National Institute of Environmental Health Sciences

Effects of bushfire smoke on daily mortality and hospital admissions in Sydney, Australia

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Abstract:

Background: Little research has investigated the health effects of particulate exposure from bushfires (also called wildfires, biomass fires, or vegetation fires), and these exposures are likely to increase, for several reasons. We investigated associations of daily mortality and hospital admissions with bushfire-derived particulates, compared with particulates from urban sources in Sydney, Australia from 1994 through 2002. Methods: On days with the highest particulate matter (PM)10 concentrations, we assumed PM 10 was due primarily to bushfires. We calculated the contribution of bushfire PM10 on these days by subtracting the background PM 10 concentration estimated from surrounding days. We assumed PM 10 on the remaining days was from usual urban sources. We implemented a Poisson model, with a bootstrap-based methodology, to select optimum smoothed covariate functions, and we estimated the effects of bushfire PM10 and urban PM10, lagged up to 3 days. Results: We identified 32 days with extreme PM10 concentrations due to bushfires or vegetation-reduction burns. Although bushfire PM10 was consistently associated with respiratory hospital admissions, we found no consistent associations with cardiovascular admissions or with mortality. A 10 µg/m 3 increase in bushfire PM10 was associated with a 1.24% (95% confidence interval Euro Surveillance (Bulletin Europeen Sur Les Maladies Transmissibles; European Communicable Disease Bulletin) 0.22% to 2.27%) increase in all respiratory disease admissions (at lag 0), a 3.80% (1.40% to 6.26%) increase in chronic obstructive pulmonary disease admissions (at lag 2), and a 5.02% (1.77% to 8.37%) increase in adult asthma admissions (at lag 0). Urban PM10 was associated with all-cause and cardiovascular mortality, as well as with cardiovascular and respiratory hospital admission, and these associations were not influenced by days with extreme PM10 concentrations. Conclusions: PM10 from bushfires is associated primarily with respiratory morbidity, while PM 10 from urban sources is associated with cardiorespiratory mortality and morbidity. © 2009 by Lippincott Williams & Wilkins.

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Resource Description

Exposure :

weather or climate related pathway by which climate change affects health

Air Pollution, Extreme Weather Event, Meteorological Factors, Temperature

Air Pollution: Interaction with Temperature, Ozone, Particulate Matter

Extreme Weather Event: Wildfires

Temperature: Fluctuations

Geographic Feature: ☒

resource focuses on specific type of geography

Urban

Geographic Location: ☒

resource focuses on specific location

Non-United States

Non-United States: Australasia

Health Impact: ☒

specification of health effect or disease related to climate change exposure

Cardiovascular Effect, Morbidity/Mortality, Respiratory Effect

Cardiovascular Effect: Heart Attack, Stroke, Other Cardiovascular Effect

Cardiovascular Disease (other): cardiovascular disease mortality

Respiratory Effect: Asthma, Bronchitis/Pneumonia, Bronchitis/Pneumonia, Chronic Obstructive Pulmonary Disease, Other Respiratory Effect

Respiratory Condition (other) : respiratory disease mortality

Population of Concern: A focus of content

Population of Concern: ☒

populations at particular risk or vulnerability to climate change impacts

Children, Elderly

Resource Type: ☒

format or standard characteristic of resource

Research Article

Timescale: ☒

time period studied

Time Scale Unspecified