

Childhood asthma – The cause could be closer to home

Introduction

Childhood asthma is one of the major causes of concern for parents all over the world, requiring a large amount of care and precautions. This paper focuses on childhood asthma in the Australian context, its Australian health and financial burden, and its prevention strategies.

Media Report

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Can gas stovetops and heaters give you asthma?

ABC Radio Canberra

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<https://www.abc.net.au/news/2021-05-23/can-gas-stovetops-give-you-asthma/100157786>

Question

The question focus of this paper is:

What are the indoor causes of childhood asthma and how can we replace these to prevent asthma in children?

Why is this important?

Asthma is one of the most common chronic and non-communicable diseases that occur in children that is extremely prevalent worldwide and significantly impacts the quality of life of the affected children. Currently, around 300 million people are affected with asthma globally, and this number is predicted to increase by 100 million by the year 2025 (Network GA 2018). Asthma is a multifactorial disease which has a high incidence and prevalence in childhood, and people who are afflicted by this disease in childhood face greater health issues and mortality in adulthood. It occurs due to interactions between genetic factors, environmental factors, and host factors. Environmental factors can include climate, air pollutants, aeroallergens, mold, and pollens, and host factors can include allergic sensitization, nutritional factors, infections, and obesity (Serebrisky and Wiznia 2019).

Children are probably more susceptible to acquiring asthma due to the large amount of time they spend indoors and the several indoor triggers that have recently been discovered such as gas stove emissions and damp housing (Knibbs et al. 2018). Apart from these, gas heaters have also been associated with respiratory irritation and asthma (Salonen et al. 2019). According to the study conducted by Knibbs et al. (2018), 26.1% of Australian houses had dampness and 38.2% of the Australian households used gas for stovetop cooking. This study also found that 7.9% of childhood asthma cases were attributable to dampness and 12.3% of the cases were attributable to gas cooking. This indicates that exposure to these indoor triggers contribute considerably to the childhood asthma burden in Australia. Dampness results in the growth of bacteria, fungi, and dust mites, which result in immunosuppression, inflammation, and cytotoxicity. Use of gas for cooking results in the emission of formaldehyde, nitrogen dioxide, and nitrous acid, all of which are associated with respiratory inflammation.

In Australia, around 2.7 million people are currently afflicted with asthma constituting around 11% of the total population. Out of this, 10% of asthma sufferers are children in the age group of 0 to 14 years constituting around 460,000 children in Australia (ABS 2018). Considering the total health burden of childhood diseases in Australia, asthma contributes 14% of the total burden for boys and 12% of the total burden for girls (ABS 2019a). Although the prevalence of asthma in Australia has remained stable over the last decade, Australia still ranks second after New Zealand in terms of asthma prevalence at the population level (Deloitte Access Economics 2015).

The financial burden of asthma in the Australian population is estimated to be \$770 million annually, representing 0.7% of the total expenditure on population health and 19% of the total expenditure on respiratory health conditions. Out of the total expenditure, \$205 million is estimated to be spent in hospitals, \$163 million is estimated to be spent for non-hospital based medical services, and \$383 million is estimated to be spent for the purchase of pharmaceuticals (ABS 2019b). The above mentioned figures are for the entire Australian population suffering from asthma and not just children, because childhood asthma is a chronic condition which progresses well into adulthood. Prevention of childhood asthma can have a considerable impact on asthma-related expenditure for the entire Australian population.

What can be done to address it?

The problem of dampness can be location-specific for houses and may be very difficult to address by individuals. Gas cooking is also quite a traditional form of cooking and several families may be at a loss for alternatives. However, in families where children are genetically more susceptible to asthma or may be demonstrating early symptoms of asthma, it may be wise for families to consider alternatives to these indoor triggers so that childhood asthma can be effectively controlled in their children.

It has been estimated that addressing dampness in Australian houses can result in a decrease in around 8% of all childhood asthma cases. Most causes of indoor dampness include excess indoor humidity or the use of moisture-sensitive materials such as plasterboard (Dedesko and Siegel 2015). Almost every house has some amount of dampness in certain areas; however, when this dampness breeds microbial growth, it can lead to the development of illnesses. Some of the strategies to control dampness include ensuring that the interior walls are not heavily exposed to water and nutrients that can support microbial growth, installation of vapour barriers in new constructions, and use of fungi-resistant building products for construction (Elinwa et al. 2018). Dampness in existing houses can be addressed by increasing ventilation by opening windows, keeping wet clothes away from living areas of the house, and installing dehumidifiers. If these strategies prove to be insufficient, professional consultation may be required for implementing more extensive strategies in the houses (Knibbs et al. 2018).

The replacement of gas for cooking with an alternative energy source is also challenging, because it operates under the assumption that the alternative source will not produce harmful indoor emissions. However, cooking itself is a process that produces emissions, which may play a role in irritating the airways (Lunden et al. 2015). Despite the challenges, this alternative should be explored as it can result in a decrease of childhood asthma burden from 12.3% to 3.4% (Knibbs et al. 2018). One approach is to fit the gas stoves with high efficiency range hoods that have outdoor vents so that all emissions are re-routed outside the houses. This type of hoods can capture gases and particles at a 75% efficiency rate as compared to recirculating range hoods having lower flow rates (Lunden et al. 2015). Range hoods can also help in controlling indoor dampness by removing water vapour generated from cooking. Apart from this, improving ventilation in the houses can also reduce exposure to products of gas combustion (Knibbs et al. 2018).

Krieger (2010) has suggested that single-intervention approaches may not work effectively in controlling indoor triggers and multi-component approaches may be more suitable for this purpose. The first component of such an approach is a home visit where an expert assesses the internal environment conditions, provides tailored and specific approaches that can be implemented in the house, provide resources to reduce triggers such as cleaning supplies, vacuum cleaners, bedding encasement, and education on quitting smoking if applicable. A successful initiative in this regard was the Seattle-Kings County Healthy Homes program which implemented home visits for reduction of indoor triggers (Breysse et al. 2014). The next component includes physical improvement of housing conditions by means of prevention of water intrusion, ensuring sufficient ventilation, use of hard surface flooring materials, and minimizing emission of volatile organic compounds. Other strategies include home insulation, fungicide application, and

installation of ventilation fans (Turcotte et al. 2014). The next component is futuristic in terms of planning construction of asthma-friendly buildings where all the common triggers are taken care of in the construction stage. A pilot project in this regard is the Breathe Easy Home project, and volunteers suffering from asthma who have moved into these homes have reported a considerable increase in symptom-free days and an overall improved quality of life (Takaro et al. 2011).

Above all, public education is the key strategy here because once the people are made aware of the triggers, people at risk will attempt to reduce exposure to indoor triggers to control asthma in their children. This can be implemented in the form of leaflets, brochures, and other informational material that clearly describe the respiratory impacts of indoor triggers and approaches that can be implemented to reduce or overcome these triggers. These materials can also offer links to consultants who can guide interested people in how to specifically address indoor triggers and offer options based on their location and budget (NSW MOH 2017).

Conclusion

This paper has described the significant health and financial burden of childhood asthma along with its prevalence rate in Australia, citing indoor triggers to be one of the most important causes for the development of asthma in children. As children spend most of their time indoors, they are constantly exposed to second-hand smoke, internal dampness breeding microbial growth, and emissions from gas stovetop cooking. Addressing these triggers by incorporating ventilation, better construction materials, and alternative energy sources for cooking can go a long way in reducing the incidence of childhood asthma, in turn controlling the health and financial burden of asthma in Australia.

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