INTEGRATED PEST MANAGEMENT INTERVENTIONS FOR HEALTHIER HOMES

CHAMACOS: A Community-University Partnership

Pesticide exposures are a key concern in many agricultural communities. Residents who live in these communities may be exposed to pesticide spray drift from nearby applications or volatilization from chemicals that evaporate into the air. Additional exposures to farmworkers and their families can occur when pesticide residues from work are inadvertently transported into their homes on the workers' clothing and skin. As a result, children could be exposed to pesticides brought into their homes. Many agricultural communities are composed of low income families who often live in substandard and overcrowded housing. These living conditions promote pest infestations and potentially expose residents to additional pesticide use in their homes. Public health, education, farming, and housing professionals need to integrate the lessons learned from this research into programs promoting farmworker health and safety..

In the last 20 years, a growing awareness has emerged about the need to conduct environmental health research in partnership with communities. Community-based Participatory Research (CBPR) empowers community members to become active participants in the research process and enables university investigators to gain a more comprehensive understanding of environmental exposures and risks. Furthermore, CBPR permits research findings to be translated into actions and strategies to reduce exposures and improve public health.

The University of California, Berkeley Center for Children's Environmental Health Research (CCEHR) is one of a dozen centers funded by the U.S. Environmental Protection Agency (EPA) and the National Institute of Environmental Health Sciences (NIEHS) in 1998.

The CCEHR's central project was CHAMACOS – the Center for the Health Assessment of Mothers and Children of Salinas. CHAMACOS means small child in Mexican Spanish. It is a community-university partnership investigating allergen exposures and the potential effects of pesticides on growth, neurodevelopment, and respiratory disease in children residing in the Salinas Valley, an agricultural region in California. CHAMACOS intervention, outreach, and education programs aim to reduce children's exposures to pesticides and other potentially toxic chemicals. The ultimate goal of CHAMACOS is to identify and understand children's exposure pathways and their health effects so that effective and age-appropriate interventions can be designed and implemented to reduce the prevalence of environmentally induced disease.

Major Accomplishments

- Documented poor housing quality, pesticide exposures that exceed national reference levels, and potential adverse effects on child development.
- Conducted successful community-based intervention studies to reduce pesticide exposures to children from occupational take-home pathways and home pesticide use to control pest infestations.

This case study is one of a series addressing integrated pest management (IPM) in low income housing. To access the series, visit www.healthyhomestraining.org/ipm/studies.htm.

IPM is a commonsense approach to pest management to keep pests out, reduce their harborage, food and water, and, where necessary, use low risk pesticides.

Research Studies

The CHAMACOS Partnership enrolled 600 pregnant women between 1999 and 2000. Researchers followed the children born from these pregnancies. They had extensive contacts with participants using questionnaires, home inspections, environmental and biological sample collections, neurodevelopmental assessments, and lung function tests. They published their findings related to pesticide use, housing quality, environmental exposures to current and historic use pesticides, behavioral risks, and health outcomes in the eight research articles cited in this case study.

Participants were primarily low-income, Mexican immigrants working in agriculture. Poor housing quality was common. For example, cockroach and rodent infestations were present in 60% and 33% of homes, respectively, and as were peeling paint (58%), mold (43%), rotting wood (11%), water damage (25%), and high resident density (76%).[1] Levels of disrepair and crowding in homes were associated with pest infestations and home pesticide use.[1] Half of all households used pesticides. Of these households, over 60% used pyrethroids and less than 10% used organophosphates (OP) such as malathion or carbamates.[1] Spray cans were the most common application method (30%).[1] Less than 10% of participants used products likely to reduce household pesticide exposure such as gels or bait stations.[1] House dust samples contained agricultural and home use pesticides.[2]

Pregnant women in the study had higher levels of organophosphorus pesticide metabolites in their urine compared to women of child bearing age in the U.S. population.[3] Although approximately 58% of pregnant women lived with three or more agricultural workers, their households had not received education about methods to reduce pesticide exposure taken home by agricultural works on their bodies, clothes, shoes or equipment. This exposure is called take-home pesticide exposure.[4] For example, 46% of these women lived in homes where people wore their work shoes or clothing into the home and 44% washed work and family clothing together.[4]

The researchers found that pesticide exposures to pregnant women were associated with children's development. For example, mothers with higher levels of urinary OP metabolites were more likely to give birth earlier and their babies were more likely to have abnormal reflexes.[5-6] Pre-natal urinary OP metabolites levels were also associated with poorer mental development and pervasive development problems at 24 months of age.[7]

Intervention Studies

With input from its community partners, CHAMACOS researchers developed two intervention studies aimed at reducing take-home pesticide exposures. One was a home-based education intervention that focused on changes in household behaviors to reduce take-home exposures from residues on farmworker clothing. The CHAMACOS Partnership strongly supported this study, but concerns were raised about focusing solely on strategies that put the burden of exposure reduction on the family. Thus, the Partnership developed a second intervention that involved growers in an effort to reduce pesticide residues on worker's clothing and skin before the worker returned home.

Field-Based Intervention

The field-based intervention focused on reducing malathion exposures to strawberry harvesters and the potential for take-home exposures to their families. Malathion is an OP pesticide. Among the 130 farmworkers who participated in this intervention, almost half had never received training related to pesticides and over two-thirds reported that they never had talked to their bosses about pesticides. The components of this intervention included the provision of:

1. Warm water to increase hand washing (investigators learned from the community that many farmworkers avoid washing their hands with cold water because they believed that cold water causes arthritis);
2. Changeable outer clothing and routine laundering to prevent contamination of clothes;
3. Disposable gloves;
4. Closed laundry bags and shoe bins to promote "safe storage" of work clothing and work shoes, and
5. Regular in-field health and pesticide education.

Malathion, a pesticide commonly used on strawberries, or the urinary metabolite MDA, was measured in urine, hand rinse, clothing patch, and skin patch samples collected to assess the efficacy of the intervention. Participants who wore gloves had much lower levels of malathion on their hands compared to those who did not wear them.[8] Additionally, harvesters who wore gloves had about half the urinary MDA levels compared to those who did not wear them.[8] Thus, glove use reduced exposures as well as skin loading that could be carried home. Clothing prevented virtually all accumulation of malathion on skin elsewhere on workers' bodies. The researchers found that malathion collected on work clothing and that removing the coveralls would likely reduce take-home pesticide exposures.[8] The intervention group who wore coveralls most likely prevented the accumulation of malathion on their regular work clothing.

Farmworkers reported that they preferred to wash their hands with warm water.[8] This practice could increase hand washing among workers and result in a reduction of both personal exposure and potential take-home exposure to families members. The use of gloves and hand washing to minimize pesticide residues on workers' hands, as well as coveralls to prevent pesticide accumulation on clothing, is likely to reduce the potential for pesticide exposure to families and children among strawberry harvesters entering fields after expiration of the post-harvest interval (72 hours). CHAMACOS is currently working with partners such as growers and agricultural officials to incorporate these intervention practices in the fields.

Home-Based Intervention

For the home-based intervention, we used an in-depth pesticide education program conducted within farmworker households to:

1. Explain what pesticides are;
2. Educate about farmworker rights related to pesticides;
3. Describe exposure routes and health effects of pesticides on children;
4. Demonstrate the concept of pesticide residue using fluorescent tracers;
5. Educate about strategies to prevent pesticide residues on the worker's clothing from entering homes (e.g., removing work clothing and shoes before entering the home);
6. Educate about integrated pest management (IPM) strategies to reduce pest infestations in the home;
7. Develop a household-specific Home Action Plan to reduce pesticide levels in the home and protect children from exposures;
8. Identify successes and barriers to implementing the Home Action Plan; and
9. Provide household resources that assist participants in taking action on pesticide exposure

The preliminary analysis indicates that significant improvements in exposure-related behaviors occurred, such as workers removing their shoes before entering the house and washing work and family clothing separately. Future analyses will focus on measurements of pesticide metabolites in children and pesticide concentration levels in house dust.

Community Education and Outreach

The CHAMACOS Partnership developed a number of initiatives to serve the community that include workshops, trainings, and multi-media materials. Go to ehs.sph.berkeley.edu/chamacos/english/pages/EduMaterial.php to view the materials.

Community Presentations

Presentations have been given to over 4000 people in the California's Salinas Valley. Participants at these forums include farm workers, community advocates, educators, and childcare center providers. Some of the materials developed and distributed include:

- Things you can do to control pests (household maintenance practices);
- Alternatives to pesticide use in the home and garden;
- Least toxic approaches to pesticide use (limit use to gel and bait stations, types of least toxic pesticides, and ways to protect children when pesticides are used);
- Reducing take-home pesticide exposures from the fields (prevent work clothes from entering the home, separate storage and laundering of work clothes, and wash clothing immediately after work);
- How to protect yourself from pesticide exposure in the fields; and
- Rights of agricultural workers.

Prenatal Environmental Health Education

In partnership with Clinica de Salud del Valle Salinas, CHAMACOS developed an innovative, computer-based prenatal environmental health program to educate pregnant women about environmental health issues. CHAMACOS designed the program for a low-literacy audience in Spanish on a touch-screen computer with voice-over narration for all written materials. Through this mechanism, pregnant women can easily navigate over 60 screens that address a variety of issues including preventing pesticide exposure, IPM, lead, allergens, and other topics. CHAMACOS is working with state officials to make this module a reimbursable health education service under the California Comprehensive Peripartum Services Program, which provides prenatal care and education to low-income California women.

Environmental Health Education for Childcare/Preschool Settings

Anecdotal discussions indicated that pest infestations and other environmental health concerns are prevalent in local childcare centers and preschools. This situation may be related to the poor housing stock in many neighborhoods. To address this concern, CHAMACOS and its partners developed a workshop to train childcare providers about environmental health issues and how to improve the quality of their facilities. Specific topics addressed include pest infestations, pesticide use, IPM, lead, mercury, and air quality.

Healthy Homes Training Partnership

In a follow-up to the documentation of severe housing quality problems among low-income Salinas Valley residents, CHAMACOS is working with local community groups to develop a research, training, and advocacy program to address the relationship between housing quality and health. In partnership with Alameda County's Lead Poisoning Prevention Program, CCEHR became one of the first training partners in California of the National Healthy Homes Training Center and Network (Training Center). The Training Center developed several courses designed to teach public health and housing professionals to take a holistic approach when identifying and resolving problems that affect the health of residents. The CHAMACOS Partnership offered its first training in March 2007. Participants included the Environmental Health Division of the Monterey County Health Department and community advocacy groups. It also developed a one-day healthy homes course that addresses agricultural, low-income, and Latino communities. The course is offered in Spanish and is targeted to housing and health promoters, community advocates, educators, and housing managers who work directly with agricultural populations.

Lessons for the Future

The CHAMACOS partnership can serve as a model of how researchers from universities can work with communities to increase knowledge about local public and environmental health concerns. The partnership already established will build technical knowledge and create a permanent infrastructure in the Salinas Valley and throughout California. Interventions need to occur at several levels. Efforts to change individual behaviors, as well as changes in policy and work practices are needed so the burden of protecting families and children is not placed solely on individuals. These efforts take time. However, the dissemination of knowledge and understanding gained through multiple efforts can lead to concrete changes that improve public and environmental health in the most affected communities.

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