

that measurable levels of up to a dozen pesticides have been found in the air inside homes. The amount of pesticides found in homes appears to be greater than can be explained by recent pesticide use in those households; other possible sources include contaminated soil or dust that migrates in from outside, stored pesticide containers, and household surfaces that collect and then release the pesticides. Pesticides used in and around the home include products to control insects (insecticides), termites (termiteicides), rodents (rodenticides), molds and fungi (fungicides), and microbes (disinfectants). In 1990, the American Association of Poison Control Centers reported that some 79,000 children were involved in common household pesticide poisonings or exposures. In households with children under five years of age, almost half stored at least one pesticide product within the reach of children. Exposure to chlorpyrifos (CP), a commonly used organophosphate insecticide, in the prenatal and early postnatal period may impair neurological development. While CP is a biodegradable pesticide, substantial persistence of CP in house dust has been demonstrated. Exposure to high levels of cyclodiene pesticides, commonly associated with misapplication, has produced various symptoms, including headaches, dizziness, muscle twitching, weakness, tingling sensations, and nausea. In addition, the EPA is concerned that cyclodienes might cause long-term damage to the liver and the central nervous system, as well as an increased risk of cancer.

There are available data on hazard evaluation methods and remediation effectiveness regarding pesticide residues in the home environment.

*Radon progeny:* The National Academy of Sciences estimates that approximately 15,000 cases of lung cancer per year are related to radon exposure. Epidemiologic studies of miners exposed to high levels of radon in inhaled air have defined the dose response relation for radon-induced lung cancer at high exposure levels. Extrapolation of this data has been used to estimate the excess risk of lung cancer attributable to exposure to radon gas at the lower levels found in homes. These estimates indicate that radon gas is an important cause of lung cancer deaths in the U.S. Excessive exposures are typically related to home ventilation, structural integrity and location.

Radon measurement and remediation methods are well developed, and the EPA recommends that every home be measured for radon. The EPA estimates that materials and labor costs for radon reduction in an existing home are \$800–\$2,500. Including radon resistant techniques in new home construction costs \$350–\$500, and can save up to \$65 annually in energy costs, according to the EPA.

*Take-home hazards from work/hobbies and work at home:* When the clothing, hair, skin, or shoes of workers become contaminated with hazardous materials in the workplace, such contaminants may inadvertently be carried to the home environment and/or an automobile. Such “take-home” exposures have been

demonstrated, for example, in homes of lead-exposed workers. In addition, certain hobbies or workplaces located in the home may provide an especially great risk of household contamination.

Control methods include storing and laundering work clothes separately, and showering and changing clothes before leaving work or immediately after arriving at home. Once a home becomes contaminated, cleaning floors and contact surfaces and replacing furnishings may be necessary to reduce exposures.

*Unintentional injuries/fire:* Unintentional injury is now the leading cause of death and disability among children younger than 15 years of age. In 1997, nearly 7 million persons in the U.S. were disabled for at least one full day by unintentional injuries received at home. During the same year, 28,400 deaths were attributable to unintentional home injuries, of which 1,800 occurred among children four years of age and younger. Among young children, three types of events accounted for more than 75 percent of deaths: fires/ burns; drownings; and mechanical suffocation. Falls and poisoning are the next most common causes of death.

Home visitation protocols have been shown to be effective in reducing exposure to such hazards. The “add-on” cost of injury prevention measures, when combined with other housing interventions are estimated at about \$100 per unit. This includes the cost of some injury prevention devices (*e.g.*, smoke alarms, electrical socket covers, etc.).

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