily living, work or school, as well as other planned activities such as social occasions and family get togethers. Often the activity restriction was accompanied by negative emotions:

"Frustrated and upset. Social plans have been cancelled, exercise cancelled. The smoke makes me panicky, which makes my asthma worse." (Bushfire affected)

"Attending appointments and going outdoors for regular activities like exercise, meeting up with friends, grocery shopping. **Even taking out the garbage bins and watering of outdoor plants has been avoided** due to the severe levels of air pollution." (18-35)

"It's also hard to know in advance which days will be smokey. Most of the time I end up stepping outside only to find out then how smokey it is. By then it is too late to advise my employer I need to work from home." (18-35)

"Driving through inner NSW to get to coastal areas to see family at Christmas. Walking to restaurants, living in tented camper trailer with no A/C." (Person with asthma)

Some participants noted the unpredictability of the situation and frustration of being unable to plan activities in advance:

"Sudden change in wind direction when out and maskless, bringing sudden, heavy smoke from fires, when 30 mins before it was clear." (No asthma)

Carers spoke about the difficulty of entertaining young children indoors, the need for caution and making considered choices about activities, and the consequences of children being unable to attend school:

"We are in the Hawkesbury district -smoke everyday - especially at school - **staying indoors as much as possible isn't always practical or available** - having to go from classroom to office for reliever."

"Can be distressing when your child has asthma during these conditions. Making wise choices about social outings and holiday activities. Knowing when is necessary to visit doctor. **Causes anxiety for asthma affected person and carer.**"



“Our school has not been responsive to the public health warnings and carried on with outdoor sport activities on days of hazardous air quality. My son has missed three days of school in order to avoid sports days etc.” (Carer)

“Staying indoors for a 3-year-old is hard. He wants to go out to play. Restricted time at friends birthday party due to outdoors.”

“By remaining at home away from school means he’s penalised in both attendance records & learning opportunities.”

Participants also described the perceived health effects of smoke exposure, both physical and emotional, in terms of challenges faced. People with asthma commonly reported an increased need for medication with some participants indicating they had asthma attacks. They also noted the strain on health services:

“Worry about going anywhere and doing anything. Stress about visiting an already stressed health care system.” (Carer)

“Increased concern about the long-term exposure to small children lungs and airways as we have been surrounded by thick smoke for nearly 2 weeks. Terrified that my youngest may have an asthma attack and during an emergency evacuation we could have been unable to seek medical help.” (Carer of 0-17)

“I’ve also had to cancel shifts on days when air quality would make it impossible for me to do my job, which has meant reduced income.” (Person with asthma)

There was a reported financial effect accompanying the smoke exposure and bushfires themselves. Participants talked about loss of income, the need to take sick leave, increased costs associated with the increased need for medication, and purchasing and running equipment to help with heat and air quality.

“Since the fires started I have had 6 days off work for my Asthma. I am now out of sick leave and the air quality has not improved.” (18-35)

“Cannot afford air conditioning and am having problems buying an air purifier. Sealing an old 60s/70s flat difficult.” (Over 56)

Finally, participants mentioned the effects of the bushfires on personal relationships, and how it changed the dynamics, such as being reliant on others— relied on friend to deliver essential foods, bread/milk (person over 56)— or needing to assist other people and animals.

“I was worried about my mother’s help. I had problems with my eyes from going out to do mums shopping and pick up meds etc.” (Carer)

Future actions

Participants made suggestions in the survey about how to mitigate the effects of poor air quality on their lives. Apart from the initiatives already suggested in the question (i.e. air quality monitoring to enable real time information and financial support for equipment or provision of air cleaners), participants broadly mentioned safety, financial assistance for medications and equipment, the need for improved policies around OHS at work, policy direction on climate change, warning and notification systems, mental health support, better access to health services and education/ information/ training. See also Appendix 4: Air quality initiatives by respondent group. Several participants highlighted more than one initiative—sometimes half a dozen—as illustrated in the following:

"Financial support would be huge for me."

"Financial support would be huge for me, offering free p2 masks, offering discounted ventolin, an air quality update app, discounted air cleaners, better management of bushfires before summer, action on global warming and climate change, more climate and environmental representatives/advocates in government, free asthma checks, free asthma or air quality management kit (masks, info booklet, health information, etc.)" (18-35)

It was clear that many participants were feeling the financial strain of extra visits to doctors, the additional medication required at the time of the bushfires, and the cost of masks and air purifying equipment:

"All of the above plus extra doc fees due to extra visits. This is another cost on top of the others above. For the older of us who have had our incomes cut so much by the government it is becoming a daily stress, which is exacerbating [sic] other chronic illness. There is no mental health help in this country, unless you can afford the \$85 out of pocket costs, +\$56+ for Gp +\$180+ for specialists. It is no wonder the elderly cannot afford the medical help they require. So much for the lucky country." (Over 56)

"Availability of air purifiers to rent or borrow during these times (if proven to work). The system I have in my apartment does not have the option to use recirculated air, so using an air purifier may help. These are expensive and not required all of the time. Also, I think employers who make it difficult for employees to work from home or to take time off need to face penalties. I feel I am going to be forced to go into the office soon because I've worked from home for too long. Smoke is the only trigger that I find difficult to manage my asthma." (18-35)

"Improve air quality monitoring for more real time information, and including rural/remote areas. financial support for air conditioners/air cleaners etc for those with asthma Further financial support for medicine and devices ie. preventers and spacers or nebulisers Improved access to GPs after hours/public holidays." (0-17)

"Support remote work for people with asthma/breathing difficulties or more generally." (bushfire unaffected)

STRENGTHS AND WEAKNESSES

Several participants argued for improved facilities in public spaces and mandated checks of air quality in offices, as well as support for people to work from home if necessary, without penalty:

“Improved air filtering and positive pressure air conditioning in some public locations such as libraries and pools, so there is somewhere with better air quality and they don't close when the air gets bad.” (bushfire unaffected)

“Offer advice to workplaces as part of WHS measures.” (bushfire affected)

Additionally, across all four open-ended questions, there were suggestions for practical initiatives that could be implemented, or research needing to be done. These included fire prevention measures and preferential access to appropriate masks for people with diagnosed respiratory conditions:

“There has be more research in finding alternative methods to create fire breaks - prescribed burn offs can't be the only method that is available! It puts an unnecessary risk to asthmatics which in turn increases the strain in our hospital emergency departments!” (Carer)

“Needs to be a registration system setup so that people with diagnosed conditions can obtain masks. Also everyone to be advised of correct fitting & go through an assessment to see if the mask is suitable or not (lots of people buying up all the masks then incorrectly using them).” (Bushfire unaffected)

“Work with Indigenous land managers regarding fire management.”

The primary strength of this survey is the large number of participants and the timely nature of dissemination. The survey was open for over a month and gave people the opportunity to respond while they were experiencing the impacts of smoke.

However, surveys are limited by being self-reported in nature and therefore it is not possible to validate whether participants did experience symptoms as a result of the smoke, health service utilisation or actions taken to reduce exposure. Additionally, regarding preventive or exposure reduction actions taken, the survey does not capture how long people took these actions for. For example, people who reported “staying inside with doors and windows closed” may have taken this action for a few hours a day or days at a time.

While the survey was responsive to the event, it collected responses while the crisis was ongoing and may underrepresent the impact. People who responded in December may have continued to be exposed to smoke and suffered additional health impacts that were not captured.

Finally, the sample was a convenience sample and not necessarily representative of the total population. People who were impacted by the smoke or vulnerable to smoke exposure may have been more likely to participate. Additionally, it did not specifically capture the voice of Indigenous Australians or other vulnerable populations.

KEY FINDINGS

1 **People with asthma were particularly vulnerable to the impacts of bushfire smoke exposure.**

They were significantly more likely to report experiencing respiratory symptoms, needing to seek medical assistance and being sick for longer than a week. People with asthma reported higher rates of serious health outcomes including attending the emergency department, hospitalisation and requiring corticosteroid medication. These actions represent serious risk to the individuals and significant costs to the health system. Additionally, people with asthma were more likely to report the financial strain and social restriction as a result of the smoke exposure. People with asthma were more likely to report taking action to reduce their exposure to smoke compared to people without asthma, but despite this were still more likely to report symptoms compared to people without asthma. While the intensity and length of smoke exposure meant most of the population were affected by smoke during the 2019-2020 Bushfire Crisis, this survey shows that people with asthma were more vulnerable to serious health complications.

2 **Children and young people were disproportionately impacted by the smoke exposure.**

Whilst children aged 0-17 tended to report less respiratory symptoms than other age groups, they were significantly more likely to report an increase in health service utilisation including visiting their general practitioner, attending an emergency department or being admitted to hospital as a result of their asthma symptoms compared to other age groups. This reflects population level data, whereby children aged 0-14 make up nearly half of all asthma hospitalisations each year. Children are at higher risk of severe asthma flare-ups due to their smaller developing lungs, higher baseline breathing rate and immature immunity. Additionally, their risk may be increased due to the lack of effective exposure reduction methods. Participants noted a key challenge in avoiding smoke exposure was the lack of appropriate masks for children, supported with people aged 0-17 being less likely than other age groups to report using a mask. Participants also reported schools not being adequately equipped to manage the periods of smoke exposure, citing difficulty keeping doors closed, lack of air conditioners and air cleaners. Carers who reported keeping their children at home to minimise exposure to smoke, cited concern about the impact of their children missing school.

3 **The unprecedented levels and duration of exposure to bushfire smoke had significant impacts on mental health, including new and increased symptoms of anxiety and depression.**

This was due to the direct impact of the number of bushfires and intensity of smoke, as well as the indirect impact of the smoke which limited participants' ability to exercise or spend time outdoors as a strategy to reduce symptoms of anxiety and depression. The known association between psychological factors and asthma symptoms means the impact of the extended bushfire period was amplified for people with asthma.

4

Sustained exposure to bushfire smoke reduced participation in everyday activities, particularly for people with asthma.

Participants reporting having to take time off work and missing sport or social engagements. These outcomes can have significant impacts on people's overall wellbeing, including contributing to feelings of social isolation, negative mental health impacts and lost education opportunities for students.

5

People with asthma were twice as likely to experience financial stress as a result of the bushfire smoke compared to people without asthma.

One quarter of people with asthma reported financial strain due to extra visits to doctors, additional medication, and purchasing masks and air purifying equipment. These stressors were intensified for people unable to work or who had reduced income as a result of the smoke.

6

The public health advice issued with the intention to minimise the impact of smoke on health did not appear to help during the 2019-2020 Black Summer Bushfire crisis.

Despite their efforts, people with asthma who reported taking steps to minimise smoke exposure and reduce the impact on their health, both before and during bushfire season, were still more likely to report respiratory symptoms, requiring medical attention and negative impacts on their quality of life. This unexpected finding may be because the smoke was present for unprecedented periods at hazardous levels. Additionally, people with asthma who reported taking their preventer medication daily, were also more likely to report taking protective actions before and during bushfire season. It is like these people with asthma had more severe asthma and therefore were more vulnerable to experiencing symptoms and requiring medical assistance with smoke exposure. These findings highlight the devastating impact of bushfire smoke on individuals at high risk, and the need for better protection particularly for

vulnerable people. Despite their best efforts, participants described how the smoke was unavoidable and often out of their personal control. Participants reported the many challenges faced to minimise their exposure to smoke, including;

- a. Needing to go outside for work, commuting or to undertake normal day to day activities. It was not practical or possible for people to remain indoors during smoke exposure, which for some people was present for weeks to months. Additionally, participants reported not having enough information to make informed decisions about the best times to be outdoors.
- b. Despite staying inside with doors and windows closed, smoke was able to get inside buildings through small gaps. Additionally, people without an air conditioner with a recirculate setting had to choose between reducing the amount of smoke present in their homes and cool houses on hot days.
- c. Increased use of air conditioners, purchasing air cleaners and face masks, all have financial implications. Some participants reported increased financial stress as a result of taking actions to protect themselves, while others were unable to due to the costs.
- d. While masks were a suitable option for some participants to reduce exposure during periods spent outside, other participants reported difficulties accessing masks. Additionally, there is no appropriate option for children, who were disproportionately affected by the smoke.
- e. There was a lack of clear guidelines or policies in workplaces and schools to minimise exposure to smoke. This includes the ability to minimise smoke exposure on their premises and providing appropriate alternatives for people, such as working from home.

RECOMMENDATIONS

The survey results indicate the main factors limiting the ability of individuals to avoid smoke during the Black Summer Bushfire crisis were the lack of relevant information, financial constraints and ineffective public health messaging. With fire seasons becoming longer and more intense, the health impacts of smoke must become a policy priority for all jurisdictions. Asthma Australia makes the following recommendations for action that will be necessary to reduce the impact of future periods of smoke on all Australians, particularly those with asthma or other vulnerabilities.

- 1** Health departments develop and implement an Air Smart campaign including:
 - year-round information to improve environmental health literacy;
 - funding for non-government health organisations to deliver air quality education;
 - targeted information for people with asthma on actions to take to prepare for expected poor air quality events; and
 - increased crisis response for periods of sustained poor air quality, such as during bushfires.
- 2** The Meeting of Environment Ministers develop a uniform approach to measuring and reporting air quality which consists of:
 - a. separating out PM2.5 in reporting of air quality data;
 - b. requiring PM2.5 to be reported as an hourly average;
 - c. using consistent terminology and measures to describe categories of air quality; and
 - d. introducing strong compliance and enforcement mechanisms to prevent non-compliance.
- 3** State and territory environmental agencies introduce more air quality monitoring stations, including in regional, rural and remote Australia, and consider the use of temporary air quality stations in further locations during times of extended periods of poor air quality.
- 4** Building standards be reviewed so that homes can be better protected against air pollution during periods of poor air quality.
- 5** An accreditation scheme be developed to identify public buildings which meet certain clean air criteria such as: they are well-sealed, have HEPA filter recycled air conditioning and can be easily accessed by community in times of poor air quality.
- 6** The Chief Medical Officer and State and Territory Chief Health Officers develop and release a national policy framework to guide institutional responses to air quality protection in early learning centres, schools, universities, workplaces, sporting associations and for outdoor events.
- 7** Health departments provide financial assistance to people with asthma for air purifiers:
 - a. Health departments develop a scheme to provide subsidies or loans to people with asthma to help with the cost of renting or purchasing air purifiers.
 - b. The Australian Government Department of Health provide financial assistance to people with asthma towards the energy costs associated with using air purifiers and air conditioning to avoid asthma flare ups by:
 - extending the 'Essential Medical Equipment Payment' to include asthma as an 'eligible medical condition'; and
 - adding air purifiers with a HEPA filter to the list of 'eligible medical equipment'.

8

The Australian Government Department of Health develop a strategy on access to and use of face masks by people with asthma during air pollution events, covering:

- a. Maintaining a stockpile of appropriate face masks and developing a strategy to distribute them to people in all areas affected by poor air quality, particularly people in high risk groups.
- b. Providing clear guidance on the optimal way to use face masks, including risks and limitations.

9

The Australian Government continue to support telehealth and expand services so people with asthma can access medical care in periods of poor air quality.

10

The Australian Government fund campaigns to increase awareness of Medicare rebates for mental health care and telehealth access to mental health care so people with asthma can access mental health support during periods of prolonged bushfire smoke.



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