

IAQA Home Health Committee

Draft

Healthy Home Environmental Assessment Principles

Scope: This document provides the essential principles and concepts to conduct a healthy home environmental assessment.

Purpose: The principles and concepts described herein are those that should be common to all healthy home environmental assessments, with each adding their own specific details, as they deem appropriate. This document describes what a healthy home should be, the importance of these concepts when assessing indoor environments, and provides the foundation for a healthy home environmental assessment protocol.

Application: This document provides general information that should be integrated into any healthy home environmental assessment protocol and is intended to guide environmental professionals seeking to apply healthy homes principles in their work.

Principles and Concepts:

All healthy home environmental assessments must include the core principles of healthy homes as described in the Essentials for Healthy Home Practitioners training. The core principles of healthy homes (NCHH) are:

- Keep it clean
- Keep it safe
- Keep it dry
- Keep it contaminant free
- Keep it pest free
- Keep it ventilated
- Keep it maintained
- (energy efficient – pending)

The healthy homes concept starts with the people who occupy buildings, the building as a system, and people as part of that system. Excluding the occupants removes a fundamental basis for the purpose of the assessment. The responsibility of the assessor is to consider all of the core principles as an integrated system rather than one hazard at a time as illustrated in the diagram below showing the convergence of health, housing, and environmental health.

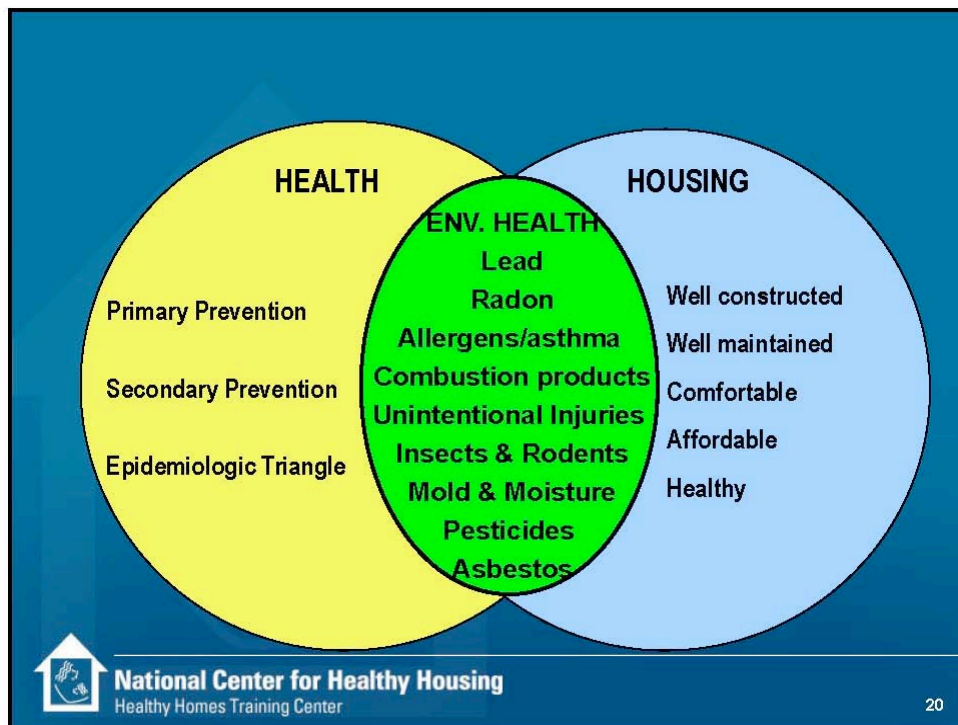


Diagram 1 - The convergence of health, housing, and environmental health

There can be a variety of reasons, motivations, and expectations underlying a request for a healthy home environmental assessment. Examples include:

- occupant complaint
- fire, water damage, and structural damage
- prevention questions
- Medical referral
- Ownership or occupancy changes
- Property management
- Litigation
- Insurance claims
- Other?

Similarly, it should be recognized that each occupant will have various levels of knowledge, awareness, and concerns including preconceptions which may or may not be accurate. It is important for anyone conducting a healthy home environmental assessment to acknowledge the person and these concerns. In addition, each individual's interactions will vary with the different components of the built environment because of the range of contaminants (pollutants) and sources, the exposure pathways (designed and unintentional), and the mechanisms for exposure (including occupant activities) as well as each individual's unique susceptibilities.

At the conclusion, the assessor is also responsible for suggesting actions that should resolve any issues or concerns identified during the assessment and for referring occupants to resources that can provide

possible solutions, whether financial, professional, certifications, or licensed. *{NOTE: precedence for this includes current lead based paint regulations}*. Guidelines for selecting appropriate resources include referrals to qualified professionals trained in the healthy home environmental assessment protocol plus other specialties and licenses as appropriate.

Discussion:

A Healthy Home has been described as one that “is sited, designed, built, and maintained, and renovated in ways that support the health of its residents.” *[Surgeon General p3]*. The goal is that all homes meet this description. When they don’t, they have potential to negatively impact the indoor environment and the health of the occupants.

The goal of a healthy home environmental assessment is to determine and document current home conditions as they relate to the concepts and principles of a healthy home, as defined above, followed by recommendations for corrective actions or improvement.

The reasons for a healthy home environmental assessment can alter the specific details of an assessment protocol. Not all homes are the same, however, the core principles and concepts will remain the same. The types and levels of complexity will vary along with the susceptibility of each occupant. Therefore, understanding these complexities and the needs of the occupants are critical first steps. Some of the factors include, but are not limited to:

- Not all assessments involve an occupant complaint.
- When there is an occupant reaction indoors, it is necessary to have a source to which the occupant is exposed and to which they are susceptible
- Not all pollutants are detectable by people having a reaction, such as carbon monoxide.
- Not all complaints are directly associated with the building, such as smoking.
- Not all homes are a factor and need to be identified as such with the cooperation of the occupant.
- Documentation is critical for conditions, findings, and conclusions both for the assessor, the client and possible third parties such as a consultant, contractor, or healthy care provider.

Any substance can be a pollutant to any specific individual so an occupant interview is imperative to narrow the possibilities from the nearly infinite variety and combinations of possible sources to a manageable few. This requires an open-ended and comprehensive qualitative visual assessment to identify variables that are relevant, whether the occupant is aware of them or not. Locations of suspect pollutants should be identified along with the transport mechanism of exposure.

The types and ranges of exposure sources can be categorized initially into three groupings of particulate, chemical, and biological. The advantage of these three broad categories is each can be easily identified by a simple set of physical properties which also differentiates it from the others. Those same physical

properties for each category guide the identification of location and how to control and remove most items within each category.

Particulates, whether visible or sub-visible, have a physical size larger than air molecules. They tend to settle out of the air onto horizontal surfaces but can also cling to and accumulate on vertical surfaces and ceilings.

Chemicals, on the other hand, are much smaller than particles and are in the same general size range as the air molecules. They don't settle out of the air onto surfaces but stay suspended with air and migrate on normal air currents to where ever the air goes through both designed and unintended pathways. An ongoing source of chemicals will accumulate in the air.

Biologicals are living organisms, both macro and micro. The controlling principle for biological is they require a particular set of environmental conditions to survive. Fine-tuning of those conditions will support thriving, reproduction, and eventually infestation. People also have a particular set of environmental conditions necessary for survival, thriving and reproducing. The problem for homes is when the environment for occupants shifts toward that for the biological pollutants. They then tend to infest, further decreasing the comfort, habitability, and healthfulness of the people. The most frequent driving force for amplification of biologicals is moisture. Biologicals are the most common confounding factor because they have properties which fit in each of the other two categories of pollutants: They have a physical size like particles and often generate chemicals.

Particulate sources include but are not limited to:

- house dust
- pollen
- animal dander
- dust mite fecal pellets
- cockroach frass and body parts
- rodent droppings
- construction dust
- char, soot and other combustion particulate from fires
- desiccated fragments of biological organism such as from mold and bacteria.
- Organic and inorganic particles, biological & non-biological, mineral.

Chemical sources include but are not limited to:

- new building materials
- new contents
- pesticides
- cleaning products
- personal care products
- VOCs from biological organisms such as from mold and bacteria
- chemical releases from water damaged materials

Biological sources include but are not limited to:

- Rodents
- dust mites
- cockroaches
- mold growth
- bacterial amplification
- general and undifferentiated “filth caused by moisture”

Building structure considerations include roofs, ceilings, walls, and floors for intrusion or condensation of moisture. Interior structures which are not habitable spaces, such as attics, basements, and crawlspaces must be considered. Although people usually don’t spend much time there, the air of each can and will migrate into the breathing zone of the living spaces. They are also frequent locations for as yet undetected lead based paint, asbestos, meth labs, and pests.

The New Framework

The historical and conventional methods of assessing home hazards are based on and follow the procedures of occupational investigations that take a “one-hazard-at-a-time” or categorical approach for regulatory compliance. These types of assessments will continue to provide insufficient information to achieve healthy homes for occupants. Therefore, a new framework for assessing indoor environmental problems is necessary.

If healthy home environmental assessments are conducted within the framework of the core principles of a healthy home, then three benefits occur: 1). The conditions in the home which create and support unhealthy environments are more likely to be identified; 2). The relationships among and between the three categories of exposure sources can be identified; and 3). A comprehensive and representative report can be prepared and completed which can be used to guide appropriate remedial actions. *If the supportive conditions are not addressed, then any cleaning or simple removal of hazards will only result in a return of the original “hazards” because the causes have not been affected.*

Particulate identification, distribution, and removal issues are covered in:

- Keep it Clean
- Keep it Pest Free
- Keep it Ventilated
- Keep it Maintained

Chemical identification, distribution, and removal techniques are covered in:

- Keep it Contaminant Free
- Keep it Pest Free
- Keep it Ventilated
- Keep it Maintained

Biologicals identification, distribution, and removal techniques are covered in:

- Keep it Clean
- Keep it Dry
- Keep it Pest Free
- Keep it Contaminant Free
- Keep it Ventilated
- Keep it Maintained

Keep it Safe is focused more on physical hazards rather than exposure hazards and is therefore mostly in a category of its own. However, supporting health by removing the particle, chemical, and biological pollutants can also be considered safety issues.

Healthy Home Environmental Assessment Process

The components of a healthy home environmental assessment may vary with the building type and use, but the principles and sequence should remain the same.

1. Initial contact and collect general information
2. Establish a clear purpose for the assessment
3. Formulate initial hypotheses
4. Site visit and walkthrough
5. Qualitative and quantitative assessment
6. Generate assessment report