

Breathing easy: tackling the toxic exposure threats to wildland firefighters.

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A mixed-method investigation of the health risks to wildland firefighters in Western Australia

Four research projects uncovered numerous factors affecting wildland firefighter PPE adherence, quantified the harmful personal exposures experienced at bushfires and found that the firefighting tunic is a secondary exposure source.

Background

Bushfires have always been a part of the Australian summer. But with temperatures rising, and rainfall reducing (Perth has just recorded the driest summer in 150 years) out-of-control bushfires across the vast state are increasing in frequency and intensity. This research aimed to examine the harmful exposures that firefighters experience at bushfires through both a qualitative and quantitative lens.

Methods

First, a pilot study trialled the proposed methods and confirmed the ability of the sampling equipment to be suitable for work in a bushfire environment. After this, 23 in-depth semi-structured interviews were conducted with forestry and volunteer firefighters. Then, from April to December 2023, real-time gas and particulate exposure monitoring was conducted on n=40 participants across ten prescribed burns and bushfires across WA. From each fire event, an outer tunic was analysed for post-incidence off-gassing of toxins. In addition, the chemical and heavy metal composition of the bushfire smoke from fires burning across five distinct eco-regions of WA was analysed using a portable Fourier transform infrared spectrometer.

Findings

Firefighters need assistance

Interviews revealed that volunteer firefighters lack a basic understanding of the health risks they face when working in a bushfire environment. Forestry firefighters across WA lacked any access to P3 respiratory equipment and did not have access to showering or laundry facilities at their workplace, this caused significant concern and unrest

Masks are paramount

Personal exposure monitoring at wildland fires revealed that firefighters experience high levels of workplace exposure for short periods of time, exceeding workplace standards set in other professions. PM10 was the most abundant particle size, contrary to previous findings.

Decontamination and isolation of PPE

We found that the firefighting tunic undergoes a process of off-gassing of chemicals such as benzene, acrolein and formaldehyde (carcinogens) following exposure to a bushfire. The tunic needs to be considered a secondary exposure source to firefighters and their families and should be isolated and washed safely.



Impact

We have translated this research into real-world action.

Here is a brief rundown:

- Our research has given the scientific backing for forestry firefighters in WA to be supplied with P3 respirators. This means that over 600 firefighters will have adequate breathing protection for the first time going into the 2024 bushfire season
- We have highlighted the importance of decontamination of PPE. The provision of washing machines in fire stations across the state is now underway.
- We are investigating the effectiveness of laundering processes to best protect firefighters
- We have begun to develop methods for surrogate exposure monitoring to monitor the health risks in the future.

Further information

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