

## Awareness of Environmental Risks and Protective Actions among Minority Women in Northern Manhattan

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We report findings of a survey of 555 women 18–35 years of age living in Northern Manhattan in New York City. The survey was conducted by the Columbia Center for Children's Environmental Health (CCCEH) to learn what community women knew about environmental risks to health and what they did to protect themselves and their families, to validate the findings of focus groups held with community women, and to provide information for planning the Healthy Home, Healthy Child campaign sponsored by CCCEH. Survey findings showed that overall awareness of environmental risks to children's health was high, with more than 95% of respondents identifying lead, household pests, pesticides, environmental tobacco smoke, and drugs as harmful to health. Similarly, more than 95% of respondents reported taking one or more protective actions to reduce these risks, suggesting that these factors significantly concern women living in Northern Manhattan. The reported levels of specific protective actions to reduce these risks, however, varied greatly. In each area of risk the most frequently reported actions were effective ones, but many other important protective actions were rarely mentioned, suggesting that there was room for an educational campaign to teach women new ways to protect their families. Survey respondents and CCCEH scientists differed in the priorities they placed on the importance of key protective actions, confirming earlier focus group findings and suggesting the importance of incorporating community concerns into the planning of environmental campaigns. *Key words:* age, children, environment, ethnicity, health, knowledge, protective action, race, risk, risk reduction, women. *Environ Health Perspect* 110(suppl 2):271–275 (2002). <http://ehpnet1.niehs.nih.gov/docs/2002/suppl-2/271-275evans/abstract.html>

We report the findings of a survey to assess what women 18–35 years of age living in Northern Manhattan in New York City know about environmental risks to health and what they do to protect themselves and their families. The survey was conducted during the planning phase of the Healthy Home, Healthy Child campaign sponsored by the Columbia Center for Children's Environmental Health (CCCEH). CCCEH undertook the campaign as part of its dual mission of conducting research and public education to reduce environmental risks to children's health, particularly risks associated with asthma, delays in growth and development, and cancer (1).

The process of developing the campaign themes and materials is described in detail in the accompanying paper in this issue by Green and her colleagues, who conducted focus groups with more than 100 residents of Northern Manhattan to learn their views of the environment and to incorporate these views into the themes of the campaign (2). The findings from the focus groups led us to add two environmental concerns identified by community residents—proper management of garbage and abuse of drugs and alcohol—to the initial themes identified by CCCEH scientists: reducing exposure to lead, environmental tobacco smoke (ETS), and air pollution; controlling household pests safely with low-toxicity pesticides; and including fruits and vegetables in family

meals to ensure adequate nutrition. The survey was undertaken with two aims. First, we wanted to confirm whether the focus group findings accurately reflected community sentiment about the themes chosen for the campaign. Second, we wanted to assess baseline levels of environmental knowledge and protective actions to understand how women living in Northern Manhattan viewed the environment and to identify areas in which an educational campaign could help them to better protect their families.

### Materials and Methods

#### Study Population and Sample

We interviewed 555 women between 18 and 35 years of age in Northern Manhattan using a convenience sample. The interviews were conducted between August and December 1999 in 17 public places including parks, school playgrounds, entrance lobbies, and prenatal clinic waiting rooms. The interviewers approached potential respondents and asked if they would like to answer a few questions about the environment and children's health. If the respondents said yes, they were asked if they were between 18–35 years of age and if they lived in Northern Manhattan or the South Bronx to establish eligibility. No information that identified individuals was collected. The Institutional Review Board of Columbia Presbyterian Medical

Center approved this procedure. Very few potential respondents declined to be interviewed, but the true refusal rate is probably higher because those who did not want to take part could simply avoid the interviewer. The two interviewers who carried out the survey were both community members. In Harlem, 337 women (61%) were interviewed by one interviewer, all in English; in Washington Heights, 218 women (39%) were interviewed by the other interviewer, 208 in Spanish and 10 in English according to respondent preference. Although we did not ask respondents to define their racial or ethnic identity, the interviewer in Harlem reported that all the respondents she interviewed were African American; the interviewer in Washington Heights reported that all respondents were Latino, including those who interviewed in English. On the basis of census data, the Spanish-speaking respondents in Washington Heights were primarily Latinos of Dominican descent, with smaller proportions from Puerto Rico or other Latin countries in Central or South America. The mean age of the respondents was 27.5 years, with no significant difference between English- and Spanish-speaking respondents.

#### Survey Questions

The questions were designed to assess the women's awareness of the health risks associated with the Healthy Home, Healthy Child campaign themes and to learn what protective

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actions they take to reduce these risks. Questions about risk were asked as yes/no questions, whereas almost all questions about protective actions were open-ended to elicit volunteered responses. Responses based on closed questions are noted in the text and tables. The interviewers used general probes (e.g., What else do you do?) to elicit additional protective actions or to clarify vague responses (Can you tell me more about that?). The questions are listed in Table 1.

### Statistical Analysis

The findings are presented as the percentage of the women who gave positive responses to questions about risk or volunteered reports of specific protective actions. Comparisons between the answers of English- and Spanish-speaking respondents were assessed using the  $\chi^2$  test for differences in proportions for categorical data and the *t*-test for differences between means for interval data. We used two-tailed tests of significance; because we made 14 comparisons, we adjusted the alpha level for statistical significance from 0.05 to 0.003 to reduce the risk of false-positive results (3).

## Results

### Knowledge of Environmental Health Risks

The data presented in Figure 1 show that the respondents had high levels of awareness of the health risks targeted by the campaign. More than 95% of the women identified lead, cockroaches, rodents, household pesticides, ETS, and drugs as harmful to health or of significant concern, and 65% thought that the pesticides farmers use on fruits and vegetables were also harmful. We asked respondents about the specific health risks posed by exposure to rodents and cockroaches in the home. For rodents, 69% of respondents mentioned bites, 69% infections, and 17% said rodents could cause or worsen asthma. With respect to cockroaches, 28% mentioned bites (a misconception), 70% infections, and 28% said cockroaches could cause or worsen asthma. Finally, to assess respondents' ability to discriminate between harmful and nonharmful substances, we asked about the health risks posed by three other substances besides lead: calcium, mercury, and zinc. Calcium was

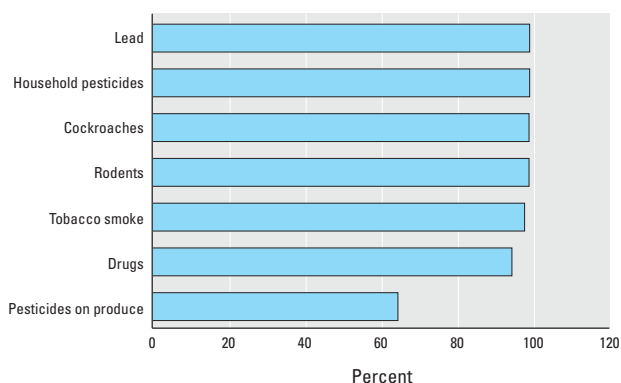
correctly seen as not harmful (<1%), mercury was correctly identified as harmful by 82% of respondents, and zinc, which is not toxic, was thought to be harmful by 22%.

### Actions to Protect Family from Environmental Health Risks

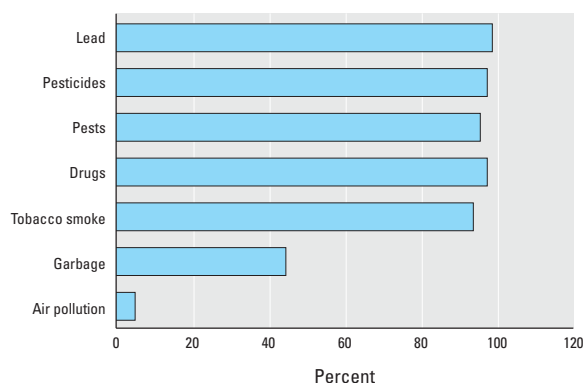
The data in Figure 2 show that almost all respondents took steps to reduce these environmental health risks, with 95% or more reporting one or more actions to control exposure to lead, pests, pesticides, drugs, and tobacco smoke. Garbage-control efforts were not addressed in a separate question, but 45% of the women voluntarily mentioned either covering their kitchen garbage containers or taking garbage out every night as an action they took to control pests. Only 5% of the women, however, reported taking any action to control air pollution, much of which originates from sources not under the control of community residents. The most common action reported to control air pollution—working with others to clean up backyards, sidewalks, or public places (2% of all respondents or 40% of those who took any action to control air pollution)—is not

**Table 1.** Survey questions.

1. Have you heard of a campaign to clean up the air in Harlem, Washington Heights, Inwood, or the South Bronx?
2. Have you done anything in the last year to clean up the air in your community? If yes, what have you done?
3. I'm going to read you a list of chemicals, and I want you to tell me if you think any of them are harmful to children (calcium, mercury, lead, zinc).
4. At what age do you think children should be tested for lead?
5. How can you prevent children from being exposed to lead at home?
6. How many servings of fruit or vegetables did you have yesterday? (Respondent views list defining serving sizes)
7. How many servings of fruit and vegetables do you think you should eat every day?
8. Do you think exposure to tobacco smoke is harmful to young children?
9. What do you do to reduce or eliminate tobacco smoke from your home?
10. What health problems do you think mice and rats can cause?
11. What health problems do you think cockroaches can cause?
12. What do you do to keep cockroaches, mice, or rats out of your home?
13. Do you think the pesticides that farmers spray on fruits and vegetables are harmful to your health?
14. Do you think the pesticides used to kill cockroaches are harmful to your health?
15. What do you do at home to reduce your family's exposure to pesticides?
16. How concerned are you about drugs in your community? (Very concerned, concerned, a little concerned, not at all concerned)
17. What do you do to prevent your family and friends from becoming involved in drugs?
18. Do you think that being involved in a community garden is a way to fight drugs?



**Figure 1.** Percentage of women who perceived specific environmental factors as harmful to health. The question about drugs assessed respondent concern about drugs in the community.



**Figure 2.** Percentage of women who reported one or more protective actions to reduce specific environmental risks to health. Garbage control efforts were not addressed in a separate question but were mentioned as a strategy to control pests.

directed at common sources of air pollution such as diesel emissions but rather at controlling garbage with its associated bad smells, trash, and the overall appearance of the local community.

**Actions to reduce exposure to lead.** Northern Manhattan is a high-risk area for childhood lead poisoning, and over the last 15 years there have been campaigns by both private and public agencies to raise awareness of lead as a health risk, to suggest protective actions, and to provide resources for testing both children and household water supplies for lead. When asked what they could do to prevent children from being exposed to lead at home, 87% volunteered that removing peeling paint would protect children. Other important preventive actions were reported at much lower rates, including having the child tested for lead (21%) or having water tested for lead (36%), and less than 5% mentioned letting tap water run until cold before drinking, cooking, or preparing baby formula. When asked directly when children should first be tested for lead exposure, 80% said testing should be done by the child's first birthday, as recommended by the American Academy of Pediatrics (4).

**Controlling household pests.** Only 2% of the women said they did nothing to control pests or that no action was needed. The most frequent responses were to keep the house very clean (66%), use pesticides (55%), cover garbage and/or take it out daily (45%), set traps (41%), and seal or repair pest entry points (24%). Four percent of the respondents mentioned using boric acid, a low-toxicity pesticide. It is interesting to note that many of the frequently reported actions are key steps in integrated pest management.

**Reducing exposure to pesticides.** The action most frequently reported was washing fruits and vegetables before cooking or eating them (55%). A third of the women mentioned storing household pesticides where children could not reach them (37%) and cleaning house after a pesticide had been applied to remove residues (35%), but less than 5% reported using baits or gels rather than sprays, leaving the apartment after spraying, or choosing not to use household pesticides at all.

**Keeping family members from using drugs.** When asked what they did to protect family and friends from drugs, almost all the women (97%) said they talked with family and friends about the dangers of taking drugs. Much smaller percentages volunteered trying to keep their intimates from associating with drug users (16%), keeping family members busy with positive activities (10%), or letting family and friends know they cared about them and their future (5%). Finally,

46% of the women responded to a direct question by agreeing that they thought being involved in a community garden is a way to fight drug use in the community.

**Nutrition.** In response to a direct question, the women reported eating an average of 2.15 servings of fruit and vegetables the day before the interview but felt that they should have eaten an average of 3.80 servings, about 75% more than they actually consumed.

**Reducing exposure to tobacco smoke.** A substantial majority of the women (70%) reported that there were no smokers living in their home. The most common protective action reported, and the most effective one, was not allowing anyone to smoke in the apartment (37%). Other steps included opening windows to air out the house (10%), going outside to smoke (7%), not smoking in the child's room (7%), and using air freshener (6%), all of which have limited or no effectiveness.

### Assessing Environmental Priorities

One of the findings from the focus groups was the difference in the importance assigned to environmental health risks by CCCEH researchers and the focus group participants. The initial list of environmental risks to be addressed in the campaign was developed by CCCEH researchers on the basis of current knowledge of the most serious environmental threats to children's health and included lead, ETS, air pollution, pesticides, pests, and inadequate nutrition. In the focus groups, the respondents recognized all of these as health hazards and agreed they were important but expressed their highest levels of concern with three issues: pests, drug and alcohol abuse, and garbage. As a result, fighting drug abuse and controlling garbage were added as campaign themes. To explore the priorities of the survey respondents and determine whether they reflected these focus group findings, we first examined the average number of responses they gave to questions about protective actions. Because there was no general question about actions taken to control garbage, this environmental concern could not be evaluated. Controlling pests received the highest average number of responses (2.5), followed by reducing exposure to lead (2.1),

pesticides (1.4), drugs (1.3), tobacco smoke (0.7), and air pollution (0.05). This way of assessing priorities is limited, however, by the different nature of the protective strategies involved. Both pest control and reducing exposure to lead involve numerous physical strategies used in the home, for example, cleaning, setting traps, testing water, cleaning up peeling paint, whereas others, such as protection of family members against involvement with drugs, involve fewer but more complex strategies, for example, talking the issues over with family members. Thus, a simple count may not reflect well the level of concern women have about these issues or the effort they invest in controlling them.

To address this issue and assess the level of agreement between the priorities of community women and CCCEH researchers, we reviewed the responses to each question about protective actions and identified what we thought was the most important or widely recommended action to reduce environmental risk in each area. The actions represented all the campaign themes with the exception of air pollution and nutrition. We then asked three CCCEH researchers knowledgeable about environmental health (not authors of this paper) to rate the importance of these six actions to protect children's health and compared their ratings with a ranking on the basis of the frequency with which survey respondents volunteered that they took these actions. The results, shown in Table 2, suggest that the values placed on these actions by community residents and researchers are very different. The researchers' most highly rated protective actions were directed at reducing exposure to lead, tobacco smoke, and household pesticides, whereas the survey respondents most frequently mentioned actions to prevent drug abuse, control household pests, and control garbage. Although these two approaches to assessing environmental priorities yielded somewhat different results, it is clear that household pests, drugs, garbage, and lead exposure were all of significant concern to these community residents.

### Perception of Environmental Health Risks by Language of Interview

We compared the responses to questions about environmental health risks given by

**Table 2.** What are the most important protective actions for mothers of young children to take?

Protective action	CCCEH scientists	Ranked by frequency of women's responses
Test child for lead	1	6
Don't smoke in house	2	4
Safe pesticide storage	3	4
Cover garbage/take out at night	4	3
Talk to family about drugs	5	1
Keep house very clean to control pests	6	2

women who completed the interview in English and in Spanish. Overall, the two groups had similar responses to 9 of 14 questions, including the risks of lead, household pesticides, tobacco smoke, drugs, and the overall perception of risk from household pests. There were, however, several substantial differences. Although the majority of both English- and Spanish-speaking respondents recognized that mercury was dangerous, English speakers were more aware of this risk (92% vs. 67%;  $p < 0.001$ ). Again, although the two language groups agreed overall that rodents and cockroaches posed health risks, English speakers were much more likely to say that rodents caused infections (92% vs. 32%;  $p < 0.001$ ), but less likely than Spanish speakers to say that cockroaches cause asthma (17% vs. 45%;  $p < 0.001$ ). Finally, English speakers were less likely than Spanish speakers to think that pesticides used on fruits and vegetables were dangerous to health (44% vs. 97%;  $p < 0.001$ ).

## Discussion

The survey findings show that overall awareness of environmental risks to children's health was high for all respondents in Northern Manhattan. More than 95% of respondents identified lead, household pesticides, ETS, and drugs as harmful to health or of significant concern. Each of these risk factors has received considerable publicity over the last few years, and in particular, an extensive public health campaign has been conducted in Northern Manhattan to raise awareness of the danger to children of lead exposure. Awareness of the optimal daily intake of fruits and vegetables was also relatively high, with women reporting 3.8 servings as the ideal, about 75% of the recommended five servings (5). In addition, fully 28% of this group of respondents drawn from the general population volunteered that cockroaches can cause or worsen asthma. The cockroach–asthma connection has not been widely publicized in the press or public health messages but has been locally advertised on bus stops and on Spanish-language radio programs by the manufacturer of a pesticide bait station, which may explain the higher percentage of Spanish speakers who linked cockroaches and asthma. Together, these findings suggest that the residents of Northern Manhattan, both English and Spanish speaking, have high levels of awareness of environmental health risks and are responsive to health information presented in the media, public health campaigns, and advertising.

With the exception of air pollution, the great majority of women took protective actions to reduce these risks, with more than 95% naming at least one action to control

exposure to lead, pests, pesticides, drugs, and tobacco smoke. The reported levels of specific protective actions to reduce these risks, however, varied greatly. In each area of risk the most frequently reported actions were effective ones, but many other important protective actions were rarely mentioned, suggesting that there was room for an educational campaign to teach women new ways to protect their families. For example, more than 80% of the women reported efforts to remove peeling paint to reduce children's exposure to lead, which has been a key message in public information campaigns. Only 21%, however, mentioned the critical step of having their child tested for lead, and less than 10% reported other important actions, such as running tap water until cold before drinking, cooking, or preparing baby formula. Similarly, the most common step reported to reduce children's exposure to tobacco smoke, not allowing anyone to smoke at home, was reported by only a third of respondents, and all other steps were mentioned by fewer than 10% of respondents. In the perennial war against household pests, two-thirds of respondents reported keeping their house very clean and about half reported taking out garbage daily and setting traps, but very few reported sealing up entry points or repairing water leaks. Despite the high level of awareness that pesticides are dangerous, however, only 3% reported using low-toxicity pesticides such as baits, gels, or boric acid powder, or said they refrained from using pesticides for cockroaches as a way of reducing exposure.

The high levels of awareness of environmental health risks reported here appear to contrast with studies reporting deficits in health knowledge among low-income, underserved populations. To explore this question, we reviewed the literature on health knowledge in low-income populations, including studies of dental caries (6), cancer (7), and cardiovascular disease (8). These studies did not address the question of whether respondents were aware that these health conditions were risks to which they were vulnerable. The studies did show, however, that knowledge of specific protective steps to prevent or recognize the condition early was quite variable, with one or two key facts or protective actions named by a majority of respondents, but with most knowledge items or protective actions reported by only a minority. Similarly, in this study we found that although awareness of environmental risks was high, knowledge and use of protective steps was quite variable, suggesting a similar pattern to reported findings about health knowledge in underserved, low-income populations.

The high levels of awareness of these environmental health risks found in the survey confirmed the focus group findings that the issues selected as campaign themes were important to community residents. In addition, the high percentages that reported taking some protective action against most of the risks suggest that community residents are highly concerned about their environment and want to improve its quality. The relatively low levels of many important protective actions suggest that there is substantial room for an educational campaign to increase the ability of families with children living at home to reduce environmental risks. Finally, both the differences between the actions rated as most important by CCCEH researchers and community residents and the differences between the perceptions of environmental risks of English-speaking and Spanish-speaking respondents indicate the importance of involving community members in planning health initiatives that concern them.

That environmental health researchers and community residents differ in their ratings of high priority protective activities is not surprising, as several studies have shown that professionals and lay people have different understanding of risk (9,10) as well as different health values and priorities (11). Health experts may know more about the scientific basis and long-term health consequences of specific risks, but community residents are likely to have unique knowledge of local conditions, exposures, and quality of life (10). The findings reported in Table 2 may reflect both sources of difference, but we believe that the differing views of the environment held by residents and researchers are probably most important. For many community residents, pest infestation and abuse of alcohol or drugs are immediate threats to their quality of life and social environment, whereas for researchers, who are less likely to experience these problems at the same level of immediacy and intensity, knowledge of the long-term effects of lead and ETS exposure are matters of greater concern.

Our decision to include the environmental issues identified by community residents in the Healthy Home, Healthy Child campaign was based on the principle that communities have the right to participate in the planning of programs that affect their health (12–14) and on evidence that communities are more likely to engage in and sustain changes in health behavior that they have helped design (15–17). Indeed, the likelihood that health experts and community residents will differ in their health priorities suggests the importance of reaching what Friere calls a “cultural synthesis” as the basis for a community–outside expert partnership to improve health (12). Recent studies have

shown that this approach can be successful in reaching and involving low-income, underserved population groups that have not previously been active in such problems as cardiovascular disease prevention (18), controlling asthma (19), dental caries prevention (20), and use of primary care services (21).

### Limitations of the Study

There are several important limitations to this study. First, the survey used a convenience sample rather than a randomized sampling procedure and thus may not accurately represent all of the women in Northern Manhattan. For example, because interviews were conducted during the day in public places, women employed full-time during the day were not part of the sample, and it seems likely that the risk perceptions and protective actions reported by this group would differ from those of women working as homemakers or employed part-time. Second, because one interviewer did all the Spanish-language interviews and the other interviewer interviewed women in English only, any differences in interviewing practice are confounded with the language, cultural, and residential differences we have described. Although they were both carefully trained in interviewing methods, we cannot rule out the possibility that this affected the findings. Third, responses to interview questions reflect not only actual beliefs and behavior but also the perceived social desirability of the response, and we cannot rule out the effect of this on the findings of the survey. Finally, the purpose of this survey was to confirm focus group findings and identify baseline levels of environmental knowledge and protective actions with respect to the seven proposed themes of the campaign. As a

result, we did not conduct a full inventory of potential factors influencing indoor air quality, such as chemical cleaning and personal care products, or of other household environmental risks to children's health. Future research should address these areas as well.

### Conclusions

Despite these limitations we think the survey findings provide valuable information for both our Healthy Home, Healthy Child campaign and other studies or interventions to increase awareness of environmental risks and protective actions. We found that in this community a high percentage of women were aware of environmental risks and took actions to reduce them, but that many important protective actions were not widely reported, confirming that a campaign to increase such actions was needed. We also found that the survey findings generally supported the findings of the focus groups held to assess community views of the environment.

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