



FACT SHEET

Community Development

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Sick Building Syndrome

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People spend most of their time indoors, with some estimates being that humans spend more than 90 percent of their lives inside constructed environments. Over time, the construction of buildings has increasingly focused on energy efficiency and comfort. Central heating and cooling systems are the norm, and home and office construction has moved toward minimizing heat or cool air loss by making buildings more airtight. At the same time, more complex materials are being used for furniture, clothing, fabrics, cleaners, detergents, and preservatives. Coupled, these and other parallel trends have created buildings where human exposure to foreign proteins, dusts, and gases through inhalation has gone far beyond what historically has been the case. This fact sheet discusses the concept of the “sick building syndrome,” the types of allergens or stimuli most likely to be found in today’s buildings, and how individuals can better cope with contemporary construction of indoor environments.

What Is Sick Building Syndrome?

In the 1970s, health care providers were faced with increasing numbers of people having headaches and allergic-like reactions to unspecified stimuli. Some of the reactions included lethargy, fatigue, headache, dizziness, nausea, irritation of mucous membranes, eye and/or nasopharyngeal irritation, and sensitivity to odors. Through exploration over several years, these reactions were linked to common symptoms of people in specific buildings and a lack of symptoms when these people were not in the buildings. This spectrum of specific and non-specific complaints, when tied to a particular

building, became known as sick building syndrome. It is important to note that sick building syndrome is not the same as “building related illness,” which refers to a specific airborne building contaminant. One well-known example of building related illness is Legionnaires’ Disease.

Sick building syndrome is often more prevalent among asthmatics among whom there is a large percentage of allergies to common indoor allergens. Indoor air pollution also disproportionately affects some populations, such as African Americans living in inner city homes that are not modernized. For these populations, there is a three times greater risk of asthma mortality than Caucasians, which may be compounded by a variety of sources including rat and cockroach infestations, sanitary conditions, access to healthcare and education, as well as indoor air pollution.

What Are the Sources of Pollution?

There are four broad categories of contributors to sick building syndrome. Other fact sheets in this series address some of these sources.

Major Combustion Pollutants

Malfunctioning or inappropriate and inefficient use of heating devices can produce pollutants at harmful levels. Carbon monoxide (CO), which is an asphyxiant, and nitrogen dioxide (NO₂) and sulfur dioxide (SO₂), which are irritants, are three of the more common products of combustion pollutants in the home. Methylene chloride, which is in some household products such as paint strippers, can also be metabolized to form CO.

Biological Air Pollutants

Found everywhere, dander, molds, dust mites, and other biologicals are carried by animals and people into and throughout homes and buildings. High relative humidity, flooding, inadequate exhaust of bathrooms or kitchens, humidifiers, dehumidifiers, air conditioners, drip pans under cooling coils, pets, and components of heating, ventilation, and air conditioning (HVAC) systems are all sources of biological air pollutants. Three types of human disease can come from these biological pollutants: infections in which pathogens invade human tissue; hypersensitivity diseases, which involve specific activity of the immune system; and toxicosis in which biologically produced chemical toxins cause direct toxic effects. In many cases, sick building syndrome may be related to microbial contamination in buildings.

Volatile Organic Compounds

At room temperature, volatile organic compounds, or VOCs, are emitted as gases from certain solids and liquids. These include formaldehyde, pesticides, solvents, cleaning agents, benzene, and perchloroethylene. In some EPA studies, indoor levels of some VOCs average two to five times greater than outdoors. A wide array of potential sources of VOCs exists in the home and in the office. Scents and hair sprays, household products such as finishes, rug and oven cleaners, paints, thinners, dry cleaning fluids, some copiers and printers, some glues and adhesives, markers, and photo solutions are among some of the common products that may emit VOCs. One of the major irritants in sick building syndrome is formaldehyde. Although urea-formaldehyde foam insulation is no longer used, buildings that had the blown foam in the 1970s may still have VOCs from the insulation. Formaldehyde is also found in resins in finishes, in plywood, paneling, fiberboard and particle board, and in some of the backings and adhesives for carpets. New installations, carpet, wall coverings, paint, or construction can all heighten problems with VOCs.

Heavy Metals

Over the past several decades, the potential for casual exposure to heavy metals in buildings has been significantly reduced. Lead was removed as an ingredient in paints starting in the 1940s and was completely banned in 1978. In August 1990, mercury (threat in the vapor, not in the paint) was removed from indoor latex paints and in 1991 from outdoor latex paints and was replaced with a different, less toxic chemical to extend shelf-life and kill mold and mildew. Although still a concern, the likelihood of inhalation of heavy metals in most buildings is minute.

The concern about heavy metals as an indoor air pollutant is greatest in older, deteriorating housing or during rehab or reconstruction projects of older buildings.

Indicators that a Health Reaction Is Due to a Sick Building

There are two components to identifying a sick building. The first is that the reactions or types of reactions are shared by several or many of the people who also inhabit the building. The second is that the reactions are triggered when in the building and are not triggered when not in the building. Some individuals, however, may have greater sensitivities to some stimuli than do other people. For these individuals, something or things in the building may be triggering a reaction, but the building may not be “sick.” This is often the case when a certain office or part of a building is rehabbed or reconfigured and decorated. That particular area of the building may create reactions in individuals, but the building itself is not problematic.

Strategies

The best way to deal with potential reactions to a sick building is to understand the reasons a building may be “sick.” The predominant culprit in most buildings is the flow of air. Fresh air and air movement patterns keep a building “flushed.” As buildings become sealed or an interior is redesigned and changes the air flow, air may not move as freely and the contaminants can accumulate in the closed space. Poorly designed or maintained ventilation systems (HVAC) can also create problems, especially in situations where the pollutants can build up over time due to poor air exchange.

The second cause can be a synergistic or combination interaction among low levels of specific pollutants. In these cases, when the specific pollutants are identified, the contributing factors are removed or altered to minimize the effect. For individuals, specific causes may be traced through “histories” of other situations in which the individual has had similar reactions.

Other factors that can contribute to the symptoms associated with sick building syndrome are some that can be relatively easily maintained. Humidity levels that are too low or too high, or changes in relative humidity in a building can aggravate individuals. Too low humidity can increase dust and particulate indoor pollution, and too high humidity can provide a breeding ground for molds and fungi. Poor lighting can increase eye strain and result in symptoms similar to sick building syndrome. Extreme

temperature fluctuations in a building can serve to release VOCs and molds or fungi.

People who suspect a building of making them sick should first track their reactions. What are the types of reactions? What are the triggers for the reaction? Do the reactions disappear when the person is not in the building? Next, examine the building for things that can be controlled. Many types of adjustments that could alleviate sick building symptoms require major structural changes in building infrastructure. So, affected individuals will have to find the things that they can control. Can windows or doors be

opened to improve air flow? Can the temperature changes within the building be minimized? Are there individual activities, such as the use of colognes or perfumes, soaps, shampoos, deodorants, perfumes in detergents, and air fresheners that can be controlled by individuals within the building? Finally, if it does seem that a building is sick, gather the evidence from multiple occupants of the building—and if possible have all occupants meet with one or a few health care providers—and contact the owner of the building and the local health department.

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