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Background

- Bushfires are a natural part of Australia's ecosystem, but the frequency and severity of bushfires in Australia has been increasing, due in part to climate change (1).
- The health and environmental impacts of bushfires results in substantial economic costs to society.

Aims

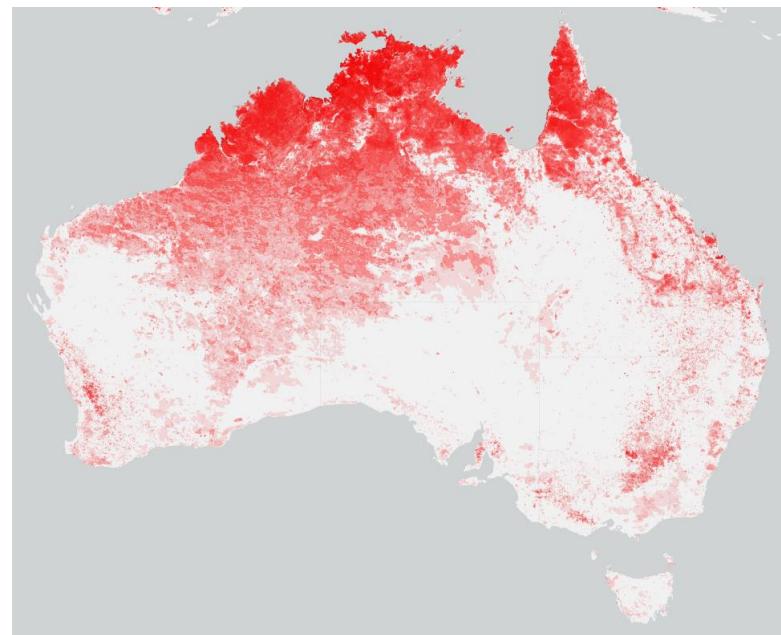
- The present analysis sought to estimate the burden of bushfires in Australia over ten years from 2021 to 2030 inclusive.

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Results

- Over the ten years from 2021 to 2030 inclusive, the modelled analysis predicted that 2418 [95% Confidence interval (CI) 2412 - 2422] lives would be lost to bushfires (Table 2).
- Healthcare costs arising from deaths for smoke-related conditions, hospitalisations for cardiovascular and respiratory conditions, and emergency department presentations with asthma amounted to \$110 million [95% CI 91 - 129 million] (discounted).
- The impact on Gross Domestic Product totalled \$17,214,949 million [95% CI 17,214,948 - 17,214,951 million].
- Value of statistical life, \$1.9 billion [95% CI: 1.5-2.2] (discounted) was lost (Table 2).
- If a hypothetical intervention or prevention strategy were able to reduce the impact of future bushfires by 10%, there would be savings of over \$11 million in healthcare costs and \$1.7 billion in GDP.

NASA MODIS burned area detections from June 2001 to May 2019 showing regions affected by fires in Australia in red



Data captured from <https://firms.modaps.eosdis.nasa.gov/map/>

Table 1. Input parameters used for the model and their respective variation and distribution.

Parameters	Base Case	Lower limit†	Upper limit†	Distribution for PSA	Source
Health burden [#]					
Deaths directly due to bushfires	34	24	44	Lognormal	Biddle et al, Australian National University
Excess deaths (any cause)	417	153	680	Lognormal	Borchers-Ariagada(1)
Respiratory hospital admissions	1124	211	2047	Gamma	Borchers-Ariagada
Cardiovascular hospital admissions	2027	0	4252	Gamma	Borchers-Ariagada
Asthma ED attendances	1305	705	1908	Gamma	Borchers-Ariagada
Healthcare costs					
Deaths directly due to bushfires	\$0	\$0	\$0		
Excess deaths (any cause)	\$6,973	\$4,881	\$9,065	Gamma	AR-DRG
Respiratory hospital admissions	\$6,679	\$4,675	\$8,682	Gamma	AR-DRG
Cardiovascular hospital admissions	\$7,175	\$5,022	\$9,327	Gamma	AR-DRG
Asthma ED attendances	\$501	\$351	\$651	Gamma	Asthma Australia
VSLY	\$222,000	\$155,400	\$288,600	Gamma	Dept of the Prime Minister and Cabinet

- The analysis considered both a healthcare and a societal perspective. A 5% annual discount rate was applied to all costs incurred and outcomes from 2022 onwards.
- Years of life lost to bushfire-related deaths were calculated by creating a cohort of individuals who died, and simulating their follow-up as if they had not died due to bushfires. Rather, they experienced sex- and-age specific mortality as per the general population. The value of statistical life lost was derived from multiplying each year of life lost by the value of statistical life year (\$222,000).
- Number of sensitivity, scenario, and probabilistic sensitivity analysis were undertaken.

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Conclusion

- The health and economic burden of bushfires in Australia looms large even if based on a conservative estimation. This underscores the importance of actions to mitigate bushfire risk.
- This model provides a tool for budget allocation and prevention activities directed to suppress bushfires in Australia.