

An Indoor Environmental Observational Research Study in Camden, NJ – Perceptions of Environmental Health

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INTRODUCTION

Numerous studies have demonstrated that environmental conditions have a profound effect on personal health. In particular, indoor environmental issues can increase the risk of developing asthma. The burden of asthma is rising across the United States and is disproportionately high among inner-city residents, especially children, (Crain, Walter, O'Connor, Mitchell, Gruchalla, Kattan, Malindzak, Enright, Evans, Morgan, Stout, 2002). Many indoor environmental asthma-related triggers have been studied in the past. One study looked at indoor-air insecticide levels during the final two months of pregnancy among a cohort of African-American and Dominican women from New York City. The results of that particular study found that the insecticides were persistent in the home with little variability in air concentrations over the two months of the study and contributed to chronic maternal inhalation exposures during pregnancy, (Whyatt, Garfinkel, Hoepner, Holmes, Borjas, Williams, Reyes, Ruah, Perera, Camann, 2007). Another study assessed variations in home concentrations of dust mite, cockroach, cat and dog allergens in dust collected in the main living areas of asthmatics' homes by family income, mother's education, dwelling type, population density, household population density, and ethnicity in Connecticut and south-central Massachusetts. The findings indicated that higher education of the mother, higher household income, living in a single family home in a less densely populated area with fewer people per room and being a white household were associated with elevated dust mite, cat and dog allergens and low cockroach allergens. In contrast, low income, living in a multifamily home in a high population density area with a higher occupancy rate per room and being a Hispanic or black household were associated with elevated cockroach allergens and low

concentrations of dust mite, cat and dog allergens, (Leaderer, Belanger, Triche, Holford, Gold, Kim, Jankun, Ren, McSharry, Platts-Mills, Chapman, Bracken, 2002). Many intervention studies have been conducted with the goal of reducing people's exposures to environmental asthma-related triggers. One intervention study looked at children and the likelihood of reducing their asthma symptoms related to exposure to cockroach allergens by using bed and pillow covers, hot washing of bedding and using cockroach bait in the home. The researchers found that the avoidance measures seemed to be ineffective in part because children living in poverty have multiple sensitivities and there were problems in applying the protocols in this environment, (Carter, Perzanowski, Raymond, Platts-Mills, 2001).

People's perceptions of the role played by the environment in shaping their health has been studied less. In one study, perceived air quality, sick building syndrome symptoms and productivity were studied in an existing office building in which the air pollution level could be modified by introducing or removing a pollution source. One of the conclusions of this particular study found that as the perceived air quality in the office building was improved, sick building symptoms (SBS) decreased and productivity increased in different buildings, (polluting versus low polluting), with otherwise identical indoor environmental conditions, (Wargocki, Wyon, Baik, Clausen, Fanger, 1999).

The purpose of the research for this study was to observe and record residents' perceptions of indoor environmental conditions and their impact on their health. In particular we wanted to find out if they had environmental health concerns and whether they believed conditions inside their homes can affect their health. Furthermore, we wanted to see if what they say about conditions in the home actually matches the

environmental conditions observed in their house. We attempt to answer these questions through a brief survey and use of observational research methods. In these home visits, we provided residents with information on indoor environmental issues and reviewed with them any environmental health issues found in the home during the site visit.

BACKGROUND

Camden City was selected for this research project because of the numerous environmental, socio-economic and other concerns, which are of concern in the city. As in most urban cities across the United States, the city has a large minority, low-income population. Over 85% of Camden City's 80,000 residents are African-American or Hispanic. Thirty-seven percent of Camden's population is under the age of 18. Only about half of Camden's adult residents have completed high school. The median family income in Camden is \$24,612, compared with \$65,370 in New Jersey. Nearly a third of Camden families have an income below the Federal poverty level. According to the US 2000 Census, nearly 1 in 5 Camden housing units are vacant. How residents in Camden perceive indoor environmental health concerns is key in helping them address actual environmental health issues. Perception is sometimes more important than reality.

METHODS

Over a three-month period of time, site visits were attempted in 60 households in Camden, NJ. During a site visit, the resident was asked to complete a survey that took 10-15 minutes on average to complete. Of the 60 attempted site visits, residents were not at home in 20 locations, 10 residents refused to participate, 1 resident did not speak English, and 3 residents did not have time to answer the survey and the visual environmental assessment of the home. A total of twenty-six (26) actual site visits were conducted. No

personal identifiers were collected during this research study. The homes were randomly selected by a community “gatekeeper” (staff member from the Camden Area Health Education Council (AHEC) who assisted the principal investigator in gaining participation of residents. The homes selected were distributed throughout the city and not concentrated in any one neighborhood. The gatekeeper was doing simultaneously doing lead testing as part of another project for a local non-profit organization (Catholic Charities). She was taking swipe samples in people’s homes for testing in a certified laboratory. If the lead levels were elevated, grant money was then being used for lead remediation at that particular home. The site visits were conducted between September 2007 and November 2007, (late summer to fall). A consent form was given to the resident to read and if verbal consent was given, the site visit was conducted. After the survey was completed, a visual environmental assessment of the home was conducted which took another 15 minutes on average to complete. Each site visit lasted approximately 20-30 minutes in total.

Survey

There were 32 questions on the survey. Questions were in a multiple-choice format and included demographic questions as well as questions about environmental conditions within the house, and perceptions of the role of the environment in shaping health outcomes. The survey asked about common conditions present in the home that could lead to health-related issues, (asthma and allergic reactions). Some of the questions asked were about pesticide use in the home, smoking, heat sources used in the home, whether their house was built before 1978, (an indication that lead-based paint maybe in the house), ventilation or lack there of, visible mold, water leaks, paints and other hazardous

products stored in the home, etc. Participants were asked several questions on whether they believed their home environment could make them sick, whether they had concerns with people smoking in the house, use of lead-based paint in the house, visible mold growing in the house. In addition, questions were asked about the presence of health symptoms including, chronic irritation of the eyes, nose or throat, headaches, dizziness, fatigue or asthma. If respondents reported that they were experienced any of these symptoms, they also asked if their symptoms improved or worsened when they were not at home. A question was also asked about potential workplace hazards or exposures to chemicals.

Environmental Assessment

After the surveys were completed, the principal investigator conducted a visual environmental assessment of the home. The goal of the observational assessment was to compare the findings of what residents reported on the survey with observational findings to see if the two matched. The assessment examined similar indoor environmental issues covered in the survey. The principal investigator only went into those sections of the house where the resident gave permission; in most cases the entire home was not evaluated. This assessment was conducted as a quick visual inspection and was not a total home inspection. This would have been difficult to accomplish due to time constraints. Environmental issues that were the focus of this evaluation were the presence of general use pesticides, visible water damage (water stains on the ceilings and walls), vermin activity, (cockroaches, mouse droppings, etc), visible mold, ventilation fans that vented outside, signs of smoking, (ash trays, people smoking, smoke odor, etc.), presence of pets, sources of heat, etc. The visual observations were very broad in nature. For example

when assessing water damage in homes, the principal investigator did not differentiate between minimal water damage, (a few water stains on the ceiling vs. major water damage, (major roof damage or whole ceilings in rooms totally ripped out). After the visual assessment was performed, the resident was alerted to any environmental concerns observed within the house and suggestions were offered for correcting the issue. In addition, a six-page fact sheet entitled “Help Yourself to a Healthy Home, Asthma and Allergies,” was provided to the residents. The fact sheet provided information on asthma and allergy-related triggers commonly found in the home and provided additional resources for further information. The fact sheet was published by the National Center for Healthy Housing, http://www.centerforhealthyhousing.org/Fact_Sheet_Asthma.pdf

Results/Findings

The survey data and information gathered from the environmental assessment were entered into SPSS (Version 14.0).

Table 1, represents reported environmental problems/issues that respondents noted on the survey. Some of the notable findings in this area are 57.7% of respondents have no environmental concerns. Only 19.2% have concerns about smoking in their house where 57.7% reported that someone in the house smokes. Only 23.1% reported having lead paint concerns though 96.2% of homes were built before 1978 and the Catholic Charities lead sampling project found that three quarters of the 500 homes in Camden tested high for lead. Only 30.8% report having visible mold concerns, though Table 4 shows a significant number of homes were found to have some level of water damage in them. 15.4% of respondents indicated that they use their gas-cooking oven as a source of heat. This is problematic because gas-cooking ovens are not designed to be used for home heat

sources. Gas cooking ovens can produce dangerous gases such as carbon monoxide and nitrogen dioxide and these gases can build up in the house potentially causing acute health effects. 69.2% reported using bug spray in the house. If applied incorrectly, the chemical can be inhaled by members of the family and cause acute health effects and/or allergic reaction. 46.2% stated on the survey that they have a ventilation fan in the house that works. 23.1% of respondents reported having visible mold and a recent water leak in the house. 38.5% said they store hazardous products in the house. 26.9% and 42.3% of respondents stated that they have pets and plants in the house respectively.

Table 2, looks at how people perceive their home indoor environment and whether they believe the conditions inside their home can make them sick. A relatively low number of people, (38%) agreed with the statement that their home environment can make them sick. This table will be discussed in more detail later in the report during the contradictions section.

The most significant statistic of table 3, is the 34.6% that reported someone in their family has asthma. The statistics were relatively low percentages and did not seem to be significant enough to elaborate on. The % with asthma will be looked at closer later in this paper in the contradictions section.

Table 4, looks at the data from the visual observational evaluation in the homes. 42.3% of the homes were observed to have evidence of smoking in them. Evidence included smoke odors, ashtrays with ashes and cigarette butts in them and people actually smoking at the time of the visual assessment. 61.5% of homes were noted through the visual observation to have pesticides stored. The most common pesticides found in the homes were general use pesticides sold over the counter at retail stores such as bee and wasp sprays and some

weed killer sprays. Almost a quarter of the homes were noted to have signs of vermin in them, which the principal investigator believes is significant. The most common signs of vermin noted were mouse droppings and live cockroaches. The most common areas where these observations were made were in kitchens and bathrooms. The extent of vermin infestations was not addressed in this research study.

73.1% of homes were noted to have some degree of water damage. The degree of water/moisture damage was not addressed in this research study due to time constraints. Any degree of water damage was listed as such. Only 26.9% of homes were found to have at least one functional fan that physically vented to the outside. If a home had at least one ventilation fan that vented to the outside, that home was counted as having mechanical ventilation. 42.3% of the homes during the visual assessment had windows open. The majority of the site visits were conducted during the fall where temperatures were still mild enough where people would leave the windows open. If this study would have been conducted in the winter months, the number of homes with windows open would have been dramatically different. This would especially affect the homes that have no mechanical ventilation. Visible mold was noted in 30.8% of the homes. The areas where visible mold was noted the most were bathrooms and basements. This would make sense since these two areas are commonly moist and/or wet due to continual moisture/water sources.

Hazardous products were found in 73.1% of homes. Hazardous products commonly found in homes were paints, paint thinners and strippers, pesticides, and petroleum products like gasoline and motor oil. They were typically stored in the basement or in kitchen or bathroom cabinets. As previously noted, the majority of the site visits were

conducted in the fall. The time of year this research study was conducted will skew survey answers and visual observations, specifically because of weather conditions and temperature. For example, people would be more likely to leave windows open in the summer and fall because the temperatures are typically warmer those times of the year, though this is subject to change based on the temperature. In contrast, in the winter people are more likely to use improper heat sources such as gas cooking ovens for heat because it is typically colder in the winter months.

Table 5, explains the demographic data that was collected on the surveys.

Contradictions

Several contradictions were found when the two data sets (survey vs. environmental assessment data) were compared to each other. Some of the contradiction highlights in table 6, are as follows –

- Out of the respondents who indicated on the survey that they had no environmental concerns, only 26.7% had ventilation fans in their home that vented to the outside.
- Out of the respondents that agreed that their home environment could make them sick, 60% reported someone in their family has asthma.
- Out of the respondents that agreed that their home environment could make them sick, 80% reported using bug spray in their residence.
- Out of the respondents that agreed that their home environment could make them sick, 60% reported someone in their household smokes.

- Out of the respondents who indicated they use bug spray in their residence, 77.8% of the homes were found to have no ventilation fans that vented to the outside on the environmental assessment.
- Out of the respondents who indicated that someone in their household smokes, 73.3% of the homes were found to have no ventilation fans that vented to the outside on the environmental assessment.
- Out of those reporting someone in their family has asthma, 66.7% of the homes were found to have no ventilation fans that vented to the outside on the environmental assessment.

Conclusion/Recommendations

A lot of useful information about indoor environmental health and resident's perception of it was gathered during this study. This study points in part, to a lack of education/knowledge when it comes to indoor environmental issues. Based on the findings of this study, the residents could benefit from educational workshops to inform and empower the residents to provide a healthier indoor environment for themselves and their families. Some of the findings point to indoor air issues that in time can contribute to poor health outcomes in the residents. For example, only 19% of respondents said they have a concern about people smoking in their house/apartment while 58% said that someone in their house smokes. In addition, 46% of respondents indicated they have at least one ventilation fan in their house. The environmental assessment showed that in fact only 27% of the houses have ventilation fans that actually vent to the outside. It also appears that the residents do not equate issues in their homes with environmental quality. For example, out of the residents that indicated they have no environmental concerns, only 26.7% actually had ventilation fans that vented to the outside. The principal investigator is surmising that the residents are not realizing that proper ventilation is a component of environmental health. Education of the residents in the city is paramount since only about half of Camden's adult residents have completed high school. The principal investigator understands that indoor environmental issues are not necessarily a major concern for the residents of Camden, NJ. As previously noted, poverty, level of education and crime are serious problems in the city comparably speaking to the rest of the state. Maslow's hierarchy of needs dictates that basic needs on the lower end of the pyramid need to be met first before anything else. Once these basic

needs are met, the residents will feel more secure and will be able to focus on indoor environmental health issues to provide a healthier environment for themselves and their family.

In summary, the principle investigator believes the environmental findings on the assessment and the survey answers are a combination of a lack of knowledge/education and a low importance being put on environmental issues by the residences because their basic needs have not been met according to Maslow's hierarchy of needs, (Figure 1). This research study should be used a starting point for indoor environmental issues in urban cities and residents perceptions of indoor environmental. More studies need to be conducted to further look at these issues.

References

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Figure 1 – Maslow’s Hierarchy of Needs

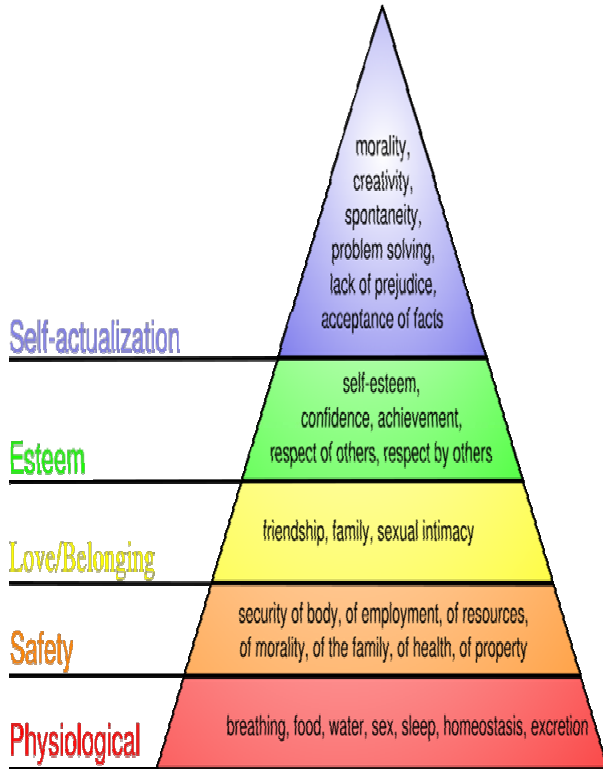


Table 1. Reported environmental problems (data from survey)

Environmental Concern/issue	% Reporting
Smoking concerns	19.2%
Lead paint concerns	23.1%
Visible mold concerns	30.8%
No environmental concerns	57.7%
New carpet in house	7.7%
Someone in house smokes	57.7%
Using gas cooking oven for source of heat	15.4%
Bug spray use in home	69.2%
Landlord uses bug spray	15.4%
A hired contractor applies pesticides in home	19.2%
Homes built before 1978	96.2%
Houses that have ventilation fans that work	46.2%
Windows are kept open for fresh air	88.5%
Houses have visible mold	23.1%
Recent water leak	23.1%
Pets in house	26.9%
Plants in house	42.3%
Hazardous Product storage in house	38.5%

Table 2. Perceptions data (from survey)

Environmental Perception	% Reporting
Respondents in agreement that their home environment can make them sick.	38%

Table 3. Reported health conditions/symptoms (from survey)

Condition/Symptom	% Reporting
Chronic Eyes/Nose/Throat Irritation	11.5%
Headaches	19.2%
Dizziness	11.5%
Fatigue	11.5%
Asthma	34.6%
Symptoms get better or disappear away from home, reappear when return home	11.5%

Table 4. Observational data (from visual environmental assessment)

Visual Observation	% observed
Evidence of smoking	42.3%
Pesticides in home	61.5%
Signs of vermin in home	23.1%
Moisture/water damage	73.1%
Ventilation fans venting to outside	26.9%
Windows noted open	42.3%
Visible mold noted	30.8%
Hazardous products noted	73.1%
Pets noted	23.1%
Plants noted	38.5%
Season visual observations conducted	(Fall) 92.3%

Table 5. Demographics (from survey)

Category	Sub-Categories	% Reporting
Age Group	18-25 years	15.4%
	26-35 years	26.9%
	36-54 years	19.2%
	55 years and above	23.1%
	Missing	15.4%
	Total	100%
Sex	Female	76.9%
	Male	23.1%
	Total	100%
Race	Caucasian	3.8%
	African American	73.1%
	Hispanic	19.2%
	Missing	3.8%
	Total	100%
Rent or Own?	Own	53.8%
	Rent	46.2%
	Total	100%

Table 6. Data Comparisons (from survey and visual environmental assessment)

Environmental Data Comparisons	Combined Data %
Respondents that indicated they have no environmental concerns but who had no ventilation fans that vented to the outside on the environmental assessment	73.3%
Respondents who agreed that their home environment can make them sick <i>and</i> those reporting someone in their family has asthma	60%
Respondents who agreed that their home environment can make them sick <i>and</i> use bug spray in their residence	80%
Respondents who agreed that their home environment can make them sick <i>and</i> those who indicated someone in their household smokes.	60%
Respondents who indicated they use bug spray in their residence despite also reporting that someone in their household has asthma	38.9%
Respondents who indicated that someone in their household smokes despite also reporting that someone in their family has asthma	46.7%
Respondents who indicated they use bug spray in their residence <i>and no</i> ventilation fans that vented to the outside were noted on the environmental assessment	77.8%
Respondents who indicated that someone in their household smokes and <i>no</i> ventilation fans that vented to the outside were noted on the environmental assessment	73.3%
Age and Respondents who indicated they use bug spray in their residence	Age 35 or under (54.5%) Age 36 or over (81.8%)
Age and Respondents who indicated that someone in their household smokes	Age 35 or under (36.4%) Age 36 or over (63.6%)
Those reporting someone in their family has asthma and visible mold noted on the environmental assessment	44.4%
Those reporting someone in their family has asthma and <i>no</i> ventilation fans that vented to the outside were noted on the environmental assessment	66.7%
Those reporting someone in their family has asthma and those homes with hazardous product storage noted on the env. assessment	55.6%