

Pollution, climate change, and childhood asthma in Australia

Peter D Sly¹, Patrick G Holt²

Global warming has consequences for our health, and the impact will only be exacerbated by inaction

As outlined in the recent *Lancet* Commission report,¹ environmental pollution in its broadest sense is a major contributor to global mortality, morbidity, and burden of disease. One major message of the report was that pollution does not receive the attention, research funding, or policy intervention that it warrants. The impact of pollution on health is compounded by climate change;² for instance, global warming is expected to result in deterioration of air quality, magnifying the adverse health effects of air pollution.³ The potential impact of climate change on health has recently attracted greater attention, stimulating the American College of Physicians to recommend direct action by physicians: engaging in environmentally sustainable practices that reduce carbon emissions; supporting efforts to mitigate and adapt to the effects of climate change; and educating the public, their colleagues, and lawmakers about the health risks of climate change.⁴

The mechanisms by which climate change is likely to affect health are complex. They include higher ambient temperatures, increasing cardiopulmonary mortality and morbidity; increases in surface ozone levels, negatively affecting lung growth and increasing the risk of asthma exacerbations; reduced rainfall in some areas and increasing levels in others, resulting in altered prevalence and seasonality of respiratory infections;⁵ higher atmospheric CO₂ concentrations, which increase the growth, pollen production, and the allergenicity of many plants while also reducing their nutritional value,⁶ and rising sea levels and increased severity and frequency of extreme weather events, displacing populations and compromising food and water security.

In this issue of the *MJA*, Knibbs and colleagues⁷ bring closer to home one aspect of the health consequences of environmental pollution, examining the impact of damp housing and gas stoves on childhood asthma in Australia. They report that 26% of Australian homes are damp and that 38% use natural gas for cooking. Based on data from published meta-analyses and the 2011 census, they calculated that the population attributable fraction of asthma related to damp housing was 7.9% (95% confidence interval [CI], 3.2–12.6%) and that attributable to gas stoves was 12.3% (95% CI, 8.9–15.8%). The authors also calculated disability adjusted life-years (DALYs) or years of healthy life lost, a standard measure of burden of disease, and estimate that dampness is responsible for 42 DALYs per 100 000 and gas stoves for 67 per 100 000 children under 14 years of age. Knibbs and his co-authors concluded that a considerable proportion of the burden of asthma in children could therefore be averted by reducing dampness in homes and the use of natural gas for cooking, or



by installing high efficiency range hoods that remove combustion products from the house. One factor the authors did not take into account was that children spend about 30% of their time at school, where they may also be exposed to dampness and unflued gas heaters.

However, there are further complexities that were beyond the scope of this study. As emphasised in the *Lancet* Commission report,¹ populations are rarely exposed to a single pollutant; even when a single source is responsible for pollution, individuals are typically exposed to mixtures of toxicants. Knibbs and colleagues⁷ highlight the reduced exposure to environmental tobacco smoke related to lower population smoking rates, but recent studies have reported that the prevalence of wheeze early in life remains high in Australia; for example, half the infants in the community-based cohort of the Barwon Infant Study had wheeze in the first year of life.⁸ Knibbs and his co-authors also suggest that indoor exposures other than those they explored may also contribute to respiratory disease in young children.⁷ Indeed, an increasing array of contaminants of indoor air are thought to contribute to wheeze and asthma, including household chemicals (especially those in aerosol sprays),⁶ plasticisers, bisphenols and phthalates,⁹ and pesticides and flame retardants.¹⁰ One factor that Knibbs and colleagues did not explicitly discuss is that the range hoods fitted in many (possibly most) Australian apartments are not externally vented, but recirculate fumes into the kitchen through filters unlikely to remove NO₂.

The impending impact of climate change, especially the anticipated expansion of zones of high ambient humidity, can be expected to result in more Australian homes having dampness problems. The report by Knibbs and colleagues indicates that Australia already has a problem with climate-related effects on indoor air quality, and the situation can only be expected to get worse if we accept the current business-as-usual attitude and do not tackle climate change seriously.

Competing interests: No relevant disclosures.

Provenance: Commissioned; externally peer reviewed. ■

© 2018 AMPCo Pty Ltd. Produced with Elsevier B.V. All rights reserved.

¹Child Health Research Centre, University of Queensland, Brisbane, QLD. ²Telethon Kids Institute, University of Western Australia, Perth, WA.
patrick.holt@telethonkids.org.au • doi: 10.5694/mja17.01145 • See Research, p. 299

- 1 Landrigan PJ, Fuller R, Acosta NJR, et al. The *Lancet* Commission on pollution and health. *Lancet* 2018; 391: 462-512.
- 2 Meng X, Zhang Y, Zhao Z, et al. Temperature modifies the acute effect of particulate air pollution on mortality in eight Chinese cities. *Sci Total Environ* 2012; 435/436: 215-221.
- 3 Fang Y, Mauzerall DL, Liu J, et al. Impacts of 21st century climate change on global air pollution-related premature mortality. *Clim Change* 2013; 121: 239-253.
- 4 Crowley RA. Climate change and health: a position paper of the American College of Physicians. *Ann Intern Med* 2016; 164: 608-610.
- 5 D'Amato G, Holgate ST, Pawankar R, et al. Meteorological conditions, climate change, new emerging factors, and asthma and related allergic disorders. A statement of the World Allergy Organization. *World Allergy Organ J* 2015; 8: 25.
- 6 Sherriff A, Farrow A, Golding J, Henderson J. Frequent use of chemical household products is associated with persistent wheezing in pre-school age children. *Thorax* 2005; 60: 45-49.
- 7 Knibbs LD, Woldeyohannes S, Marks GB, Cowie CT. Damp housing, gas stoves and the burden of childhood asthma in Australia. *Med J Aust* 2018; 208: 299-302.
- 8 Gray L, Lin T, O'Hely M, Vuillermin P. Family history of allergic disease is associated with adverse infant respiratory health and increased healthcare utilisation: findings from the Barwon Infant Study. *Intern Med J* 2016; 47: 16.
- 9 Cakmak S, Dales RE, Hebborn C, Saravanabhavan G. The association between urinary phthalates and lung function. *J Occup Environ Med* 2014; 56: 376-381.
- 10 Impinen A, Nygaard UC, Lødrup Carlsen KC, et al. Prenatal exposure to perfluoralkyl substances (PFASs) associated with respiratory tract infections but not allergy- and asthma-related health outcomes in childhood. *Environ Res* 2018; 160: 518-523. ■