What is Indoor Air Quality and how does it affect me?

Indoor Air Quality, or IAQ, refers to the quality of the atmosphere in a building. It encompasses many aspects of a healthy and comfortable atmosphere: temperature, humidity, and the amount of pollutants such as carbon dioxide, radon, volatile organic compounds and particulate matter. IAQ in homes receives more attention these days because houses are more airtight and better insulated than ever before. While this means that houses require less fuel for space heating, it also means that passive air leakage through the building envelope will not provide sufficient ventilation to moderate concentrations of airborne pollutants.

Temperature and humidity are primary factors in ensuring that occupants are comfortable and healthy. The temperature of a home is usually regulated by the heating system. Water vapor, on the other hand, is produced by daily activities such as breathing, cooking, showering and can come from houseplants and soils in crawlspaces. It is measured as relative humidity. Some humidity is desirable (30-40 percent is recommended) because it keeps skin and sinuses from becoming too dry, stops static build-up and is beneficial for people with asthma. High humidity, however, can cause problems for the house and its occupants. Humidity levels above 40 percent in winter in our climate can lead to condensation within the building envelope, which promotes the growth of mold, mildew and rot, and humidity above 60% any time of the year provides growing conditions for bacteria, viruses and fungi.

Pollutants are introduced into a house in many ways. Carbon dioxide is produced when people breathe, and is often used to gauge the indoor air “freshness” (the air exchange rate). Carbon monoxide is a dangerous gas produced by combustion heating appliances, gas ranges and cars. All homes should have a CO alarm near any bedrooms. Pollutants that can cause irritation or long-term health problems originate from materials in or around our homes, such as formaldehyde, which is released from furnishings such as carpeting and cabinets, or radon, which is released from certain types of soils underneath a home’s foundation. Other pollutants of concern are the result of activities such as smoking, cooking and chemicals used for cleaning or pest control. Many of these pollutants can trigger asthma symptoms, irritate eyes, and cause headaches or fatigue. Long-term exposure to some pollutants in sufficient concentrations can contribute to the risk of cancer or respiratory disease, so it is important to manage pollutant levels for the health of the home’s occupants.

How is Indoor Air Quality improved in homes?

There are several ways to manage IAQ, and one of the most important is through ventilation. There are two basic types of ventilation: whole-house ventilation and local ventilation.

Local ventilation is provided for high-pollution areas, such as kitchens and bathrooms. The purpose of local ventilation is to remove the pollutants before they migrate to other areas of the house. This is typically achieved using exhaust ventilation, such as range hoods and bath fans. These devices can be controlled by switches or run on a timer and serve to exhaust pollutants and excess humidity.

Whole-house ventilation dilutes pollutants that are unavoidable, such as compounds released by furnishings and bio-effluents from people in the home. There are many ways to provide whole-house ventilation. The first relies on natural air leakage, a strategy that was common in the past when homes were not built as tightly as they are today. With no mechanical ventilation system, natural pressure gradients caused by wind and temperature differences move air through open windows or the building.
envelope. This strategy is not recommended, as it is not reliable and can result in poor IAQ in tight homes, and can result in wasted energy in leaky homes where heat escapes through the walls, windows, and roof.

Two whole-house mechanical ventilation strategies are exhaust-only and supply-only systems. An exhaust-only system usually consists of one or more bathroom fans designed to run continuously. Fresh air must enter through the building envelope. In a supply-only system, a central fan is typically integrated into a forced air distribution system and brings fresh air into a home. Supply-only systems are not recommended in Alaska since they force moisture from inside the house into the building envelope.

The final whole-house ventilation strategy is to employ a balanced, distributed system such as a heat recovery ventilator (HRV) or an energy recovery ventilator (ERV). These appliances exhaust stale air and provide fresh air at an equal rate, distributing it through the home through a ducted system.

No matter what the strategy is for a ventilation system, make sure it’s working properly and that outdoor air vents are open and unblocked. For more information on these devices, see our website at www.cchrc.org or come on a public tour on the second Thursday of each month to see various ventilation strategies.