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Original Research

A public health needs assessment for domestic indoor overheating

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ABSTRACT

Objectives: Indoor overheating is a potentially fatal health hazard that was identified as an issue requiring urgent action in the 2017 UK Climate Change Risk Assessment. We aimed to make research on this issue more accessible to local public health teams to encourage its inclusion in local strategic needs assessments.

Study design: Epidemiological health needs assessment.

Methods: We adapted established health needs assessment methods, focussing on the epidemiological component, drawing evidence from a non-systematic literature review that was complemented by discussion with experts.

Results: Indoor overheating arises from an interaction between occupants' susceptibility to heat, their behaviour and the building's location and its characteristics. Many of these factors are interrelated and, at a national level, are expected to vary over time with demographic and climate change. Understanding these factors, ways to mitigate them and a long-term view are all essential for managing overheating risk.

Conclusions: There is a need for services to be provided at the local level that consider the home environment and its impact on health in all seasons. A population-level approach to risk management across a local area is also useful to inform collaborative efforts to reduce future incidence of overheating and better understand how it varies with socio-economic deprivation.

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Introduction

There are an estimated 2000 heat-related deaths in the United Kingdom (UK) currently each year, and this figure is projected to rise to 7000 by 2050 due to demographic and climatic changes.¹

External temperatures at which heat-related deaths start to occur vary by country² and region within the UK³ and are relatively low;⁴ for example, ecological time series studies have estimated excess mortality rate to increase with temperature from levels as low as 19 °C in London.^{3,5}

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There is an absence of quantified estimates of the health burden associated with measured indoor exposure to heat.⁶ Design criteria relevant to indoor overheating tend to be based on thermal comfort standards, which seek to avoid exceeding temperatures that would result in most occupants feeling too warm^{7,8} but may not reflect the needs of specific population subgroups.⁶ To date, no official health-based threshold temperature for indoor overheating in dwellings has been established and no maximum temperature threshold has been set in building regulations.^{7,9–11} However, the effects of heat on the body, the groups most susceptible and the epidemiology of population health impacts during both normal summer temperatures and heat wave periods are fairly well understood.^{2,4,10,12} In recognition of this, the 2017 UK Climate Change Risk Assessment (CCRA) identified indoor overheating as a key issue requiring urgent action,¹³ highlighting the current lack of explicit national policies to address it. Both the CCRA and the National Institute for Health and Care Excellence (NICE) have stressed the need for designing new homes and adapting existing homes, so that they are energy efficient in winter and also resilient to summer heat^{13,14} while minimising the need for air conditioning, with its potentially high financial and cumulative carbon costs.¹³ The National Planning Policy Framework requires local planning authorities to ‘adopt proactive strategies to mitigate and adapt to climate change.’¹⁵ Indoor overheating represents a challenge for national and local government policy, has important potential implications for public health and environmental sustainability, and poses a reputational and financial risk for the housing sector.⁷

Tackling indoor overheating will require coordinated action across multiple sectors, including local public health teams. The inclusion of a checklist for the public and professionals in the Heatwave Plan for England (HWP) with advice on keeping the home cool¹⁶ and the production of a methodology by the Chartered Institution of Building Services Engineers to support building designers who assess overheating risk in residential buildings⁹ are both welcome steps forward, but more is needed to increase awareness and understanding of this issue. We aimed to make research on indoor overheating more accessible to local public health teams to encourage its inclusion in local strategic needs assessments, with the objectives of describing risk factors for indoor overheating and identifying methods to assess and manage overheating risk.

Methods

Study design

We carried out a descriptive epidemiological study by adapting established epidemiological healthcare needs assessment (HNA) methods^{17,18} for this environmental health protection topic.

Definitions

We limited our focus to domestic homes. Within the domestic housing sector, we considered both new build dwellings and existing housing, which may be subject to retrofit in future

and three housing tenures: owner occupied, private rental or social rented.¹⁹ We used the term ‘indoor overheating’ to describe situations in which susceptible people are exposed to high indoor temperatures in their homes that may result in negative health impacts.

Data collection

Between January and September 2015, we carried out a non-systematic review of published peer-reviewed and grey literature, covering summary papers, reports and some primary studies concerned with indoor overheating in the UK. This was conducted as part of a broader project undertaken during a specialist public health training placement, whose brief was to identify the need for additional guidance on indoor overheating to accompany the HWP. The review was updated in August 2017 to include key studies published from September 2015 onward. The broader project required discussion with experts and attendance at meetings and events such as the 2015 Heatwave Plan Seminar, the London Heat Risk Forum, the Zero Carbon Hub steering group and the launch of the Committee on Climate Change’s 2015 Statutory Progress Report to Parliament. These interactions assisted in the identification of key documents to review and interpretation of the epidemiological evidence.

Analysis

We described the risk factors for indoor overheating in terms of person, place and time. Based on our knowledge of these risk factors, overheating risk management techniques were identified both at the level of individual homes/developments and their residents and at the level of areas and their populations.

Results

Descriptive epidemiology of risk factors for indoor overheating

Person

Groups more susceptible to the health effects of heat include the following:^{12,20}

- older people, especially those older than 75 years, house-bound, living alone, socially isolated or in care homes. Older people have reduced thermo-perception and thermoregulatory capacity;
- babies and young children; and
- those with long-term physical (especially respiratory or heart) problems, mental illness or on multiple medications.

In addition to physical susceptibility, occupants’ behaviour, occupancy patterns and ability to adapt to heat or act on advice are important aspects influencing exposure. Susceptible groups are more likely to be at home during the day, increasing their exposure to the highest temperatures.^{10,21} People with dementia, mobility problems and drug or alcohol dependence may be less able to adapt their behaviour to keep cool or be less

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