ENvironmental Assessment Protocols for Homes, Schools, and Child Care

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ABSTRACT
Assessment protocol and training program modules have been developed for environmental health and safety hazards found in occupied spaces and near outdoor areas where children spend most of their time: home, school, and child care. The home and child care modules contain customizable assessment checklists, mitigation action plans that emphasize low-cost and no-cost approaches, fact sheet handouts, and extensive training and reference materials. The assessment covers outdoor sources, tobacco smoking, mold and moisture, lead, dust, other common indoor air contaminants, and other hazards. The school module is based on the U.S. EPA’s IAQ Tools for Schools, but adds supplemental checklists and materials on asthma, mold and moisture, air cleaning, cleaning management, and other topic areas. There is a special focus on allergy and asthma-related conditions. Dozens of Albuquerque homes and over 1400 New Mexico child care providers have had environmental assessments performed or received training using these materials.

INDEX TERMS
Environmental assessments, Children, Homes, Schools, Child care

INTRODUCTION
The majority of children’s time is spent in indoor and near-outdoor environments that often contain a wide and increasing variety of environmental hazards with the potential for causing health-damaging exposures. Children are uniquely at risk from environmental hazards in a number of ways (Bates, 1995; Bearer, 1995):

- children’s vital systems are in a dynamic state of development even after birth, and therefore more vulnerable to environmental exposures,
- children drink, eat and breathe proportionally more than adults, therefore endure more exposure to environmental contaminants, and
- children’s normal developmental behaviors, such as hand to mouth activities and crawling on floors and the ground increases their exposure to environmental hazards.

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The U.S. Environmental Protection Agency (EPA, 1996) identifies nine major environmental health threats to children, of which six: 1) lead poisoning, 2) pesticides, 3) asthma, 4) drinking water contaminants, 5) second-hand tobacco smoke (ETS), and 6) overexposure to the sun are found in and around the indoor environment. Two other hazards present in the indoor environment are also mentioned as possible threats: the effects on the endocrine system from pesticides and industrial chemicals, and effects from particulate matter air pollution. Other hazards, such as physical hazards and radon exposure are not mentioned, but were included in this project.

A number of other assessment tools have been developed (ALAW, 1997; EPA, 1995; MSU, 1996; UW, 1997), but have not been directed at any or all of the child’s indoor environments, or do not encompass the broad spectrum of environmental hazards. Taking a multi-media, total indoor environment perspective, this project (known as the Healthy Environments and Living Places [H.E.L.P.] for Kids Project) was initiated to develop assessment protocols for environmental health and safety hazards found in occupied spaces and nearby outdoor areas where children spend most of their time: home, school and child care. There is a special focus on allergy and asthma-related conditions. The overall goals of the project were to:

1) Develop assessment methodologies to identify environmental health and safety hazards in spaces frequented by children,
2) Emphasize prevention and mitigation action plans that use low-cost and no-cost approaches,
3) Increase awareness of these hazards among occupants, school staff and facilities personnel, and child care providers, and
4) Create training and assessment materials that can be easily adopted and customized by community groups, school districts, and governmental agencies across the nation.

PROJECT DEVELOPMENT AND ELEMENTS
An initial, comprehensive resource review was performed to gather information on journal articles, reports, brochures and pamphlets, checklists and forms, and existing programs similar to that proposed in this project. This review uncovered a very large body of information on possible hazards, guidelines and regulations, assessment protocols and programs, questionnaires, reference and educational materials, and other pertinent resources.

One of the most difficult tasks of this project was to balance the need for a comprehensive assessment tool with the practical limitations of time to perform the assessment. This balance point was different for the three environments since the targeted audiences, the goals for assessment and training, and the availability of time and fiscal resources were different. Hard decisions were required to determine which hazards and questions would be included and excluded.

Separate stand-alone modules were produced for each of the three environments (home, school, and child care). Development of the project materials involved the participation of national experts and local community group members. Numerous revisions were made based on experience and comments from field and pilot tests conducted in Albuquerque, New Mexico, USA.

Home module
The home environmental review module is based on materials created by the Master Home Environmentalist through the American Lung Association of Washington (ALAW, 1997). Modifications have been made to emphasize asthma concerns, identify high priority 'Critical
Hazards, expand on preventive and corrective actions, and provide additional elements (handouts, resource lists). The major hazard areas covered include: asthma and allergies, outdoor pollutant sources, moisture and mold, lead and dust, hazardous household products, pest control and pesticides, indoor air pollutants, cleaning activities, drinking water, heating and cooling equipment, and injury prevention.

The following elements are included in the home review module:

1) Checklist. This 205-question checklist is designed to be administered during a home visit by laypersons from the community, who have received 1-1/2 days of classroom and field training. The goal is to complete the home visit within two hours. Seventy-one (71) questions address conditions that the reviewer is to observe without necessarily querying the occupant (e.g., site drainage, moisture damage, peeling paint), while the remaining questions usually require responses from the occupant (e.g., tobacco smoking in the dwelling, cleaning activities, pesticide use). One hundred forty-two (142) questions inquire about issues that can directly or indirectly affect asthma conditions (e.g., dust mite control activities, use of carpeting, air cleaning equipment). Fifty-seven (57) questions are specially labeled to identify high priority, critical hazards that should be corrected immediately (e.g., improperly vented combustion equipment, storage of hazardous products, children eating paint chips). Community members played a key role in designing and phrasing checklist questions. Their efforts helped to reduce bias and make occupants feel more comfortable during the interview process.

2) Action Plan. Each question in the checklist has a response that is linked to one or more recommended actions. The action plan provides a brief description of: a) the importance of the question or observation, and b) what actions can be taken to address the hazard/problem. Many actions emphasize low-cost and no-cost solutions. The action plan, containing this basic information written in non-technical language, is left with the occupant as an educational tool. Spanish language versions of the checklist and action plan have been developed by a collaborating organization (Sainvilmar, 2002).

3) Personal Checklist and Action Plan. Some questions were identified by community-tested feedback as too personal to be asked by a reviewer. A separate 27-question checklist and corresponding action items were created from these questions. These materials are intended to be mailed to participants before the home visit. If the occupant desires, they can be discussed with the reviewer during the subsequent home visit.

4) Resource List. This list, covering 16 hazard categories, is a template for local organizations to include contact information on local agencies, contractors, and government contacts that can provide additional assistance to the occupant. The four areas of assistance include: a) additional general information, b) technical support (e.g., lead testing of paint), c) contractors and suppliers that provide products (e.g., allergy-control covers for bedding) or services (e.g., remediation of mold problems), and d) sources of financial assistance to implement the recommended actions.

5) Handouts. The handouts are short, descriptive fact sheets/pamphlets that provide additional information to occupants on general hazard areas. Only those handouts that apply to hazards found in the dwelling are furnished to the occupants. Many of these handouts had already been developed and printed by various organizations and government agencies. Other handouts were prepared as part of this project.
6) Training Materials. Instructional tools, including an instructor guide, slide presentation, and student and reference manuals have been developed to train the individuals going into the homes to conduct the environmental reviews.

**Child care module**

Designed for smaller, home-based child care (typically, with 12 or fewer children), this environmental assessment module has been derived from the home methodologies. Larger, center-based, child care facilities may be more appropriately assessed using the school methodologies (see below).

Three separate sets of assessment materials have been prepared assuming that two different groups will be performing the reviews in child care homes. The first group consists of trained laypersons from the community who, in the process of conducting home reviews, encounter a child care in the home. The second group of reviewers consists of state- and local-sponsored monitors and inspectors of home-based child care. For state program purposes, two sets of shorter checklists and action plans have been created.

Following are the elements included in the child care module:

1) Child Care Home Environmental Review Checklist and Action Plan. Similar to the materials developed for the home reviews, these full-length documents are intended to be administered by the trained community individual who visits the child care home. The goal is that a child care home visit should take no more than two hours. These materials may also be useful for child care providers who wish to conduct a self-assessment. Hazards specific to the child care environment that have been added include: personal hygiene and disease transmission, and food preparation.

2) State Child Care Home Environmental Review Checklist and Action Plan. These 'generic' state documents are intended to be modified by state child care agencies for their purposes (for example, to exclude items that are already covered in a child care home inspection). To shorten the time to conduct the review, some items were deleted from the full-length documents. This assessment is expected to take one hour to complete.

3) NM State Child Care Home Environmental Review Checklist and Action Plan. This third set of materials was developed specifically for, and with the assistance of, the State of New Mexico. A review based on these materials should be completed in approximately 30 to 45 minutes.

4) Resource Lists, 5) Handouts, and 6) Training Materials for child care homes are similar or identical to those prepared for the home review module.

**School module**

The schools environmental assessment module is based on the EPA’s Indoor Air Quality Tools for Schools (TFS) which covers indoor air pollution sources, ventilation, and control (EPA, 1995). This project added supplemental material to cover other environmental hazards that might be found in schools such as lead, pest control, and others. Some of the topic areas found in the TFS kit and supplemental materials may already be part of a school's maintenance, health and safety, or risk management programs.

The audience for the school module is intended to be teachers, staff, environmental specialists, risk managers, health and safety officers, and maintenance and operations
personnel. However, successful implementation requires ‘top to bottom’ support, including district superintendents and administrators, as well as school staff, community members and parents. It is recommended that each school assign an environmental coordinator to oversee activities.

In addition to the TFS materials, the following elements were produced and included in the school environmental assessment module:

1) Start-up Guidance. Since it can be difficult to implement this module, or even the EPA’s TFS, additional documents were drafted to provide roadmaps for school personnel in generating support, assigning responsibilities, evaluating the environment, taking action on problem areas, and earning program recognition.

2) Walk-through Checklists. Supplemental checklists have been produced to guide school personnel in conducting walk-through assessments of exterior conditions, maintenance and general building spaces, and classrooms. These checklists have links to the TFS reference materials and supplemental ‘Backgrounders’.

3) Supplemental Backgrounders and Checklists. Additional information on environmental hazard topic areas not extensively covered in the EPA’s TFS, was developed in the form of ‘Backgrounders’. The topics include: air cleaning for airborne allergens, asbestos, asthma, cleaning management, drinking water quality, food safety, hazardous material and solid waste management, lead exposure, mold and moisture, pest management, safety and injury prevention. Checklists corresponding to each of the topics were created to assist with more extensive investigations of problems identified during the walk-through.

4) Training Materials. The training materials developed for the school module are organized similarly to those for homes and child care, but incorporate the school elements 1 – 3 (above).

 IMPLEMENTATION

Local community groups, child care programs, or schools may not want, nor have the resources, to implement all of the program components or the full checklists and action plans. Therefore, the components and materials have been designed to be customized for the needs of the individual communities. For example, if a community would like to focus its program on asthma, then the checklist, action plan, reference lists, and handouts can be modified to exclude all other topic areas.

Most of the project materials were created with standard commercial software programs and are available in electronic versions. Although currently available in stand-alone paper and electronic formats, the assessments process could be enhanced by actively linking the checklists and action plans/backgrounders in a laptop-based ‘expert system’.

Portions of the home environmental review module have been used to perform over 40 assessments in Albuquerque-area homes as part of various asthma survey and demonstration projects (Sainvilmar, 2002). In addition, the child care module has been used by the State of New Mexico in approximately 70 state-wide workshops to train approximately 1400 child care workers and providers. Responses to the workshops have been positive, with many providers remarking that the information provided has been very helpful. This curriculum is currently being modified to train food program monitors who are expected to reach approximately 7500 home-based child care providers (Srsen, 2002). The school module has been piloted in two Albuquerque elementary schools.
DISCUSSION AND IMPLICATIONS
The tools developed as part of this project are suitable for evaluating environmental hazards in a wide variety of indoor spaces, with benefits to adult occupants as well as children. Besides identifying environmental problems and offering guidance on resolving these problems, the protocols and materials are an excellent mechanism for educating large segments of the community on indoor environmental hazards. In addition, the modular and re-configurable organization of the project materials makes it possible for them to be adapted to the diverse needs of communities across the U.S. The information relating to asthma and allergies is especially useful in light of the recent Institute of Medicine findings that link the development and/or exacerbation of asthma to a number of indoor environmental exposures (IOM, 2000). All of the factors implicated in the IOM report are included in the assessment and training materials.

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REFERENCES