EXPLORING EFFECTIVE EDUCATION OF FAMILY CHILD CARE PROVIDERS ABOUT ISSUES RELATED TO INDOOR ENVIRONMENTAL POLLUTANTS: TRAINING WORKSHOP VS. PRINTED MATERIAL

A Thesis
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by
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ABSTRACT

Currently, approximately 6 million children have asthma and close to half a million children suffer from elevated blood lead levels, making asthma and lead exposure among the most pertinent health issues facing children in the United States. With a rapidly growing number of children being cared for in child care programs, it is essential for child care providers to be able to maintain a healthy environment. The present study was designed to test the effectiveness of educating family child care providers about indoor environmental pollutants using two low-cost, widely distributable educational treatments. The two educational treatments, a peer educator-led training workshop (n = 14) and a printed, self-study guidebook received in the mail (n = 17), were assessed by measuring participant knowledge of indoor pollutants as well as exposure-reducing behaviors, both before and after the educational treatment. As hypothesized, both treatment groups (N = 31) showed significant improvement in general knowledge of indoor pollutants; improvement on both lead knowledge $t(30) = -2.908, p < .01$ and asthma knowledge $t(30) = -2.839, p < .01$ post-treatment scores were statistically significant. The second hypothesis that there would be a significant improvement in both treatment groups on child care providers’ exposure-reducing behaviors was not confirmed. The third and fourth hypotheses that the workshop treatment group would show significantly more improvement on both knowledge and exposure-reducing behavior than the guidebook treatment group were also not confirmed. This study’s findings that the guidebook treatment was as equally effective as the training workshop treatment, suggests that there is great potential for creating positive change in family child care providers’ exposure-reducing behavior and knowledge of indoor environmental pollutants using a simple, low-cost method, such as an educational guidebook.
BIOGRAPHICAL SKETCH

Jamie Holmer grew up in NE Washington, DC with her mother, father, and older brother. She began her education at Capitol Hill Day School, then continued on for high school at the Maret School. Following high school, she attended Emory University in Atlanta, GA and graduated in 2004 with a B.A. degree in Psychology. During the summer of her third year in university, Jamie worked at NASA in Houston, TX as a student intern in the Habitability and Human-Factors Lab. As she spent the summer working in a freezing cold and windowless office, Jamie started thinking about the psychology of the everyday built environment and how the same design research and rigor used to make decisions for NASA could be applied to less extreme spaces. When she discovered that Cornell University had a department of Design and Environmental Analysis with a Human-Environment Relations major, she decided to continue on for a master’s degree. Some of her favorite past times include playing soccer, going for walks in the arboretum, and eating macaroni and cheese.
For my family and friends who have been an ever supportive force during this journey.
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CHAPTER ONE
INTRODUCTION

Rationale

The quality, design, and maintenance of built environments are essential elements that contribute to overall human health. Indoor environmental pollutants, defined as lead, mold, dust mites, pests (cockroaches, mice, and rats), secondhand smoke, combustion by-products (nitrogen dioxide and carbon monoxide), chemical irritants (found in cleaners, paints, adhesives, and air fresheners), and pets (any warm-blooded animals), pose serious health risks to the population at large. Similar to the adult population in the United States, children spend approximately 90 percent of their time indoors (U.S. Environmental Protection Agency [EPA], 2001). In contrast to adults, children’s exploratory behavior, lower proximity of breathing zones to the ground, higher respiratory rates compared to body weight, and rapidly developing bodies make indoor environmental pollutants a greater health threat (Staes, Balk, Ford, Passantino, and Torrice, 1994; U.S. EPA, 2001).

Both asthma and lead exposure are associated with significant financial as well as societal costs. A study by Landrigan et al. (2002), estimated a range of $48.8-64.8 billion as the total annual costs for environmentally attributable childhood diseases in the United States, with $43.4 billion attributed to lead poisoning and $2.0 billion attributed to asthma. According to National Institute of Allergy and Infectious Diseases [NIAID] (2001), asthma accounts for an annual total of more than 10 million missed school days, which can lead to significant disruptions in education. Lead poisoning denies almost half a million children their full potential to be productive adults and has been correlated with behavior problems, including attention deficit disorder and juvenile delinquency (Centers for Disease Control and Prevention [CDC],
It is clear that prevention of childhood asthma and lead exposure would benefit society significantly, both socially and economically.

The incidence of childhood asthma has grown significantly over the past 25 years. According to the CDC, 20 million people have asthma, of which 6.1 million are children (U.S. EPA, 2005). Uncontrolled asthma poses a serious health risk and can result in severe limitations of daily life. Asthma is considered the most common chronic childhood disease, the third-ranking cause of hospitalization in children under 15, and results in an estimated $3.2 billion in annual expenditures for treating children under 18 (U.S. EPA, 2005; CDC, 2005). In addition, asthma related mortality rates have increased substantially over the past two decades, with child mortality rates doubling from 1980 to 1993 (NIAID, 2001). Although the definitive cause of asthma remains unknown, researchers believe that combinations of genetic and environmental factors determine a person’s susceptibility for developing asthma (NIAID, 2001).

In the past 30 years, there have been considerable efforts to eliminate lead hazards, and while they have successfully reduced overall youth blood lead levels, children across the country continue to suffer from a range of health problems, behavioral disorders, and learning disabilities due to lead exposure (U.S. EPA, 2006). Currently, there are an estimated 434,000 children between the ages of 1-5 years that have blood lead levels (BLLs) greater than 10 µg/dL (CDC, 2004). It is the goal of The U.S. Department of Health and Human Services to eliminate incidences of BLLs greater than 10 µg/dL in children aged 1-5 by the year 2010. In order to achieve this objective, childhood lead poisoning has been labeled by the CDC as the primary environmental health hazard facing American children (U.S. Department of Housing and Urban Development, 1995). With reductions in lead exposure rates slowing and childhood asthma on the rise, it is evident that lead exposure and asthma are among the most pertinent health issues facing children in the United States.
Despite efforts to conduct research on indoor environmental issues and to communicate the findings of that research, the majority of the population still does not have a clear sense of the significant health risks of indoor pollution. In addition, most people are unaware of what they can do to reduce the risk of asthma, cancer, and other serious diseases that are caused by indoor pollutant exposure (U.S. EPA, 2001). At a time when asthma rates are reaching all-time highs and the elimination of childhood lead exposure is a national priority, it is imperative that information about indoor environmental pollutants be effectively disseminated and communicated. Particularly since reducing exposure to indoor pollutants can be as simple as making minor changes to one’s daily routine, education is needed in order to provide adequate knowledge so these simple, preventative steps can be taken (Ott and Roberts, 1998).

The issue of exposure to indoor environmental pollutants is of particular relevance for child care providers, especially in light of the rapidly growing number of children being cared for in child care programs (Hofferth, 1996). Child care providers are entrusted with both the safety and care of the children in their programs, and parents want to know that their child is in a hazard-free environment. In order for child care providers to maintain a healthy environment that can serve as the foundation for good child care, it is necessary for them to know how to protect the children for whom they are responsible. As stated by Staes et al. (1994, p. 3), “many hazards can be prevented or controlled, if recognized, and early childhood development can be enhanced through informed decisions made during the design and maintenance of child-care centers.”

The need for effective educational materials to disseminate this critical information about indoor environmental pollutants to family child care providers is not addressed by existing literature. The focus of this study was directed at family child care, where providers care for up to eight children in their own home, rather than child
care centers, which accommodate more children, because centers are typically
operated in a public building and are more likely to have access to professional
maintenance. Since the overarching objective of this study is to positively impact both
the knowledge and behavior of family child care providers on a large scale, it is also
important to research the effectiveness of educational methods that allow for wide
distribution.

Since proper knowledge and exposure-reducing behaviors can impact much of
the suffering and disease associated with indoor environmental pollutants, the
challenge of simply communicating complex information, both in terms of
informational content and educational method, is an essential element to improving
children’s health. This study was designed to address the issue of how to effectively
disseminate knowledge of indoor environmental pollutants and affect exposure-
reducing behavior.

**Research objectives**
The goal of this study is twofold:

1) To efficiently and effectively educate family child care providers about
indoor environmental pollutants in order to improve their ability to identify potential
hazards and reduce the risk of exposure by altering everyday behaviors, such as
implementing recommended cleaning and maintenance practices.

2) To determine the relative effectiveness of two different educational methods
by comparing participant knowledge retention and behavior changes after exposure to
either a training workshop or a printed material intervention.
CHAPTER TWO
REVIEW OF LITERATURE

Definition of asthma

Asthma is defined as a chronic inflammatory condition of the bronchial airways that currently affects approximately 6 million children in the United States. Asthma is triggered by various allergens, irritants, and respiratory infections that result in tightness in the chest, coughing, wheezing, shortness of breath, and low blood oxygen (American Lung Association, 2005). According to the National Institute of Allergy and Infectious Diseases [NIAID] (2001), combinations of genetic and environmental factors determine a person’s susceptibility for developing asthma. As a result of the numerous elements that contribute to its development and severity, asthma is an extremely complex illness for which the cause of its development is still not completely understood (Institute of Medicine [IOM], 2000). At this point in time, there is no cure for asthma, but asthma development and exacerbation research continues to increase the existing knowledge about the disease.

Asthma is currently the most common chronic childhood disease, with rates of childhood asthma increasing approximately 5% a year between 1980 and 1996, resulting in a total increase of around 75% (Cummins and Jackson, 2001). According to the American Lung Association (2005), approximately 4 million children under the age of 18 have had an asthma attack in the past 12 months, with potentially many more undiagnosed cases. Despite relatively similar asthma rates across different ethnicities, asthma mortality is significantly higher among African Americans as well as in urban areas with high levels of poverty and minority populations (IOM, 2000). Every year, asthma is the cause of children missing an extra 10 million days of school nationally, a loss of approximately $1 billion in productivity of parents with asthmatic
children, and over $10.7 billion in health care costs (NIAID, 2001). Despite medical advances and increased understanding of this chronic disease over the past few decades, childhood asthma rates continue to escalate (Lanphear, Aligne, Auinger, Weitzman, and Byrd, 2001).

**Definition of lead exposure**

Lead exposure is identified by the elevation of blood lead levels due to contamination of lead through the process of absorption, and is particularly harmful for young children. Lead is a toxic metal that can be extremely damaging to almost every system in the body when it is consumed or inhaled (Andrews, 2001). Despite efforts since the 1970’s to reduce lead exposure by removing it from commonly used items, such as gasoline, dishes, and paint, there continue to be sources of lead in our environments. In 1991, the CDC set the safe blood lead level at 10 µg per deciliter. Although this level is significantly lower than what had been considered acceptable in the past, there is evidence that even blood lead levels below 10 µg per deciliter can result in intellectual impairment (Canfield et al., 2003).

Since the 1970’s, children’s average blood lead levels have decreased approximately 80%, however, low-income children, children living in urban areas, and children living in older housing continue to be more likely to have elevated blood lead levels (CDC, 2000). For unborn babies and children under the age of six, lead exposure and lead poisoning are of particular concern because of their susceptible brains and nervous systems (Andrews, 2001). According to the U.S. Department of Housing and Urban Development (2006), there are close to one million children across the nation who are under age six and have blood lead levels high enough to impair their ability to think, concentrate, and learn. A summary of the current knowledge in the field of healthy housing stated that among low-income children in the U.S.,
approximately 17% have blood lead levels above 10 µg per deciliter (Breysse et al., 2004). A World Health Organization (2006) report states that 25% of homes in the United States have considerable lead based paint hazards. This suggests that even with the efforts to remove lead from the environment, risk of exposure is still a significant concern for the U.S. population. In response to this ongoing health issue, the Department of Health and Human Services’ Healthy People 2010 initiative has set a national goal of eliminating incidences of blood lead levels above 10 µg per deciliter in children ages 1-5 years old.

Indoor environmental pollutants and the development of asthma

With adults and children spending more than ninety percent of their time indoors (U.S. EPA, 1989) and recent studies indicating that even in industrialized cities, the air inside buildings can contain more pollutants than outdoor air (U.S. EPA, 1995), it is evident that indoor air quality is a significant public health concern. Ott and Roberts (1998) state that regulations to improve air quality have been primarily focused on outdoor air, and that indoor air quality problems continue to exist and do not receive adequate consideration. In their study of “total human exposure”, Ott and Roberts (1998) found that it was more likely for people to come into contact with potentially toxic pollutants when they were in their homes, offices, and automobiles, rather than when they were outside. It is likely also that children will come into contact with these same pollutants in their homes, and, possibly child care settings. Although the United States has made significant improvements to outdoor air, primarily through the control of automobile and industrial emissions, indoor air remains a significant source of pollutants and is not regulated with the same priority and concern that outdoor air receives (Ott and Roberts, 1998).
Indoor environmental pollutants and asthma do not have the same clearly causal relationship as lead and elevated blood lead levels, but indoor pollutants are closely linked with the incidence of asthma. According to Etzel (2003), children’s risk of developing asthma and exacerbation of asthma are increased by environmental exposure to indoor pollutants. Although outdoor air pollution may exacerbate asthma, it is not likely that outdoor pollution is the cause for the increasing prevalence of asthma in our population’s children (Etzel, 2003). In addition to containing more pollutants than outdoor air, indoor air may contain pollutants that are more likely to engender the development of childhood asthma.

Although more data is needed, there is limited research on the relationship between indoor environmental pollutant exposure and asthma. For example, according to a study conducted by the IOM (2000), sufficient evidence was found to conclude that there is a causal relationship between exacerbation of asthma and exposure to allergens produced by cats, cockroaches, and house dust mites for sensitized individuals; it was also found that exposure to environmental tobacco smoke [ETS] exacerbates asthma in preschool-aged children. Sufficient evidence of an association between exacerbation of asthma and several other indoor air exposures, such as fungi or molds, nitrogen dioxide, and damp conditions was found. When examining the relationship between indoor air exposures and the development of asthma, the committee found significant evidence of a causal relationship with exposure to house dust mites in susceptible children and sufficient evidence to conclude that there is an association with exposure to ETS in younger children. Limited or suggestive evidence was found between cockroach allergen exposure and the development of asthma in preschool-aged children. The committee found inadequate or insufficient evidence to determine whether or not an association exists between the development of asthma and exposure to cat, dog, rodent, and bird
allergens; fungi or molds; and nitrogen dioxide. Although individual indoor pollutants have been associated with the development and exacerbation of asthma, it is clear that additional research is needed in order to study the combined effects of indoor pollutants and gain a more holistic understanding.

Indoor environmental pollutants have become a more prevalent issue as a result of the energy crisis of the 1970s, which led to the tightening of construction methods and decreases in air circulation in an attempt to reduce energy consumption. Unfortunately, these changes, coupled with insufficient ventilation systems, have resulted in rising indoor air pollution problems (Etzle, 2003). This is of particular importance when looking at child care settings, since infants and children are at higher risk from pollutant exposure due to their developing bodies and typical childhood behaviors. Their likelihood to play and crawl on floors, and place hands or objects in their mouths, significantly increases the risk of exposure to indoor pollutants. Young children are also more vulnerable as a result of their small body weight and developing organs (Ott and Roberts, 1998).

Despite the fact that asthma and lead poisoning are associated with risk factors that are found in a child’s built environment, this issue has received little attention from researchers or policymakers (Cummins and Jackson, 2001). There is particularly limited research and information about indoor environmental pollutants and hazards that exist in child care settings, however, this topic is becoming more recognized as an important issue that warrants attention (Staes et al., 1994). In order to improve environmental quality in child care settings, the topic of environmental pollutants must be addressed so that potential hazards can be effectively identified and controlled.
**Increased use of child care**

Over the past decades, the United States has been experiencing a social revolution leading to an increasing proportion of mothers entering the workforce and a significant number of children attending child care outside of the home (Nafstad, Jaakkola, Skrondal, and Magnus, 2004; Hayes, Palmer, and Zaslow, 1990). In our current society, child care in out-of-home settings is a common experience for children of all economic classes (Hayes et al., 1990). Although there are considerable debates about who should provide child care and who should pay for it, there is agreement that the healthy development of the next generation is a priority (Hofferth, 1996).

In view of the fact that children are spending a large proportion of their time in child care settings outside of the home, it is important to know how this could potentially affect their health. Although there are a range of different care settings, the focus of this particular research involved family child care, which refers to providers who care for unrelated children in their own home (Hofferth, 1996). Family child care is of particular interest given that these providers typically perform their own cleaning, unlike schools or child care centers that use professional cleaning services. In addition, potential conditions in child care providers’ homes, such as insufficient ventilation, mold and dampness problems, indoor allergens, and environmental tobacco smoke, have been associated with children’s risk of developing respiratory symptoms and diseases (Nafstad, Jaakkola, Skrondal, and Magnus, 2004).

**Child care providers current knowledge about lead and asthma triggers**

Although cognitive and social development is of great concern for child care providers, health and safety are imperative since they influence all aspects of a child’s development. A review of the Health and Safety Standards (2nd edition) compiled by the American Academy of Pediatrics, the American Public Health Association, and the
National Resource Center for Health and Safety in Child Care (2002), reveals that the topics of asthma and certain indoor pollutants, such as lead, mold, tobacco smoke, and dust mites, are briefly mentioned, but standards are generally too vague to be effective for child care providers who do not have previous knowledge of the topic. In addition, this book of standards is 538 pages of pure text, which might not be a widely accessible form of education for a population whose education levels can vary tremendously. Since they might be unaware of certain hazards in their environment, a child care provider’s lack of education about indoor pollutants could lead to an increased risk of exposure for the children in their program.

It is an unfortunate truth that most people remain unaware of the significance of indoor pollution or how simple changes in behavior can reduce exposure (Ott and Roberts, 1998). In the development of the Chicago Lead Knowledge Test, Mehta and Binns (1998) found that although most study participants were able to answer questions about lead exposure correctly, they were less successful in answering questions related to the prevention of lead poisoning. In particular, participants knew very little about how diet and nutrition are related to lead exposure. Metha and Binns (1998) concluded from their findings that although people are aware of the risks of lead exposure, they need education concerning the specific actions that can be taken to reduce the risk of lead exposure. Anecdotal evidence, from preliminary workshops conducted by the principle investigator, suggests that child care providers are unfamiliar with accurately identifying indoor environmental problems, are unaware of how indoor pollutants can affect children’s health, and are uninformed about practical ways of reducing the risk of exposure within the child care setting.

The reality that child care providers receive little or no training on the topic of indoor environmental pollutants and children’s health suggests that efforts to educate child care providers about indoor environmental pollutants are vital in the endeavor to
have a positive impact on childhood health, safety, and well-being. Although recognizing the presence of indoor environmental pollutants is not necessarily an easy task, especially since some of the dangers, such as carbon monoxide or dust mites, are undetectable through sight or smell, it is essential to educate child care providers about lead poisoning and asthma prevention, so they can effectively identify existing or potential hazards and take actions to reduce the risk of exposure.

**How to reduce exposure to lead**

Lead poisoning is one of the most common and preventable childhood health problems (CDC, 2005). By being aware of where lead can be found and how to avoid exposure, child care providers can help prevent the children in their child care programs from coming into contact with lead. The best method for dealing with lead poisoning is to prevent exposure in the first place (Committee on Environmental Health, 2005). Before regulations were introduced in the 1970s, lead was used in the making of numerous products, including paint, gasoline, dishes, and pottery (U.S. EPA, 2005).

According to the U.S. EPA (2005), the most common sources of lead include lead paint, dust, and soil. Many of the homes built before 1978 contain lead-based paint, which is a hazard if it is chipping or peeling. Paint chips flaking off painted surfaces in poor condition and soil that contains lead get ground down into a fine dust and become part of regular household dust (Jordan, Yust, Robison, Hannan, and Deinard, 2003). Deteriorating lead-based paint and the combustion of gasoline containing tetraethyl lead have been the primary sources that contribute to lead in soil, which can be tracked into the home on shoes or be ingested by a child playing outdoors (U.S. EPA, U.S. Consumer Product Safety Commission, and U.S. Department of Housing and Urban Development, 2003).
In order to reduce the risk of lead exposure, it is important to keep lead-based paint in good condition and repaint before chipping or peeling occurs (U.S. EPA, 2005). Any areas that show signs of deterioration or wear should be repaired as soon as possible and children should be kept away from the area (National Safety Council, 2000). Since any outside dirt can contain lead, it is best to prevent tracking in dirt in the first place. Otto and Roberts (1998) state that carpets can retain significant amounts of toxic compounds, such as dust containing lead and asthma triggers, when they are vacuumed in a normal manner; while hard surfaces, such as wood, linoleum, or tile are easier to keep clean and free of lead dust and asthma triggers. Their research studies have shown that some simple behaviors can reduce the amount of toxic compounds present indoors. For example, the use of doormats reduced the amount of lead in a typical carpet by a factor of six, because much of the dirt containing pollutants was wiped off on the doormat rather than tracked into the home (Otto and Roberts, 1998). An even more effective method of reducing the amount of toxic pollutants brought into the home on shoes is to remove shoes before entering the home (Otto and Roberts, 1998). Franke, Cole, Less, Foarde, and Berry (1997) found that airborne dust mass decreased by 50% when a new cleaning program was introduced in a multifloor, noncompliant building. Some of the new cleaning procedures implemented included the use of high-efficiency vacuum cleaners, entry mats, and damp, disposable cloths for dusting. Although these results are only representative of a single building, this study indicates that indoor air quality can be improved by using cleaning methods that control or prevent indoor pollutants.

Other ways to reduce lead exposure include covering exposed soil with grass, plants, gravel, or wood chips to help create a protective barrier against lead exposure from soil (U.S. EPA, 2006). In general, children’s hands should be washed frequently, particularly before meals, after outdoor play, and before naptime in order to reduce the
risk of lead ingestion (National Safety Council, 2000). Since lead dust can settle on anything in the home, children’s toys should be washed at least once a week with a cleaning solution of detergent and water, then disinfected with a bleach solution of one quarter cup bleach to a gallon of water (American Academy of Pediatrics, American Public Health Association, and U.S. Department of Health and Human Services, 2002). One of the least commonly known ways to reduce the risk of lead poisoning is to eat a healthy diet that includes foods high in calcium and iron since this can help reduce the amount of lead that is absorbed by the body (National Safety Council, 2000). The evidence for dietary intervention in lead-exposed children was reviewed by the CDC’s Advisory Committee on Childhood Lead Poisoning Prevention (2002), and stated that although no trial data existed to support claims, laboratory and clinical data suggest that a diet high in iron and calcium may decrease lead absorption, while adequate vitamin C may increase renal excretion.

When cleaning, there are several ways to reduce exposure to lead. For example, dry cleaning methods, such as sweeping with a broom or using a feather duster, should never be used because they will only cause the dust to be spread around inside the home (National Safety Council, 2005). Wet cleaning methods are more effective because they dampen the dust and prevent it from getting stirred up into the air and spread around. In particular, the Department of Housing and Urban Development recommends wet mopping floors once a week using the “3 bucket system”, which aids in removing lead dust from floors, rather than just spreading it around. High Efficiency Particulate Air [HEPA] vacuums are recommended to clean surfaces on a weekly basis, since they have filters that are able to capture fine lead dust, while traditional vacuums allow this dust to escape through the exhaust and get blown back into the air (Texas Cooperative Extension, 2006).
Some of the other, less common sources of lead include drinking water, cans with lead soldering, and various imported items, such as mini blinds, candy, pottery, and toys. Typically, lead levels in drinking water are low, however, lead can leach into water from pipes that contain lead or that have lead solder at the pipe joints (CDC, 2004). Since hot water has the ability to leach more lead than cold water, hot water from the faucet should never be used for cooking or drinking. Filters that specifically remove lead, drinking only bottled water, or flushing out the pipes for one or two minutes before use, are methods that can help reduce exposure to lead in water (CDC, 2004). To ensure that children are not exposed to toys or other products that contain lead, it is important to check with the Consumer Product Safety Commission (2006) regularly for recall and safety information.

**How to reduce exposure to asthma triggers**

Although there is currently no known cure for asthma, it is a controllable disease (American Lung Association, 2005). The U.S. Department of Housing and Urban Development (2005) stated in a report to Congress, that their overall research findings show that interventions are feasible and effective at reducing asthmatic symptoms in children living in multi-hazard, high-risk housing. And, according to the results of the Third National Health and Nutrition Examination Survey, the elimination of indoor pollutants and allergens could lead to the prevention of approximately 39% of doctor-diagnosed asthma among U.S. children under six years of age (Lanphear et al. 2001).

Some of the strongest asthma triggers, including mold, dust mites, pests, and tobacco smoke, can be prevented or at least reduced with simple behavior changes or house repairs. Mold spores are constantly in the air; however, they need moisture in order to grow (CDC, 2005). Any source of excess moisture, such as a crack in the
foundation or roof, plumbing leaks, or poor ventilation, can result in mold growth. In order to prevent mold, it is important to maintain a clean and dry home by having proper ventilation, fixing water leaks as soon as possible, and keeping indoor humidity between 30-50% (National Safety Council, 2000).

Dust mites live in bedding, stuffed toys, upholstered furniture, and carpets and also collect in general household dust. In order to reduce exposure to dust mites, bedding should be washed in hot water once a week (U.S. EPA, 2004); mattresses, box springs, and pillows should be enclosed in dust mite proof covers (U.S. EPA, 2004); indoor humidity should be kept between 30-50% (National Safety Council, 2000); area rugs and stuffed toys should be washed in hot water once a month (Environmental Health Watch, 2005); and surfaces should be cleaned with a HEPA filter vacuum twice a week (Texas Cooperative Extension, 2006).

Pests, including rats, mice, and cockroaches in particular, are asthma trigger hazards in the home and they can become a problem if food, water, and shelter is available for them inside. Integrated Pest Management [IPM], which uses a variety of methods to control pests, is a safe and effective way to reduce exposure (U.S. EPA, 2000). IPM suggests that the best way to kill any existing pests is to use bait stations or traps rather than sprays or foggers, which can be harmful to people if the spray is inhaled. To help prevent pests from entering the home, IMP recommends removing all food, water, and shelter sources. Food sources can be eliminated by cleaning up spills or crumbs immediately, washing dishes right away, storing food in airtight containers, and taking out the trash daily. Any water sources can be removed by fixing any moisture problems, such as plumbing leaks or excess humidity. And since pests like to hide in clutter, it is important to get rid of any excess boxes, bags, or piles of paper.
Secondhand smoke from a cigarette, pipe, or cigar is extremely dangerous for children. To prevent exposure, the home should be declared a smoke-free zone, so anyone wishing to smoke should do so outside and away from children (U.S. EPA, 1995). Even when allowing people to smoke outside, care must be taken to ensure that smoke does not get blown back inside through an open door or window. It is also important to prevent smoke from being carried inside on a person who smokes outside; hands should always be washed after smoking and wearing a smoking jacket that can be taken off once inside and washed frequently is a good idea (Public Health Seattle and King County, 1998).

Other asthma triggers that are not as strong, but still pose risks include combustions by-products, chemical irritants, and pets. Exposure to combustion by-products, including nitrogen dioxide and carbon monoxide, can be a result of unvented or poorly vented gas stoves, closed or blocked chimney flues, unvented non-electric space heaters, or wood stoves that are not properly vented or that have a loose door (U.S. EPA, U.S Consumer Product Safety Commission, and Office of Radiation and Indoor Air, 1995). The most important way to reduce exposure to combustion by-products is to make sure that all combustion appliances, such as clothes dryers, kitchen stoves, furnaces, hot water heaters, and fireplaces, are properly vented to the outside (National Safety Council, 2004). Carbon monoxide detectors should be placed on each level of the home and maintenance procedures should be closely followed on all combustion appliances (Texas Cooperative Extension, 2006).

Exposure to chemical irritants can be a result of failing to follow the directions on a product, mixing different cleaning products together, poor ventilation when using certain products, or using aerosol products indoors (Public Health Seattle and King County, 1998). In order to reduce hazardous exposure, it is essential to read the directions before using a product and follow those directions carefully during use.
When using any product that is a chemical irritant, proper ventilation is important, so fumes do not get trapped inside the home. After using a chemical product, reseal containers tightly and store them in a safe place that is out of children’s reach.

Pets, including cats, dogs, and rodents, can be sources of asthma triggers, so in order to reduce exposure, pets should be kept out of sleeping areas and the home should be vacuumed twice a week with a HEPA filter vacuum (U.S. EPA, 2006).

Existing research on strategies for reducing indoor pollutants

The risks associated with indoor environmental pollutants, particularly for children, are well documented, but despite overwhelming amounts of information about specific pollutants, few studies have attempted to assess the effectiveness of indoor pollutant education and its relation to overall knowledge as well as the adoption of exposure-reducing behaviors.

One of the few studies that sought to link indoor pollutant education with exposure-reducing behavior was conducted by Leung et al. (1997). This research sought to examine behavioral changes three months after participation in The Master Home Environmentalist (MHE) program, established by the American Lung Association to train volunteers about indoor pollutants and how to conduct Home Environmental Assessments. The study found that 41% of the recommendations were implemented after participant home assessments, where a volunteer conducted an evaluation and provided specific recommendations for reducing exposure to indoor pollutants (Leung et al., 1997). One of the weaknesses of this study was the fact that the calculation of a behavior change only required the participant to confirm they had acted on the recommendation at least once during the three-month period, so it is difficult to know if permanent behavior change occurred. One of the most important aspects of this study was the fact that volunteers, rather than experts, were successfully
used to conduct home assessments. This element supports the use of non-expert, peer-trainers in the current study, which simultaneously reduces training workshop costs and allows workshops to take place in any location a volunteer is willing to be trained.

Laquatra, Boggess, Pierce, and Diligent (2005) focused on the ability of an educational intervention to increase participant knowledge of indoor environmental pollutants. More specifically, this study sought to assess the effectiveness of a method for educating limited resource households about indoor environmental pollutants and how exposure could potentially be reduced. In this “Practical Management Strategy” project, the experimental group received an in-home visit by an educator who conducted a knowledge survey, a presentation about indoor pollutants, and an inspection of the home. The study found that out of nine different statements about indoor pollutants, participant change in response in the direction of the correct answer was statistically significant for three of the statements. Even though this study attempted to assess the effectiveness of an educational method, some notable weaknesses were the fact that the experimental group was composed of approximately 80% retirees and it did not assess whether this increase in understanding resulted in exposure-reducing behaviors. One of the most important aspects of this study was the fact that a new educational material was developed by the research team specifically for the use of the project, since an appropriate material did not previously exist. This element supports the idea that a new educational material, specifically developed for family child care providers, could be successful in increasing knowledge of indoor environmental pollutants in the current study.

**Existing research on strategies for reducing asthma triggers**

There is limited research that focuses specifically on participant adoption of exposure-reducing behaviors related to asthma triggers. One of the few studies that
focus on this particular topic is a study conducted by Takaro, Krieger, and Song (2004). This research compared the effectiveness of one year higher-intensity and lower-intensity interventions on the reduction of asthma triggers in the homes of low-income children. The high-intensity group received home environmental assessments from community health workers, individualized action plans, an average of seven additional visits from a health worker, and new materials that included a new vacuum, bedding covers, door mats, cleaning kits, and food storage containers. The lower-intensity group only received the initial assessment, a home action plan, and bedding covers.

The results of this study confirmed that both groups showed improvement in asthma trigger knowledge and related exposure-reducing behaviors. Both groups showed significant improvements in the use of allergy control bedding covers, the use of ventilation, overall trigger knowledge scores, symptom days, and in some exposure-related behaviors, such as vacuuming. The study also found some evidence of reductions in measurable levels of indoor pollutants; the higher-intensity group had significant reductions in dust mite and dog antigens, moisture, cockroaches, surface dust, and the asthma trigger composite score, while the lower-intensity group only had significant reductions in cat antigens (Takaro et al., 2004). This is one of the only studies to compare the effectiveness of two interventions at varying levels of intensity; unfortunately, the study did not conduct a cost analysis for each intervention. This idea of comparing results from two interventions of differing intensities was incorporated into the research design of the current study, where participants either attended a training workshop or received an educational guidebook in the mail.
Existing research on strategies for reducing lead exposure

More research exists that focuses specifically on lead hazard control, possibly due to the fact that lead exposure can be definitively linked to sources of lead in the environment. One of the weaknesses in this field of literature is the lack of low-cost, widely applicable interventions, with many opportunities requiring the award of a grant in order to receive funding for lead abatement.

A study conducted by Galke et al. (1999) provides evidence that a high-cost, intensive, single-home lead abatement program can successfully reduce lead exposure. In order to assess the effectiveness of the U.S. Department of Housing and Urban Development Lead Hazard Control grant program, this study evaluated the impact of lead hazard interventions, ranging from window replacement to lead-based paint repair, on dust loading levels and children’s blood lead levels. With data from approximately 2,600 dwellings, the study found that the program’s interventions caused a significant reduction in lead dust, with declines of 50-88%, and children’s blood lead levels, with declines of 26% (Galke et al., 1999). One of the weaknesses of this study is the fact that there is no evidence that the grant program includes an educational aspect that informs families of lead exposure-reducing behaviors which they can do on their own. The effect of a more holistic or low-cost approach has not been addressed in this field, which is why the current study focused on assessing the effectiveness of interventions that were specifically developed to be inexpensive.

One of the few attempts to factor in the cost of an intervention was conducted by Haynes, Lanphear, Tohn, Farr, and Rhoads (2002). A meta-analysis was compiled in order to measure the effect of low-cost lead hazard control interventions on children’s blood lead concentrations. It was concluded that although there was no significant decline in the overall mean of blood lead concentrations, there was a significant decline in the number of children who had blood lead concentrations
greater than 15 \( \mu g/dL \) and 20 \( \mu g/dL \) (Haynes et al., 2002). Although this is one of the few studies to factor in an intervention budget, the study defined “low-cost” as a strategy that was less than $2,500 per housing unit or family, which is still significant when thinking about interventions on a national level. It is also important to note that this study focused on a single lead hazard control method, dust control, so the impact of a more multifaceted intervention on children’s blood lead concentrations requires further research. The current study incorporated this element of low-cost interventions; however, both the training workshop and guidebook treatments were significantly less than the $2,500 per family budget maximum described above, with the cost of each training workshop amounting to approximately $150 and each guidebook costing approximately $13 each.

Schultz, Pawel, and Murphy (1999) conducted one of the few studies that focused on education as the primary intervention for reducing blood lead levels in children. In this study, participants received an in-home educational visit from a lead outreach staff member of the Milwaukee Health Department, who discussed lead sources, the associated health risks, and exposure-reducing behaviors. Some of the recommendations for reducing exposure included hand washing, dietary suggestions, and cleaning procedures. It was found that there was a significant average decline of 4.2 \( \mu g/dL \) (21%) in blood lead levels for the experimental group, while the reference group only experienced an average of 1.2 \( \mu g/dL \) (6%) decline (Schultz et al., 1999). However, it should be noted that this study only included children with elevated blood lead levels, between 20 - 24 \( \mu g/dL \), so the impact of education on children without elevated levels remains unstudied. It should also be noted that although this was a statistically significant decline, the average decline of 4.2 \( \mu g/dL \) would be insufficient for reducing an already elevated blood lead level to below the 10 \( \mu g/dL \) safety threshold. Further research is needed in the area of prevention in order to assess the
effectiveness of exposure-reducing behavior for children without previously elevated blood lead levels. This study’s ability to positively affect children’s blood lead levels through an educational intervention, rather than providing abatement assistance, supports the decision of the current study to use a purely educational method to reduce exposure to indoor environmental pollutants.

One of the few studies that utilized peer educators in the research design was conducted by Jordan et al. (2003). This study sought to determine the effectiveness of a primary prevention strategy, called the Phillips Lead Project, where same-ethnicity peer educators conducted 20 bi-weekly educational sessions over a one-year period and quarterly booster sessions for the next two years in the intervention condition. After analyzing data from 378 children, the study concluded that a significantly greater percentage of the intervention group children, 81%, maintained blood lead levels less than 10 µg/dL before the age of 3, compared to 73% in the control group. It was determined that the educational intervention resulted in an approximate 34% reduction in the risk of blood lead levels less than or equal to 10 µg/dL (Jordan et al., 2003). The study mentioned difficulties in scheduling educational sessions and some control group contamination, so it is possible that the effectiveness of this educational intervention was actually underestimated. Unfortunately, it is impossible to separate the effects of the same-ethnicity peer educators from the overall result, therefore, this topic should be addressed in future research. This study’s successful use of peer educators rather than experts supports the decision to use peer trainers in the current study.

**Summary of indoor environmental pollutant reduction strategy research**

After reviewing the existing literature on indoor environmental pollutants and children’s health, it is clear that research is still needed in order to form a better
understanding of what the most effective methods are for increasing knowledge and reducing exposure. All of these studies attempt to measure the effectiveness of an educational or environmental intervention, however, these strategies require home visits from a specialist, which is both time intensive and costly. The effectiveness of low-cost, widely applicable educational interventions on indoor environmental pollutants requires attention in this field of research. It is also evident that existing research has primarily focused on either lead exposure or asthma triggers, so research on indoor environmental pollutants that include both topics is needed.

The vast majority of existing programs and strategies are not specifically directed at educating family child care providers about indoor environmental pollutants. While the topic of indoor pollutants in schools has been given considerable attention in recent years, child care programs have not received the same amount of consideration. For example, the U.S. EPA (2000) developed the Indoor Air Quality Tools for Schools Program in order to help schools both avert and resolve indoor air quality problems, however, family child care programs may have difficulty relating the suggested solutions to their own environments. With the exception of the Home-Based Child Care Lead Safety Program, which is primarily focused on lead abatement in individual homes, few attempts have been made to investigate whether indoor environmental pollutant control strategies could be implemented specifically in child care settings, and subsequently replicated on a larger scale throughout the country.

**Effective design of educational information**

In our complex age of information, the need for effective communication has never been greater. Printed materials, such as brochures, have become a common form of communication due to their inexpensive production costs, diverse applications, and easily distributable nature. Although this form of educational media
is widely used, research on their ability to convey information has been limited (Clark, AbuSabha, von Eye, and Achterberg, 1999). The effectiveness of an educational intervention is not solely based on the quality of the informational content, but on whether the text, pictures, and graphic design work together to form a message that is easy for the reader to receive, understand, and act on.

Although several of the previously reviewed studies mentioned the use of educational materials, few documented whether factors aside from informational content were addressed. During the development of indoor pollutant educational materials for the previously discussed Laquatra et al. (2005) study, the most frequent recommendations given by education consultants stated that the materials should be simple and concise; identify each pollutant, the health risks it poses, its common sources, and ways to prevent exposure; and use graphics extensively. These elements were incorporated into the design of the educational guidebook developed for the current study. By creating a visually intense and consistent layout that identified each indoor pollutant, a simple definition, the associated health risks, its common household sources, and strategies for reducing exposure to the specific pollutant, the guidebook attempted to be both engaging and informative.

As our need for more effective and efficient information exchange grows, visual communication is becoming increasingly more important. According to Macdonald-Ross (1977, p. 49) “Graphic devices have been invented by humans to help represent, explain, and control the world in which they live.” In a literature review of the role pictures play in the communication of health information, Houts, Doak, Doak, and Loscalzo (2006) found that pictures can provide significant benefit in the areas of attention, comprehension, recall, and intention/adherence. For example, when comparing instructional medical handouts, patients who received handouts with pictures were significantly more likely to read the handout than patients who received
handouts with only text, and were significantly more likely to recall the information they had read as well as adhere to the instructions they were given. When assessing the role of pictures in the comprehension of health materials, Houts et al. (2006) found that although both low and high literacy showed higher comprehension scores, low literacy participants in particular benefited from illustrated handouts. It was also found that text with pictures aided participants with free recall of information presented in an educational handout, which Houts et al. (2006) referred to as the “pictorial superiority effect”. The picture superiority effect describes the phenomenon that memory for pictures is generally better than memory for words, which is typically explained using the dual-coding theory (Anglin, Vaez, and Cunningham, 2004). Dual-coding theory proposes that when both verbal and image coding occur to code information into memory, recall improves (Clark et al., 1999). This evidence that visual elements can significantly impact the effectiveness of an informational material supports the decision in the current study to use images extensively throughout the guidebook and training workshop in order to identify sources of pollutants and ways for reducing exposure.

It is clear that visuals have many different functions when used in information design (Pettersson, 1998). Although the informational focus of these studies is not indoor environmental pollutants, the message that graphics can enhance the effectiveness of printed communication is extremely relevant. Instructional message design and visual communication are areas of research that have been greatly overlooked in the field of indoor pollutants. The current study sought to understand the most effective methods of communication in order to design successful educational interventions on the topic of indoor environmental pollutants.
Summary

Children’s health and disease prevention relies significantly on understanding the negative impact of indoor environmental pollutants and how these risks can be avoided. However, in order for this knowledge to contribute successfully to the population, it is imperative to study how preventative information can be translated into effective and cost-efficient intervention techniques. The present study was designed to test the effectiveness of educating family child care providers about indoor environmental pollutants using two low-cost, widely distributable educational treatments. The two educational treatments, a peer educator-led training workshop and a printed guidebook received in the mail, were assessed by measuring participant knowledge of indoor pollutants as well as exposure-reducing behaviors, both before and after the educational treatment.

Hypotheses

The hypotheses of the present study are as follows:

1. There will be a significant increase in child care providers’ general knowledge of indoor pollutants for both educational treatments.

2. There will be a significant increase in child care providers’ behavior to reduce exposure to indoor pollutants for both educational treatments.

3. There will be a significant increase in general knowledge of indoor pollutants for child care providers who attended a training workshop compared to those who received the printed material.

4. There will be a significant increase in behavior to reduce exposure to indoor pollutants for child care providers who attended a training workshop compared to those who received the printed material.
CHAPTER THREE
METHODOLOGY

The experimental design of this study is a test-retest design. This is an appropriate strategy since the study aimed to determine whether the manipulated independent variable, educational treatment, had a significant effect on the dependent variable, participants’ knowledge and behaviors related to lead exposure and asthma triggers.

Participants

The individuals who participated in this research study were 31 child care providers recruited from a network of family day care providers in Rochester, NY. Flyers informing child care providers about the nature of the study were distributed throughout the childcare network in order to raise interest in the educational opportunity (see Appendix A). Child care providers who were interested in participating in the study called the contact number on the flyer and left their name, telephone number, and home address with an administrative assistant. Each participant was fully informed of the study procedures and risks by giving verbal consent. The verbal consent script read to all participants (see Appendix B) was approved by the Cornell University Committee on Human Subjects [UCHS]. The child care providers who completed the first telephone survey and either attended a training workshop or received a guidebook in the mail, received credit for two training hours that contributed to the annual training hours required by New York State as well as a thank you gift bag. Due to a lack of ability to contact some residents after the initial telephone survey, data from 31 of the original 37 participants were used, resulting in a retention rate of approximately 84%. At the end of the second telephone
survey, all participants were asked questions designed to provide information on socio-demographic variables, including gender, age, ethnicity, and highest education level completed. Table 1 summarizes the demographic characteristics of the participants both by treatment group and an overall total.

Table 1. *Demographic characteristics of participants by treatment group and total*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Guidebook (n = 17)</th>
<th>Workshop (n = 14)</th>
<th>Total (N = 31)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency(%)</td>
<td>Frequency(%)</td>
<td>Frequency(%)</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
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<tr>
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<td>13(92.9)</td>
<td>30(96.8)</td>
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<td>1(7.1)</td>
<td>1(3.2)</td>
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<td>Age range category</td>
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<tr>
<td>18-30</td>
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<td>0(0)</td>
<td>2(6.5)</td>
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<tr>
<td>31-40</td>
<td>5(29.4)</td>
<td>7(50)</td>
<td>12(38.7)</td>
</tr>
<tr>
<td>41-50</td>
<td>4(23.5)</td>
<td>4(28.5)</td>
<td>8(25.8)</td>
</tr>
<tr>
<td>51-60</td>
<td>5(29.4)</td>
<td>2(14.3)</td>
<td>7(22.6)</td>
</tr>
<tr>
<td>61+</td>
<td>1(5.9)</td>
<td>1(7.1)</td>
<td>2(6.5)</td>
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<tr>
<td>Ethnic group</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
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<td>7(50)</td>
<td>7(22.6)</td>
</tr>
<tr>
<td>Black</td>
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<td>5(35.7)</td>
<td>20(64.5)</td>
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<td>Hispanic</td>
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<td>2(6.5)</td>
</tr>
<tr>
<td>Other</td>
<td>2(11.8)</td>
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<td>2(6.5)</td>
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</table>
Table 1 (continued).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Guidebook (n = 17)</th>
<th>Workshop (n = 14)</th>
<th>Total (N = 31)</th>
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</thead>
<tbody>
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<td>Education</td>
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<td>Some high school</td>
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<td>6(19.4)</td>
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<td>7(22.6)</td>
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<td>Some graduate work</td>
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<td>1(7.1)</td>
<td>1(3.2)</td>
</tr>
</tbody>
</table>

Measures

Two different surveys were developed for the purpose of this test-retest study; however, there are two versions of the second survey due to the fact that some questions required alternate phrasing depending on the condition group of the participant. Each participant was administered two surveys, one to measure general knowledge of indoor pollutants and behaviors to reduce exposure to indoor pollutants prior to an educational treatment (Appendix B) and a second survey (Appendixes C and D), which measured general knowledge of indoor pollutants and behaviors to reduce exposure to indoor pollutants after the educational treatment, which was administered approximately three weeks after each participant’s educational treatment.

The measures used in this study were compiled from various indoor environmental pollutant materials, such as The Chicago Lead Knowledge Test (Mehta and Binns, 1998), the Teacher’s Guide to Indoor Air Quality Indoor Air Quality True
or False Worksheet (Environmental Health Center, 2000), the How Asthma-Friendly Is Your Child-Care Setting? Checklist (National Heart, Lung, and Blood Institute, n.d.), the Childcare Facility Questionnaire: Center-based and Family (Laquatra, Maxwell, and Pierce, 2005), and the Home Environmental Assessment List (Master Home Environmentalist Program, 1995).

On the first survey, participants were asked open-ended background questions about their child care program and home, how frequently they performed certain cleaning tasks, to identify asthma triggers out of a list of words, and true/false statements about lead exposure and indoor air quality. On the second survey, participants were asked to select the appropriate choice on a 5-point Likert scale to indicate their opinion of the educational treatment they had received, questions from the first survey were asked again, such as how frequently they performed certain cleaning tasks, to identify asthma triggers out of a list of words, and true/false statements about lead exposure and indoor air quality, then demographic information was collected.

**Materials**

Two types of educational materials were created for the purpose of the study: one consisted of a printed guidebook (see Appendix E), while the other, a training workshop, consisted of visual aids (see Appendix F), a presentation script (see Appendix G), and demonstration materials. In order to maintain consistency between the two different materials, identical content, including information covered, images used, and order of presentation, was used for both materials. Minor differences in script were unavoidable; however, these variations were kept to a minimum in order to assure that they were equal in terms of educational substance.
The guidebook was a 36 page, 8.5” x 11” double sided, color printed, spiral bound material with clear front and back covers. The guidebook was divided into four main sections, including introduction, lead, asthma triggers, and conclusion. Each of the four sections had the same layout in order to give the guidebook format consistency. The main text, which was black, 10 point, news gothic standard font on a white background, was positioned in the middle of the page. Images paired with the key points of the text were placed in a column along the edge of the page surrounded by a brown box. If the particular page was identifying common sources of an indoor pollutant, the color of the key point phrase beneath the paired image was red. If the page was identifying ways to reduce exposure to a certain indoor pollutant, the key point under the image was green. Throughout the main text on the page, these key point phrases were also in their respective red or green type in order to connect the key points and images to the text on the page. On certain pages, more information, such as information hotlines or visual diagrams, were located in a green band across the top of the page. There was a checklist located at the back of the guidebook that was designed to help the users investigate their home and find potential indoor pollutant hazards.

The visual aids for the training workshop were 37, 11” x 17” color printed pages that were spiral bound across the top of the pages and mounted on a triangle foam core base. Each page contained the key points and images that were used in the guidebook on a larger scale, while the peer educator verbally communicated the main text of the guidebook. The same colors and formatting tendencies were used for the visual aides as the guidebook in order to keep a graphical consistency between the two educational interventions. The presentation script for the peer educators conducting the training workshops consisted of 40, 8.5” x 11” double sided, color printed, spiral bound pages with clear front and back covers. This material contained the main text
from the guidebook in 32 point news gothic standard font, so that each of the peer educators could present the same information as the text in the guidebook during the presentation. In addition to the verbal content, the presentation script booklet gave directions to the peer educators of exactly when they should turn the pages of the visual material, when demonstrations should occur, and what steps needed to be taken during each demonstration.

Images from Getty Images™, an online imagery, film and digital service, were used extensively in the development of the materials in order to give concrete graphic representations of the concepts and practices being discussed. All of the images used in the materials consisted of cut out, color photographs, so that the image was depicted as an object floating on a white background. This removed any excess visual information that could have the potential for distracting or confusing the participant from the key point being communicated by the image. The use of these communicative images was of particular importance due to the fact that the child care provider population used to recruit participants for this study had no educational prerequisite and there was a potential of low literacy participants in the study.

The informational content of the materials was compiled from various sources including the U.S. Environmental Protection Agency, Department of Housing and Urban Development, National Safety Council, the National Center for Healthy Housing, and The American Academy of Pediatrics. Current knowledge about indoor environmental pollutants, their common sources, and ways to reduce exposure was gathered (see “How to reduce exposure to lead” and “How to reduce exposure to asthma triggers” in Chapter Two: Review of Literature) and written in simplified terms. Carol Kawecki and Jonathan Wilson from the National Center for Healthy Housing provided feedback on the materials and their input was incorporated in order to ensure that the content was valid and up to date. An asthma expert from Cornell
University also provided feedback on the script, suggesting that some asthma triggers be identified as stronger than others. This advice was incorporated into the material and mold, dust mites, pests—cockroaches in particular, and tobacco smoke were focused on as stronger asthma triggers than combustion by-products, chemical irritants, and pets. Graphic design input from a design specialist at Cornell University was incorporated to ensure the material was both engaging and effective. More specifically, the design needed to support both visual and verbal learning styles, focus the reader on critical issues, and clarify for the reader detrimental sources of pollutants in parallel with strategies for reducing exposure.

**Procedure**

This study used a test-retest design, where data obtained from telephone surveys administered to two condition groups both before and after an educational treatment were compared. The child care providers who were successfully recruited from the network of family day care providers for the study were randomly divided into two condition groups: one group received individual printed educational guidebooks about indoor environmental pollutants in the mail, while the other group attended an indoor environmental pollutant group training workshop delivered by a trained peer educator. All participants gave verbal consent and completed a 20 minute knowledge and behavior assessment survey (see Appendix B) administered over the telephone prior to receiving either an educational guidebook or attending a training workshop. This initial survey provided a baseline of the child care provider’s knowledge about indoor environmental pollutants and outlined the provider’s relevant cleaning practices.

Each of the participants in the training workshop condition was asked to sign up for one of four training workshops scheduled in the Rochester area. With the goal
of having local child care providers lead the training workshops, five providers were trained as peer educators by Extension Associate, Mark Pierce, using the training materials developed for this project (see Appendixes F and G). These five peer educators were identified through their participation in the Home-Based Child Care Lead Safety Program and recruited for the purpose of this study. In order to keep the effects of individual knowledge and presentation style to a minimum, the peer educators were instructed to recite the presentation script provided (see Appendix G) rather than using their own narration. The workshop was approximately 1.5 hours in length and included two demonstrations that illustrated key concepts of the presentation.

The goal of the first demonstration was to communicate to the workshop participants that lead dust is almost invisible on a surface and that dry methods of cleaning, such as sweeping and dry dusting, can actually just spread lead dust around rather than eliminate it. Each participant was given a packet of Splenda® sugar substitute, a sheet of paper towel, and an 8.5” x 11” piece of new, black construction paper. The participants were instructed to spread the contents of the sweetener packet on the sheet of construction paper, rub the sweetener thoroughly into the paper, and shake off any excess sweetener into a trash bag. Then, they were told to use their sheet of paper towel to clean the paper surface until they thought the sweetener dust was gone. After they were done cleaning with the paper towel, they were asked to lick the construction paper, so they could discover that the paper was still sweet after they thought all of the sweetener dust was gone.

The second demonstration showed the workshop participants how to use the “3 Bucket System”, a cleaning system recommended by the Department of Housing and Urban Development. The peer educator used a rag, a spray bottle, and three buckets to exhibit the correct cleaning method for preventing lead dust from being spread
around the home. The spray bottle was labeled “detergent and water” and the three buckets were labeled “detergent and water”, “water only”, and “empty”. First, the peer educator soaked the rag in the detergent water and misted a small area of floor with detergent water from the spray bottle. Then, they scrubbed the misted area of floor with the soaked rag and squeezed the dirty water from the rag into the empty bucket. The rag was then rinsed in the bucket labeled “water only” and squeezed out into the empty bucket again. Participants in the workshop were encouraged to take turns using the supplies to go through the steps of the “3 Bucket System”.

Due to personal scheduling and location factors, the number of participants that attended each training workshop ranged from two to six participants. At the end of each training workshop, participants received a indoor pollutant guidebook (see Appendix E) for reference and a thank you gift bag. Each peer educator received $50 for each training workshop she conducted (all peer educators were women).

The participants in the guidebook mailing condition were informed that all child care providers could not be trained at the same time, but were assured that they would have the option to attend a training workshop at a later date. After their initial telephone survey, the participants in the educational guidebook condition were mailed a copy of the indoor pollutant guidebook (see Appendix E), a thank you gift bag, and a letter explaining that they would be contacted for their second survey in approximately three weeks (see Appendix H).

Three weeks after receiving either an educational guidebook in the mail or attending a training workshop, each participant was called to complete the second knowledge and behavior assessment survey (see Appendixes C and D) in order to assess any change in knowledge or cleaning practices.
CHAPTER FOUR
RESULTS

Of the 37 participants who completed the pre-treatment survey, 31 (84%) participants also completed the post-treatment survey. Data from these 31 participants were analyzed using SPSS 13.0 for Windows (SPSS Inc, Chicago, Ill). As shown in Table 2, of the child care providers, 96.8% were female, 38.7% were in the 31-40 age range category, 71% were non-White, 80.7% had less than a college degree, 93.5% lived in a house, 83.9% were home owners, 83.9% lived on a side street, 93.5% lived in a home built before 1978, 48.4% had been a child care provider for 10 years or longer, 58.1% have had children in their program with asthma, and 12.9% have had children in their program with elevated blood lead levels (BLLs).

Analysis of treatment group equality prior to research intervention

Since participants were randomly assigned to either the training workshop \( (n = 14) \) or the guidebook \( (n = 17) \) treatment group, a chi-square test was used to see if there were statistically significant differences between the two treatment groups in the categorical demographic variables, including age category, ethnic group, education level, and whether participants had ever had a child in their program with asthma or high blood lead levels. Results from the chi-square test show that age category \( x^2(4, 31) = 3.36, p = .499 \), education level \( x^2(4, 31) = 4.09, p = .394 \), and previous children with asthma \( x^2(1, 31) = .009, p = .925 \) or high blood lead levels \( x^2(1, 31) = .043, p = .835 \) were not statistically significant, suggesting that the treatment groups were approximately equal on these variables. The only variable that showed statistical significance was ethnic group \( x^2(3, 31) = 15.86, p = .001 \), which is supported by the fact that there were no White or Hispanic participants in the guidebook treatment.
Table 2. *Participant background information by treatment group and total*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Guidebook (n = 17)</th>
<th>Workshop (n = 14)</th>
<th>Total (N = 31)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency(%)</td>
<td>Frequency(%)</td>
<td>Frequency(%)</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>17(100)</td>
<td>13(92.9)</td>
<td>30(96.8)</td>
</tr>
<tr>
<td>Male</td>
<td>0(0)</td>
<td>1(7.1)</td>
<td>1(3.2)</td>
</tr>
<tr>
<td><strong>Age range category</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-30</td>
<td>2(11.8)</td>
<td>0(0)</td>
<td>2(6.5)</td>
</tr>
<tr>
<td>31-40</td>
<td>5(29.4)</td>
<td>7(50)</td>
<td>12(38.7)</td>
</tr>
<tr>
<td>41-50</td>
<td>4(23.5)</td>
<td>4(28.5)</td>
<td>8(25.8)</td>
</tr>
<tr>
<td>51-60</td>
<td>5(29.4)</td>
<td>2(14.3)</td>
<td>7(22.6)</td>
</tr>
<tr>
<td>61+</td>
<td>1(5.9)</td>
<td>1(7.1)</td>
<td>2(6.5)</td>
</tr>
<tr>
<td><strong>Ethnic group</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>0(0)</td>
<td>7(50)</td>
<td>7(22.6)</td>
</tr>
<tr>
<td>Black</td>
<td>15(88.2)</td>
<td>5(35.7)</td>
<td>20(64.5)</td>
</tr>
<tr>
<td>Hispanic</td>
<td>0(0)</td>
<td>2(14.3)</td>
<td>2(6.5)</td>
</tr>
<tr>
<td>Other</td>
<td>2(11.8)</td>
<td>0(0)</td>
<td>2(6.5)</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Some high school</td>
<td>5(29.4)</td>
<td>1(7.1)</td>
<td>6(19.4)</td>
</tr>
<tr>
<td>High school degree</td>
<td>7(41.2)</td>
<td>5(35.7)</td>
<td>12(38.7)</td>
</tr>
<tr>
<td>Some college</td>
<td>3(17.6)</td>
<td>4(28.6)</td>
<td>7(22.6)</td>
</tr>
<tr>
<td>College degree</td>
<td>2(11.8)</td>
<td>3(21.4)</td>
<td>5(16.1)</td>
</tr>
<tr>
<td>Some graduate work</td>
<td>0(0)</td>
<td>1(7.1)</td>
<td>1(3.2)</td>
</tr>
</tbody>
</table>
Table 2 (continued).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Guidebook (n = 17)</th>
<th>Workshop (n = 14)</th>
<th>Total (N = 31)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency(%)</td>
<td>Frequency(%)</td>
<td>Frequency(%)</td>
</tr>
<tr>
<td>Housing type</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>House</td>
<td>16(94.1)</td>
<td>13(92.9)</td>
<td>29(93.5)</td>
</tr>
<tr>
<td>Apartment</td>
<td>0(0)</td>
<td>1(7.1)</td>
<td>1(3.2)</td>
</tr>
<tr>
<td>Other</td>
<td>1(5.9)</td>
<td>0(0)</td>
<td>1(3.2)</td>
</tr>
<tr>
<td>Location</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Main road</td>
<td>3(17.6)</td>
<td>2(14.3)</td>
<td>5(16.1)</td>
</tr>
<tr>
<td>Side street</td>
<td>14(82.4)</td>
<td>12(85.7)</td>
<td>26(83.9)</td>
</tr>
<tr>
<td>Year home built</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prior to 1978</td>
<td>16(94.1)</td>
<td>13(92.9)</td>
<td>29(93.5)</td>
</tr>
<tr>
<td>Not sure</td>
<td>1(5.9)</td>
<td>1(7.1)</td>
<td>2(6.5)</td>
</tr>
<tr>
<td>Ownership of home</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Own</td>
<td>14(82.4)</td>
<td>12(85.7)</td>
<td>26(83.9)</td>
</tr>
<tr>
<td>Rent</td>
<td>3(17.6)</td>
<td>2(14.3)</td>
<td>5(16.1)</td>
</tr>
<tr>
<td>Years as provider</td>
<td>$M = 8.01$</td>
<td>$M = 11.97$</td>
<td>$M = 9.8$</td>
</tr>
<tr>
<td>Children w/ asthma</td>
<td>10(58.8)</td>
<td>8(57.1)</td>
<td>18(58.1)</td>
</tr>
<tr>
<td>Children w/ high BLLs</td>
<td>2(11.8)</td>
<td>2(14.3)</td>
<td>4(12.9)</td>
</tr>
</tbody>
</table>

*Note.* “Years as provider” variable was represented by the treatment group and total mean, rather than by a frequency and percentage, since answers ranged from .08 to 20 years.
The data were also analyzed to assess whether the treatment groups were statistically equal in pre-treatment knowledge and behavior scores. An independent samples t-test was used to see if there were statistically significant differences between the two treatment groups on the continuous dependent variables, including lead knowledge, asthma knowledge, indoor air quality knowledge, and exposure-reducing behavior pre-treatment scores. An independent samples t-test is an appropriate statistical method because we have continuous dependent variables and a single independent variable with two categories. Before running the t-test, a Levene’s test was used to assess whether the assumption of equal variances was violated. The Levene’s test showed that both the lead knowledge $F(1, 31) = .003, p = .960$ and the exposure-reducing behavior $F(1, 31) = .303, p = .586$ pre-treatment scores were not significant, which suggests that the variance in these knowledge and behavior scores were approximately equal for both treatment groups. However, the indoor air quality pre-treatment score was significant $F(1, 31) = 10.41, p < .01$ and the asthma pre-treatment score was borderline significant $F(1, 31) = .303, p = .059$, which implies that the variance in these knowledge scores were not equal for both treatment groups. Since the Levene's test was significant for both the indoor air quality and asthma pre-treatment scores, the unequal variance values were used when interpreting the t-test results for those two scores.

As shown in Table 3, the results of the independent samples t-test showed that the lead knowledge $t(29) = -1.00, p = .324$, asthma knowledge $t(29) = -2.502, p = .837$, and exposure-reducing behavior $t(29) = -2.502, p = .837$ pre-treatment scores were not statistically different, which suggests that the treatment groups did not differ on these variables prior to treatment. However, the indoor air quality knowledge pre-treatment score was significant $t(21.86) = -2.502, p < .05$, which suggest that the treatment groups were not equal on this variable prior to treatment. After comparing
the indoor air quality knowledge pre-treatment score means shown in Table 3, it is clear that the participants assigned to the training workshop had a higher indoor air quality knowledge pre-treatment mean score ($M = 6.71, SD = .469$) than the participants assigned to the guidebook treatment group ($M = 5.88, SD = 1.17$).

Table 3. Participant pre-treatment knowledge and behavior scores by treatment group

<table>
<thead>
<tr>
<th>Variable</th>
<th>Guidebook $M$</th>
<th>Workshop $M$</th>
<th>$p$-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead knowledge</td>
<td>10.00</td>
<td>10.79</td>
<td>.324</td>
</tr>
<tr>
<td>Asthma knowledge</td>
<td>4.71</td>
<td>4.79</td>
<td>.837</td>
</tr>
<tr>
<td>Indoor air quality knowledge</td>
<td>5.88</td>
<td>6.71</td>
<td>.013</td>
</tr>
<tr>
<td>Exposure-reducing behaviors</td>
<td>15.12</td>
<td>14.93</td>
<td>.837</td>
</tr>
</tbody>
</table>

Analysis of hypotheses

In order to study the effectiveness of the two educational treatments, all 31 participants’ pre and post-treatment surveys were scored into four categories including lead knowledge, asthma knowledge, indoor air quality knowledge, and exposure-reducing behaviors (Appendix I). The lead knowledge score was computed by counting the number of correct answers for each participant in the lead true/false section, which consisted of 15 questions. The asthma knowledge score was computed by counting the number of correct answers for each participant in the asthma trigger section, where participants were read the following eight words: mold, lead paint, dust mites, cockroaches, tobacco smoke, radon, nitrogen dioxide, and animal dander, and were asked to identify which ones they thought were asthma triggers. The indoor air quality knowledge score was computed by counting the number of correct answers for
each participant in the indoor air quality true/false section, which consisted of seven questions. The exposure-reducing behavior score was computed by counting the number of correct behaviors in the cleaning and behavior sections, which consisted of 24 questions. Each of these four categories was scored by assigning one point for each correct answer, therefore, 15 was the highest score a participant could receive on the lead knowledge section, 8 was the highest score a participant could receive on the asthma knowledge section, 7 was the highest score a participant could receive on the indoor air quality knowledge section, and 24 was the highest score a participant could receive on the exposure-reducing behavior section.

**Hypotheses 1 and 2**

In the current study, it was hypothesized that there would be a significant increase for both educational treatments in child care providers’ general knowledge of indoor pollutants. It was also hypothesized there would be a significant increase for both educational treatments in child care providers’ behavior to reduce exposure to indoor pollutants. Paired samples t-tests were used to see if statistically significant differences exist between the pre and post treatment scores of lead knowledge, asthma knowledge, indoor air quality knowledge, and exposure-reducing behavior. A paired samples t-test is an appropriate statistical method because we would like to compare the means of pre and post scores from the same group at different times. Paired samples t-tests were first conducted to compare pre and post-treatment scores for the entire sample, regardless of treatment group. Since the research hypotheses are directional, one-tailed t-tests were used for the following analysis. As shown in Table 4, improvement on both lead knowledge $t(30) = -2.908, p < .01$ and asthma knowledge $t(30) = -2.839, p < .01$ post-treatment scores were statistically significant, while indoor air quality knowledge $t(30) = .796, p > .05$ and exposure-reducing behaviors $t(30) = -$
1.306, \( p > .05 \) were not statistically significant. With the exception of indoor air quality knowledge, this result confirms our first hypothesis that there would be a significant improvement in both treatment groups on child care providers’ general knowledge of indoor pollutants. Although the indoor air quality knowledge score was not significant, the mean score of about six points out of a seven point maximum is already a high score, with little room for improvement. Unfortunately, our second hypothesis that there would be a significant improvement in both treatment groups on child care providers’ exposure-reducing behaviors is not confirmed.

Table 4. *Overall participant knowledge and behavior changes (\( N = 31 \))*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Pre-score ( M )</th>
<th>Post-score ( M )</th>
<th>( p )-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead knowledge</td>
<td>10.35</td>
<td>11.35</td>
<td>.004</td>
</tr>
<tr>
<td>Asthma knowledge</td>
<td>4.74</td>
<td>5.35</td>
<td>.004</td>
</tr>
<tr>
<td>Indoor air quality knowledge</td>
<td>6.26</td>
<td>6.10</td>
<td>.216</td>
</tr>
<tr>
<td>Exposure-reducing behaviors</td>
<td>15.03</td>
<td>15.52</td>
<td>.101</td>
</tr>
</tbody>
</table>

*Note.* The highest score for each variable = 15, 8, 7, and 24, respectively.

**Hypotheses 3 and 4**

In the current study, it was also hypothesized that there would be a significant positive difference in general knowledge of indoor pollutants as well as exposure-reducing behaviors between child care providers who attended a training workshop and those who just received the printed material. Paired samples t-tests were conducted to compare pre and post-treatment scores for each separate treatment group. Since the research hypotheses are directional, one-tailed t-tests were used for the
following analysis. As shown in Table 5, the guidebook treatment group showed improvement on both lead knowledge $t(16) = -1.869, p < .05$ and asthma knowledge $t(16) = -2.021, p < .05$ post-treatment scores were statistically significant, while indoor air quality knowledge $t(16) = .223, p > .05$ and exposure-reducing behaviors $t(16) = -.706, p > .05$ were not statistically significant. The workshop treatment group also showed improvement on both lead knowledge $t(13) = -2.259, p < .05$ and asthma knowledge $t(13) = -1.963, p < .05$ post-treatment scores were statistically significant, while indoor air quality knowledge $t(13) = .888, p > .05$ and exposure-reducing behaviors $t(13) = -1.127, p > .05$ were not statistically significant.

Table 5. Participant knowledge and behavior changes by treatment group

<table>
<thead>
<tr>
<th>Variable</th>
<th>Guidebook ($n = 17$)</th>
<th>Workshop ($n = 14$)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td>Lead knowledge</td>
<td>10.00</td>
<td>10.94</td>
</tr>
<tr>
<td>Asthma knowledge</td>
<td>4.71</td>
<td>5.35</td>
</tr>
<tr>
<td>Indoor air quality knowledge</td>
<td>5.88</td>
<td>5.82</td>
</tr>
<tr>
<td>Exposure-reducing behaviors</td>
<td>15.12</td>
<td>15.47</td>
</tr>
</tbody>
</table>

*Note. The highest score for each variable = 15, 8, 7, and 24, respectively.*

To determine whether these pre and post-treatment mean scores are statistically different depending on treatment group, mean improvement scores for the lead knowledge, indoor air quality knowledge, asthma knowledge, and exposure-reducing behavior variables were calculated for each participant. Mean improvement scores for each of these variables were calculated by subtracting the pre-treatment
score from the post-treatment score. An independent samples t-test was then selected to compare the mean improvement scores, with treatment as the grouping variable. Before running the t-test, a Levene’s test was used to assess whether the assumption of equal variances was violated. Results show that the lead knowledge $F(1, 31) = .765, p = .389$, the indoor air quality knowledge $F(1, 31) = .005, p = .944$, the asthma trigger knowledge $F(1, 31) = .067, p = .797$, and the exposure-reducing behavior $F(1, 31) = .007, p = .932$ improvement scores were not significant, which suggests that the variance in these knowledge and behavior scores were approximately equal for both treatment groups.

As shown in Table 6, the results of the independent samples t-test showed that the lead knowledge $t(29) = -.185, p = .427$, asthma knowledge $t(29) = .171, p = .433$, indoor air quality knowledge $t(29) = .551, p = .293$, and exposure-reducing behavior $t(29) = -.384, p = .352$ mean improvement scores were not statistically different for the two treatment groups. This result does not confirm our third and fourth hypotheses that there would be a significant improvement in general knowledge of indoor pollutants or exposure-reducing behaviors for child care providers who attended a training workshop compares to those who just received the guidebook in the mail.

Table 6. Participant mean improvement scores by treatment group

<table>
<thead>
<tr>
<th>Area of improvement</th>
<th>Guidebook ($n = 17$)</th>
<th>Workshop ($n = 14$)</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead knowledge</td>
<td>.941</td>
<td>1.07</td>
<td>.427</td>
</tr>
<tr>
<td>Asthma knowledge</td>
<td>.647</td>
<td>.571</td>
<td>.433</td>
</tr>
<tr>
<td>Indoor air quality knowledge</td>
<td>-.059</td>
<td>-.286</td>
<td>.293</td>
</tr>
<tr>
<td>Exposure-reducing behavior</td>
<td>.353</td>
<td>.643</td>
<td>.352</td>
</tr>
</tbody>
</table>
Further analysis of treatment differences

To analyze the study results in greater detail, paired samples t-tests were conducted on each of the individual questions that were used to create the summary scores of the four categories (Appendix I), including lead knowledge, asthma knowledge, indoor air quality knowledge, and exposure-reducing behaviors. By running paired samples t-tests on individual questions, we can determine the specific questions on which participants showed statistically significant improvement. Paired samples t-tests were first conducted to compare pre and post-treatment question outcomes for the entire sample, regardless of treatment group. Each question was scored by assigning one point for each correct answer; therefore one was the highest score a participant could receive on a question. As shown in Table 7, three questions from the lead knowledge section, one question from the indoor air quality section, five questions from the asthma trigger section, and one question from the exposure-reducing behavior section were found to be statistically significant. While most questions were actually significant due to an improvement, the lead paint \( t(30) = 2.683, p < .05 \) and radon \( t(30) = 2.108, p < .05 \) scores in the asthma trigger section were statistically significant due to a decrease in the mean score, where almost all of the participants answered these two questions incorrectly. Table 7 demonstrates that most of the significant change for the overall sample occurred in the lead knowledge and asthma trigger knowledge scores, which is consistent with the confirmed hypothesis that there would be significant improvement in participant knowledge of indoor pollutants from pre to post-treatment.
Table 7. *Significant improvement on individual questions for entire sample (N = 31)*

<table>
<thead>
<tr>
<th>Questions related to lead exposure:</th>
<th>Pre</th>
<th>Post</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Washing a child’s hands often helps prevent lead poisoning.</td>
<td>.839</td>
<td>.968</td>
<td>.043</td>
</tr>
<tr>
<td>2. Cleaning a home with soap and water decreases lead in the home more than dusting or sweeping.</td>
<td>.484</td>
<td>.742</td>
<td>.009</td>
</tr>
<tr>
<td>3. A balanced diet, with a good amount of iron and calcium that does not contain too many fatty foods, decreases lead absorption by the body.</td>
<td>.548</td>
<td>.742</td>
<td>.056</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Questions related to indoor air quality:</th>
<th>Pre</th>
<th>Post</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. People spend as much as 90% of their time indoors.</td>
<td>.677</td>
<td>.839</td>
<td>.096</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Questions on identifying asthma triggers:</th>
<th>Pre</th>
<th>Post</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Lead paint</td>
<td>.226</td>
<td>.032</td>
<td>.012</td>
</tr>
<tr>
<td>2. Dust mites</td>
<td>.871</td>
<td>1.00</td>
<td>.043</td>
</tr>
<tr>
<td>3. Cockroaches</td>
<td>.387</td>
<td>.807</td>
<td>.000</td>
</tr>
<tr>
<td>4. Radon</td>
<td>.161</td>
<td>.032</td>
<td>.043</td>
</tr>
<tr>
<td>5. Animal dander</td>
<td>.871</td>
<td>1.00</td>
<td>.043</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Questions related to exposure-reducing behavior:</th>
<th>Pre</th>
<th>Post</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Ever had a lead assessment done in your home?</td>
<td>.387</td>
<td>.484</td>
<td>.083</td>
</tr>
</tbody>
</table>

*Note.* Improvement score was calculated by subtracting pre-treatment score from the post-treatment score.
In order to see if improvement was different between the two treatment groups, paired samples t-tests were then conducted to measure pre and post-treatment question scores for each separate treatment group. As shown in Table 8, the guidebook treatment group showed improvement on one lead knowledge question and five asthma trigger questions. However, lead paint and radon were statistically significant due to a decrease in correct answers on these questions in the asthma trigger section. In comparison, the workshop treatment group showed improvement on one asthma trigger question and two exposure-reducing behavior questions.

Table 8. Significant improvement on individual questions by treatment group

<table>
<thead>
<tr>
<th>Guidebook treatment group</th>
<th>Pre</th>
<th>Post</th>
<th>p</th>
</tr>
</thead>
</table>

Questions related to lead exposure:

1. Cleaning a home with soap and water decreases lead in the home more than dusting or sweeping.  
   .484  .742  .041

Questions on identifying asthma triggers:

1. Mold  
   .765  .941  .083
2. Lead paint  
   .294  .000  .020
3. Dust mites  
   .824  1.00  .083
4. Cockroaches  
   .353  .706  .009
5. Radon  
   .235  .000  .041
6. Nitrogen dioxide  
   .471  .706  .041
7. Animal dander  
   .824  1.00  .083

Questions related to exposure-reducing behavior:

1. How often clean small toys (blocks, etc.)?  
   1.00  .765  .041
Table 8 *(continued).*

<table>
<thead>
<tr>
<th>Workshop treatment group</th>
<th>Pre</th>
<th>Post</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Questions on identifying asthma triggers:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Cockroaches</td>
<td>.429</td>
<td>.929</td>
<td>.003</td>
</tr>
<tr>
<td>Questions related to exposure-reducing behavior:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. How often damp wipe window sills?</td>
<td>.571</td>
<td>.786</td>
<td>.041</td>
</tr>
<tr>
<td>2. How often dry dust?</td>
<td>.000</td>
<td>.2857</td>
<td>.040</td>
</tr>
</tbody>
</table>

*Note.* Improvement score was calculated by subtracting pre-treatment score from the post-treatment score.

These findings do not as clearly support the confirmation of our first hypothesis as the results in Table 7 when the entire sample was analyzed together. However, these results do not take into account whether the participants answered the question correctly both pre and post-treatment, or if the post-treatment scores were unanimously correct (M = 1.0) but the difference from the pre-treatment score was not statistically significant, so this information was compiled for both treatment groups. As shown in Table 9, the guidebook treatment group scored perfectly on 9 questions, 4 of which were unanimously correct both pre and post-treatment, while the workshop treatment group scored perfectly 12 questions, 5 of which were unanimously correct both pre and post-treatment. The majority of these results were not found to be significant in the paired samples t-tests previously discussed. Any scores that were not found to be statistically significant represent questions that most participants performed well on regardless of the treatment intervention. The fact that the vast majority of the questions represented in Table 9 relate to knowledge of indoor pollutants supports the confirmation of our first hypothesis.
Table 9. *Questions answered unanimously correct (M = 1.0) by treatment group*

<table>
<thead>
<tr>
<th>Treatment Groups: G = guidebook, W = workshop</th>
</tr>
</thead>
</table>

Questions related to lead exposure:

1. Lead paint more likely to be found in older homes.  
   - G
2. High lead in the body can affect a child’s ability to learn.  
   - G*  W*
3. Washing a child’s hands often helps prevent lead poisoning.  
   - G
4. One way for children to get lead poisoned is by having lead dust on their hands and then putting their hands in their mouth.  
   - G*  W*
5. Lead in soil can harm children.  
   - W
6. Some dishes and pottery are not safe to use in cooking or for eating because they can contain lead.  
   - W

Questions related to indoor air quality:

1. You cannot see, smell, or taste many indoor air pollutants.  
   - W
2. Smoking is only dangerous to the person who is smoking.  
   - G*  W*
3. Pesticides only hurt the pests they were designed to kill.  
   - W*

Questions on identifying asthma triggers:

1. Dust mites  
   - G  W
2. Tobacco smoke  
   - G  W*
3. Animal dander  
   - G  W

Questions related to exposure-reducing behavior:

1. Clean stuffed toys in washing machine.  
   - W
2. Wet mopping floors at least once a week.  
   - G*  W

* indicates when $M = 1.0$ both pre and post-treatment
Analysis of participant feedback by treatment group

In order to collect more subjective information about the two treatments, the post-treatment survey included a participant feedback section. A treatment feedback score was computed for each participant by counting the number of positive responses in the feedback section of the post-treatment survey. The feedback score was calculated by assigning points for each positive answer to the six questions in the feedback section (Appendix I). For example, the first four questions were on a Likert scale, so the most positive answer was counted as five points and the least positive answer was counted as 1 point. The last two questions were simple yes or no questions, so one point was counted for each yes response. Therefore, a score of 22 was the highest a participant could receive on the treatment feedback section. An independent samples t-test was then selected to compare the feedback scores, with treatment as the grouping variable. Before running the t-test, a Levene’s test was used to assess whether the assumption of equal variances was violated. Results show that the first $F(1, 31) = 33.63, p = .000$, second $F(1, 31) = 14.78, p = .001$, fifth $F(1, 31) = 9.30, p = .005$, and sixth $F(1, 31) = 7.41, p = .011$ feedback questions were statistically significant, which suggests that the variance in these knowledge and behavior scores were not approximately equal for both treatment groups. Since the Levene's test was significant for these four questions, the unequal variance values were used when interpreting the t-test results for these questions.

As shown in Table 10, the results of the independent samples t-test showed that the total feedback score means $t(26.168) = -3.341, p = .003$ as well as the first $t(16) = -2.219, p = .041$, second $t(22.32) = -2.247, p = .035$, and third $t(28.947) = -3.395, p = .002$ feedback questions were statistically significant, which suggests that the feedback on overall satisfaction, perceived information understood, and helpfulness were more positive from the workshop treatment group. Although the
fourth, fifth, and sixth feedback questions were not statistically significant, the means of the workshop treatment group were consistently higher, suggesting that the workshop treatment group read more of the guidebook, found the guidebook easier to understand, and were more likely to use the checklist in the back of the guidebook to assess their own home.

Table 10. *Participant feedback by treatment group*

<table>
<thead>
<tr>
<th>Feedback question topic</th>
<th>Guidebook $M$</th>
<th>Workshop $M$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Overall feedback on treatment</td>
<td>4.76</td>
<td>5.00</td>
<td>.041</td>
</tr>
<tr>
<td>2. How much of treatment they understood</td>
<td>4.18</td>
<td>4.79</td>
<td>.035</td>
</tr>
<tr>
<td>3. If treatment was sufficiently helpful</td>
<td>3.05</td>
<td>4.57</td>
<td>.002</td>
</tr>
<tr>
<td>5. If the guidebook was easy to understand</td>
<td>.882</td>
<td>1.00</td>
<td>.163</td>
</tr>
<tr>
<td>6. If used assessment checklist in guidebook</td>
<td>.529</td>
<td>.786</td>
<td>.140</td>
</tr>
<tr>
<td>Total feedback score $M$</td>
<td>17.18</td>
<td>20.29</td>
<td>.003</td>
</tr>
</tbody>
</table>

*Note.* The highest score for each question = 5, 5, 5, 5, 1, and 1, respectively.
CHAPTER FIVE
DISCUSSION

It was hypothesized that there would be a significant improvement for both educational treatments in general knowledge of indoor pollutants and exposure-reducing behavior, and that the improvement of the training workshop treatment group in knowledge and exposure-reducing behavior would be significantly greater than the guidebook treatment group. The hypotheses were partially confirmed by the study results. Both treatment groups showed significant improvement in general knowledge of indoor pollutants. However, the hypotheses that both treatment groups would improve on exposure-reducing behavior and that the workshop treatment group would show significantly more improvement than the guidebook treatment group were not confirmed by the results.

The result of improved knowledge of indoor pollutants supports the conclusions of previous research, such as Laquatra et al. (2005) which found that participants showed improvement on one-third of the indoor environmental pollutant statements after receiving an educational intervention. The result of unaltered exposure-reducing behavior does not support the conclusions of previous research, such as Leung et al. (1997) and Takaro et al. (2004) which found that a significant number of the exposure-reducing recommendations were put into practice after participants received a home assessment and action plan. However, the interventions used in these previous studies were significantly more intensive than the ones used in the current study. It is possible that the inconsistency of this study’s findings could be attributed to the nature of the treatments, since the current study did not have experts visit the home of each participant and provide an individual action plan. The result of treatment group equivalence does not support the conclusions of previous research,
such as Takaro et al. (2004) which found that a higher-intensity treatment group was more successful than a lower-intensity treatment group at achieving significant reductions in measurable levels of indoor pollutants. Again, the inconsistency between the current study and previous research might be due to the fact that even the lower-intensity treatment described by Takaro et al. (2004) was still significantly more intensive than the current study’s more intensive intervention, the training workshop. It is also possible that the intensity level of the training workshop was not dissimilar enough from the intensity of the guidebook treatment to produce a significant result.

When interpreting the data from the more detailed analyses conducted, there were some unexpected results of particular note. For example, an interesting outcome, as shown in Table 7 and Table 8, was the fact that post-treatment scores showed that the vast majority of the participants answered incorrectly that lead paint and radon were asthma triggers. This was most likely due to the participants’ tendency to identify all eight of the words in the asthma trigger section as asthma triggers. Also, since lead paint, although not an asthma trigger, was one of the topics covered in the indoor environmental pollutant education, it is possible that participants remembered learning about it, and therefore associated it with the rest of the information that covered asthma triggers. Radon was a word that most participants were generally unfamiliar with, but after the educational treatment, almost all participants assumed it was an asthma trigger. This might have been due to the fact that it was listed among several asthma triggers they recognized. Therefore, it is recommended that future studies find an alternative measure to assess asthma trigger knowledge. It is also interesting to note the differences between Table 7 and Table 8, with more individual questions showing significance, particularly in the lead knowledge section, when the entire sample was analyzed as a whole. This is mostly likely a consequence of the limited sample sizes of the treatment groups, which makes significant findings harder.
to come by. Therefore, it is recommended that future studies recruit a larger sample size, so more in-depth analyses could result in more meaningful interpretation.

This study attempted to narrow the focus of previous research by focusing on low-cost interventions to educate family child care providers about indoor environmental pollutants, including lead exposure and asthma triggers. Both the training workshop and the educational guidebook treatments developed for this study can be considered “low-cost” relative to interventions described in previous research. Each training workshop cost approximately $150, which paid for the cost of the demonstration materials, presentation visuals, a guidebook to take home and a peer trainer to lead the workshop. Sending the guidebooks in the mail was considerably less expensive, with each guidebook costing $13 for printing and postage. This study’s finding that the less expensive treatment, the guidebook mailing, was as equally effective as the training workshop in increasing knowledge of indoor pollutants, is a valuable contribution to this field’s knowledge base and can serve as the foundation from which future research can begin.

**Research limitations**

Despite the fact that the design of this study controlled for many threats to validity, there were still several limitations which could have potentially had an affect on our results. In terms of threats to external validity, there may have been an interaction of test by treatment, which suggests that the use of a pretest prior to administering treatment may have increased or decreased the participants’ sensitivity to the independent variables, thus making the results unrepresentative of the actual treatment effect. Another possible threat to external validity is an interaction of selection by treatment; the fact that this study only used participants that were family
child care providers from Rochester, NY could be a hindrance to the possibility of generalizing the results.

In terms of threats to internal validity, there may have been a problem with the selection of the participants. Although there was random assignment to the treatment group, recruitment of the participants was not random; as a result, the participants recruited for this study may have differed from the general population on some unknown characteristic. As a result, it is unclear whether the findings of this study are truly a result of the independent variables. The unequal ethnic distribution that occurred in the random assignment to treatment group is particularly notable, with the guidebook treatment group lacking the diversity shown in the workshop treatment group. In terms of threats to statistical validity, the small sample size of this study may not have been sufficient to conclusively detect or refute a treatment effect.

Although one of the goals of this study was to utilize local peer educators as both an attempt to study the feasibility of using multiple, non-expert trainers and to facilitate participant-trainer identification, this could be considered a limitation of the study. Even though peer educators were given training scripts with detailed information on how to run the training workshop, it is impossible to know if the script was followed exactly. Therefore, there is a possibility that there was quality variation between peer educators/training workshops. In the future, it would be ideal to have one trainer conduct all training workshops in order to ensure presentation consistency.

Another limitation could have been the fact that since it was not feasible to visit the homes of each participant to gather data before and after the educational intervention, this study’s data on behavior was based on telephone surveys. Since no physical assessment or behavioral observation was conducted, participant responses might have been reflective of social desirability rather than actual cleaning behavior. It is also important to note that although attempts to contact the participant after the
educational intervention did not start until three weeks had passed, difficulty reaching participants in order to conduct the follow-up survey resulted in non-exact spacing between intervention and evaluation. It is debatable whether this should be interpreted as an advantage or disadvantage, since the extra time could have given some participants more opportunity to incorporate changes in their cleaning practices, or the extra time could have resulted in a loss of knowledge recall.

It is also possible that a treatment effect was not detected due to an invalid measure, since the survey was not extensive or specific enough to measure the vast range of potential changes in participant knowledge or exposure-reducing behavior. In an attempt to keep survey time commitments to a minimum of 20 minutes per survey, the amount of data collected on knowledge of each of the pollutants covered and every exposure-reducing behavior recommended in the guidebook and during the training workshop was potentially insufficient. It is possible that behavior changes or increases in knowledge could have occurred in areas that were not specifically covered by the survey. It is also possible that the three week follow-up time was insufficient for allowing behavior change to occur. Since some participants had been unable to read the materials before the second telephone survey, it is possible that our data did not reflect all potential knowledge and behavior changes. However, it is also a possibility that those participants that did not read the guidebook before the second survey might never get around to reading it, and this should be an indication that this type of educational intervention relies heavily on individual motivations, which has potentially negative effects on effectiveness outcomes.

In terms of the educational materials created, although efforts were made to keep the language simple and straightforward, the readability of the guidebook and presentation materials were not pilot tested nor professionally assessed, which may have affected the participants’ ability to read, understand, and act on the message. The
illustrations, typography, and reading level of the materials developed should have been assessed to determine their appropriateness for the target audience.

**Future research opportunities**

In the future, in order to protect against some of the limitations encountered in this study, it would be advised to use true random selection, have a larger sample size, use professionally assessed educational materials, and examine potential confounding variables, such as commitment to change and social influences. Some additional solutions for limitations faced in this study include using a more extensive survey measure that would be more sensitive to improvements in knowledge or behavior and using a single, expert trainer to conduct all of the training workshops, so consistency of informational content can be ensured. A second follow-up survey could be added to the study in order to see how knowledge retention and exposure-reducing behaviors change over a longer period of time. Also, although each participant served as their own control with the test-retest study design, it might have been interesting to incorporate a condition group that did not receive an educational intervention of any kind. This additional control group might have been able to give some insight about the true variability of participant answers, separate from educational intervention.

In addition to a readability assessment, it would be interesting to study the impact of various lengths of materials, since a single 36 page guidebook might have proved too overwhelming for participants to read all at once. Particularly since participants had difficulty differentiating lead exposure and asthma triggers as two separate topics within the broader context of indoor pollutants, materials that focus on one topic at a time might be more effective. It might be interesting to study the effectiveness of sending smaller amounts of material over a longer period of time, so participants could potentially work on behavior changes more gradually as they
learned about different pollutants, rather than trying to change many behaviors in response to education about several pollutants.

In general, more thorough study of the association between exposure to indoor environmental pollutants in child care and children’s health is needed. It is also essential to continue to evaluate whether the current recommendations for individual, non-professional behaviors to reduce exposure to indoor pollutants are effective and can have a positive impact on children’s health. Additional research is needed to document effective and cost-efficient behavior change strategies that improve participant compliance with proven exposure-reducing interventions. The factors affecting behavior change, particularly in the area of cleaning and maintenance, need to be better understood and studied, so their findings can be incorporated into the design of interventions.

Based on the findings of the current study, one suggested course of action for future research would be to focus specifically on the guidebook educational treatment. Since the guidebook treatment was as equally effective as the training workshop, more cost-efficient, and was less time intensive for both participants and research coordinators, a study that expanded the research exclusively on the guidebook would be ideal for recruiting a larger sample of participants. Participant implementation, defined as significant improvement in exposure-reducing behavior, should be the overarching goal of this study, since this particular result was not achieved by the current study. Providing one, higher-intensity treatment group with some of the specific materials mentioned in the guidebook, such as dust mite proof covers, water filters, cleaning supplies, and door mats, might be an effective strategy to impact some specific exposure-reducing behaviors, as previous research has shown (Takaro et al., 2004).
**Conclusions**

The results of this study show that both the training workshop and guidebook educational interventions have a positive effect on knowledge and a limited effect on exposure-reducing behavior. In light of the fact that previous research on this particular topic is limited, this study has contributed significantly to the indoor environmental pollutant field knowledge base, both in terms of the research methodology as well as the design and content of the educational treatments. This study’s finding that the guidebook treatment was as equally effective as the training workshop treatment, suggests that there is great potential for creating positive change in family child care providers’ exposure-reducing behavior and knowledge of indoor environmental pollutants using a simple, low-cost method, such as an educational guidebook. Future studies will hopefully be able to give more insight on the cost-benefit analysis of differing treatment intensities as well as broaden the understanding of various factors that impact behavior change.
APPENDIX A – FLYER USED TO RECRUIT PARTICIPANTS

Front of flyer:

Learn how to protect the children in your child care program from indoor pollutants!

healthier environment = healthier children = happier child care

You are invited to participate in a training program for family child care providers about common indoor pollutants, where they come from, and how they can be controlled.

The training program is being sponsored in part by Cornell Cooperative Extension in Monroe County and the Department of Design and Environmental Analysis at Cornell University.

For more information, please see the back of this page.

Back of flyer:

This program qualifies as 2 training hours that will count towards your annual hours of training required by New York State.

Sign up now for this FREE training that will occur this spring and early summer! To show our appreciation for your participation, you will receive a gift bag as a thank you.

In order to receive training, you will need to participate in two separate telephone interviews that will take approximately 20 minutes each.

To sign up for this training or for more information, please contact: Diana Webb 585.697.3569
APPENDIX B – FIRST TELEPHONE INTERVIEW (FOR BOTH GROUPS)

Assessment Instrument 1

Date ____________    ID # ____________

“Hello, this is __________, calling from Cornell University about the project you agreed to participate in about indoor pollutants. Part of the project includes answering a 20 minute telephone survey. Is this a good time for you to take the survey?”

-- If say no, make an appointment to call back at a more convenient time: ________________

-- If say yes:
“Great. First I am going to read you some information about the study, then you will be able to ask any questions you may have before agreeing to be in the study.

The purpose of this study, which is being sponsored in part by Cornell Cooperative Extension in Monroe County and the Department of Design and Environmental Analysis at Cornell University, is to help child care providers learn more about common indoor pollutants, where they come from, how they can be controlled, and how they affect children’s health.

If you agree to be in this study, we will ask you to participate in two separate 20 minute telephone interviews (the one we are having now counts as the first of these two). You will also be asked to attend either a 2 hour training workshop or to give us feedback on an educational material we are developing.

We do not anticipate any risks for you participating in this study, other than those encountered in day-to-day life.

The direct benefit to participating is that you will learn how to reduce exposure to environmental pollutants in your home. This is important for you and your family, the children in your child care program, and your program as a business.

The indirect benefit to participating is helping develop educational methods that allow for wide distribution. Based on the findings of this study, it is anticipated that the educational materials will be made available to child care providers on both a statewide and national level.

As compensation for your participation, you will receive a gift bag as a thank you. You will also receive 2 training hours that will count toward your annual hours of training required by New York State.

Your decision whether to not to participate will not affect your current or future relations with Cornell Cooperative Extension in Monroe County or Cornell University. You may skip any questions you do not feel comfortable answering. And, if you decide to participate, you are free to withdraw at any time.

The records of this study will be kept private. Your answers on this survey will not be shared with anyone, including the parents of children in your program or the staff at the child care network. In any sort of report we might publish, we will not include any information that will make it possible to identify you. Research records will be kept in a locked file and only the
researchers will have access to the records. The researcher responsible for this study is Professor Lorraine Maxwell.

Do you have any questions at this time? If you have any questions later, you may contact Prof. Maxwell by telephone at 607-255-1958 or by email at lem3@cornell.edu

Do you understand all of the information that has been stated? Yes _____ No _____

Do you agree to participate in the study? Yes _____ No _____

“Great, please answer the questions to the best of your ability. If there are any questions you do not understand or would prefer not to answer please just let me know.”

“Okay, first I’m going to ask you some general background questions.”

Background

1. How long have you been a child care provider? ______________________

   1a. In your current location?: ______________________________

2. What is the maximum number of children your program can accommodate? ______________________________

3. What is your average daily enrollment? ______________________________

4. What ages do you accept? _______________________________________

5. Is the child care program located in:   a house     an apartment     other: ______

6. Do you own or rent the house/apartment where your child care program is located?

7. Is the home located on a:     main road       side street       other: __________

8. What year was your built? (if known) prior to 1978? _________________

   8a. If prior to 1978, have you ever had a lead assessment done in your home?

9. Are any rooms used for child care on a basement level? ________________

10. Do you provide food for the children in your program?

    complete meals      snacks      just drinks     other: ________________
11. Do you use hot water from the faucet for cooking or drinking? __________

12. Do you have a carbon monoxide detector installed in your home? __________

13. Is there any peeling or chipping paint inside your home? ________________

14. Does anyone, including visitors, smoke inside your home? ______________

15. Do you have people take off their shoes before entering your home? ______

16. Do you know what the humidity level inside your home is? ______________

17. Do you have any pets in your home? _________________________________
   19a. if yes, where are they allowed inside? __________________________

“Now I’m going to ask you some questions about your cleaning practices.”

Cleaning

18. Who does the major cleaning for your child care program?
   you (the provider) the owner of the building
   a cleaning service other: __________________

19. Do you clean the toys the children play with? ________________________

20. I am going to go over a few different types of toys, so just let me know if you clean
   them, how you clean them and how often you clean them:

<table>
<thead>
<tr>
<th>Toy</th>
<th>How Clean</th>
<th>How Often</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Large climbing toys</td>
<td>1.</td>
<td>1.</td>
</tr>
<tr>
<td>2. Blocks/ small toys</td>
<td>2.</td>
<td>2.</td>
</tr>
<tr>
<td>3. Stuffed toys</td>
<td>3.</td>
<td>3.</td>
</tr>
</tbody>
</table>

20a. Are there any other toys that you clean that we have not talked about?
21. Now I’m going to read through a list of cleaning tasks, just let me know if you do them and how often—for example, “more than once a day”, “once a day”, “twice a week”, “once a week”, “less than once a week”:

<table>
<thead>
<tr>
<th>Task</th>
<th>More than once a day</th>
<th>Once a day</th>
<th>Twice a week</th>
<th>Once a week</th>
<th>Less than once a week</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Take out the trash</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wash dishes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vacuum</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sweep</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wet mop</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Damp wipe window sills</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wipe counters</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dry dust</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dust with a damp cloth</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wash the children’s bedding</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

22. Does your vacuum have a HEPA filter (high efficiency particulate air filter)?

_________________________________________________________________________

23. To your knowledge, have you ever had any children in your child care program with asthma or who have had high blood lead levels? __________________________
“Now I’m going to ask you a question about asthma triggers. Asthma triggers are things in the environment that might cause an asthma attack for a person who has asthma. Are you familiar with asthma?”

--If answer no, explain that “Asthma is a chronic inflammatory disease of the airway that causes symptoms, such as shortness of breath, tightness in the chest, coughing, and wheezing.”

Asthma

24. I am going to read you some word, just answer “yes”, “no”, or “not sure” if you think they are an asthma trigger:

mold  lead paint  dust mites  cockroaches

tobacco smoke  radon  nitrogen dioxide  animal dander

“Now I’m going to read you some statements about lead exposure, just answer “true”, “false” or “not sure” to the statements.”

Lead

25. _____ Lead paint is more likely to be found in newer homes than in older homes.

26. _____ High lead in the body can affect a child’s ability to learn.

27. _____ Most children have symptoms right away if they have an elevated blood lead level.

28. _____ Living in a building during renovation/remodeling can increase a child’s exposure to lead.

29. _____ Washing a child’s hands often, helps prevent lead poisoning.

30. _____ Cleaning a home with soap and water decreases the lead in the home more than dusting or sweeping.

31. _____ One way for children to get lead poisoned is by having lead dust on their hands and then putting their hands in their mouth.
32. _____ Lead in water can be removed by boiling.
33. _____ Most cases of childhood lead poisoning are caused by drinking water that contains lead.
34. _____ Warm tap water usually contains less lead than cold tap water.
35. _____ Lead in soil cannot harm children.
36. _____ Some dishes and pottery are not safe to use in cooking or for eating, because they contain lead.
37. _____ Most children get lead poisoned by breathing in lead, rather than by eating or swallowing lead.
38. _____ The human body needs a small amount of lead for good nutrition.
39. _____ A balanced diet, with a good amount of iron and calcium that does not contain too many fatty foods, decreased lead absorption by the body.

“Now I am going to ask you a few more true/false questions, but these are about indoor air issues.”

Indoor Air Quality

40. _____ You cannot see, smell, or taste many indoor pollutants.
41. _____ You cannot do anything to prevent indoor air quality problems.
42. _____ Indoor air pollutants can be either natural or artificial.
43. _____ People spend as much as 90 percent of their time indoors.
44. _____ Opening a window will always solve an indoor air pollution problem.
45. _____ Smoking is only dangerous to the person who is smoking.
46. _____ Pesticides only hurt the pests they were designed to kill.

“That is the end of the survey. If there were questions that you weren’t sure about or seemed confusing, they should be answered in the training you will be receiving shortly.”
--If receiving printed material: “We are developing an educational program for child care providers about indoor pollutants. However, not all providers will be able to attend a training workshop, so we are developing educational materials to be used in the future. We will be sending you a copy of these materials in the mail very soon. We would like you to read them over carefully and we will contact you for your second telephone interview in about 3 weeks. After your second telephone interview, you will have the opportunity to attend a free training session later on in the summer or in the fall.”

--If attending a training workshop: participant signed up for convenient training workshop date and told “You will be contacted for your second interview about three weeks after your training workshop.”

“I would also like to give you the opportunity to participate in another phase of this study. Two research assistants would come to your home to collect dust samples. These dust samples would be tested and you would receive a report of any asthma triggers that are present in your home. The dust samples will not be tested for lead and this report will only be shared with you and not with any of the parents in your child care program.

Please understand that collecting dust samples is not an indication of the cleanliness of your home. Dust collects everywhere. You may not be aware that there are microscopic particles in the air that might be asthma triggers for some people. If there are indoor air pollutants in your home related to asthma, the training/materials will give you ways to reduce these triggers.

If you agree to participate, you will be asked to give flyers to the parents in your child care program, so dust samples can be collected in their homes as well.

In return for your participation, you name will be put in a lottery to win a HEPA filter vacuum. Since we are only recruiting 8 family child care programs for this phase of the study, you will have a 1 in 8 chance of winning the vacuum. Those who do not win the vacuum will receive a $10 bonus for each family that participates. So, if you get 6 families to participate, you would earn $60.

Would you like to be considered for this part of the study?” Yes _____ No _____

Thank you so much for your time and participation.”
APPENDIX C – SECOND TELEPHONE INTERVIEW (FOR TRAINING WORKSHOP PARTICIPANTS ONLY)

Assessment Instrument 2 (training workshop participants)

Date ____________    ID # ____________

“Hello, this is __________, calling from Cornell University about the project you are participating in about indoor pollutants. You have already completed the first telephone survey, but there is a second survey that needs to be completed that takes about 20 minutes. Is this a good time for you to take the second survey?”

-- If say no, make an appointment to call back at a more convenient time:

_____________________________________________________________________

-- If say yes:

“Great, please answer the questions to the best of your ability. If there are any questions you do not understand or would prefer not to answer please just let me know.”

“Okay, first I’m going to ask you some questions about the training workshop you attended.”

Feedback

1. Overall, what did you think of the training workshop?
   Liked it a lot    Somewhat liked it    Neither liked or disliked it
   Somewhat disliked it    Disliked it a lot

2. Can you give an example of something you liked? __________________________

3. Can you give an example of something you disliked? ________________________

4. How much of the training workshop would you say you understood?
   All of it    Most of it    Some of it    A little of it    None or almost none of it

5. Is there any thing about the training workshop that you would change to make it better? Yes  No __________________________________________________________

6. Do you think attending a training workshop helped you understand the information more clearly than if you had just received a guidebook with the information?
   Strongly Agree    Agree    Neither Agree nor Disagree    Disagree    Strongly Disagree
7. How much of the guidebook did you read?
   All of it         Most of it         Some of it         A little of it         None or almost none of it
8. Did you find the guidebook easy to follow and understand?  Yes    No _______
9. Did you use the checklist in the back of the guide to assess your home?  Yes  No
10. Is there anything about the guidebook that you would change to make it better?
     Yes  No  ________________________________________________
11. Is there anything else about either the training session or guidebook that you would
     like to mention that we have not talked about?  _________________

“Okay, now I’m going to ask you some general background questions. A lot of the questions from now on were asked in the first survey, but we need to ask again.”

Background

12. Have you ever had a lead assessment done in your home? ______________
13. Do you use hot water from the faucet for cooking or drinking? __________
14. Do you have a carbon monoxide detector installed in your home? __________
15. Is there any peeling or chipping paint inside your home? ________________
16. Does anyone, including visitors, smoke inside your home? ______________
17. Do you have people take off their shoes before entering your home? _______
18. Do you know what the humidity level inside your home is? ______________
19. Do you have any pets in your home? __________________
19a. if yes, are they allowed in children’s sleeping area? ________________
“Now I’m going to ask you some questions about your cleaning practices.”

Cleaning

20. I am going to go over a few different types of toys, so just let me know if you clean them, how you clean them and how often you clean them:

<table>
<thead>
<tr>
<th>Toy</th>
<th>How Clean</th>
<th>How Often</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Large climbing toys</td>
<td>1.</td>
<td>1.</td>
</tr>
<tr>
<td>2. Blocks/ small toys</td>
<td>2.</td>
<td>2.</td>
</tr>
<tr>
<td>3. Stuffed toys</td>
<td>3.</td>
<td>3.</td>
</tr>
</tbody>
</table>

21. Now I’m going to read through a list of cleaning tasks, just let me know if you do them and how often—for example, “more than once a day”, “once a day”, “twice a week”, “once a week”, “less than once a week”:

<table>
<thead>
<tr>
<th>Task</th>
<th>More than once a day</th>
<th>Once a day</th>
<th>Twice a week</th>
<th>Once a week</th>
<th>Less than once a week</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Take out the trash</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wash dishes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vacuum</td>
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</tr>
<tr>
<td>Sweep</td>
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<td></td>
</tr>
<tr>
<td>Wet mop</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Damp wipe window sills</td>
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<tr>
<td>Dust with a damp cloth</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Wash the children’s bedding</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

22. Does your vacuum have a HEPA filter (high efficiency particulate air filter)?
“Now I’m going to ask you a question about asthma triggers. Asthma trigger are things in the environment that might cause an asthma attack for a person who has asthma.”

23. I am going to read you some word, just answer “yes”, “no”, or “not sure” if you think they are an asthma trigger:

- mold
- lead paint
- dust mites
- cockroaches
- tobacco smoke
- radon
- nitrogen dioxide
- animal dander

“Now I’m going to read you some statements about lead exposure, just answer “true”, “false” or “not sure” to the statements.”

Lead

24. _____ Lead paint is more likely to be found in newer homes than in older homes.
25. _____ High lead in the body can affect a child’s ability to learn.
26. _____ Most children have symptoms right away if they have an elevated blood lead level.
27. _____ Living in a building during renovation/remodeling can increase a child’s exposure to lead.
28. _____ Washing a child’s hands often, helps prevent lead poisoning.
29. _____ Cleaning a home with soap and water decreases the lead in the home more than dusting or sweeping.
30. _____ One way for children to get lead poisoned is by having lead dust on their hands and then putting their hands in their mouth,
31. _____ Lead in water can be removed by boiling.
32. _____ Most cases of childhood lead poisoning are caused by drinking water that contains lead.
33. _____ Warm tap water usually contains less lead than cold tap water.
34. _____ Lead in soil cannot harm children.
35. ____ Some dishes and pottery are not safe to use in cooking or for eating, because they contain lead.

36. ____ Most children get lead poisoned by breathing in lead, rather than by eating or swallowing lead.

37. ____ The human body needs a small amount of lead for good nutrition.

38. ____ A balanced diet, with a good amount of iron and calcium that does not contain too many fatty foods, decreased lead absorption by the body.

“Now I am going to ask you a few more true/false questions, but these are about indoor air issues.”

**Indoor Air Quality**

39. ____ You cannot see, smell, or taste many indoor pollutants.

40. ____ You cannot do anything to prevent indoor air quality problems.

41. ____ Indoor air pollutants can be either natural or artificial.

42. ____ People spend as much as 90 percent of their time indoors.

43. ____ Opening a window will always solve an indoor air pollution problem.

44. ____ Smoking is only dangerous to the person who is smoking.

45. ____ Pesticides only hurt the pests they were designed to kill.

“If you don’t mind, we would like to ask a few questions in order to gather some general information about our participants as a group.”

**Demographics**

46. What is your gender?  Male   Female

47. Please choose one of the following age range categories that your current age fits into:

18-30   31-40   41-50   51-60   61+
48. What is the category that best describes your ethnicity?

- White
- Black
- Hispanic
- Asian
- Native American
- Unknown or chose not to report

49. What is the highest grade or year of school that you have completed?

- Some high school
- Completed high school or GED
- Some college
- College Degree
- Some graduate work
- Completed Master’s Degree
- Completed Doctorate
- Chose not to report

“That is the end of the survey. Thank you so much for your time and participation. Are there any final questions you have?”
APPENDIX D – SECOND TELEPHONE INTERVIEW (FOR PRINTED MATERIAL PARTICIPANTS ONLY)

Assessment Instrument #2 (printed material participants)

Date ____________    ID # ____________

“Hello, this is __________, calling from Cornell University about the project you are participating in about indoor pollutants. You have already completed the first telephone survey, but there is a second survey that needs to be completed that takes about 20 minutes. Is this a good time for you to take the second survey?”

-- If say no, make an appointment to call back at a more convenient time: ________________

-- If say yes:

“Great, please answer the questions to the best of your ability. If there are any questions you do not understand or would prefer not to answer please just let me know.”

“Okay, first I’m going to ask you some questions about the guidebook you received in the mail.”

Feedback

1. Overall, what did you think of the guidebook?

   Liked it a lot    Somewhat liked it    Neither liked or disliked it
   Somewhat disliked it    Disliked it a lot

2. Can you give an example of something you liked? ______________________

3. Can you give an example of something you disliked? ____________________

4. How much of the guidebook would you say you understood?

   All of it    Most of it    Some of it    A little of it    None or almost none of it

5. Is there any thing about the guidebook that you would change to make it better?

   Yes    No __________________________________________________

6. Do you think attending a training workshop would have helped you understand the information more clearly than just receiving a guidebook?

   Strongly Agree    Agree    Neither Agree nor Disagree    Disagree    Strongly Disagree
7. How much of the guidebook did you read?
   All of it    Most of it    Some of it    A little of it    None or almost none of it
8. Did you find the guidebook easy to follow and understand?
   Yes   No ________________________________
9. Did you use the checklist in the back of the guide to assess your home?
   Yes   No ________________________________
10. Did you find you had questions that were not answered by the guidebook?
    Yes  No  questions: ________________________________
11. Is there anything else about the guidebook that you would like to mention that we have not talked about?
    ______________________________________

“Okay, now I’m going to ask you some general background questions. A lot of the questions from now on were asked in the first survey, but we need to ask again.”

*Background*

12. Have you ever had a lead assessment done in your home? ________________
13. Do you use hot water from the faucet for cooking or drinking? __________
14. Do you have a carbon monoxide detector installed in your home? __________
15. Is there any peeling or chipping paint inside your home? _________________
16. Does anyone, including visitors, smoke inside your home? _______________
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- dust mites
- cockroaches
- tobacco smoke
- radon
- nitrogen dioxide
- animal dander

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**Lead**

24. _____ Lead paint is more likely to be found in newer homes than in older homes.

25. _____ High lead in the body can affect a child’s ability to learn.

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**Demographics**

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47. Please choose one of the following age range categories that your current age fits into:

   18-30   31-40   41-50   51-60   61+
48. What is the category that best describes your ethnicity?

White     Black     Hispanic     Asian     Native American

Unknown or chose not to report

49. What is the highest grade or year of school that you have completed?

__ Some high school
__ Completed high school or GED
__ Some college
__ College Degree
__ Some graduate work
__ Completed Master’s Degree
__ Completed Doctorate
__ Chose not to report

“That is the end of the survey. Thank you so much for your time and participation. Are there any final questions you have?”

“Would you like to be contacted later on in the summer about attending a training workshop about indoor pollutants?” Yes ________ No ________
APPENDIX E – GUIDEBOOK ON INDOOR POLLUTANTS

Protecting Children from Indoor Pollutants

a guide for child care providers.

healthier environment + healthier children = happier child care

mold, moisture, pet dander
combustion by-products, chemical irritants, paint chips, mold
poor ventilation, lead dust, rats, dust mites, secondhand smoke, carbon monoxide, nicotine
asthma triggers, paint chips, mold
lead poisoning, chemical irritants, nitrogen dioxide, cockroaches, secondhand smoke, asthma triggers, moisture, combustion by-products, RATS, mold, dust mites, cockroaches, lead poisoning, asthma triggers, MICE
combustion by-products, chemical irritants, paint chips, moisture, pet dander
lead dust, poor ventilation, CARBON MONOXIDE, mold, dust mites, cockroaches
lead poisoning, asthma triggers, MICE, secondhand smoke, nitrogen dioxide, rats, combustion by-products, chemical irritants, paint chips, MOISTURE, pet dander
lead dust, poor ventilation, dust mites, cockroaches, lead poisoning, asthma triggers, MICE, secondhand smoke, nitrogen dioxide, rats, combustion by-products, chemical irritants, paint chips, moisture, pet dander, poor ventilation, dust mites, cockroaches, MICE
choking
paint or poor IDE, moisture, pet dander
asthma triggers, rats, cockroaches, lead poisoning
lead dust, BON Mono, lead poisoning, smoke, nitrogen dioxide, chemicals, chemical irritants, moisture, pet dander
lead dust, poor ventilation, CARBON MONOXIDE, mold, dust mites, cockroaches, lead poisoning, asthma triggers, MICE

Cornell University
It is not always easy to tell if your home has indoor pollutant problems, so this guide was created to help.

The guide is broken down into four main sections: Introduction, Lead, Asthma Triggers, and Conclusion. Each section has the same layout:
- The main text is in the middle of the page.
- Pictures paired with the main points of the text are in a column down the side of the page.
- On some pages, more information can be found in the green space at the top of the page.

Example two page layout:

There is also a checklist that can be found at the back of this guide that is designed to help you find possible pollutant problems. We recommend that you read through the entire guide first, then use the checklist to help you investigate your home.
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- reducing exposure .............................................. page 6

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**Remember:**

Disclaimer: As each reader's circumstances vary, you, our reader, understand that this document is solely for informational purposes. The guidance offered in this document is based upon the most recent knowledge about lead and asthma triggers available as of May 2006. Users bear all risks associated with reliance on the identified practices for reducing exposure to indoor environmental pollutants and have sole responsibility for evaluating the information this guide contains. Neither Cornell University nor any of its employees nor contributors to this document makes any warranty, expressed or implied, or assumes any legal liability for any use of, or the results of, any information, product, or process discussed in this document.
The goal of this guide is to describe the sources of some common indoor pollutants, how they affect children's health, and how they can be controlled.

The idea is that if you get to know more about indoor pollutants and are able to see problems in your home, you will be able to reduce the risk of exposure by making some simple changes to the way you do things, like how you clean your home.

This guide will focus on how to reduce lead exposure and what to do to control asthma triggers, since these are two of the most important health issues for children.

The most common and the worst asthma triggers found inside the home are mold, dust mites, pests – cockroaches in particular, and secondhand smoke. This guide will also go over other indoor asthma triggers, including harmful gases called combustion by-products, chemical irritants, and pets.

Do not be worried if you are not sure what some of these things are, this guide will go over everything in detail.

So, why do you need to know this information?

Indoor pollutants can be serious health risks even though lots of people are unaware of these hazards. As we all know, children have growing bodies and tend to put lots of things in their mouths. Unfortunately, this means that young children are more likely to come into contact and be harmed by indoor pollutants than adults.

Also, it is simply good business to know how to best protect the children in your child care program, especially with parents' concerns about the safety of their children and increased awareness about these risks.

The good news is that exposure to indoor pollutants can be reduced or even prevented and relatively simple steps can be taken to make big differences in your home.

Because so much time is spent at home, any improvement you can make to the quality of the environment will make a large difference to you and the children in your child care program.
what causes indoor pollutants

First, let’s just go over some of the common things that cause indoor pollutants and start to get a feel for where they can be found in your home.

You could have lead-based paint that is chipping or peeling on either the inside or outside of your home. Or maybe the bedding in the sleeping area is full of dust mites. You might have a bathroom or a basement that gets wet or floods and could encourage mold growth. Or maybe you have cleaning products that contain chemical irritants that are not stored or used properly. Your kitchen might have high levels of harmful gases known as combustion by-products because your stove is not properly vented. Or you could have pests, such as cockroaches or mice, that you just cannot seem to get rid of. You might have a pet that spreads dander around the home. Or maybe smoking is allowed inside your home and creates secondhand smoke.

Some of these things you might not recognize at this point, but that’s OK. The rest of this guide will help explain them.
Before we get into the details of each indoor pollutant, there are some general things to keep in mind that might help you decide if there is a problem in your home.

With newer construction methods, buildings are being built tighter or with fewer cracks than ever before. A tightly constructed building means that very little air flows in or out of the building, which can be great for lowering heating bills, but if vents and fans are not used for ventilation, it can be quite a pickle because indoor pollutants get trapped inside.

Ventilation is the process of bringing fresh air inside and removing stale indoor air to the outside. Even if you have an older home and tight construction is not a problem, ventilation and getting rid of indoor pollutants is still important. This is because holes and cracks that allow air to leak between indoors and outdoors are not a reliable way to ventilate your home.

The best thing to do is to get your home as tight as possible by getting rid of holes and cracks and then making sure your home is properly ventilated to get rid of indoor pollutants. If you notice stale odors, or that there is a lack of air movement in your home, see mold or mildew growing anywhere, or think the inside air is very humid, this could be a sign of an indoor pollutant problem. It is also important to notice how you feel inside your home compared to outside. If you feel much healthier outside of your home, this could be a clue that something is not right inside your home.

Lead exposure and asthma are among the most important health issues facing children in the United States. With more pollutants in indoor air than outdoor air and people spending about 90% of their time indoors, we are facing a prickly situation.

About 1 out of every 13 children of school age has asthma, making asthma the most common chronic childhood disease.

The goal is not to scare you with this information, but rather to inform you of risks that may exist in your home and give you some ways to minimize these risks.

Managing indoor pollutants is like driving a car. We all know it is dangerous to drive, but this does not stop us from driving. However, we do as many things as we can to reduce risks, such as wearing seat belts or using car seats for children.
Lead is a highly poisonous metal that causes all kinds of health problems, particularly in young children if it is swallowed or breathed in. Babies and children up to 6 years old are most at risk because their bodies are growing rapidly and are more sensitive to pollutants. They are also at higher risk because they have more exposure due to hand-to-mouth activity and amount of time spent on the floor.

Exposure to even a small amount of lead can cause learning and behavioral problems in children and possibly damage their brains, kidneys, and other organs. High levels of lead in the blood is very dangerous and can result in coma or even death.

Usually, you cannot tell by looking at a child that they have been exposed to lead, so, a blood test done by a doctor is the only sure way to tell. This simple test to measure the lead level of the blood should be done at the 1st and 2nd year well-baby checkups.

Lead poisoning is one of the most common and preventable childhood health problems. By being aware of where lead exists in your home and learning how to reduce or avoid it, you can prevent the children in your child care program from being exposed to lead.

Before 1970 lead was used in making household paints and gasoline. Although U.S. manufacturers no longer use lead to make these things, there can still be lead in and around your home.

Old chipping or peeling lead-based paint and soil with lead in it that is tracked into the home on shoes and boots, are the most common sources of lead. Lead can be found in outdoor soil because lead use to be in gasoline, so years of car exhaust that contains lead has settled in the soil.

Paint chips that fall from painted surfaces in poor condition and soil that contains lead both get ground down into a fine dust and become a part of the regular dust in your home. This creation of lead dust is also common with painted surfaces that experience a lot of wear, such as windows and doors that are opened and closed.
health risks

Exposure to even a small amount of lead can cause learning & behavioral problems in children & possibly damage their brains, kidneys, & other organs. High levels of lead in the blood is very dangerous & can result in coma or even death.

Lead dust, like regular dust, can get anywhere and get on anything in your home. However, normal cleaning does NOT get rid of lead dust and can actually just spread it around. Because young children like to put everything in their mouths, they can end up accidentally eating lead dust if things are not cleaned properly.

Some of the less common sources of lead are from drinking water, lead soldered cans, pottery made outside the United States, and other imported items. In general, lead levels in drinking water are low, however, lead can get into water from pipes that have lead in them or have lead solder at the pipe joints.

Although most of the food cans in this country no longer contain lead, some imported canned products come in cans with lead soldering, which can contaminate the food within. You cannot tell if a can has lead solder just by looking, so if your grocery store is not sure, it is a good idea to buy these items less often.

Some of the glazes used for older or imported pottery can contain lead. Avoid using pottery you are not sure about to serve food or drink – especially acidic foods, such as tomatoes and fruit, because they can soak up the lead in the pottery glaze. Do not serve or store food in any pottery that has cracks in the glazing.

Other imported items, like mini blinds, candy, and toys, could also contain lead. Children’s toys are obviously a topic of great concern for you as a child care provider.

To be sure that your children are not being exposed to toys or other products that contain lead, you should talk to other child care providers and parents to share information and check with Consumer Product Safety Commission regularly for recall and safety information.

You can contact the Consumer Product Safety Commission by calling their hotline at 1-800-638-2772 or you can check their website (www.cpsc.gov) for updated information.
Here are some of the ways you can reduce the risk of lead exposure in your home.

First, it is important to know how old your home is. If it was built before 1978, assume it has paint with lead in it. The only way to know for sure is to have a risk assessment done by a licensed professional. A risk assessment tells you if there are any sources of lead in your home and what actions to take to deal with these problems. Lead-based paint in good condition is NOT a hazard. Keep in mind that there is only a danger when lead-based paint starts to peel or chip, because children can eat the paint chips or the paint chips can be ground into lead dust and breathed in.

Therefore, it is important to keep paint in good condition and repaint before chipping or peeling occurs. Areas that do have chipping or peeling lead-based paint must be fixed as soon as possible. Exposure to lead cannot be prevented if there is lead-based paint in poor condition in your home. Cleaning alone will not control this problem. You must eliminate the source of the problem in order to prevent exposure to lead.

If you have lead paint in poor condition, keep children away from those areas to avoid exposure. Use cardboard or contact paper to cover the area completely until repairs are made. Although we will not go into detail about construction in this guide, any renovation, demolition, or repair work done in a home with lead-based paint must be done with extreme care because it could cause a dangerous amount of lead dust to spread around the home.

You should never try to remove lead-based paint yourself because it is very dangerous. It is important to get a professional who has experience in safely removing lead paint if you need work done.

Eating a healthy diet, that includes foods high in calcium and iron, can actually help reduce the amount of lead that is absorbed by the body. Some foods that are high in calcium include dairy products, such as milk or yogurt. Some foods high in iron include cereals, such as Bran Flakes®, Total® or Life®.

In order to prevent swallowing lead, wash children’s hands frequently, especially before meals, after outdoor play, and before naptime.
The only way to know if your tap water has lead in it is to have it tested. Testing your water is easy and only costs about $25-$30. You can call your local health department to find out more about testing.

If tests do show lead in your drinking water, take steps to reduce exposure. Because it is easier for lead to get into hot water, always use cold water for drinking, cooking, and making baby formula. Never use hot water from your faucet for cooking or drinking.

You can also use a filter to remove the lead from your tap water, but make sure to use a filter that specifically says that it removes lead because not all brands do this. If this option is too expensive, you can also run the water for 1-2 minutes before using it. This method of flushing out the pipes is only necessary when the water has been sitting in the pipes for more than a hour and is particularly important when the water has been sitting for a long time, such as overnight.

Since any dirt from outside can have lead in it, it is best not to bring it into your home in the first place. You might try having everyone take off their shoes or boots at the door of your home to prevent tracking lead soil inside. Even when removing shoes at the door, use doormats and wash them monthly.

Another method for reducing lead exposure from soil is to cover any bare soil outside your home with grass, plants, gravel, wood chips or a thick layer of mulch. This will create a protective barrier over the soil and help reduce exposure to lead when children play outside.

Since lead dust can be on children's toys and children often put these toys in their mouths, it is important to wash toys at least once a week. Toys should be washed with a cleaning solution of detergent and water. After cleaning, it is a good idea to disinfect the toys with a bleach solution made by adding 1/4 cup of bleach to a gallon of water. We will talk more about safely cleaning with bleach in the "Chemical Irritants" section of this guide (page 22).
If you have lead in your home or you are not sure, there are several cleaning steps that you can take to reduce exposure to lead in your home.

You should never use cleaning methods like sweeping with a broom or using a feather duster to remove lead dust, because this will only cause the dust to be spread around. Wet cleaning methods work better because they dampen the dust and keep it from getting stirred up into the air and spread around.

You should wet mop your floors once a week using the "3 bucket system", a cleaning system recommended by the Department of Housing and Urban Development.

To use this method, you need a rag or mop, a spray bottle, and 3 buckets: 1 with a cleaning solution made of detergent (any product with the word "detergent" in the title or name works fine), and water, 1 with water only, and 1 that is empty.

1. Soak the sponge or mop in the detergent water.
2. Mist a small area of floor with detergent water in a spray bottle.
3. Scrub the misted area of floor with the soaked sponge or mop.
4. Squeeze the dirty water from the sponge or mop into the empty bucket. Rinse the sponge or mop in the rise bucket filled with water only, then squeeze it out in the empty bucket again.
5. Continue with this method until the entire floor is cleaned.
6. Rinse the entire floor area by repeating the above process using clean water rather than detergent water.

NOTE: The cleaning and rinsing water buckets should be replaced every room or every half hour, which ever comes first. All dirty water should be poured down the toilet, so it doesn't spread lead anywhere else in your home or outside. You can make a final pass over the cleaned floor with a HEPA filter vacuum to pick up any remaining dust.
Window sills, ledges and other surfaces where dust settles or collects should be wet dusted once a week using a cleaning solution in a spray bottle and disposable paper towels.

To use this method, you have one spray bottle filled with detergent water, one spray bottle filled with rinse water, and a roll of disposable paper towels.

1. Spray the surface with the cleaning solution, wipe, and throw the paper towel away.
2. Spray the surface with the rinse water, wipe again, and throw away the paper towel.

NOTE: Never dip a dirty paper towel into the cleaning solution and never use the same paper towel to clean another area. Dirty paper towels should be thrown away immediately in a trash bag, rather than in the regular trash in order to keep the lead from being spread around once the paper towel dries.

To reduce exposure to lead dust, you should vacuum with a HEPA filter at least once a week. “HEPA” (High Efficiency Particulate Air) vacuums have special filters that can trap fine lead dust, while regular vacuums allow this fine dust to escape through the exhaust and get blown back into the room.

HEPA vacuums are more expensive than traditional vacuums, so if this is not an option, you may be able to get HEPA filter bags to upgrade your regular vacuum. With any type of vacuum it is important to use a vacuum that has bags, rather than a bagless vacuum, because bags allow for cleaner disposal of the dirt and dust picked up. It is also important to vacuum very slowly in order to get all the dust on the surface you are cleaning, especially carpets.

We want to say again that using these methods to clean will help reduce exposure, but if there is a problem, for example chipping lead-based paint, it must be fixed in order to completely eliminate the source of lead dust.
OK, now that we have gone over lead, we are going to move on to talk about asthma triggers, which are the other main focus of this guide. But first, let's go over some general information about asthma.

Asthma is a lung disease that causes people to wheeze, cough, be short of breath, and sometimes even die.

Not much is known about what causes people to get asthma, however, a lot is known about what causes people who have asthma to have an asthma attack.

Asthma attacks are episodes when breathing is very difficult and the person having the attack can feel like a fish out of water. If you want to experience what it feels like to have an asthma attack, run in place for a few minutes, then stop, and try to breathe through a straw for air.

Asthma triggers are things that make breathing problems worse for people with asthma and might cause a person with asthma to have an asthma attack.

There are lots of different asthma triggers, however, some of the strongest triggers are found in the home. These include mold, dust mites, pests - cockroaches in particular, and tobacco smoke. Other asthma triggers that are not as strong, but still important, include combustion by-products, chemical irritants, and pets.

Many of the triggers found in the home can be greatly reduced by simple repairs and changes in some habits.

Reducing the triggers that are inside your home will help a child with asthma better deal with the triggers found outside that are more difficult to avoid, such as pollen and smog.
Mold is a fungus that makes tiny, invisible spores. Mold spores are like little seeds that float in the air and hope to land on something that is wet enough for them to start growing. When mold forms, it looks like a dark or stained fuzzy area and may have a musty odor.

Many people are allergic to mold and it can cause asthma attacks for people who have asthma. When mold grows, it puts irritating and sometimes poisonous things into the air, so being near mold often makes people feel sick. Even people who don’t have mold allergies can get irritation of the eyes, skin, nose, throat or lungs. For those who do have asthma, being around mold can trigger an asthma attack.

Mold spores are always in the air, but in order for them to become a mold growth, the spores need moisture.

Moisture can come from lots of places, including cracks in your foundation, roof or plumbing leaks, poor ventilation, and flooding.

Vents that do not lead to outside the home can result in mold growth because excess moisture is trapped inside and can create humid or damp environments in your home.

Too much moisture in your home creates a good place for mold to grow. If you notice fogging on the inside of your windows or water droplets forming on your walls, this is a sign that your home has too much moisture.

Carpet or rugs used in moist places like bathrooms, kitchens or basements that get wet often and cannot be washed frequently in a washing machine are an easy place for mold to grow.

Since mold grows in moist or damp places, indoor humidity levels above 50% can promote mold growth in your home. Even if the humidity level in your home is below 50%, a leak in your plumbing or roof could cause mold to grow and should be repaired. We will talk about how you can measure the humidity level inside your home in a moment.
Although the air is never free of mold, you can prevent growth by keeping your home clean and dry. In order to control the amount of moisture in your home, there are a few methods to keep in mind.

One is ventilation – make sure your home is well ventilated, so excess moisture is let out by exhaust fans and vents. You should make sure that you have vents or exhaust fans that are connected to the outside in places where a lot of heat or moisture builds up. It is very important to vent your kitchen stove, clothes dryer, and any bathrooms in your home, since these are places where heat and moisture are often present.

You should keep indoor humidity between 30-50% in your home. The amount of moisture or humidity in the air can be measured with a hygrometer. A digital hygrometer can be bought for about $20 at most hardware stores and it can tell you the indoor temperature and what the humidity level inside your home is. If the humidity level is above 50%, you can use a dehumidifier to take moisture out of the air.

Fixing the source of a moisture problem is the key to controlling mold. Throw out boxes, newspapers, or anything that has mold growing on it and cannot be cleaned. All water problems should be fixed right away to prevent mold growth.

If you have mold growing in your home, you can clean small areas of mold yourself, but this should be done carefully and only if the moldy area is under 10 square feet.

Mold can be removed from hard, cleanable surfaces by taking the following steps:

1. If you have a HEPA filter vacuum, slowly vacuum the area to remove as much mold as possible.
2. Clean the area with a bleach solution made by mixing one cup of bleach with a gallon of water. This amount of bleach should only be used when cleaning mold and not for regular cleaning (see “Chemical Hazards” on page 22 to learn more about bleach).
3. Once you have cleaned the area, make sure the surface stays clean and dry to stop mold from growing there again.

If you have a mold problem that you are unable to deal with on your own, you should call a professional for help or call your local health department to get more information.
**Dust Mites**

**Definition**
Dust mites are tiny bugs you cannot see that eat the skin flakes we shed.

**Health Risks**
Exposure may trigger an asthma attack. Exposure can cause asthma in children.

**Common Sources**
- Bedding
- Stuffed toys
- Upholstered furniture
- Carpets
- Dust in your home
- Indoor humidity above 50%

Our bodies shed thousands of tiny flakes of skin every day. These flakes of skin are invisible to us, but they collect on bedding, mattresses, pillows, stuffed furniture, curtains, and carpets.

Dust mites are tiny bugs you cannot see that eat the skin flakes we shed.

Dust mites are a normal part of life and every house has them. The problem is that many people are allergic to dust mites and they can be a strong asthma trigger for people with asthma.

Dust mites like to live in bedding (including sheets, blankets, mattresses, and pillows), stuffed toys, upholstered furniture, and carpets. They also collect in the general dust in your home.

Dust mites like to be in moist places, so if the indoor humidity in your home is above 50%, this could help dust mites live and multiply.
Although dust mites are in every home, here are ways you can reduce exposure to dust mites.

Wash all bedding and blankets in hot water once a week. It is best to use water that is 130 degrees Fahrenheit, but if this is not possible, you should dry bedding in a very hot dryer.

You should also enclose bed mattresses, box springs, and pillows in dust mite proof covers to keep dust mites from living there. Make sure that the covers you choose say specifically that they are for dust mites, since not all are.

Hardwood flooring or other smooth surfaces are generally easier to keep clean because dust mites cannot hide on smooth surfaces. It is harder to keep carpet and upholstered furniture free of dust mites.

If possible, it is best to clean your home with a special “HEPA” filter vacuum twice a week. It traps small things, like dust mites, that other vacuum filters allow to blow through. They also reduce the amount of allergen dust that gets back into the air through the exhaust while vacuuming. Again, you may be able to get HEPA filter bags to upgrade your regular vacuum.

NOTE: Vacuuming should not occur when children are in the room, especially children with asthma. This is due to the fact that the cleaning could stir up dust and trigger an attack.

Because dust mites like to live where it is moist, it is a good idea to monitor the humidity level in your home. As mentioned before, you can do this with a hygrometer and the indoor humidity should be kept between 30-50%. If the humidity is above 50%, you can use a dehumidifier or air conditioner to reduce the humidity in the air.

Stuffed toys should be washed in hot water once a month to kill dust mites.

Area rugs should also be washed once a month in hot water to kill dust mites.
Pests

Definition
Pests include cockroaches, rats, and mice that can be found indoors.

Health Risks
Droppings, saliva, and body parts can trigger asthma. Pesticides used to prevent pests can harm people too.

Common Sources

- Food crumbs
- Spills
- Dirty dishes left out
- Garbage not taken out often enough
- Moisture problems
- Clutter

Lots of homes have problems with pests such as cockroaches, rats, and mice.

Most people are unaware, however, that the droppings and saliva of rats and mice can be triggers for people with asthma. And, cockroaches are not just yucky, they are one of the worst asthma triggers in the home.

"Cockroach dust" is made out of roach droppings and body parts, and is a very strong asthma trigger.

It is also important to know that some of the methods to get rid of pests, such as bug sprays, foggers or bombs, can be harmful to people as well, so care must be taken when dealing with pests in your home.

Pests can become a problem in the home if food, water, and shelter is provided for them there.

Food crumbs, spills, and dirty dishes left out all attract pests because they provide food. Garbage that is not taken out often enough or tightly sealed is also food and can attract pests into your home.

Since pests also need water to survive, any moisture problems, such as water leaks or excess humidity, can be an attraction for them.

Clutter around the home, such as piles of magazines, newspapers, or boxes provide shelter and can serve as a hiding place for pests, making it difficult to get rid of them.
Integrated Pest Management (IPM) is a safe and effective way to get rid of cockroaches, rats, and mice.

Integrated Pest Management, which is just a fancy way of saying to use a variety of methods to control pests, uses baits and simple corrections to problems in your home to get rid of pests. It does not use bug sprays, fumigations or bombs because these methods have chemicals in them that are poisonous, so when they are sprayed in the air, they may be harmful to people.

The best way to kill cockroaches is to use bait stations. Bait stations have roach poison mixed with roach food in them, so it does not kill the roach until after it gets back to its nest, where it can poison other roaches too.

NOTE: A bait station may be toxic if placed in children’s mouths, so be very careful about where you put bait stations and make sure they are out of children’s reach.

To kill rats and mice, use traps with food, like peanut butter, as bait.

In addition to placing bait stations or traps around your home, it also important to not give pests food, water, and shelter.

Remove all food sources by cleaning up food crumbs or spills and washing dirty dishes right away (or putting them in soapy water in the sink). Make sure food is stored in airtight containers and that pet food is not left out. Trash should be taken out daily and kept in a container with a tight fitting lid.

Remove all sources of water for pests by fixing any moisture problems in the home, such as plumbing leaks or excess humidity.

Since cockroaches like to live and hide in clutter, you should get rid of clutter created by boxes, bags, and paper.
Secondhand smoke is exhaled smoke from smokers and side stream smoke from the burning end of a cigarette, pipe, or cigar.

Tobacco smoke is a serious breathing irritant and a strong asthma trigger.

We all know that tobacco smoke is bad for you. Secondhand smoke can cause ear infections, breathing problems, and lung cancer even in healthy nonsmokers.

Children without asthma that are exposed to tobacco smoke are at risk for developing asthma. For adults and children that already have asthma, exposure to tobacco smoke increases the number and severity of asthma attacks.

Asthma can be triggered by the smoke from the burning end of a cigarette, pipe, or cigar as well as the smoke breathed out by a smoker.

Smoking inside your home or around children is ultimately very dangerous for the children.
The best thing to do is to declare your home a smoke-free zone, this includes all people living in or visiting the home.

If someone would like to smoke, require that they smoke outside and do not smoke around children. Smoking in another part of the home is not enough to protect children or prevent exposure because toxic chemicals will spread to other areas of the home through the air.

Even when smoking is done outside, care must be taken to prevent exposure.

For example, do not smoke near windows or doors when smoking outside, because smoke might blow inside.

Other things that can be done include wearing a smoking jacket when smoking outside that can be taken off once inside and washed frequently and always washing your hands after smoking.
Now we are going to discuss a few other asthma triggers that could be in your home, but are not documented to be as strong triggers as mold, dust mites, cockroaches, and tobacco smoke.

First, we will go over harmful gases, known as combustion by-products.

Combustion by-products, including the odorless gases nitrogen dioxide and carbon monoxide, come from the use of any appliance that has a flame and burns gas, wood, or kerosene.

Sources of combustion by-products include unvented or poorly vented gas stoves, closed or blocked chimney flues, unvented non-electric space heaters, or wood stoves that are not properly vented or that have a loose door. All of these situations allow combustion by-products to build up inside your home, which can be a hazard.

Gas, wood, and kerosene produce gases, smoke, and soot when they burn, which can be triggers for asthma. Exposure to nitrogen dioxide can cause irritation of the eyes, nose, and throat; shortness of breath; and could even lead to lung disease, such as emphysema.

Fuel burning appliances that do not work properly can produce carbon monoxide, which is a deadly gas. Exposure to carbon monoxide can cause fatigue, dizziness, disorientation, and possibly death.
The most important thing is that combustion appliances need to be vented to the outside. Combustion appliances include clothes dryers, kitchen stoves, boilers, furnaces, hot water heaters, fireplaces, and wood stoves.

Do not use non-electric space heaters inside your home unless they are vented to the outside. If you have a gas stove, you should always turn on the stove hood or exhaust fan that vents to outside when you are cooking or baking. Do not use kitchen stoves for heating your home because this can result in high levels of harmful gases.

If you have a fireplace and are going to make a fire, be sure that the chimney flue is open and clear, so smoke can escape up through the chimney. If you have a wood stove, make sure it is vented to the outside and that the door fits correctly and is not loose.

One of the simplest ways to prevent exposure to carbon monoxide is to install a carbon monoxide detector. It works like a smoke detector and sets off an alarm if it detects dangerous levels of carbon monoxide in the air.

Carbon monoxide detectors should be placed on each floor of your home. If the detector is battery powered, be sure to replace the batteries every 6 months.

It is also important to follow maintenance procedures. You should have your heating system checked once a year by a qualified technician to make sure it is working properly. This is because combustion appliances that are in good repair are less likely to leak harmful gases into your home. You should also have your chimney checked once a year to make sure openings are kept clear.
Chemical Irritants

**Definition**
Chemical irritants can be found in products including cleaners, paints, adhesives, cosmetics, and air fresheners.

**Health Risks**
Exposure to chemical irritants can lead to headaches, dizziness, & loss of memory. It could also result in eye, nose, & throat irritation. There is also a possibility of increased risk of cancer with long term exposure.

Chemical irritants can be found in many products such as cleaners, paints, adhesives, cosmetics, and air fresheners.

Some ways exposure to chemical irritants can occur include not following the directions on a product, mixing different cleaning products together, poor ventilation when using a product, or using aerosol products indoors. These activities can lead to hazardous levels of chemicals in the air and can be very dangerous.

Exposure to chemical irritants can lead to headaches, dizziness, and loss of memory. It could also result in eye, nose, and throat irritation. There is also a possibility of increased risk of cancer with long term exposure.

In order to prevent hazardous exposure, there are a few steps you can take.

Always read the directions before using a product and make sure you follow the directions carefully. When using any product that is a chemical irritant, make sure you have proper ventilation, like opening a window, so fumes are allowed to escape.

Things to remember when you are using bleach:

1. Before sanitizing with a bleach solution, clean any visible soil from the surface with a detergent water and rinse well with water.
2. You should open a window and use a fan to keep the air moving.
3. Only use about 1/4 of a cup of household bleach in a gallon of water (1 tablespoon to 1 quart of water).
4. Two minutes of contact is recommended (you can either let the solution air dry or wait 2 minutes before wiping the surface dry)

**Note:** Never mix chlorine bleach with anything other than water because dangerous vapors can be produced. Always wear gloves. You should mix a fresh bleach solution every day for maximum effectiveness. Also, some people are sensitive to bleach fumes, so do not use bleach when other people, especially children, are in the room.

After you are finished using any chemical product, make sure that you reseal containers tightly and keep them out of children's reach. A locked cabinet is a good idea for safe storage.
Pets include any warm-blooded animals, such as dogs, cats, and rodents.

Pets are one of the most commonly known asthma triggers. However, recent data is not very clear about how much cleaning is needed to keep them from being asthma triggers.

For this reason, we are just going to mention a couple things you should keep in mind if you do have a pet in your home.

Animal dander is tiny, dead skin flakes shed from animals. The dander, urine, feces, saliva, or hair from pets can be a trigger for people with asthma.

In order to reduce exposure, we have two main recommendations.

The first is to keep pets out of sleeping areas, or the places where the children in your child care program sleep and take naps, so these places don't get contaminated with dander and pet hair.

The second recommendation is to vacuum two or more times a week with a HEPA filter vacuum if possible. Because the HEPA filter is able to trap very small things, like pet dander, it will help reduce the amount of pet allergens in your home.
Now that we have gone over some of the common indoor pollutants, let’s talk about some tips for finding problems that may exist in your home.

First, take a tour of your home. Slowly walk through each room and look for signs of the indoor pollutants we have talked about today. Keep a close look for water leaks, chipping paint, mold growth, cockroaches, dust build-up, or any of the “common sources” in this guide. We have created a checklist that can be found at the back of this guide for you to use while you take a tour of your home, so you don’t forget any ‘common sources’ to look for.

Next, investigate some of the possible problems.

For example, it is a good idea to talk with the parents of the children in your child care program. Let them know how important it is for them to have their children’s blood lead level tested when they are young. Blood tests are required for children ages 1 and 2 or if there is a chance any child has been exposed to lead.

Also, if your home was built before 1978 or you think there could be lead-based paint, have a risk assessment done so you can know for sure. Have a trained professional check your home rather than using a do-it-yourself kit. Professionals use a portable x-ray fluorescent machine, so the assessment will cause no damage.

You could also get a hygrometer, like we mentioned before, and measure the indoor humidity level to see if it is in the recommended range of 30-50%.

It is also important to become aware of how you and your children feel inside the home compared to outside. If symptoms of irritation or asthma attacks decrease when you are outside the home, this could be a clue that there is a problem inside.
Usually, the best strategy for dealing with a problem is source control. This means to completely eliminate the individual pollutant or pollutants that are causing the problem.

Increasing air flow into the space by opening windows or doors will also help lower the amount of pollutants in the air, but if the problems are not eliminated, then fresh air is only a short-term fix rather than a long-term solution.

For example, if you have mold growing inside, opening a window will allow some of pollutants in the air to escape, but the only way to solve the problem is to get rid of the mold.

Try to follow the “reducing exposure” suggestions made in this guide if you find a problem in your home.

However, if you find a problem that you are unable to deal with on your own using the “reducing exposure” suggestions, it is important to get the help of an expert. Your local health department or cooperative extension office are good resources getting professional help.

Indoor pollutant problems are serious concerns and should not be ignored.

It is also important to remember that professionals who use lead-safe work practices should always be involved if you are planning on doing any construction or renovation work in a home that might have lead paint in it.
Before we come to the end of this guide, we just want to review some of the key actions to take to prevent exposure to indoor pollutants.

First, make your home smoke free by declaring your home a smoke free zone and requiring that smokers smoke outside and away from children.

Also, keep moisture and indoor humidity under control. Too much moisture in a home can increase mold, dust mites, and cockroaches, since they need moisture to live.

Stop lead dust from being brought into your home by using door mats and asking everyone to take off shoes or boots at the door.

Vacuuming twice a week with a HEPA filter vacuum can greatly reduce the amount of allergens, such as lead dust, mold spores, dust mites, and pet dander.

Wet mop and wet dust once a week to reduce exposure to lead dust. When dusting or mopping, always be sure to use a wet mop, paper towel, or cloth so that allergens are not stirred up into the air. While wet mopping and dusting do not to dip the towel or rag you are using back into the cleaning water because this will contaminate the water and only spread allergens or lead dust around. It is best to use the 3 bucket system that we talked about earlier in this guide.

NOTE: It is important to keep in mind that cleaning such as vacuuming and wet mopping or dusting should not occur when children are in the room, especially children with asthma. This is due to the fact that the cleaning could stir up dust and trigger an asthma attack.

Since toys can have dust mites or lead dust, it is important to wash and disinfect hard surface toys once a week and wash stuffed toys monthly.
The information in this presentation has been gathered from many different sources including the Environmental Protection Agency (EPA), Department of Housing and Urban Development (HUD), National Safety Council (NSC), and the National Center for Healthy Housing (NCHH).

U.S. Environmental Protection Agency (EPA):
- Indoor Environmental Asthma Triggers
- Tools for Schools
- IAQ Tools for School Managing Asthma in the School Environment
- Indoor Air Quality-Mold
- "The Inside Story: A Guide to Indoor Air Quality"
- No Attacks: Preventing Attacks, Triggers in Your Home
- A Brief Guide to Mold, Moisture and Your Home
- Lead in Paint, Dust, and Soil
- Protect your Family from Lead In Your Home

U.S. Department of Housing and Urban Development (HUD)
- Lead Paint Safety: A Field Guide for Painting, Home Maintenance, and Renovation Work
- Controlling and Preventing Household Mold and Moisture Problems

National Safety Council
- IAQ Fact Sheets

National Center for Healthy Housing (NCHH)
- Home-Based Child Care Lead Safety Project
- National Healthy Homes Training Center
- Creating a Healthy Home: A Field Guide for Cleanup of Flooded Homes
- Healthy Homes Maintenance Checklist

*Caring For Our Children* National Health and Safety Performance Standards:
Guidelines for Out-of-Home Child Care Programs Second Edition

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Thank You!

It is nearly impossible to remember everything in this guide after one read, so keep it handy and look things up when you need to.

Congratulations on being the kind of child care provider that is willing to take the time to learn about providing healthier child care.

Remember: Eliminating or reducing indoor pollutants can be done at low-cost and will benefit you and the children you care for.
This checklist has been created to help you find any pollutant problems you might have in your home.

Checklist

Go through each of the items on the list and check the ones you see signs of in your home.

After you have gone through your entire home, take steps to fix the source of the pollutant problem by following the suggestions made in this guide. The page numbers where this information can be found are listed next to each pollutant checklist.
<table>
<thead>
<tr>
<th>Lead</th>
<th>Mold</th>
</tr>
</thead>
<tbody>
<tr>
<td>If you check any of the boxes below, see pages 4-9</td>
<td>If you check any of the boxes below, see pages 12-13</td>
</tr>
<tr>
<td>□ Was your home built before 1978?</td>
<td>□ Do you see mold growing anywhere (walls, carpet, around windows, under sinks, in shower)?</td>
</tr>
<tr>
<td>□ Do you see any peeling paint?</td>
<td>□ Are there any cracks in your foundation?</td>
</tr>
<tr>
<td>□ Do you see any soil outside or is soil tracked into your home on shoes?</td>
<td>□ Do you have roof or plumbing leaks?</td>
</tr>
<tr>
<td>□ Do you see any dust build-up?</td>
<td>□ Are there any unvented bathrooms, dryers, or stoves? Do any existing vents not lead to outside the home?</td>
</tr>
<tr>
<td>□ Do you have drinking water that has never been tested for lead?</td>
<td>□ Are there signs of too much moisture (fog on windows or water droplets on your walls)?</td>
</tr>
<tr>
<td>□ Do you buy imported canned products that might have lead soldering?</td>
<td>□ Is there carpet in your bathrooms, kitchen, or basement?</td>
</tr>
<tr>
<td>□ Do you use older or imported pottery to serve or store food?</td>
<td>□ Is indoor humidity above 50%?</td>
</tr>
</tbody>
</table>
### Dust Mites
If you check any of the boxes below, see pages 14-15

- [ ] Is there bedding that is not washed once a week in hot water?
- [ ] Are there stuffed toys that are not washed?
- [ ] Is there upholstered furniture that is not vacuumed with a HEPA filter?
- [ ] Are there carpets that cannot be washed or are not vacuumed with a HEPA filter?
- [ ] Do you see any dust build-up?
- [ ] Is your indoor humidity above 50%?

### Pests
If you check any of the boxes below, see pages 16-17

- [ ] Do you see any cockroaches, mice, rats, or signs of their presence (droppings)?
- [ ] Do you see any food crumbs?
- [ ] Are spills not cleaned up immediately?
- [ ] Are there dirty dishes left out?
- [ ] Is the garbage not taken out daily?
- [ ] Do you have moisture problems (leaks, standing water, excess humidity)?
- [ ] Is there clutter (piles of magazines, newspapers, or boxes)?
Secondhand Smoke
If you check any of the boxes below, see pages 18-19

- Does anyone smoke inside your home?
- Does anyone smoke around the children?

Chemical Irritants
If you check any of the boxes below, see page 22

- Do you ever not follow the directions on a product?
- Do you ever mix cleaning products together?

Combustion By-Products
If you check any of the boxes below, see pages 20-21

- Do you have a gas stove that is not vented to the outside?
- Do you have a fireplace with a closed or blocked chimney flue?
- Do you use unvented non-electric space heaters?
- Do you have a wood stove that is not vented to the outside or that has a loose door?

Pets
If you check any of the boxes below, see page 23

- Do you have any pets?
 Protecting Children from Indoor Pollutants

A guide for child care providers.

Overview

**goal:** Describe the sources of common indoor pollutants, how they affect children's health, and how they can be controlled.

**main focus:**

1. Lead Exposure
2. Asthma Triggers: mold, dust mites, pests, secondhand smoke, combustion by-products, chemical irritants, pets
Justification

why you need to know this information:

- Indoor pollutants pose serious health risks.
- Young children are at higher risk than adults.
- Families want their children in a safe environment.
- Exposure can be reduced or prevented.

Introduction

what causes indoor pollutants:
Introduction

**signs of problems:**
- Poor ventilation.
- Stale or stuffy air.
- Odors.
- Lack of air movement.
- Presence of mold and mildew.
- Excessive humidity.
- Feeling healthier outside the building.

Introduction

**facts about risk:**
- There are more pollutants in indoor air than outdoor air.
- People spend about 90% of their time indoors.
- About 1 out of every 13 children of school age has asthma.
**Lead**

**definition:** Lead is a highly poisonous metal that causes all kinds of health problems, particularly in young children, if it is swallowed or breathed in.

**health risks:**
- Learning and behavioral problems.
- Possibly damage brain, kidneys, and other organs.
- High levels can result in coma or even death.

**common sources:**
- chipping or peeling lead-based paint
- outdoor soil
- dust in your home

**other sources:**
- drinking water
- cans with lead soldering
- older or imported pottery and other imported items
Reducing exposure:

- Know how old your home is
- Keep paint in good condition
- Eat foods high in calcium and iron
- Wash hands before meals, after outdoor play, and before naptime
- Always use cold water for drinking, cooking, and making formula
- Filter water or run water for 1-2 mins before using

- Take off shoes or boots at the door
- Cover any bare soil
- Wash toys once a week
- Wet mop your floors once a week using the “3 bucket system”
- Clean window sills and ledges once a week
- Vacuum with a HEPA filter at least once a week
Asthma Triggers

**definition:** A lung disease that causes people to wheeze, cough, be short of breath, and sometimes even die.

“Asthma Attacks” are episodes when breathing is difficult.

---

Asthma Triggers

**indoor sources:**
- mold
- dust mites
- pests
- secondhand smoke
- combustion by-products
- chemical irritants
- pets

You can reduce triggers that cause asthma attacks.
**Mold**

**definition:** Mold is a fungus that makes tiny, invisible spore. Mold spores are like little seeds that float in the air and hope to land on something that is wet enough for them to start growing.

**Mold**

**health risks:**

- Being near mold can make people feel sick because it can put irritating and sometimes poisonous things in the air.

- Can irritate the eyes, skin, nose, throat or lungs.

- Could trigger an asthma attack in people with asthma.
Mold

**common sources:**
- cracks in foundation
- roof and plumbing leaks
- vents that do not lead to outside the home
- too much moisture
- carpets in bathrooms, kitchens, and basements
- indoor humidity above 50%

**Reducing exposure:**
- make sure home is well ventilated
- keep indoor humidity between 30-50%
- use a dehumidifier
- water problems should be fixed right away
- clean small areas of mold yourself
- call a professional or local health department
**Dust Mites**

**definition:** Dust mites are tiny bugs you cannot see that eat the skin flakes we shed.

**health risks:**
- Exposure may trigger an asthma attack.
- Exposure can cause asthma in children.

**common sources:**
- bedding
- stuffed toys
- upholstered furniture
- carpets
- dust in your home
- indoor humidity above 50%
**Dust Mites**

Reducing exposure:
- Wash bedding once a week in hot water
- Dust mite proof covers for pillows and mattresses
- HEPA filter vacuum twice a week
- Keep indoor humidity between 30-50%
- Wash stuffed toys once a month
- Wash area rugs once a month

**Pests**

Definition: Pests include cockroaches, rats, and mice that can be found indoors.

Health risks:
- Droppings, saliva, and body parts can trigger asthma.
- Pesticides used to prevent pests can harm people too.
Pests

common sources:
- food crumbs
- spills
- dirty dishes left out
- garbage not take out often enough
- moisture problems
- clutter

reducing exposure:
- use bait stations and traps
- clean food crumbs, spills, and dirty dishes right away
- food stored in airtight containers
- take garbage out daily
- fix moisture problems
- get rid of clutter
Secondhand Smoke

definition:
Secondhand smoke is exhaled smoke from smokers and side stream smoke from the burning end of a cigarette, cigar, or pipe.

health risks:
- Can cause ear infections, breathing problems, and lung cancer even in nonsmokers.
- May increase risk of developing asthma.
- Increases number and severity of asthma attacks in people with asthma.

Secondhand Smoke

common sources:
cigarettes, pipes, cigars

smoking inside your home, smoking around children
Secondhand Smoke

Reducing exposure:
- No smoking inside your home
- Do not smoke around children
- Do not smoke near windows or doors when smoking outside
- Wear a smoking jacket when smoking outside
- Always wash hands after smoking

Combustion By-Products

Definition:
Combustion by-products, including the odorless gasses nitrogen dioxide and carbon monoxide, come from the use of any appliance that had a flame and burns gas, wood, or kerosene.

Common sources:
- Unvented gas stoves
- Closed or blocked chimney flues
- Unvented non-electric space heaters
- Wood stoves that are not properly vented or that have a loose door
Combustion By-Products

**health risks:**

* Nitrogen Dioxide
  - Irritation of the eyes, nose, and throat.
  - Shortness of breath.
  - Could lead to lung disease, such as emphysema.

* Carbon Monoxide
  - Fatigue.
  - Dizziness.
  - Disorientation.
  - Death.

Combustion By-Products

**reducing exposure:**

- Combustion appliances need to be vented to the outside
- Always turn on the stove hood or exhaust fan
- Be sure the chimney flue is open and clear
- Install carbon monoxide detectors
- Follow maintenance procedures
**Chemical Irritants**

**Definition:**
Chemical irritants can be found in many products such as cleaners, paints, adhesives, cosmetics, and air fresheners.

**Common Sources:**
- Not following directions
- Mixing cleaning products
- Poor ventilation
- Using aerosol products indoors

**Chemical Irritants**

**Health Risks:**
- Headaches, dizziness, and loss of memory.
- Eye, nose, and throat irritation.
- Possible increased risk of cancer with long term exposure.

**Common Sources:**
- Follow directions
- Open a window
- Reseal containers tightly
- Keep out of children’s reach
Pets

**definition:** Pets include any warm-blooded animals, such as dogs and cats.

**health risks:** The dander, urine, faces, saliva, or hair from pets can be a trigger for people with asthma.

**reducing exposure:**
- keep pets out of sleeping areas
- vacuum two or more times a week with a HEPA filter

---

**Conclusion**

**tips for finding problems:**

1. **Take a tour of your home.**
   - Look for potential sources of indoor pollutants.

2. **Investigate the details.**
   - Tell parents about testing blood lead levels.
   - Have a lead assessment done.
   - Measure indoor humidity.

3. **Look for symptoms.**
   - Do asthma symptoms decrease upon leaving the facility?
Conclusion

what to do if you suspect a problem:

Basic strategies:

• Source control
• Get the help of an expert

Key Actions

key actions to take:

1. Make your home smoke free.

2. Keep moisture and indoor humidity under control.

3. Take off shoes or boots at the door.
Key Actions

4. Vacuum twice a week with a HEPA filter vacuum.

5. Wet mop and wet dust once a week.

6. Wash and disinfect hard toys once a week and wash stuffed toys once a month in hot water.

References

U.S. Environmental Protection Agency (EPA):
- Indoor Environmental Asthma Triggers
- Tools for Schools
- IAQ Tools for School Managing Asthma in the School Environment
- Indoor Air Quality: Mold
- "The Inside Story: A Guide to Indoor Air Quality"
- No Attacks: Preventing Attacks, Triggers in Your Home
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- Healthy Homes Maintenance Checklist

"Caring For Our Children" National Health and Safety Performance Standards:
Guidelines for Out-of-Home Child Care Programs Second Edition
Thank You!

Congratulations on being the kind of child care provider that is willing to take the time to learn about providing healthier child care!

Remember: Eliminating or reducing indoor pollutants can be done at a low-cost and will benefit you and the children you care for...
Hello, my name is _______ and I would like to welcome you and thank you all for taking the time to be here. Today, we are going to be talking about indoor pollutants.

This training program is being sponsored in part by Cornell Cooperative Extension in Monroe County and the Department of Design and Environmental Analysis at Cornell University.

The goal of this training session is to describe the sources of some common indoor pollutants, how they affect children’s health, and how they can be controlled.

The idea is that if you get to know more about indoor pollutants and are able to see problems in your home, you will be able to reduce the risk of exposure by making some simple changes to the way you do things, like how you clean your home.

Today, we will focus on how to reduce lead exposure and what to do to control asthma triggers, since these are two of the most important health issues for children.

The most common and the worst asthma triggers found inside the home are mold, dust mites, pets – cockroaches in particular, and secondhand smoke. We will also go over other indoor asthma triggers, including harmful gases called combustion byproducts, chemical irritants, and pets.

Do not be worried if you are not sure what some of these things are, we will be going over everything in detail and there will be lots of time for questions.
So, why do you need to know this information?

Indoor pollutants can be serious health risks even though lots of people are unaware of these hazards. As we all know, children have growing bodies and tend to put lots of things in their mouths. Unfortunately, this means that young children are more likely to come into contact and be harmed by indoor pollutants than adults.

Also, it is simply good business to know how to best protect the children in your child care program, especially with parents’ concerns about the safety of their children and increased awareness about these risks.

The good news is that exposure to indoor pollutants can be reduced or even prevented and relatively simple steps can be taken to make big differences in your home.

Because so much time is spent at home, any improvement you can make to the quality of the environment will make a large difference to you and the children in your child care program.

First, let’s just go over some of the common things that cause indoor pollutants and start to get a feel for where they can be found in your home.

You could have lead-based paint that is chipping or peeling on either the inside or outside of your home. Or maybe the bedding in the sleeping area is full of dust mites. You might have a bathroom or a basement that gets wet or flooded and could encourage mold growth. Or maybe you have cleaning products that contain chemicals known to be harmful. For example, the stove in your kitchen might have high levels of harmful gases known as combustion byproducts because your stove is not properly vented. Or you could have pests, such as cockroaches or mice, that you just cannot seem to get rid of. You might have a pet that spreads dander around the home. Or maybe smoking is allowed inside your home and creates secondhand smoke.

Some of these things you might not recognize at this point, but that’s OK. The rest of this training session will help explain them.
Before we get into the details of each indoor pollutant, there are some general things to keep in mind that might help you decide if there is a problem in your home.

With newer construction methods, buildings are being built tighter or with fewer cracks than ever before. A tightly constructed building means that very little air flows in or out of the building, which can be great for lowering heating bills, but if vents and fans are not used for ventilation, it can be quite a pickle because indoor pollutants get trapped inside.

Ventilation is the process of bringing fresh air inside and removing stale indoor air to the outside. Even if you have an older home and tight construction is not a problem, ventilation and getting rid of indoor pollutants is still important. This is because holes and cracks that allow air to leak between indoors and outdoors are not a reliable way to ventilate your home.

The best thing to do is to get your home as tight as possible by getting rid of holes and cracks and then making sure your home is properly ventilated to get rid of indoor pollutants. If you notice stale odors, or that there is a lack of air movement in your home, see moist or mildew growing anywhere, or think the inside air is very humid, this could be a sign of an indoor pollutant problem. It is also important to notice how you feel inside your home compared to outside. If you feel much healthier outside of your home, this could be a clue that something is not right inside your home.

Lead exposure and asthma are among the most important health issues facing children in the United States. With more pollutants in indoor air than outdoor air and people spending about 90% of their time indoors, we are facing a tricky situation.

About 1 out of every 13 children of school age has asthma, making asthma the most common chronic childhood disease.

The goal is not to scare you with this information, but rather to inform you of risks that may exist in your home and give you some ways to minimize these risks.

Managing indoor pollutants is like driving a car. We all know it is dangerous to drive, but this does not stop us from driving. However, we do as many things as we can to reduce risks, such as wearing seat belts or using car seats for children.
The first indoor pollutant we are going to talk about is lead.

Lead is a highly poisonous metal that causes all sorts of health problems, particularly in young children if it is swallowed or breathed. Babies and children up to 6 years old are most at risk because their bodies are growing rapidly and are more sensitive to pollutants. They are also at higher risk because they have more exposure due to hand-to-mouth activity and amount of time spent on the floor.

Exposure to even a small amount of lead can cause learning and behavioral problems in children and possibly damage their brains, kidneys, and other organs. High levels of lead in the blood are very dangerous and can result in coma or even death.

Usually, you can tell by looking at a child that they have been exposed to lead, so a blood test done by a doctor is the only sure way to tell. This simple test to measure the lead level of the blood should be done at the 1st and 2nd year well-baby check-ups.

Lead poisoning is one of the most common and preventable childhood health problems. By being aware of where lead exists in your home and learning how to reduce or avoid it, you can prevent the children in your child care program from being exposed to lead.

Before 1970, lead was used in making household paints and gasoline. Although U.S. manufacturers no longer use lead to make these things, there can still be lead in and around your home.

Old chipping or peeling lead-based paint and soil with lead in it that is tracked into the home on shoes and boots, are the most common sources of lead. Lead can be found in outdoor soil because lead used to be in gasoline, so years of car exhaust that contains lead has settled in the soil.

Paint chips that fall from painted surfaces in poor condition and soil that contains lead both get ground down into a fine dust and become a part of the regular dust in your home. This creation of lead dust is also common with painted surfaces that experience a lot of wear, such as windows and doors that are opened and closed.

Lead dust, like regular dust, can get anywhere and get on anything in your home. However, normal cleaning does NOT get rid of lead dust and can actually just spread it around. Because young children like to put everything in their mouths, they can end up accidentally eating lead dust if things are not cleaned properly.
Demonstration: How Lead Dust Spreads

Materials to use:
- Construction paper
- Packets of sugar substitute
- Paper towels
- Trash bags

1. Give each participant a sheet of construction paper and a packet of sugar substitute.

2. Have each participant spread the contents of the sugar packet on their sheet of construction paper. Ask them to rub the sugar thoroughly into the paper, then to shake off the excess into a trash bag.

3. Give each participant a paper towel. Ask them to clean the paper surface until they think all the sugar is gone. Encourage them to rub hard. Collect any excess in the trash bag.

4. Next, suggest that they lick the cleaned paper. Do they still taste the sweetener? If they don't want to lick the paper, ask them what they smelled and tasted while they were cleaning.

This demonstration shows how fine lead dust is and that dry methods of cleaning only spread dust around. The fact that the participants could taste the sweetener illustrates this.

Some of the less common sources of lead are from drinking water, lead soldered cans, pottery made outside the United States, and other imported items. In general, lead levels in drinking water are low, however, lead can get into water from pipes that have lead in them or have lead solder at the pipe joints.

Although most of the food cans in this country no longer contain lead, some imported canned products come in cans with lead soldering, which can contaminate the food within. You cannot tell if a can has lead solder just by looking, so if your grocery store is not sure, it is a good idea to buy these items less often.

Some of the glasses used for older or imported pottery can contain lead. Avoid using pottery you are not sure about to serve food or drink – especially acidic foods, such as tomatoes and fruit, because they can soak up the lead in the pottery glaze. Do not serve or store food in any pottery that has cracks in the glazing.

Other imported items, like mini blinds, candy, and toys, could also contain lead. Children's toys are obviously a topic of great concern for you as a child care provider.

To be sure that your children are not being exposed to toys or other products that contain lead, you should talk to other child care providers and parents to share information and check with Consumer Product Safety Commission regularly for recall and safety information.

You can contact the Consumer Product Safety Commission by calling their hotline at 1-800-638-2772 or you can check their website [www.cpsc.gov](http://www.cpsc.gov) for updated information.
Here are some of the ways you can reduce the risk of lead exposure in your home.

First, it is important to know how old your home is. If it was built before 1978, assume it has paint with lead in it. The only way to know for sure is to have a risk assessment done by a licensed professional. A risk assessment tells you if there are any sources of lead in your home and what actions to take to deal with these problems. Lead-based paint in good condition is NOT a hazard.

Keep in mind that there is only a danger when lead-based paint starts to peel or chip, because children can eat the paint chips or the paint chips can be ground into lead dust and inhaled in.

Therefore, it is important to keep paint in good condition and repaint before chipping or peeling occurs. Areas that do have chipping or peeling lead-based paint must be held as soon as possible. Exposure to lead cannot be prevented if there is lead-based paint in poor condition in your home. Cleaning alone will not control this problem. You must eliminate the source of the problem in order to prevent exposure to lead.

If your home has lead paint in poor condition, keep children away from those areas to avoid exposure. Use cardboard or contact paper to cover the area completely until repairs are made. Although we will not go into detail about construction in this training session, any renovation, demolition, or repair work done in a home with lead-based paint must be done with extreme care because it could cause a dangerous amount of lead dust to spread around the home.

You should never try to remove lead-based paint yourself because it is very dangerous. It is important to get a professional who has experience in safely removing lead paint if you need work done.

Eating a healthy diet that includes foods high in calcium and iron, can actually help reduce the amount of lead that is absorbed by the body. Some foods that are high in calcium include dairy products, such as milk or yogurt. Some foods high in iron include cereals, such as bran flakes, Triscuits, or LifeSavers.

In order to prevent swallowing lead, wash children’s hands frequently, especially before meals, after outdoor play, and before bedtime.

The only way to know if your tap water has lead in it is to have it tested. Testing your water is easy and only costs about $25-$30. You can call your local health department to find out more about testing.

If tests show lead in your drinking water, take steps to remove exposure. Because it is easier for lead to get into hot water, always use cold water for drinking, cooking, and making baby formula. Never use hot water from your faucet for cooking or drinking.

You can also use a filter to remove the lead from your tap water, but make sure to use a filter that specifically says that it removes lead because not all brands do this. If this option is too expensive, you can boil the water for 1.2 minutes before using it. This method of flushing out the pipes is only necessary when the water has been sitting in the pipes for more than a hour, and is particularly important when the water has been sitting for a long time, such as overnight.
Since any dirt from outside can have lead in it, it is best to bring it into your home in the first place. You might try having everyone take off their shoes or boots at the door of your home to prevent tracking lead soil inside. Even when removing shoes at the door, use doormats and wash them monthly.

Another method for reducing lead exposure from soil is to cover any bare soil outside your home with grass, plants, gravel, wood chips or a thick layer of mulch. This will create a protective barrier over the soil and help reduce exposure to lead when children play outside.

Since lead dust can be on children’s toys and children often put these toys in their mouths, it is important to wash toys at least once a week. Toys should be washed with a cleaning solution of detergent and water. After cleaning, it is a good idea to disinfect the toys with a bleach solution made by adding 1/4 cup of bleach to a gallon of water. We will talk more about safely cleaning with bleach later on in this training session.

If you have lead in your home or you are not sure, there are several cleaning steps that you can take to reduce exposure to lead in your home.

You should never use cleaning methods like sweeping with a broom or using a feather duster to remove lead dust, because this will only cause the dust to be spread around. Wet cleaning methods work better because they dampen the dust and keep it from getting stirred up into the air and spread around.

You should wet mop your floors once a week using the “3 bucket system”. A cleaning system recommended by the Department of Housing and Urban Development.

- **demonstration: using the 3 bucket system**
  
  **materials to use:**
  - cleaning cloth
  - 3 buckets: 1 with detergent + water, 1 with water only, 1 empty
  - spray bottle

  1. Soak the sponge or mop in the detergent water.
  2. Mop a small area of floor with detergent water in a spray bottle.
  3. Scrub the mopped area of floor with the soaked sponge or mop.
  4. Squeeze the dirty water from the sponge or mop into the empty bucket.
  5. Thoroughly clean the mop in the bucket filled with water only. Then squeeze it out into the empty bucket again.
  6. Continue with the method until the entire floor is cleaned.

  The cleaning and mopping water buckets should be replaced every noon or every half hour, which ever comes first. All dirty water should be poured down the toilet, so it doesn’t spread lead anywhere else in your home or outside. You can make a final pass over the cleaned floor with a HEPA filter vacuum to pick up any remaining dust.

script for this page continues
Window sills, ledges and other surfaces where dust settles or collects should be wet dusted once a week using a cleaning solution in a spray bottle and disposable paper towels.

To use this method, you will need one spray bottle filled with detergent water, one spray bottle filled with rinse water, and a roll of disposable paper towels.

1. Spray the surface with the cleaning solution, wipe, and throw the paper towel away.
2. Spray the surface with the rinse water, wipe again, and throw away the paper towel.

Never use a dirty paper towel into the cleaning solution and never use the same paper towel to clean another area. Dirty paper towels should be thrown away immediately in a trash bag, rather than in the regular trash in order to keep the lead from being spread around once the paper towel dries.

To reduce exposure to lead dust, you should vacuum with a HEPA filter at least once a week. HEPA (High Efficiency Particulate Air) vacuums have special filters that can trap fine lead dust, while regular vacuums allow the fine dust to escape through the exhaust and get blown back into the room.

HEPA vacuums are more expensive than traditional vacuums, so if this is not an option, you may be able to get HEPA filter bags to upgrade your regular vacuum. With any type of vacuum it is important to use a vacuum that has bags, rather than a bagless vacuum, because bags allow for cleaner disposal of the dirt and dust picked up. It is also important to vacuum very slowly in order to get all the dust on the surface you are cleaning, especially carpets.

We want to say again that using these methods to clean will help reduce exposure, but if there is a problem, for example chipping lead-based paint, it must be fixed in order to completely eliminate the source of lead dust.

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OK, now that we have gone over lead, we are going to move on to talk about asthma triggers, which are the other main focus of this training session. But first, let’s go over some general information about asthma.

Asthma is a lung disease that causes people to wheeze, cough, be short of breath, and sometimes even die.

Not much is known about what causes people to get asthma, however, a lot is known about what causes people who have asthma to have an asthma attack.

Asthma attacks are episodes when breathing is very difficult and the person having the attack can feel like a fish out of water.

If you want to experience what it feels like to have an asthma attack, run in place for a few minutes, then stop, and try to breathe through a straw for air.

**Materials to use:**
- Straws
Asthma triggers are things that make breathing problems worse for people with asthma and might cause a person with asthma to have an asthma attack.

There are lots of different asthma triggers, however, some of the strongest triggers are found in the home. These include mold, dust mites, pests -- cockroaches in particular, and tobacco smoke. Other asthma triggers that are not as strong, but still important, include combustion by-products, chemical irritants, and pets.

Many of the triggers found in the home can be greatly reduced by simple repairs and changes in some habits.

Reducing the triggers that are inside your home will help a child with asthma better deal with the triggers found outside that are more difficult to avoid, such as pollen and smoke.

Mold is a fungus that makes tiny, invisible spores. Mold spores are like little seeds that float in the air and hope to land on something that is wet enough for them to start growing. When mold forms, it looks like a dark or stained fuzzy area and may have a musty odor.

Many people are allergic to mold and it can cause asthma attacks for people who have asthma. When mold grows, it puts irritating and sometimes poisonous things into the air, so being near mold often makes people feel sick. Even people who don’t have mold allergies can get irritants of the eyes, skin, nose, throat or lungs. For those who do have asthma, being around mold can trigger an asthma attack.
Mold spores are always in the air, but in order for them to become a mold growth, the spores need moisture.

Moisture can come from lots of places, including cracks in your foundation, roof or plumbing leaks, poor ventilation, and flooding.

Vents that do not lead to outside the home can result in mold growth because excess moisture is trapped inside and can create humid or damp environments in your home.

Too much moisture in your home creates a good place for mold to grow. If you notice fogging on the inside of your windows or water droplets forming on your walls, this is a sign that your home has too much moisture.

Carpet or rugs used in moist places like bathrooms, kitchens or basements that get wet often and cannot be washed frequently in a washing machine are an easy place for mold to grow.

Since mold grows in moist or damp places, indoor humidity levels above 50% can promote mold growth in your home. Even if the humidity level in your home is below 50%, a leak in your plumbing or roof could cause mold to grow and should be repaired. We will talk about how you can measure the humidity level inside your home in a moment.

Although the air is never free of mold, you can prevent growth by keeping your home clean and dry. In order to control the amount of moisture in your home, there are a few methods to keep in mind.

One is ventilation—make sure your home is well ventilated, so excess moisture is let out by exhaust fans and vents. You should make sure that you have vents or exhaust fans that are connected to the outside in places where a lot of heat or moisture builds up. It is very important to vent your kitchen stove, clothes dryer, and any bathrooms in your home, since these are places where heat and moisture are often present.

You should keep indoor humidity between 30-50% in your home. The amount of moisture or humidity in the air can be measured with a hygrometer. A digital hygrometer can be bought for about $20 at most hardware stores and it can tell you the indoor temperature and what the humidity level inside your home is. If the humidity level is above 50%, you can use a dehumidifier to take moisture out of the air.
Fixing the source of a moisture problem is the key to controlling mold. Throw out boxes, newspapers, or anything that has mold growing on it and cannot be cleaned. All water problems should be fixed right away to prevent mold growth.

If you have mold growing in your home, you can clean small areas of mold yourself, but this should be done carefully and only if the mold area is under 10 square feet.

Mold can be removed from hard, cleanable surfaces by taking the following steps:

1. If you have a HEPA filter vacuum, slowly vacuum the area to remove as much mold as possible.
2. Clean the area with a bleach solution made by mixing one cup of bleach with a gallon of water. This amount of bleach should only be used when cleaning mold and not for regular cleaning. Again, we will talk about safely cleaning with bleach later on in this training session.
3. Once you have cleaned the area, make sure the surface stays clean and dry to stop mold from growing there again.

If you have a mold problem that you are unable to deal with on your own, you should call a professional for help or call your local health department to get more information.

are there any questions?
Although dust mites are in every home, there are ways you can reduce exposure to dust mites.

Wash all bedding and blankets in hot water once a week. It is best to use water that is 130 degrees Fahrenheit, but if this is not possible, you should dry bedding at a very hot dryer.

You should also enclose box mattresses, box springs, and pillows in dust-mite proof covers to keep dust mites from living there. Make sure that the covers you choose say specifically that they are for dust mites, since not all are.

Hardwood flooring or other smooth surfaces are generally easier to keep clean because dust mites cannot hide on smooth surfaces. It is harder to keep carpet and upholstered furniture free of dust mites.

If possible, it is best to clean your home with a special "HEPA" filter vacuum twice a week. It traps small things, like dust mites, that other vacuum filters allow to blow through. They also reduce the amount of allergen dust that gets back into the air through the exhaust while vacuuming. Again, you may be able to get HEPA filter bags to upgrade your regular vacuum.

Vacuuming should not occur when children are in the room, especially children with asthma. This is due to the fact that the cleaning could stir up dust and trigger an attack.

Because dust mites like to live where it is moist, it is a good idea to monitor the humidity level in your home. As mentioned before, you can do this with a hygrometer and the indoor humidity should be kept between 30-50%. If the humidity is above 50%, you can use a dehumidifier or air conditioner to reduce the humidity in the air.

Stuffed toys should be washed in hot water once a month to kill dust mites. Area-rugs should also be washed once a month in hot water to kill dust mites.
Lots of homes have problems with pests such as cockroaches, rats, and mice.

Most people are unaware, however, that the droppings and saliva of rats and mice can be triggers for people with asthma. And, cockroaches are not just yucky; they are one of the worst asthma triggers in the home.

“Cockroach dust” is made out of roach droppings and bodily parts, and is a very strong asthma trigger.

It is also important to know that some of the methods to get rid of pests, such as bug sprays, foggers, or bombs, can be harmful to people as well, so care must be taken when dealing with pests in your home.

Pests can become a problem in the home if food, water, and shelter is provided for them there.

Food crumbs, spills, and dirty dishes left out all attract pests because they provide food. Garbage that is not taken out often enough or tightly sealed is also food and can attract pests into your home.

Since pests also need water to survive, any moisture problems, such as water leaks or excess humidity, can be an attraction for them.

Clutter around the home, such as piles of magazines, newspapers, or boxes provide shelter and can serve as a hiding place for pests, making it difficult to get rid of them.

Integrated Pest Management (IPM) is a safe and effective way to get rid of cockroaches, rats, and mice.

Integrated Pest Management, which is just a fancy way of saying to use a variety of methods to control pests, uses baits and simple corrections to problems in your home to get rid of pests. It does not use bug sprays, foggers, or bombs because these methods have chemicals in them that are poisonous, so when they are sprayed in the air, they may be harmful to people.

The best way to kill cockroaches is to use bait stations. Bait stations have cockroach poison mixed with roach food in them, so it does not kill the roach until after it gets back to its nest, where it can poison other roaches too.

A bait station may be toxic if placed in children’s mouths, so, be very careful about where you put bait stations and make sure they are out of children’s reach.

To kill rats and mice, use traps with food, like peanut butter, as bait.
In addition to placing bait stations or traps around your home, it is also important to not give pests food, water, and shelter.

Remove all food sources by cleaning up food crumbs or spills and washing dirty dishes right away (or putting them in soapy water in the sink). Make sure food is stored in airtight containers and that pet food is not left out. Trash should be taken out daily and kept in a container with a tight-fitting lid.

Remove all sources of water for pests by fixing any moisture problems in the home, such as chewing leaks or excess humidity.

Since cockroaches like to live and hide in clutter, you should get rid of clutter created by boxes, bags, and paper.

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Secondhand smoke is exhaled smoke from smokers and sidestream smoke from the burning end of a cigarette, pipe, or cigar.

Tobacco smoke is a serious breathing irritant and a strong asthma trigger.

We all know that tobacco smoke is bad for you. Secondhand smoke can cause ear infections, breathing problems, and lung cancer even in healthy non-smokers.

Children without asthma that are exposed to tobacco smoke are at risk for developing asthma. For adults and children that already have asthma, exposure to tobacco smoke increases the number and severity of asthma attacks.

Asthma can be triggered by the smoke from the burning end of a cigarette, pipe, or cigar as well as the smoke breathed out by a smoker.

Smoking inside your home or around children is ultimately very dangerous for the children.
The best thing to do is to declare your home a smoke-free zone, this includes all people living in or visiting the home.

If someone would like to smoke, require that they smoke outside and do not smoke around children. Smoking in another part of the home is not enough to protect children or prevent exposure because toxic chemicals will spread to other areas of the home through the air.

Even when smoking is done outside, care must be taken to prevent exposure.

For example, do not to smoke near windows or doors when smoking outside, because smoke might blow inside.

Other things that can be done include wearing a smoking jacket when smoking outside that can be taken off once inside and washed frequently and always washing your hands after smoking.

**Are there any questions?**

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Now we are going to discuss a few other asthma triggers that could be in your home, but are not documented to be as strong triggers as mold, dust mites, cockroaches, and tobacco smoke.

First, we will go over harmful gases, known as combustion by-products.

Combustion by-products, including the colorless gases nitrogen dioxide and carbon monoxide, come from the use of any appliance that has a flame and burns gas, wood, or kerosene.

Sources of combustion by-products include unvented or poorly-ventilated gas stoves, sealed or blocked chimney flues, unvented non-electric space heaters, or wood stoves that are not properly vented or that have a loose door. All of these situations allow combustion by-products to build up inside your home, which can be a hazard.

Gas, wood, and kerosene produce gases, smoke, and soot when they burn, which can be triggers for asthma. Exposure to nitrogen dioxide can cause irritation of the eyes, nose and throat, shortness of breath, and could even lead to lung disease, such as emphysema.

Fuel burning appliances that do not work properly can produce carbon monoxide, which is a deadly gas. Exposure to carbon monoxide can cause fatigue, dizziness, disorientation, and possibly death.
The most important thing is that combustion appliances need to be vented to the outside. Combustion appliances include clothes dryers, kitchen stoves, boilers, furnaces, hot water heaters, fireplaces, and wood stoves.

Do not use non-vented space heaters inside your home unless they are vented to the outside. If you have a gas stove, you should always turn on the stove hood or exhaust fan that vents to outside when you are cooking or baking. Do not use kitchen stoves for heating your home because this can result in high levels of harmful gases.

If you have a fireplace and are going to make a fire, be sure that the chimney flue is open and clear, so smoke can escape up through the chimney. If you have a wood stove, make sure it is vented to the outside and that the door fits correctly and is not loose.

One of the simplest ways to prevent exposure to carbon monoxide is to install a carbon monoxide detector. It works like a smoke detector and sets off an alarm if it detects dangerous levels of carbon monoxide in the air. Carbon monoxide detectors should be placed on each floor of your home. If the detector is battery powered, be sure to replace the batteries every 6 months.

It is also important to follow maintenance procedures. You should have your heating system checked once a year by a qualified technician to make sure it is working properly. This is because combustion appliances that are not in good repair are less likely to leak harmful gases into your home. You should also have your chimney checked once a year to make sure openings are kept clear.

Chemical irritants can be found in many products such as cleaners, paints, adhesives, cosmetics, and air fresheners.

Some ways exposure to chemical irritants can occur include not following the directions on a product, mixing different cleaning products together, poor ventilation when using a product, or using aerosol products indoors. These activities can lead to hazardous levels of chemicals in the air and can be very dangerous.

Exposure to chemical irritants can lead to headaches, dizziness, and loss of memory. It could also result in eye, nose, and throat irritation. There is also a possibility of increased risk of cancer with long-term exposure.

In order to prevent hazardous exposure, there are a few steps you can take:

Always read the directions before using a product and make sure you follow the directions carefully. When using any product that is a chemical irritant, make sure you have proper ventilation, like opening a window, so fumes are allowed to escape.
There are a few things you should remember when you are using bleach:

1. Before sanitizing with a bleach solution, clean any visible soil from the surface with a detergent and rinse well with water.
2. You should open a window and use a fan to keep the air moving.
3. Only use about 1/4 of a cup of household bleach in a gallon of water (1 tablespoon to 1 quart of water).
4. Two minutes of contact is recommended (you can either let the solution air dry or wait 2 minutes before wiping the surface dry).

Never mix chlorine bleach with anything other than water because dangerous vapors can be produced. Always wear gloves. You should mix a fresh bleach solution every day for maximum effectiveness. Also, some people are sensitive to bleach fumes, so do not use bleach when other people, especially children, are in the room.

After you are finished using any chemical product, make sure that you wash all containers tightly and keep them out of children’s reach. A locked cabinet is a good idea for safe storage.

Pets include any warm-blooded animals, such as dogs, cats, and rodents.

Pets are one of the most commonly known asthma triggers. However, recent data is not very clear about how much cleaning is needed to keep them from being asthma triggers.

For this reason, we are just going to mention a couple things you should keep in mind if you do have a pet in your home.

Animal dander is tiny, dead skin flakes shed from animals. The dander, urine, feces, saliva, or hair from pets can be a trigger for people with asthma.

In order to reduce exposure, we have two main recommendations.

The first is to keep pets out of sleeping areas, or the places where the children in your child care program sleep and take naps, so these places don’t get contaminated with dander and pet hair.

The second recommendation is to vacuum two or more times a week with a HEPA filter vacuum if possible. Because the HEPA filter is able to trap very small things, like pet dander, it will help reduce the amount of pet allergens in your home.
Now that we have gone over some of the common indoor pollutants, let’s talk about some tips for finding problems that may exist in your home.

First, take a tour of your home. Carefully walk through each room and look for signs of the indoor pollutants we have talked about today. Keep a close look for water leaks, chipping paint, mold growth, rodent nests, dust buildup, or any of the “common sources” we have talked about in this training session.

A checklist was created for you to use while you take a tour of your home, so you don’t forget any “common sources” to look for.

**Demonstration**

So over checklist and explain how they should go through each item on the list and check the ones they see signs of in their home.

**Materials to use:**

- Checklist

Next, investigate some of the possible problems.

For example, it is a good idea to talk with the parents of the children in your childcare program. Let them know how important it is for them to have their children’s blood lead levels tested when they are young. Blood tests are required for children ages 1 and 2 or if there is a chance any child has been exposed to lead.

Also, if your home was built before 1978 or you think there could be lead-based paint, have a risk assessment done so you can know for sure. Have a trained professional check your home rather than using a do-it-yourself kit. Professionals use a portable x-ray fluorescent machine, so the assessment will cause no damage.

You could also get a hygrometer, like we mentioned before, and measure the indoor humidity level to see if it is in the recommended range of 30-50%.

It is also important to become aware of how you and your children feel inside the home compared to outside. If symptoms of irritation or asthma attacks decrease when you are outside the home, this could be a clue that there is a problem inside.
Usually, the best strategy for dealing with a problem is source control. This means to completely eliminate the individual pollutant or pollutants that are causing the problem.

Increasing air flow into the space by opening windows or doors will also help lower the amount of pollutants in the air, but if the problems are not eliminated, then fresh air is only a short-term fix rather than a long-term solution.

For example, if you have mold growing inside, opening a window will allow some of pollutants in the air to escape, but the only way to solve the problem is to get rid of the mold.

Try to use the “reducing exposure” suggestions made in this training session if you find a problem in your home.

However, if you find a problem that you are unable to deal with on your own using the “reducing exposure” suggestions, it is important to get the help of an expert. Your local health department or cooperative extension office are good resources getting professional help.

Indoor pollutant problems are serious concerns and should not be ignored.

It is also important to remember that professionals who use hazardous work practices should always be involved if you are planning on doing any construction or renovation work in a home that might have lead paint in it.

Before we come to the end of this training session, we just want to review some of the key actions to take to prevent exposure to indoor pollutants.

First, make your home smoke free by declaring your home a smoke-free zone and requiring that smokers smoke outside and away from children.

Also, keep moisture and indoor humidity under control. Too much moisture in a home can increase mold, dust mites, and cockroaches, since they need moisture to live.

Stop lead dust from being brought into your home by using door mats and asking everyone to take off shoes or boots at the door.
Vacuuming twice a week with a HEPA filter vacuum can greatly reduce the amount of allergens, such as lead dust, mold spores, dust mites, and pet dander.

Wet mop and wet dust once a week to reduce exposure to lead dust. When dusting or mopping, always be sure to use a wet mop, paper towel, or cloth so that allergens are not stirred up into the air. While wet mopping and dusting do not to dip the towel or rag you are using back into the cleaning water because this will contaminate the water and only spread allergens or lead dust around. It is best to use the 3-bucket system that we talked about earlier in this guide.

It is important to keep in mind that cleaning such as vacuuming and wet mopping or dusting should not occur when children are in the room, especially children with asthma. This is due to the fact that the cleaning could stir up dust and trigger an asthma attack.

Since toys can have dust, mildew or lead dust, it is important to wash and disinfect hard surface toys once a week and wash stuffed toys monthly.

The information in this presentation has been gathered from many different sources including the Environmental Protection Agency (EPA), Department of Housing and Urban Development (HUD), National Safety Council (NSC), and the National Center for Healthy Housing (NCHH).

This brings us to the end of the training session. We hope that you have learned that eliminating or reducing indoor pollutants can be done at low-cost and will benefit you and the children you care for.

Thank you very much for your time.

Are there any final questions?
[Date], 2006

Dear [participant name here],

Thank you for your participation in this project related to indoor environmental pollutants and for completing your first telephone survey.

Enclosed you will find a training guide that has been created to help child care providers, like yourself, learn more about indoor pollutants, how they affect children's health, and how they can be controlled. In order to help us develop the best educational materials possible, we would greatly appreciate if you read this guide over carefully and give us feedback during your second telephone survey. You will be contacted for your second telephone survey in about 3 weeks.

Although you will receive 2 training hours after you complete your second survey, you will also have the opportunity to attend a free training session about indoor pollutants. You will be able to sign up for a training session when you are contacted for your second survey.

Thank you so much again for your time and participation. Please feel free to contact me with any questions or concerns about the project.

Sincerely,

Jamie Holmer
jeh64@cornell.edu
607.312.2083

Cornell University is an equal opportunity, affirmative action educator and employer.
APPENDIX I – SURVEY QUESTIONS BY SUMMARY TOPIC SECTION

Lead Knowledge Section (True/False):

1. Lead paint is more likely to be found in newer homes than in older homes.
2. High lead in the body can affect a child’s ability to learn.
3. Most children have symptoms right away if they have an elevated blood lead level.
4. Living in a building during renovation/remodeling can increase a child’s exposure to lead.
5. Washing a child’s hands often, helps prevent lead poisoning.
6. Cleaning a home with soap and water decreases the lead in the home more than dusting or sweeping.
7. One way for children to get lead poisoned is by having lead dust on their hands and then putting their hands in their mouth.
8. Lead in water can be removed by boiling.
9. Most cases of childhood lead poisoning are caused by drinking water that contains lead.
10. Warm tap water usually contains less lead than cold tap water.
11. Lead in soil cannot harm children.
12. Some dishes and pottery are not safe to use in cooking or for eating, because they contain lead.
13. Most children get lead poisoned by breathing in lead, rather than by eating or swallowing lead.
14. The human body needs a small amount of lead for good nutrition.
15. A balanced diet, with a good amount of iron and calcium that does not contain too many fatty foods, decreased lead absorption by the body.
Asthma Trigger Knowledge Section:

Which of the following words are asthma triggers?

1. Mold
2. Lead paint
3. Dust mites
4. Cockroaches
5. Tobacco smoke
6. Radon
7. Nitrogen dioxide
8. Animal dander

Indoor Air Quality Knowledge Section (True/False):

1. You cannot see, smell, or taste many indoor pollutants.
2. You cannot do anything to prevent indoor air quality problems.
3. Indoor air pollutants can be either natural or artificial.
4. People spend as much as 90 percent of their time indoors.
5. Opening a window will always solve an indoor air pollution problem.
6. Smoking is only dangerous to the person who is smoking.
7. Pesticides only hurt the pests they were designed to kill.

Exposure-reducing behavior section:

1. Have you ever had a lead assessment done in your home?
2. Do you use hot water from the faucet for cooking or drinking?
3. Do you have a carbon monoxide detector installed in your home?
4. Is there any peeling or chipping paint inside your home?
5. Does anyone, including visitors, smoke inside your home?
6. Do you have people take off their shoes before entering your home?
7. Do you know what the humidity level inside your home is?
8. How do you clean large climbing toys?
9. How often do you clean large climbing toys?
10. How do you clean blocks/ small toys?

11. How often do you clean blocks/ small toys?

12. How do you clean stuffed toys?

13. How often do you clean stuffed toys?

14. Does your vacuum have a HEPA filter (high efficiency particulate air filter)?

15 – 24. From this list of cleaning tasks, let me know if you do them and how often:

<table>
<thead>
<tr>
<th>Task</th>
<th>More than once a day</th>
<th>Once a day</th>
<th>Twice a week</th>
<th>Once a week</th>
<th>Less than once a week</th>
<th>N/A</th>
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</thead>
<tbody>
<tr>
<td>Take out the trash</td>
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<td>Wash dishes</td>
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<td>Vacuum</td>
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<td>Sweep</td>
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<td>Wet mop</td>
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<td>Damp wipe window sills</td>
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<tr>
<td>Wipe counters</td>
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<tr>
<td>Dry dust</td>
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<tr>
<td>Dust with a damp cloth</td>
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<tr>
<td>Wash the children’s bedding</td>
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</tbody>
</table>

Feedback Section:

1. Overall, what did you think of the training workshop/guidebook? (Liked it a lot,
   Somewhat liked it, Neither liked or disliked it, Somewhat disliked it, Disliked it a lot)

2. How much of the training workshop/guidebook would you say you understood? (All of it,
   Most of it, Some of it, A little of it, None or almost none of it)

3. [workshop] Do you think attending a training workshop helped you understand the
information more clearly than if you had just received a guidebook with the information?
(Strongly Agree, Agree, Neither Agree nor Disagree, Disagree, Strongly Disagree)

3. [guidebook] Do you think attending a training workshop would have helped you
understand the information more clearly than just receiving a guidebook? (Strongly Agree,
Agree, Neither Agree nor Disagree, Disagree, Strongly Disagree)

4. How much of the guidebook did you read? (All of it, Most of it, Some of it, A little of it,
None or almost none of it)

5. Did you find the guidebook easy to follow and understand? (Yes/No)

6. Did you use the checklist in the back of the guide to assess your home? (Yes/No)
REFERENCES


February 23, 2006, from
http://www.hud.gov/offices/lead/guidelines/hudguidelines/index.cfm


