PROJECT DESCRIPTION

(a) Problem, Background and Justification

The Northeast/mid-Atlantic is currently the most densely populated geographic area in the United States. Demographics show a rapidly urbanizing population with an estimated 80% of the total U.S. population now living in cities (U.S. Census, 2000). Limited data exists on pesticide use by urban residents. Estimates of the amount of land being managed as lawns and suburban open space (1.2 million acres in the NE) are termed "urban" uses and estimated pesticide use, extrapolated from sales data, is reported in lbs active ingredient per acre (Apelin & Grube, 2000-2001). However, "urban" by this measure is a heterogeneous amalgam of land management types and populations that are not further identified by subpopulation. Consequently important issues and clientele are overlooked. For example, we have little data on indoor pest management practices in the vast realm of inner-city homes. Low-income populations are arguably most in need of solid IPM education (see below) and yet are the least served by IPM researchers and educators.

Inner-city urban residents face cumulative health risks from multiple sources of environmental pollutants and toxins both indoors and out. Particularly in low-income urban communities, exposure to pests and pesticides are a ubiquitous, pernicious health threat inside homes. The most vulnerable populations include infants and children, pregnant women and the elderly. Health impacts of common urban pests include contaminated food, disease vectoring and asthma triggered by pest feces, hair and other "animal dander". The severity of asthma as an exploding health issue for urban children is well documented. Less well known and understood are the potential chronic health effects of excessive indoor use of pesticides on children and the elderly, who comprise large proportions of many urban low-income neighborhoods. As outlined above, there is a great unmet need for culturally-appropriate, community-based programming on specific, effective and least toxic Integrated Pest Management (IPM) approaches. In order to design and deliver effective IPM outreach programs to inner-city neighborhoods, we need a much better understanding of urban residents' attitudes, knowledge and behavior in response to pest infestations.

Populations in urban, low-income neighborhoods across the Northeast may be estimated at 3,368,795 persons, which represents 6.2% of the total population in the Northeast (U.S. Census, 2000). Consequently, the number of people potentially impacted by chronic pest situations and pesticide misuses is thus large. The proposed project would provide new valuable information on the pest management practices and educational needs of a huge underserved clientele. Results will be applicable to any urban area with similar demographic subgroups and thus the potential benefits and impacts by extension are also large.

The following points explain the multi-faceted scope addressing pest issues and IPM implementation in an urban environment.

1. Pesticide use by urban residents in response to indoor pests can be extreme.

Residents living unwillingly with serious indoor pest infestations become demoralized and/or desperate to get rid of these creatures (Majekodunmi et al 2002). Using "bug bombs, "bug sprays" or "rat baits", which are commonly available at any corner store, discount outlet or big box chain, is a cultural norm. Until recently, very little data existed on the exposure of city residents to pesticides in their homes, whether applied by residents themselves, a pest control operator hired by them or by a landlord. Recent studies by physicians in New York City have shown multiple, cumulative and unmonitored exposures of urban children and adults to pesticides (Landrigen et al., 1999). Frequency of indoor insecticide spraying for cockroaches in a high percentage of homes in the Boroughs of Brooklyn and Manhattan by *residents themselves* was once a week or more (Surgan et al. 2002). A household exposure survey found that 100% of a population of pregnant women in northern Manhattan and the South Bronx had detectable airborne exposure to each of three insecticides and one fungicide (Berkowitz et al., 20003). In another study on early life environmental risk factors, children exposed to insecticides before age one had nearly 2 1/2 times the risk of developing asthma before age five than did non-exposed children (Ma et al. 2002).

About 90 percent of US households overall use pesticides. It has been well documented that urban outdoor use of pesticides negatively affects surface waters nationwide (USGS-NWQA 1999a, 2002). In inner-city urban areas, indoor use of insecticides in particular is commonplace. This may be the most concentrated and therefore dangerous exposure children have to pesticides. Infants and toddlers spend almost all of their time at home. Inhalation, ingestion and absorption of pesticides in house dust can be a major route of exposure for children. Hand-to-mouth activity and time spent on the floor increases this exposure. The CDC's Non-Occupational Pesticide Exposure Study found that air in households identified as high users of pesticides had detectable levels of 11 different pesticides on average (CDC, 2003). Air in some homes contained 20 different pesticides. Because some pesticides tend to concentrate near the floor, the breathing zone of an infant or crawling toddler contains up to four times the pesticide concentration compared to two feet off the ground. Little biological monitoring has been done to determine the amount of pesticides actually absorbed by children. However, the testing that has been done indicates exposure is extensive (Dam et al. 2000). TCP is the main breakdown product of the organophosphate insecticide chlorpyrifos. Until recently, this neurotoxin was a common active ingredient in many household insecticides and widely applied by structural pest control operators. The Minnesota Children's Exposure Study (MCPES 2001) found TCP in the urine of 92 per cent of the 89 children tested. Currently, permethrin is a common active ingredient in many household insecticidal products. This chemical has been recently shown to be an endocrine disruptor as well as implicated as an asthma trigger. While not volatile, the pelleted formulation and extremely low LD50 of anti-coagulent based rodenticides makes them problematic for use around young children.

Given the wide variety of active and inert ingredients in insecticides and the unknown effects of these toxins on the developing child, the elderly and those with compromised immune systems, limiting exposure to more risky products and formulations should be a priority. Other urban studies have shown that it is entirely possible to implement IPM programs in low-income neighborhoods and public housing units with intensive outreach, education and tailoring of programs to individuals' needs (Greene and Breisch 2001, Miller and Meek 2004).

2. Human behavioral aspects of pest management in low-income communities

Few solid data exist elucidating "consumer behavior" around pests and pest management in poor neighborhoods. The rigorous urban studies that have been done (Flint, Wilen 2001 & 2002) focus more on outdoor lawn and garden scenarios, but nonetheless show disturbing trends around pesticide use.

- Over one quarter of respondents report that they do not read pesticide labels explaining environmental effects, how or where to store products nor about human health effects
- Respondents prefer to get additional information about pest control from product packaging or product brochures
- Residents in single-family detached homes do their own pesticide applications whereas those that rent or own an attached home or apartment will use a commercial company
- The most common formulation of pest control product used is a ready-to-use aerosol spray (43.5%); followed by ready-to-use pump spray (20.9%) and concentrated spray (9.3%)
- Insecticides were the majority of products stored in and around the home. 53 active ingredients were identified from all the products of which 33 were insecticide labels.
- The most frequent use pattern for pesticide application is once every few months (43.1%), followed by once a month (17.7%) and once a year (16.2)

Working with the Philadelphia School and Community IPM Partnership (PSCIP) for the past two years in low-income African American neighborhoods in West Philadelphia, we have heard testimony of and/or witnessed various dynamics that contribute to the risk factors associated with pest infestations and pesticide abuse indoors. Culturally, the presence of pests such as roaches and rodents in the home carries with it an element of shame and disgust. Consequently, residents themselves apply " bug bombs" and "bug sprays" and other do-it-yourself pesticide remedies regularly, with little attention to or knowledge of potential toxicity. Access to quality information on effective alternatives in an appropriate format for diverse audiences populating low-income neighborhoods is very limited, as is access to quality IPM services and products. Because underlying causes of chronic pest infestations are not understood or addressed, repeat pesticide applications are made, which is both costly and ineffective. The adage, "if some is good, more is better" is commonly adhered to and pertinent label information largely considered unintelligible and therefore ignored. "Raid" is a cure-all, even to the extent of being "sprayed for mice". Meanwhile people are inundated with disparate, confusing information that emanates from multiple sources. These include pesticide point-of-purchase pest management "advice", product labels' proclamations (e.g. Kills Ants!), over-stated media advertisements at peak pest seasons, "helpful" neighbors and relatives, and a variety of pest control operators licensed and otherwise. Purchased services of pest management professionals may or may not ascribe to a preventative, least toxic protocol, especially if offering a "cheap, quick-fix" option. In fact, some residents demand that PCOs spray for pests, since that is what is expected of an "exterminator". Finally, the problem of unlicensed operators persists at an unknown level, with consumers of pest management services unaware of proper questions to ask to protect themselves. Surely, these citizens have not been adequately served by our educational efforts.

3. The presence of cockroaches and rodents exacerbate or cause asthma

Asthma is one of the nation's most significant and fastest-growing chronic health threats to children under 18 and the Philadelphia region is no exception. According to a 2004 health survey by the Philadelphia Health Management Corporation (cite), 22% of Philadelphia children ages 18 and under - approximately 77,500 children – have been diagnosed with asthma. Asthma is the leading cause of school truancy and accounts for a high percentage of emergency room visits. Asthma is also a leading cause of death in the elderly, particularly black females. Public and private asthma outreach programs typically emphasize reducing major asthma triggers: second-hand smoke, pet dander, dust mites, mold and "pests" in general. Indoor use of certain pesticide active ingredients, inerts, propellants and formulations are particularly problematic for individuals with respiratory problems, including asthma. However, without solid IPM training, asthma educators cannot help their clients improve their pest management practices.

4. Need for better understanding of low-income urban clientele's needs

Effective long-term suppression of pest populations with a minimum of reliance on risky products can be accomplished with Integrated Pest Management (IPM) but much remains to be done to achieve this in urban environments. Urban populations are extremely diverse, comprised of a mosaic of many linguistic, racial, ethnic and religious populations. We lack specific knowledge about these clientele's unique understandings of pests and pesticides, and behaviors around pesticide use, storage and disposal. Consequently, we also lack appropriate outreach materials and strategic networks to effectively educate about and promote IPM implementation.

IPM programming in the U.S. has mainly been directed to agriculture. Even so-called "Urban IPM" has primarily targeted turf, gardening and landscape problems in suburbia, that is, "agriculture in the city". However, understanding the pest problems and pest management implementation approaches necessary in core city environments will have to go beyond looking for parallels from agriculture and moving them into the 'city limits.' We need to start from scratch by understanding the situation of our clients just as IPM implementers did with their agriculture clients more than 30 years ago. The new Federal IPM Roadmap requires that we address urban pest problems. As we invested in understanding our agricultural clients—their motivations, knowledge, attitudes, skill, aspirations and practices – we also need to invest in understanding our clients in poor, inner-city neighborhoods.

We like to think of IPM being based on sound, scientific studies of pest populations, their depredation of humans and their possessions, and the impact of new technologies on their management. But the implementation of IPM has more to do with changing human behavior than applying the sciences of biology, chemistry and physics. In order to change human behavior towards pests, one must first understand it.

Philadelphia and Camden Site Characteristics

In Philadelphia, the Department of Public Health has well-established programs for lead abatement. Lead programs have good information on community demographics and occurrence of aging housing stock – a factor closely correlated with high levels of roach and rodent infestations. A map of the Philadelphia potential target area was provided by our lead partners and is attached in the Appendices. Low-income neighborhoods can be identified by census data using zip codes. Precise information on our proposed study site can be found in the Evaluation Plan under Study Sample.

In Philadelphia, PA the demographics of the target neighborhoods are exemplified by those of West Powelton – predominantly African American (90%), many over 60 years of age (18%), relatively low home-ownership (28%), many below the poverty level (37%) with high unemployment rate (20%). Residents in these neighborhoods do exhibit a strong allegiance to community and aspire to a sense of pride in their neighborhoods. This attribute, along with the need to address pest problems at the *community* level will be instrumental in overcoming individual feelings of shame, despair and lack of control in one's own home. The goal of improved quality of life via effective pest suppression and reduced risk to children is one that residents can stand behind and aspire to.

In Camden, NJ, our target community is within the Heart of Camden Program. The Heart of Camden program is an urban renewal project that renovates run down housing in Camden, NJ and then sells the homes at a discount to disadvantaged families. It is similar to the Habitat for America program. As a result, the program gives us a unique entry into the community. In addition, because the program is connected to the Camden diocese, the connection will allow us to make contacts with other programs in the city and expand the number of people we can survey.

Level of Pest/Pesticide Problems in Target Communities

The true extent of infestations of cockroaches (German, American and Oriental), mice and rats in urban areas is unknown, as is the exact quantity and kinds of pesticides used to combat them. However, in the study area of Greater Metro Philadelphia, with 6.1 million people, and neighboring Camden, New Jersey, with about 80,000 people, one might assume pest populations of several orders of magnitude larger. If every household were using up to six pesticide products as was found in some boroughs in New York City, this would be a tremendous amount of human exposure.

We have as yet no statistical data on amounts or kinds of pesticide active ingredients and/or formulations used in low-income communities of Philadelphia as a whole. However, two residents on our PSCIP team volunteered their heavily German roach infested homes as "IPM Demonstration Homes" in adjacent West Philadelphia neighborhoods. PSCIP members completed assessments of both pest species and abundance, observed products present in the homes as well as questioned residents about insecticide use patterns. Preliminary results indicate that the norm in these neighborhoods closely tracks published data from New York (cite). Other PSCIP community partners, whether pest management professionals or community residents, corroborate this general impression. One PSCIP collaborator who owns a local pest control business (Pest Free Maintenance Inc.) described a client attempting to purchase two boxes of "bug bombs", asserting that every so often she set one off in every room in the home to "get rid of the roaches". When asked whether anyone in the home suffered from asthma, she responded in the affirmative, both she and her two children. When the client was informed of better management practices using sanitation and repair combined with less risky gel baits, glue boards and boric acid formulations, she was incredulous and thankful, stating "no one has ever told me about any of this before".

Addressing Stakeholder Priorities

The proposed project directly addresses priorities identified by the NE Community IPM Working Group, the NE Community and Urban IPM Conference in Manchester, NH on March 15-16, 2005 and our own Philadelphia-based community stakeholder group.

NE Community IPM Priorities Addressed:

• Develop a PMSP for residential IPM for suburban outdoor and indoor urban IPM.
• Outreach: Develop and create an outreach campaign for residential IPM (radio, TV, and other creative forums). Develop material and distribute to end-users.
• Research: General research on residential IPM

Community and Urban IPM Conference Priorities

Top priority: Develop IPM outreach to homeowners, retailers of pest management products, and multipliers (media, libraries, teachers).

Philadelphia School and Community IPM Partnership (PSCIP) Priorities

PSCIP stakeholders meet annually in large group format to update, network, brainstorm and articulate ongoing and emerging priorities. The group's overall goal is to reduce health risks by reducing both pests and pesticide use via IPM education and implementation in Philadelphia. Information and priorities gathered during our PSCIP meetings and focus group results in 2004 and 2005 identified 12 categories of actions that should be taken to build a community-based approach to IPM awareness. Each category included itemized suggestions of specific actions. The top four categories were selected by nominal group process. These categories and the specific actions they encompassed became the basis for our further efforts as a group and also provided elements for this proposal. In the last meeting (8/16/05), subgroups were formed to discuss four questions, each in a facilitated format. Each subgroup represented areas of activity needed in order to successfully implement IPM in urban communities.

Health/Community Group Questions

1. What needs to happen in order to reach at-risk residents with IPM message?
2. How can my organization participate?
3. Are there opportunities for staff education/networking?
4. What are possible funding opportunities?

Community Outreach Group Questions

1. What needs to happen in order to help neighborhoods learn about and understand IPM?
2. What specific entities need to be involved?
3. How can our organization help?
4. Collaborative resources?

Technical Group Questions

1. What needs to happen in order to increase access to IPM services or products in low-income neighborhoods?
2. What needs to happen in order to increase residents understanding of pest/pesticides?
3. How can our organization help?

4. Collaborative resources?

PSCIP stakeholders identified key priorities and large numbers of suggested partnership activities to support them. The proposed project is, in part, a result of these specific suggestions. For a full view of the participating members of the PSCIP stakeholder group and recent focus group results, see **http://paipm.cas.psu.edu/community/pscip.html.** A copy of the most recent full group meeting is in the appendix.

Objectives and Anticipated Impacts

There are three primary objectives of the proposed project.

Research Component of the Project:
1. Research city residents' understanding and behavior pertaining to pests and pesticides using standard demographic methods. Anticipated impacts are (a) IPM educators will learn how to better serve this large and under-served clientele and (b) city residents will begin to express and question their assumptions and understandings of pest presence and pesticide use in the home.

Outreach Component of the Project:
2. Develop new and improved outreach materials targeted to the expressed needs of city clientele. Anticipated impacts are that new culturally and situation-appropriate materials will enable and empower residents to make positive behavioral changes in the home, reducing health risks attributable to both the presence of noxious pests and uninformed use of toxic pesticide active ingredients and formulations.

3. Deliver information about pests, pesticides and IPM approaches
Anticipated impacts are that at least 500 residents, 6 health care provider organizations and the outreach staff will be exposed to new information on pests, pesticides and IPM. This information will be in a format to be used directly by the target audience. In the train-the-trainer contacts, a potentially much larger population can be reached through their own outreach to clientele.

Approach and Procedures

1. Research city residents' understanding and behavior pertaining to pests and pesticides.

a) Two different types of survey instrument will be developed to collect information. First, a short survey that can be easily completed in a few minutes will be designed to be utilized at community events, points of purchase and other "open" venues. Clients will be solicited who are willing to participate in a more in-depth survey to be administered in person by project personnel, preferably in the home of the client. Participants in this survey will be the recipients of an IPM resource kit ("Bug Off! IPM Kit) containing stepwise information for IPM implementation for roaches, ants and rodents, contact information for IPM advice and poison control, non-toxic traps with instructions for use, and sealed containers for keeping food items.

b) Conduct a visual survey and document types of pesticide active ingredients and formulations available in neighborhood stores.

For inner city residents transportation and money are daily limiting factors. Thus most purchases happen close to home. In our preliminary observations, many people buy pesticides at the closest drug store, variety store or dollar store. Information about what to buy appears to be primarily by looking at the title of the product and/or asking the clerk.

c) Invite store managers to answer basic questions about the products they supply and whether or not they would like to learn more about them.

Store managers and clerks are themselves city residents who might benefit from better understanding of pests, pesticides and IPM. Since they may or may not be able to make purchasing decisions for their store, they can at least become more aware of how to serve their customers better by having improved knowledge of the relative merits (or lack thereof) of the products on their shelves.

2. Develop new and improved outreach materials targeted to the educational needs of city clientele

a) Using information gathered from the research phase of the project as well as our experience working in these environments over the last several years, the project team will work with our urban health outreach partners to write/script, design and develop brochures, radio spots, presentations, skits, IPM kit give-aways, and other forms of communication.

b) Contacts will be initiated to begin to develop multi-lingual materials, beginning with Spanish. Agencies, including the Philadelphia Department of Health, provide translation services.

c) Power point presentations, resource information and sample IPM kits will be developed for health care educators to use in their programming with urban clientele. The IPM kit approach was successful in a previous project in public housing in Chicago (Knight 2005)

d) Pre-existing relevant material will be sought out, shared with partners and compiled to create a resource database on urban IPM outreach materials. For example, the video developed by Rutgers entitled "Urban Integrated Pest Management Strategies: Arrest the Pests in Your Nest" will be "tested" with our partner organizations to assess its relevance to the project. This video was funded by the EPA Pesticide Environmental Stewardship Program and addresses urban audiences and their knowledge about the common pests they may encounter. It broadly discusses the chemical and non-chemical options that are available to control pests and talks about the items, such as sanitation, that should be done on a continual basis. The video is different than most because the host is an actual homeowner in the Isles, Inc. housing development in Trenton and is shot in her own home. Access to all materials will be provided through the Pennsylvania and New Jersey IPM web sites.

3. Deliver information about pests, pesticides and IPM approaches to target audiences

a) PSCIP stakeholders identified a large number of potential delivery sites for pest, pesticide and IPM information. There are many social service agencies in both Philadelphia and Camden that have substantial outreach activities concerning health and welfare issues. Project staff will begin working down this list, starting with avenues that co-opt existing outreach networks and promise

to reach the most health care practitioners and the highest number of individual residents. Partners have specific contacts in each case. Sample suggestions for outreach and access to communities include:

Access to neighborhoods via
Block Captains organization
Faith-based organizations
Community health fairs
Neighborhood improvement associations
Landlords and landlord organization
PCO training in IPM and customer relations

Access via pre-existing programs/venues
Include in information packets sent out by Asthma Link Line
Include information in poisoning prevention info in Injury Free Coalition
Include information in Staff-Physician Advocacy Program aimed at primary care centers
Department of Human Services "Support Communities Outreach Program"
Department of Public Welfare
Philadelphia Corporation for Aging
Include training on IPM in classes at Schools of Nursing
Include information in waiting rooms of community health services, hospitals and doctor's offices

Access to greater public areas
Radio / TV spots – either free public service announcements (PSAs) or guest on radio and TV talk shows
Simple articles placed in publications routinely read by target residents
IPM information booth in front of key stores where pesticides are purchased

All materials developed will be available for use on all cooperators' websites. The PA IPM Web site includes both a Community IPM section (http://paipm.cas.psu.edu/community.html) as well as a Problem Solver (http://paipm.cas.psu.edu/problemSolv.html) section that are easily accessed.

Evaluation Plan

The proposed project in its entirety is a research-based evaluation of the present state of IPM programming available to inner city residents as well as an inventory of the attitudes, perceptions and practices of program clients. Results of this research/extension project will provide a dependable assessment from which urban IPM outreach activities of the proposed project as well as future projects can draw benefit.

In addition to the demographically-proper description of clientele, changes in clientele attributes will be tracked through out the project. Pre-test, post-test questionnaires an interviews will document changes in knowledge, attitudes, skills, aspirations and practices that result from outreach activity interventions as detail in the methods section.

Evaluation Methodology

This section includes the research plans for the program implementation and evaluation component of the project and describes the following: 1) the types of communities and households to be included in the sample, 2) content of the survey instrument to be used for evaluating the IPM program, and 3) the design of the evaluation component of the project.

Study Sample

Two communities in West Philadelphia, Pennsylvania and Camden, New Jersey will be selected as sites for this study. Within these two communities 50 households will be selected to participate in the study. Because this study is concerned with IPM implementation and how it relates to the health and well-being of children, all households selected for participation will include households with children. Although specific communities have yet to be selected to participate in the study, on-going IPM work in two communities in Philadelphia and Camden allow us to describe the type of communities in which we will be working.

Two communities in West Philadelphia and Camden are described below in Table 1. For our purposes, a community is described as a geographically bound area that has the same zip code. As described below in Table 1, the study sample for the research component of this project will be selected from lower income communities in these two cities that are susceptible to pest infestation. Both communities are predominantly non-White and low income. Between one third and one-half of all households in both communities have incomes below the poverty line. Educational attainment is low– between 50% and 75% of the adult population in both communities have a high school education or less. These communities were also selected because they contain a large percent of family households, and most of the family households in both communities contain children less than 18 years of age (60% and 66%, respectively), which is the target sample population. Equally as important is the age of the housing stock in these communities. Over one third of the housing stock in both communities was built before 1940, and approximately 70% was built before 1960. The design and condition of older housing makes it especially susceptible to pest infestation. The profile of these two communities should communicate the need for IPM program implementation, and evaluation of the effectiveness of that program, in these types of inner-city urban communities. The combination of older housing stock, a low income and less educated population and a high proportion of families with children indicates that these types of communities are susceptible to pest infestation, and are likely to use low cost pest control methods that exacerbate health (asthma) and possibly developmental problems for adults and especially children. Social isolation, language barriers, low education and lack of resources also make these communities difficult to reach and educate about IPM practices. For these reasons, implementing and evaluating an IPM program in these types of urban communities is a critical step to improving the health and well-being of families and children in these areas.

Table 1. Social and Demographic Profile of Philadelphia and Camden Communities

Indicator	Philadelphia (zip=19131)	Camden (zip=08104)
Race and Ethnicity		
White	18.0	16.8
African-American	76.1	63.4
Other racial group	5.9	19.8
Hispanic ethnicity	2.5	22.7
Households at or Below Poverty	33.1	45.0
Educational Attainment of the Adult Population		
Less than high school education	23.6	44.4
High school education	28.8	31.1
More than high school education	47.6	22.5
Family Households		
Family households with children	44.3	76.0
Family households with children that are headed by a single parent	64.0	60.0
Spanish Language Spoken in Home	4.5	22.6
Year Housing was Built		
1980 or after	7.5	4.3
1960-1979	20.6	20.3
1940-1959	34.1	38.9
Before 1940	37.8	36.5

Source: 2000 SF3 U.S. Census of Population and Housing

Once two specific communities similar to the communities described above are selected, we will work with community leaders, NGOs', health service providers, religious leaders, and local schools to gain entrance into these communities. A sample of approximately 50 families with children will be recruited to participate in the study. A snowball sampling approach (Flick, 2002), a method commonly used in the social

sciences, will be used to recruit households with children to participate in the study. This approach involves first identifying key informants in a community who identify possible households to participate in the study. Once the initial households have been identified, a network of additional households are subsequently identified based on information provided by households already included in the sample.

Survey Content

A survey instrument for evaluating pretest and posttest knowledge, attitudes, skills and behaviors regarding IMP practices and related issues will be developed as part of the research component of this study. The survey developed will be designed as a paper and pencil survey that will be collected from households participating in the study by trained project staff. The survey will include approximately 35-40 questions and will be designed to take between 20-30 minutes to complete for the average adult. The survey will be pilot tested for content and design prior to collecting data in the field. The survey will ask questions in the following areas:

- participant's perception of what constitutes a pest
- feelings and concerns about pest infestation (psychological well-being, health concerns)
- specific concerns about children and pests
- types of pests in participant's household
- current problems with pests
- knowledge about how to get rid of pests
- current practices for getting rid of pests, and history of practices
- knowledge about safety and health risks associated with different types of pest control, and also specifically for children
- knowledge about ingredients in pest control products
- knowledge of effectiveness of pest control measures and products
- reasons for using specific pest control products (costs and benefits)
- social norms in community for getting rid of pests
- knowledge about IPM, best IPM practices, costs and benefits of IPM
- current use of IPM practices
- future plans for using IPM for pest control

Study Evaluation Design

The evaluation design for this study will use a one-group pretest-posttest design (Cook and Campbell, 1979) in the two low-income urban communities in Philadelphia, Pennsylvania and Camden, New Jersey described earlier. Figure 1 outlines the data collection plans for this study.

O_1	X	O_2

Figure 1. One Group Pretest-Posttest Design

The one group pretest-posttest design is one of the more frequently used methods in the social sciences that allows researchers to evaluate the impact of a program on the participants in a study. Survey methodology will be used to collect information on the study participant's knowledge, attitudes, skills and behaviors (KASB) regarding IPM both before and after they participate in an IMP program. The survey content is described above. First, the survey will be given to the study sample that evaluates their KASB regarding IPM and related issues. This step is referred to as the pre-program observation (***O_1*** in figure 1). Next, the IPM program will be implemented in the two urban communities (***X*** in figure 1). Finally, after program implementation a posttest survey will be administered to the study sample (***O_2*** in figure 1) to gauge their KASB regarding IPM after participating in the program. Participation in the IPM program is expected to result in significant changes that indicate increased knowledge about IPM practices, more positive and accepting attitudes about using IPM, and significant behavioral changes that incorporate IPM practices into the pest control practices of study participants.

Appropriate statistical analyses will be conducted to understand how participating in the IPM program impacts the KASB of study participants'. Analysis of variance (ANOVA) and analysis of covariance (ANCOVA) are two statistical methods commonly used to estimate mean group differences in outcomes associated with program participation (Cook and Campbell, 1979; Light, Singer and Willett, 1990), and will be used to evaluate the impact of IPM program participation in this study.

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Appendices to Project Description
PSCIP Meeting Minutes
Letter from Mark Robson
Map of Philadelphia low-income neighborhoods (Lead Abatement)

Key Personnel
Penn State: Dr. Ed Rajotte will serve as the Principal Investigator of the project. He will provide access to the Philadelphia sites and cooperators, provide budgetary and strategic oversight and access to IPM technical expertise. Dr. Anastasia Snyder will lead in the design of the research survey instruments, data collection protocol and data analysis

Rutgers University: Dr. George Hamilton will make the necessary connection with the Heart of Camden program and other community groups located in Camden, NJ, assist in the development of the program in Camden, NJ, facilitate the collection of data in Camden, NJ, and coordinate students assisting in the project from the UMD-NJ School of Public Health. Dr. Mark Robson of the University of Medicine and Dentistry of New Jersey (UMD-NJ) School of Public Health will provide us additional contacts with the City of Camden and gains us access to MPH students who can assist with the project.