

Respiratory Health in Home and Leisure Pursuits

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KEYWORDS

- Asthma • Respiratory adverse health effects • Household • Cleaning • Dust • Vapors • Hobbies
- Pets

KEY POINTS

- A diverse array of home-based and leisure activities may generate hazardous respirable exposures.
- Routine domestic activities such as cooking and cleaning, heating systems, and a variety of hobbies, avocations, and leisure pursuits have been associated with a spectrum of respiratory tract disorders, including acute irritation or lung injury, rhinitis, asthma, and chronic obstructive lung disease.
- The home environment – where people spend as much as 50% of their life – and leisure activities – where certain particularly hazardous exposures could be avoided – present special health risks that should be part of the health assessment of individuals across all demographic groups.

INTRODUCTION

A diverse array of home-based and leisure activities may generate hazardous respirable exposures (Fig. 1). Because these activities are extensive, so, too, are the adverse respiratory effects that may be associated with them. Adverse respiratory effects associated with home and leisure activities include both upper and lower airway conditions and parenchymal diseases. Respiratory tract disorders potentially attributable to home-based and leisure activities–associated exposures include respiratory tract irritant effects, asthma, chronic obstructive lung disease, rhinitis, malignancy, and selected interstitial lung diseases. Although numerous reports have established causal relationships between a spectrum of exposures and adverse health effects, significant knowledge gaps persist regarding the epidemiology of home and leisure exposures, exposure–response relationships, and adverse health outcomes. Selected exposures covered in this review include some that present major worldwide

public health challenges (eg, cooking and heating with biomass fuels), others that are sporadic yet notable (eg, bird fancying), and still others that are mainly of historical interest (eg, certain photographic processing exposures), but nonetheless they all serve to illustrate important principles of environmental respiratory health. An encyclopedic cataloging of all possible home-based and leisure activity exposures and their adverse health effects is beyond the scope of this review, but the subject matter covered should provide a context and framework for approaching this diversity of topics.

HOME ENVIRONMENT

General Considerations

In post industrial societies, people spend approximately 90% of their time indoors. More than half of this time is spent at home.¹ Advances in home construction and building insulation have led to improved mechanical air conditioning and heating efficiency, but typically at the cost of diminished air exchange between the indoor and outdoor

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Clin Chest Med 33 (2012) 715–729

<http://dx.doi.org/10.1016/j.ccm.2012.08.001>

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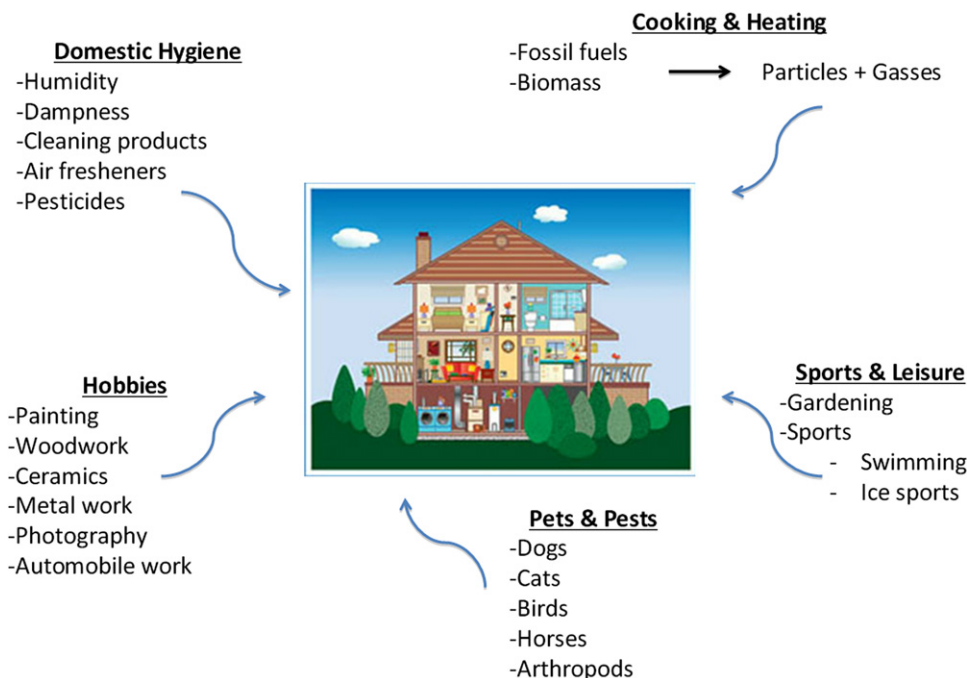


Fig. 1. Home and leisure based activities that may cause respiratory disease.

environments. Diminished indoor–outdoor air exchange rates can result in the accumulation of indoor air pollutants.² Although the relationships among air exchange rates, indoor air quality, and adverse health effects are complex, high concentrations of respirable contaminants, including combustion byproducts, mineral dusts, or aeroallergens, are widely appreciated to cause irritant effects in exposed individuals or trigger exacerbations of asthma in susceptible or sensitized individuals.

Humidity can be another important factor that influences the air quality in the home.³ Most modern buildings experience some kind of water damage during their life span. Water damage can result from ground penetration or leaks in windows, roofs, and pipes.⁴ Other activities, such as showering or bathing, humidifier use, and cooking, further contribute to indoor moisture. Drywall is a favorite construction material for interior walls but it can easily absorb water and moisture. Leaks into a wall or ceiling constructed with drywall, even from a single event, can initiate significant mold growth within days. Modern construction techniques include the use of drywall treated with antifungal agents such as sodium pyrrhione and the use of antimildew products such as tributyltin. Although these agents are effective in preventing mold growth, they may have their own adverse effects. For instance, tributyltin can cause eye and throat irritant effects.⁵

Humid and damp environments are ideal for the growth of molds, fungi, bacteria, mites, and insects.^{1,6} A spectrum of respiratory and nonrespiratory complaints have been described among building occupants exposed to mold and fungal spores. Mold spores produce mycotoxins and glucans that may be associated with respiratory effects, although there is contentious mechanistic debate over the role of specific mediators of such effects in humans.⁷ Respiratory disorders attributed to indoor fungi include new onset asthma,^{8–12} exacerbations of asthma,^{13,14} hypersensitivity pneumonitis,^{15,16} and a spectrum of symptoms including cough, dyspnea, and wheeze.¹⁷ Upper respiratory tract symptoms and respiratory infections have also been attributed to indoor mold exposure.¹⁸ A recent report found a relationship between building-related rhinosinusitis in water-damaged buildings and the subsequent development of asthma.¹⁹ Although more commonly considered an outdoor mold, positive skin prick tests for the mold genus *Alternaria* have been associated with asthma and hypersensitivity pneumonitis.²⁰ By promoting the proliferation of mold and other microorganisms, dampness can synergistically increase the eosinophilic inflammation in airways by inducing adjuvant-like activities of allergens.²¹

Unusually wet weather patterns may lead to changes in indoor ecology resulting in respiratory disease. During the winter of 1997–1998, a weather

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