

**INTEGRATION OF ENVIRONMENTAL PUBLIC HEALTH INTO
PRIMARY HEALTH CARE SERVICES FOR LOW INCOME
PREGNANT WOMEN**

By

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LIST OF TABLES

- i. Table 1. Frequency of Answer Selections to Assessment Questions. Pre vs. Post-Assessments
- ii. Table 2. 2 Sample T-test results for comparison of number of correct answers on pre and post knowledge assessments.

ABSTRACTINTEGRATION OF ENVIRONMENTAL PUBLIC HEALTH INTO PRIMARY HEALTH CARE
SERVICES FOR LOW INCOME PREGNANT WOMEN

Renée L Whiskey

Objective: To assess the effectiveness of a pilot intervention using Integrated Pest Management (IPM) as a method to integrate environmental public health into primary health care services for low-income pregnant women. Methods: Pregnant women \geq 18yrs old and clients of the Drexel University 11th Street Family Health Services Center were recruited. Pre-intervention environmental knowledge assessments were conducted to measure knowledge of pest identification and toxicity of hazardous pesticides. Home visits were conducted along with delivery of IPM education and materials. Two weeks post intervention participants were contacted to complete a post-intervention environmental knowledge assessment. Results: Frequencies of answer correct answer changes and two sample t-test analysis results show that the delivered intervention result in a significant knowledge change among the cohort ($p=0.04$). Conclusion: The use of Integrated Pest Management as a method to integrate

environmental public health into primary health care services for low income pregnant women is an effective method of creating knowledge change in the cohort.

INTRODUCTION

Continuing research maintains that there is an important link between environmental toxins and disease. Chemicals that are readily available to the public have been linked to diseases of the lung and cancers. Of particular concern is the exposure of these chemicals to the vulnerable population of children both in the pre-natal and early post natal periods. Unfortunately, information about the potentially serious toxic effects of readily available chemicals is not often easily available to those whom are in most need. This pilot intervention and research project aims to address this gap by integrating environmental public health into primary health care services for low income pregnant women. The aims of this research are to develop and implement an innovative method of environmental health information distribution to low income pregnant women clients of the Drexel University School of Nursing's 11th Street Family Health Services Center along with evaluating the efficacy of delivered outreach and education. Participants were recruited to receive a home visit which served as an opportunity to assess the home for sources of pest entranceways, sources of sustenance for pests, current pest control methods and toxic chemical use. They were also asked to complete pre and post knowledge assessments to measure knowledge of the hazards caused by toxic chemical use and best practices for pest control.

Background

“Understanding the relationship between residential environmental hazards and children’s health problems is a necessary precedent to preventing those problems.”

(Brysse P, 2003)

The relationship between housing and health has been well established. In the US early recognition of the housing and health relationship led to the rise of the sanitary reform in the early 1800s. Substandard housing plagued by overcrowding and poor maintenance contributed to increased transmission of infectious diseases. Structural deficits, lack of appropriate temperature control or adequate ventilation, under maintained piping systems etc. all contribute to making homes reservoirs for spread of disease, environmental toxins and allergens. Although early efforts at correcting the health concerns centered around housing and infectious disease were very successful, the growing concern surrounding the ever growing incidence of asthma and asthma morbidity rates has brought housing and health back into the focus of public health awareness. According to Kreiger et al., in a call for public health action in housing and health, indoor environmental toxins may be in part responsible for disparities in asthma morbidity and are linked to substandard housing thus disproportionately affecting Blacks and low income people (Kreiger J, 2002). The realm of housing and health is very complex, thus making a public health response multifaceted and providing many areas to begin intervention. Researchers can choose to address environmental tobacco

smoke, lead exposure, injury etc. This research study focuses on an aspect of exposure that can be fairly manageable by the public, exposure to pesticides in the home. One thing is evidently clear, the uniqueness of children and their development both pre natal and early post natal makes interventions focused on children a practical starting point. The study basis is that early intervention of preventable risks associated with pesticides use in the home and the deliverance of related information to the public through primary health care visits can create effective knowledge and behavioral change in low income communities.

Significance

Pesticide exposure is a Global Health epidemic. Although the majority of pesticide poisoning cases occur in developing countries, exposure is common in the U.S. also (Jaga K, 2003). Nearly all disease has an environmental component. The National Cancer Institute has stated that the environment may be a factor 70-90% of all cancers and Smith et al estimates that 25-33% of the Global health burden of disease can be attributed to environmental risk factors (Hamilton WJ, 2005)and (Smith KR, 1999). A recent report by Pew Environmental Health Commission argues that the only way to reduce the immense cost of chronic disease in the US, some 100 million people suffering each year and \$325 billion in annual cost and lost productivity, is to address the environmental health gap that exists. Estimates of annual costs for asthma and neurobehavioral disorders in children, two of the most common health effects of exposure to pesticides, are \$2.0 billion and \$9.2 billion respectively (Landrigan PJ, 2002).

While our nation and the world at large continues to soar with new advancements to improve the quality of life it has also contributed to the health burden by way of direct and/or byproduct exposure. With upwards of 80,000 new synthetic chemicals developed over the last half century the Environmental Protection Agency is overburdened with the task of reviewing almost 3,000 new chemical a year (Landrigan PJ, 2002). Unfortunately, the reality is that many people are exposed to harmful products and suffer adverse health effects as a result of their exposure. In an effort to keep homes clean, disinfected and pest free people rely on the chemicals they see in everyday stores that profess to rid them of these concerns. In many cases the exposed are members of the most vulnerable populations particularly infants, children and the developing fetus especially those of low-income and minority communities. The developing fetus is particularly susceptible to health effects associated with exposures to environmentally toxic substances for many reasons. Pesticides by their nature are neurotoxins and are also considered teratogens (substances toxic to the developing fetus) thereby, having many adverse effects on the nervous system particularly in regards to developmental delays. Understanding of exposure pathways can provide researchers with innovative ways to address exposures early and intervene preemptively. Rapid cell proliferation, an increase in the number of cells as a result of cell growth and division, allows for cells that have been exposed to toxins to continue to divide rapidly spreading toxicity. Teratogenic chemicals such as pesticides easily pass from the blood to the brain in the prenatal stage of development because the blood brain barrier is not formed until well after birth. In the critical process of brain

development there are open windows of critical stages where interference from a teratogenic agent can cause significant damage in cell development or specification thus becoming possible causes for developmental delays (Rodier, 1994). Perera and associates have reported that less efficient toxic clearance mechanisms allow toxins to remain in the body longer than they would in an adult and longer years of existence gives a significant period of time for diseases to develop following exposure. This is also important for exposure to small children who live closer to the ground in their early years where toxins in the air tend to settle. Maternal exposure to pesticides may even cause spontaneous abortions, fetal death and some birth defects (Slansky D, 2003). Experimental studies of both prenatal and neonatal exposure to clorpyrifos, one of the most commonly used pesticides in the residential setting, have reported neurochemical and behavioral effects as well as selected brain cell loss (Perera FP, 2002). Residential pesticide use has also been linked to the development of asthma, exacerbation of its symptoms and sensitization to specific allergens. There is recent evidence from The Columbia Center for Children's Environmental Health study of pregnant women and children that reports *in utero* sensitization to specific allergens can occur independent of sensitization of the expecting mother, possibly putting the child at higher risk of asthma. This may be due to critical windows in prenatal development during which exposure to environmental toxicants can modify the formation and maturation of the lungs [(Plopper CG, 2000) and (Perera FP, 2002)]. The lack of resources for research, outreach and prevention should cause health care professionals to rethink this void and focus

preventative efforts to address the diseases that are potentially preventable through public health efforts and pollution prevention.

Most Americans spend an overwhelming majority of their time indoors and in close human contact with potentially hazardous chemicals which may occur during routine daily tasks in the home environment. Children spend as much as 80-90% of their time indoors author Gurunathan reports that full time homemakers and young children spend about 21hrs a day in the home (Gurunathan S, 1998). The home environment, in particular, represents an important source of fetal and early childhood exposures to biological, chemical and physical agents as well as a strategic opportunity for intervention (Brysse P, 2003). Unfortunately those at highest risk are usually low-income minority and socially disadvantaged residents of urban communities who are subject to living in substandard housing and lack access to health care resources and comprehensive health education. In an effort to keep homes sanitized and free from the nuisance of pests, often residents of these communities perform tasks that are seemingly benign such as spraying pesticides or using harsh chemicals to assist in cleaning. Studies have shown that after a single blast application of chlorpyrifos, pesticide residue can remain in indoor air and on surfaces in the home for up to two weeks. After one blast application potential exposure to children can reach anywhere from 60-120 times the EPA's recommended reference levels for exposure (Berkowitz GS, 2003). This concentrated exposure to pesticidal chemicals has proven itself to be extremely hazardous to developing children. In a prospective cohort study showing widespread pesticide use during pregnancy in minority communities of New York City,

459 African American and Dominican women were interviewed. 85% reported using some form of pest control measure during pregnancy. All women had detectable levels of at least three pesticides (chlorpyrifos, diazinon and carbamate propoxur) in personal air samples collected in third trimester of pregnancy (Perera, 2005). The pesticides were detected in 45-74% of blood samples collected from mothers and newborns at delivery; maternal and newborn levels were highly correlated, indicating that pesticides had been transferred from mother to fetus during pregnancy (Perera, 2005).

The basic focus of designing and implementing interventions for pesticides exposure should shift towards screening homes (Bryse P, 2003). Although, knowledge and behavioral change is at times challenging to obtain, this novel method of environmental health outreach will rigorously attempt to achieve such goals. While health care providers are regarded as logical sources of environmental health knowledge, evidence indicates that neither physicians nor nurses/nurse practitioners receive much formal training in this area [(Graber DR, 1995) and (Goldman RH, 1999)]. The Texas Medical Association Physician Oncology Education Program mailed a questionnaire to 350 Texas primary care physicians to evaluate their attitudes, practice and training. 86.1% of respondents reports that they had never had formal training in environmental health history-taking and 91.7% indicated the desire to learn more about environmental health hazards. The data also revealed that patients regularly raise questions about environmental topics in which primary care physicians are not formerly trained (Hamilton WJ, 2005). Therefore, the need for environmental health outreach and education for patients is apparent.

Integrated Pest Management

Integrated Pest Management (IPM) is a pest control technique that uses a less toxic comprehensive approach to ridding pests. Its core principles focus on identification, prevention, exclusion, removal and control of pests. The IPM method makes clear that pests are looking to meet the same basic needs as humans (food, water and shelter) and attempts to attack infestation by removing the sources for such needs and other underlying causes of infestation in order to achieve a long term solution. It consists of a combination of simple methods that focus on prevention and safe control by figuring out why and how pests are a problem and how and why they enter the home. IPM promotes the use of less toxic pest management methods such as using gels and traps thereby protecting people from breathing in harmful poisonous chemicals from sprays and aerosols. IPM techniques include the use and correct placement of traps, gel baits, closure of cracks and crevices, removal of food and water sources for pests, education of methods, recognition of pests and signs of infestation, removal of highly toxic pesticides from the home and maintenance of methods. Many studies have shown that the use of IPM techniques in urban communities provides a successful long term solution to controlling pests and as a result may have a positive effect on the health of residents. Long term control of pests can significantly reduce exposure to cockroaches and mice and related allergens as well as reducing exposure to pesticides that have been linked to asthma, allergies and certain types of cancer. In a study of 131 mothers,

enrolled at prenatal visits, Brenner and colleagues conducted a prospective intervention trial in which the intervention group received individually tailored IPM cockroach education, repairs, less toxic pest control application, supplies and 4 months of follow up. Results found that the proportion of intervention homes that had cockroaches declined from 80.5% to 39.0% in roughly 6 months (Brenner BL, 2003). Authors Wang and Bennett conducted a comparison study of Integrated Pest Management in public housing using flushing, vacuuming, monitoring sticky traps, educational materials, baits, gels and follow up to control for cockroaches in the IPM group. At the 29 week follow up only one apartment in the IPM group had high levels of infestation (>12 cockroaches), shown by counts on monitoring traps, in contrast to the 5 apartments with high levels of infestation that were only treated with baits and gels. Based on the results authors Wang and Bennett concluded that IPM was a more sustainable method of control with education of the residents being an important component of its success (Wang C, 2006). The authors from this study also analyzed the cost benefit associated with IPM and found that although IPM was more expensive than bait only treatment, \$64.8 and \$35.00 respectively, the researchers expect that IPM will better control at similar costs to bait treatment when considering long-term success (Wang C, 2006).

Methods

This project was a pilot intervention with measurement of knowledge and behavior change among the cohort. The main aims of this project are 1. To develop and implement an innovative method of environmental health information distribution to

low income and predominantly minority pregnant women clients of the Drexel University School of Nursing's 11th Street Family Health Services Center and 2. To evaluate the efficacy of the delivered intervention and education.

To address these goals researchers began with developing the required educational materials. The first step to providing education to the participants of the intervention began with creating information pamphlet for participants to keep and reference after the project's completion. Environmental health information was gathered in the following methods: 1) direct acquisition from existing records (ie. public access fliers), 2) adaptation from existing sources 3) material generation from investigator knowledge or expertise and 4) compilation of existing materials from the Pennsylvania Integrated Pest Management Cooperative Extension (PAIPM). Materials were reviewed by the research team to determine what materials were literacy appropriate for potential participants and to determine what information may be most useful. After reviewing all gathered materials the research team decided to address three specific pests and other supplemental materials. Initial pamphlet contained information regarding cockroaches, mice/rats, ants, reading labels of pesticides, information on hiring a professional and phone numbers for the National Pesticide Information Center and Poison Control. Provision of the number for the National Poison control hotline was critical to the information booklet. Although there was great encouragement for participants to understand proper storage methods for pesticides, it was understood that accidents do occur and the contact information may be useful for accidental poisoning with other poisonous materials that were not mentioned as a part of this study. Following the

compilation of educational materials a focus groups was conducted by the research team (Dr. Perez, Dr. Ward, two MPH students and the research coordinator), with project personnel, 11th St Center care providers and 11th Street client advisory board. Using the principle of participation as a guide the research team understood that active participation from members of the intended population in defining their own high priority problems enhances success in achieving goals and therefore thought feedback from this select group of advisory board members would be effective in developing the most appropriate materials for distribution during the course of the project. The focus group served to gather information on the clarity, relevance and effectiveness of materials intended for distribution throughout the project. Feedback from the focus group included concerns about the use of the term low-income and the addition of bed bugs and fleas and home cleaning tips. The contributions from the focus group led to modification of the materials to better suit the needs of the clients.

Once materials were finalized the Internal Review Board Approval was sought through the Drexel University Office of Regulatory Research and Compliance (ORRC). An expedited review was completed and concerns were addressed by the research team. Some concerns included the initial request to perform assessments on person declining to participate (a component the research team thought would be beneficial for comparison to knowledge and behavior in consenting participants), inclusion of the standard statement on the recruitment signs, inclusion of 24-hour contact numbers for research team investigators, unduly noting benefits of participation, more explicit description of consenting processes and correcting for readability level of informed

consent. The research team chose to remove the proposal to question those who declined participation under the advice of the ORRC all other corrections were made and the application was resubmitted for review. Due to the length IRB process the time line for the project became shorter and some minor deviations from the original proposal were changed to ensure project completion. The one month follow up phone call was removed from the project due to time constraints.

The selection criteria for participants were restricted to pregnant women 18 years of age and older that were receiving prenatal care or participating in pregnancy related classes at the 11th Street Health Center. Participants were also required to have a permanent place of private residence, participants renting single rooms in a home were excluded from the study. The Drexel University School of Nursing's 11th Street Family Health Services Center is a comprehensive, nurse-managed health center run by the Drexel University College of Nursing and Health Professions in collaboration with the Family Practice and Counseling Network. It functions by the mission to provide quality, comprehensive health services to all the people it serves with special attention to vulnerable people and residents of public housing communities. Its seamless integration of behavioral health care and other medical services into primary care visits provides a platform to offer inclusive health care services to its clients as possible. This site was selected due to its provision of an infrastructure that provided the greatest potential for positive results. It also provides a unique pregnancy related program, the Centering for Pregnancy Class, for low income pregnant women to receive pre-natal visits and in class education about pregnancy related topics as well as environmental health topics such as

“Healthy Homes.” Participant recruitment began after focus groups were completed. Recruitment signs were posted in the lobby and waiting area of the clinic. The research coordinator introduced the project to women enrolled in the Centering for Pregnancy classes and asked about their willingness to participate. Recruitment signs were also posted in the Health Center’s lobby, entrance ways, dental offices, behavioral health offices and Primary care exam rooms [See appendix A for approved recruitment signs]. Upon expressing willingness to participate all persons were informed that participation was completely voluntary, could be terminated at anytime, and that lack or termination of participation would have in no way affected their care or access to services at the 11th Street Health Center. Participants were then consented on the spot. The IRB approved informed consent form was read to each individual page by page and each page was initialed by the participant once it was ensured that information provided on the page was completely understood. At the end of the document both the participant and the research coordinator signed the document and participants were allowed to keep a copy. [See appendix B for approved Informed consent application].

Participants were then asked to complete an environmental knowledge assessment at the time of recruitment. The environmental knowledge assessment consisted of eight questions that were intended to be used to gage knowledge of toxicity, identification of pests currently present in the home, less toxic was to rid homes of pest, proper pesticide storage etc [See appendix C for environmental assessment]. Participants were asked to attach their names, phone numbers and addresses, however no other identifiers were collected at any time during the project. The names, addresses and

phone numbers were used to schedule home visits with the women and link pre assessments to post assessments for measuring knowledge change resultant of the intervention.

Home visits were carried out by the research manager and both MPH students under the supervision of the principal investigators. The research manager and MPH students were trained by the PAIPM coordinator on methods of IPM and proper product selection. Home visitors were also trained by the principal investigators on proper data collection, participant education, and intervention delivery techniques. Home inspectors answered any questions or concerns of the participants, explained all educational materials, and conducted a thorough environmental hazard inspection (specific to pests and pesticide exposure) of the home. Specific inspection guide documents were used to record data and all home visits were conducted in a consistent and uniformed manner. Individually tailored information on ways to reduce environmental hazards and risks, with particular emphasis placed on pesticide exposure, was discussed with participants during the visit based upon what was observed. An emphasis on pesticide exposure was placed as a result of the susceptibility of a developing fetus to the neurotoxic effects of pesticide exposure during gestation.

As a part of the home visit participants were taught to reduce their exposures and risks by using IPM techniques. In an effort to further reduce exposure to participants, the project also included a pesticide “trade in” program during the visit in which participants were offered mouse traps, boric acid, fly traps and swatters, copper mesh for

sealing/blocking large holes and silicone caulking for sealing cracks and crevices, in exchange for any pressurized aerosols, sprays or liquid pesticides which may have been present in their homes.

Follow up was conducted two weeks after home visit interventions. Participants were contacted either by phone or in person. The initial follow up addressed any question or concerns of the participants and collected information regarding compliance to the recommendations offered from the home inspection. Information regarding non-compliance was also collected as well as participant perception of IPM method efficacy. Participants were also asked to complete the environmental knowledge and behavioral assessment again. The second environmental knowledge assessment addressed the same issues as the initial assessment and the results were used for comparison to gauge the change in knowledge and behavior resultant from the delivered outreach. Changes in answers on the assessments were analyzed using the SPSS version 17.0 statistical package. Analysis was conducted by the two MPH students working on the research team.

As an additional benefit to participation in this project, participants were offered the following incentives: a \$10 gift card to a local merchant upon completion of the home inspection and a \$15 gift card to a local merchant following the completion of the second follow up phone call. The \$10 gift card were given to participants by the home inspectors at the end of the home inspection and the \$15 gift card were mailed to participants after completing the second follow up phone call.

Results

Initial goals for recruitment were to have at least 30 participants. However, recruitment yielded a total of 10 consented study participants. Four of the ten participants were recruited by initial recruitments efforts of signage and Centering for Pregnancy Class announcements for participation. The remaining 6 were given the intervention in a group setting during one of the Centering for Pregnancy classes at the 11th Street Health Center. The data from pre and post tests were analyzed using SPSS software.

Frequencies were calculated for each response to the environmental knowledge assessment and interpreted for their meaning. Paired T-tests were also conducted for pre and post data to assess whether the intervention was successful in creating knowledge change among the cohort. Frequency calculations showed the following: when asked to identify the items that were dangerous to their health pre interventions results showed 30% of the cohort choosing the correct items from a list and 70% of participants choosing the correct items on post intervention assessments. When each independent variable from the same question was assessed the pre test found that 60% of the population thought Boric Acid was dangerous to their health, 80% thought Bleach was dangerous to their health and 80% thought Raid Sprays were dangerous to their health. Post test assessments reported 20% of the population thought Boric Acid was a danger to their health, 60% thought Bleach was a danger and 80% though Raid Sprays were a danger to health. Table 1 depicts results of the assessment questions. A 2 sample

t-test was also performed to compare means on questions of the environmental assessment that had a dichotomous response which indicated whether participants had significant knowledge change resultant of the delivered intervention. Results from the 2 sample t-test yielded a p-value of 0.04 signifying that there was a significant mean change in number of correct answers chosen for dichotomous questions on pre and post assessments. A significant knowledge change did occur among participants and the delivered outreach was effective in eliciting knowledge change.

Frequency of Answer Selections to Assessment Questions. Pre vs. Post-Assessments

Assessment Question	Pre-Test	Post Test
Identified Correct items dangerous to health	30%	70%
-Boric Acid is a danger to health	60%	20%
-Bleach is a danger to health	80%	60%
-Raid Spray is a danger to health	80%	80%
<u>Level of concern about how items affect health</u>		
Not concerned	30%	20%
Somewhat concerned	30%	20%
Quite concerned	30%	50%
<u>Identified pests in the home</u>		
Mice/Rats	50%	30%
Cockroaches	70%	60%
Bed bugs	0	10%
<u>Understood what causes infestation</u>		
Water leaks	20%	20%
Cracks and Crevices	70%	70%
Correctly identified appropriate methods of elimination	30%	80%
-Sprays	50%	10%
-Poisons	40%	10%
-Caulking Walls	40%	70%
-Traps	60%	40%
-Gels	80%	60%
Agreed that there are less toxic methods of elimination	90%	90%
Understood there is a right and wrong way to store pesticides	70%	100%
Has the number for Poison Control accessible to everyone in the home	30%	80%

Table 1. Percentages of responses to environmental knowledge assessment questions.

2 Sample T-test results for comparison of number of correct answers on pre and post knowledge assessments.

	Variable 1	Variable 2
Mean	5.642857143	7
Variance	5.324175824	3.692307692
Observation	14	14
Pearson Correlation	0.451081337	
Hypothesized mean difference	0	
Df	13	
T Stat	-2.267200289	
P(T<=t) one-tail	0.020540345	
T critical one-tailed	1.770933383	
P(T<=t) two-tail	0.04108069	
T critical two tailed	2.160368652	

Table 2.

Researchers also collected information about product interventions satisfaction and adherence to recommended changes. Nine of the 10 participants responded for follow up satisfaction questions. Some responses to whether participants found the intervention helpful included “will definitely recommend to others”, “new methods are 10 times better”, “caught 2 mice so far and have seen much less cockroaches” and “have not seen any mice since”. Overall participants were generally satisfied with the delivered intervention and believed that they were experiencing success in ridding their homes of pests in a less toxic manner.

Discussion

Although the sample size of this intervention was very small the findings of this study are similar to other studies of IPM effectiveness in Low income minority communities. There were some noticeable changes that are reported by comparing simple frequency of answers for pre and post tests and significant knowledge change was also indicated as a result of 2 sample t-test ($p=0.04$). The small data set led researchers to the conclusion that the presence of pests in the home is an unexpected highly sensitive issue. Potential participants may not have been comfortable admitting that pests were present due to fear of social stigmas attached (ie stigma of being “dirty”). They may have also been uncomfortable with the idea of having home visits which requires strangers to enter the home, a place where people feel most comfortable. There were some limitations of this research study. Resultant of using a knowledge assessment questionnaire there may have been some self –reporting bias. Although, the research team stressed that the assessment was not an exam and answers were being used as a tool to improve the program there may have been stigma attached to having wrong answers and this might explain why many participants chose not to answer certain questions. With added time the questionnaire may have been revised to include questions that reported a little more detail for responses. For example, when participants were asked about their level of concern, initial responses were equal at all levels (30% not concerned, 30% somewhat concerned, 30% quite concerned) and post

intervention responses shifted to higher levels of concern (20%, 20% and 50% respectively) however, there was no indication as to whether concern was heightened because of new knowledge of potential health hazards or if those who chose low levels of concerns are not concerned because they now know how to change their behaviors to avoid potential health hazards. Another limitation of this study was the short follow up period (2 weeks post-intervention). It is very possible that 2 weeks may not be enough time to observe real changes in levels of infestation. It would also rely on participant observation of level of infestation rather than the IPM method of trap monitoring. The two week time span may also not be enough time to imply that participants truly retained the new knowledge and continued to use IPM methods. A one month post-intervention home visit would have allowed for researchers to lay monitoring traps which would indicate 1. Whether participants maintained IPM methods; 2. Whether levels of infestation were truly lowered due to intervention; or 3. Where improvements may be made in information delivery or modification of previously taught techniques (ie targeted trap placement). A major strength of the study was the ability of the intervention to be beneficial to participants with differing styles of learning comfort. The educational component of this intervention was vital to producing success and special efforts were made to accommodate different learning styles. A family friendly DVD was distributed and watched with participants, a comprehensive information booklet (written for a 6th grade reading level) was also distributed and home interventions were hands on participatory and demonstrative learning experiences. These approaches were designed to give participants a sense of control

over protecting themselves and their families from the associated potential health effects of exposure to toxic pesticides and control over changing behaviors. This active participation of participants is an important variable in degree of knowledge change.

Conclusion

There is a growing body of evidence to support that integrating environmental public health into primary health care services for low income and minority communities is a beneficial research effort. As in this study, other research using IPM methods as a mode of delivery to elicit change in potential health hazards in communities have shown that IPM programs can be successful. After studying this particular cohort the research had found that although this may be valiant effort further research must look to identify readiness to change. Despite aggressive recruitment efforts the research team unexpectedly uncovered that the sensitivity factor coupled with list of other more pressing tasks that expecting mothers are facing posed a rather large recruitment barrier. Despite difficulties with recruitment participants were satisfied with the intervention and analysis of assessment data have shown that this intervention effort was successful at creating knowledge change.

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Appendix

Appendix A

PREGNANT?

**Tired of dealing with
pests in your home?**

**Concerned about your
child's health?**

**Participate in a research study to
help you find a healthier way
to deal with pests in your home**

**Receive up to \$25 worth of Gift Cards to
your favorite stores**

for your participation!



You must be at least 18 years old to qualify.

**If you are interested in participating in this study, please
contact**

Lindsay Herendeen: (215) 769-1582

This research is conducted by researchers who are members of Drexel
University.

APPROVED
OFFICE OF REGULATORY RESEARCH COMPLIANCE

Protocol No. 17984-01

App. Date 2/25/09

Exp. Date 2/22/10



Subject Initials _____

Page 1 of 4

Drexel University
Consent to Take Part in a Research Study

1. **SUBJECT NAME:** _____
2. **TITLE OF RESEARCH:** **Integration of Environmental Public Health into Primary Health Care Services for Low Income Pregnant Women**
3. **INVESTIGATOR'S NAME:** Hernando Perez, PhD, MPH
4. **RESEARCH ENTITY:** Drexel University.
5. **CONSENTING FOR RESEARCH STUDY:** This is a long and an important document. If you sign it, you will be authorizing Drexel University and its researchers to perform research studies on you. You should take your time and carefully read it. You can also take a copy of this consent form to discuss it with your family member, attorney or any one else you would like before you sign it. Do not sign it unless you are comfortable in participating in this study.
6. **PURPOSE OF RESEARCH:** You are being asked to participate in a research study. The purpose of this study is to address the deficiency in the supply of environmental health outreach in general, and housing and health outreach in particular, available to inner city communities in Philadelphia. You have been asked to participate because you receive care at 11th Street Family Health Services Center and you are pregnant. A total of one hundred and twenty (120) subjects, including you, will be enrolled in this study and all of them will be pregnant women receiving care at 11th Street Family Health Services Center.

To be eligible for the study, you must be a pregnant woman, 18 years or older, who is receiving care at Drexel University School of Nursing's 11th Street Family Health Services Center OR you must be attending pregnancy related courses at the center during a continuous six month period.

Your participation in this study is voluntary. You may choose not to participate in this study. Once you are enrolled in the study, your participation may end if you decide that you no longer want to participate. You may withdraw from this study at any time with no negative consequences.

7. **PROCEDURES AND DURATION:** Your participation in this study will involve the following:
 - One (1) home visit
 - Two (2) phone calls by researchers over the course of one (1) year.
 - To continue being involved in the study you will need to allow researchers into your home to check your personal use of pesticides.
 - The inspections could include such areas as living rooms, bedrooms, kitchens, bathrooms, closets, basements or crawl spaces, attics, storage rooms, wall spaces where there are access panels to plumbing, and spaces inside and behind dressers and cabinets.
 - If there are areas that you are not willing to permit the researcher to inspect, please let the researcher know.
 - During the visit, you will be asked about your use of pesticides.
 - One month after the home visit, the project coordinator will call you to ask some questions to follow up on your use of pesticides.
 - You will be asked to complete a questionnaire, below is a description of each of the visits and phone calls that will be made to your home if you decide to participate. One of the researchers listed on the last page of this consent form will be conducting all visits and phone calls described below.

APPROVED
OFFICE OF REGULATORY RESEARCH COMPLIANCE

Protocol No.	1-12-11-01
App. Date	2/23/10
Exp. Date	2/23/10

Version 1

Visit #1**(Today, or when you decide to participate in the future.)**

This visit will take about 30 minutes to complete. You will first be asked to complete a questionnaire (Environmental Knowledge Assessment form). You will then receive environmental health information materials. After signing this document, you will be scheduled for a home visit by the project coordinator.

Visit #2**(Within a month of Visit #1)**

This home visit will help to determine the presence of potential environmental health hazards in your home. The researcher will be paying close attention to how you attempt to control pests. While at your home researchers will:

- Provide a detailed explanation of educational materials
- Answer your questions and concerns
- Collect a detailed environmental history.
- Then a thorough environmental hazard inspection of the home will be performed.

During the inspection, the inspector will provide specific information on ways to reduce risk and potential exposures based upon what is observed. All identified potential hazards will be addressed during the inspection. However, particular importance will be placed on potentially hazardous exposures to pesticides. Emphasis will be placed on pesticides because of its potential to harm a baby during pregnancy. The trained home inspector will also offer replacement methods of pest management and give recommendations on less toxic methods of pest management.

Phone Call #1**(Two weeks after Visit#2)**

Two weeks following Visit #2 (the home inspection) you will receive a phone call to address any questions and or concerns. You will also be asked if you are following the recommendations of the home inspector and possible reasons for why you may not be. This phone call should last about 10mins.

Phone Call #2**(One month after Visit #2)**

One month following Visit #2 you will receive a phone call from project coordinator. During this phone call you will be asked questions about the items identified during your home inspection. These will include questions about your use of pesticides in the home. This phone call will last about (10) minutes.

This follow up call will serve to answer any questions or concerns, measure compliance with recommendations for alternative pest management and measure project satisfaction and perception along with the completion of another environmental assessment questionnaire.

In summary, your involvement in this research will last about two (2) months from the day of your initial assessment. Your home will be inspected once and you will receive two follow up phone calls.

APPROVED

OFFICE OF REGULATORY RESEARCH COMPLIANCE

Protocol No. 17984-01

App. Date 2/23/09

Exp. Date 2/22/10

8. RISKS AND DISCOMFORTS/CONSTRAINTS:

You may feel anxious or stressed after finding out that toxins in your home may be affecting your unborn child's health. In the event that this information makes you feel overwhelmed there will be counseling available for you to discuss your concerns. You will be provided with information on how to help control the toxins that may affect your unborn child's health and any questions you have about how to control these things will be answered.

9. UNFORESEEN RISKS: Participation in this study may involve unforeseen risks. If unforeseen risks occur, the Drexel University Office of Research Compliance will be notified.**10. BENEFITS:** There may be no direct benefit from participating.**11. REASONS FOR REMOVAL FROM STUDY:** You may be required to stop the study before its completion for any of the following reasons:

- a) If you move into a new residence before the end of the study.
- b) If all or part of the study is discontinued for any reason by the sponsor, investigator, university authorities, or government agencies; or
- c) If the researchers are unable to contact you after multiple attempts via telephone and in person, you may be removed from study.

12. VOLUNTARY PARTICIPATION: Participation in this study is completely voluntary, and you can refuse to be in the study or stop participation at any time without the loss of any benefits to which you are entitled. Withdrawal from or refusal to participate in this research study will in no way affect your care or access to services at the Drexel University School of Nursing 11th Street Family Services Center.**13. RESPONSIBILITY FOR COST:** Drexel University will be responsible for any costs relating to conducting this study.**14. STIPEND/REIMBURSEMENT:** You will receive a \$10 gift certificate to a local merchant upon completion of the home visit. Also, a \$15 gift certificate mailed to you upon completion of the second follow up phone call.**15. IN CASE OF INJURY:** If you have any questions, or believe you have been injured in any way by being in this research study, you should contact Dr. Hernando Perez at telephone number (215) 762-6514. However, neither the investigator, nor Drexel University, will make payment for injury, illness, or other loss resulting from your being in this research project. If you are injured by this research activity, medical care including hospitalization is available, but may result in costs to you or your insurance company because Drexel University does not agree to pay for such costs. If you are injured or have an adverse reaction, you should also contact the Drexel University Office of Regulatory Research Compliance at 215-755-7857.**16. CONFIDENTIALITY:** In any publication or presentation of research results, your identity will be kept confidential, but there is a possibility that records which identify you may be inspected by authorized individuals such as representatives of Drexel University, the institutional review board ("IRB"), or employees conducting peer review activities. You consent to such inspections and to the copying of excerpts of your records, if required by any of these representative, is indicated by signing this form.

APPROVED
OFFICE OF REGULATORY RESEARCH COMPLIANCE

Protocol No. 17984-01

App. Date 2/23/09

Exp. Date 2/22/10

Subject Initials _____
Page 4 of 4

17. **OTHER CONSIDERATIONS:** If you wish further information regarding your rights as a research subject, or if you have problems with a research-related injury, please contact the Institution's Office of Research Compliance by telephoning 215-755-7857.

18. **CONSENT:**

- I have been informed of the reasons for this study.
- I have had the study explained to me.
- I have had all of my questions answered.
- I have carefully read this consent form, have initialed each page, and have received a signed copy.
- I give consent voluntarily.

DO NOT SIGN THIS INFORMED
CONSENT AFTER THIS DATE 2/22/10

Subject or Legally Authorized Representative Date _____

Investigator or Individual Obtaining this Consent Date _____

List of Individuals Authorized to Obtain Consent

NAME	TITLE	DAY PHONE #	24 HOUR PHONE#
Hernando Perez	Principal Investigator	(215) 762-6514	(215) 762-6514
Louise Ward	Co-Investigator	(215) 762-1240	(215) 762-1240
Mehmet Erdogan	Outreach Worker	(215) 769-1582	(215) 769-1582
Renee Whiskey	Outreach Worker	(215) 769-1582	(215) 769-1582
Lindsay Herendeen	Project Coordinator	(215) 769-1582	(215) 769-1582

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Protocol No. 7084-01
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Appendix C**Environmental Knowledge Assessment**

The following questions will be used to see how much you currently know about controlling pests. Only our research team will be able to see your answers. This is not a test, just a tool to help us help you better.

1. Identify which of the following items are dangerous to your health.

___ Lemon Juice ___ Bleach ___ Vinegar
 ___ Boric Acid ___ Raid Spray

2. How concerned are you that the above mentioned items may affect your health or the health of your family?

___ Not Concerned at all ___ Somewhat Concerned ___ Quite Concerned

3. What pests are visible in your home? Check all that apply.

___ Rats/mice ___ Cockroaches ___ Ants ___ Bed bugs

4. Which of the following conditions make your home accessible to pests? Check all that apply.

___ Food crumbs ___ Water leaks ___ Old furniture
 ___ Cracks and crevices around windows that need sealing

5. What is the best way to rid your house of pests? Check all that apply.

___ Sprays (Raid) ___ Caulking your walls ___ Gels
 ___ Poison ___ Traps

6. Some methods of controlling pests are less toxic than others. ___ True ___ False

7. There is no right or wrong way to store pesticides in your home. ___ True ___ False

8. The phone number for POISON CONTROL is easy for everyone in your home to find.
__True __False

NAME: _____

Address: _____

Phone Number: _____

