Published in final edited form as:

Pract Anthropol. 2003 ; 25(1): 10–13. doi:10.17730/praa.25.1.f156336v010380j6.

A CULTURALLY APPROPRIATE FARMWORKER PESTICIDE SAFETY PROGRAM

Pamela Rao, Thomas A. Arcury, Sara A. Quandt

Introduction

Farming is one of the most hazardous occupations in the US. Anyone who works on a farm is at risk for a variety of occupational injuries and illnesses. Hired farmworkers are often at a disadvantage for preventing injury and illness because they lack control in the workplace. Over the past few decades, the number and percentage of US farmworkers who are immigrants, mainly from Mexico and the Latin American countries, has increased dramatically. Because many of these recently-arrived workers do not speak or read English, it is especially difficult for them to learn and implement workplace safety procedures. Safety education materials are frequently not available in Spanish, and employers are seldom bilingual.

Since 1996, we have worked to improve the occupational safety and health of migrant and seasonal farmworkers in North Carolina through the development and implementation of culturally and educationally appropriate workplace safety education programs. This article describes our efforts in one domain of farmworker occupational health, pesticide safety.

North Carolina Farmworker Health Research

Current estimates indicate that the number of North Carolina's migrant farmworkers and dependents exceeds 140,000, with approximately twice this number of seasonal farmworkers. The composition of the state's farmworker population has changed in the past two decades, from predominantly African-American to more than 90% Hispanic and foreign-born. Because of the relative recency of this population in North Carolina, there are few culturally appropriate and linguistically accessible health education resources, including pesticide safety materials. To address this shortage, we have undertaken a series of projects with North Carolina's farmworker population. These projects have several goals:

- To describe and document the situation of North Carolina's farmworkers;
- To understand and document the knowledge, beliefs and behaviors of this population with regards to pesticide use and safety;
- To assess the effectiveness of the WPS and other pesticide safety programs; and
- To develop, implement, evaluate and disseminate culturally and educationally appropriate pesticide safety materials.

The projects took an explicitly anthropological approach to addressing the problem. Starting with the concept of cultural models—the mental templates that guide people's perceptions

and actions—we conducted ethnographic research to compare and contrast the models of pesticide safety held by various groups within the agricultural community. We used a multi-method approach, combining participant-observation; in-depth, key informant and group interviews; surveys; and exposure assessment. Ethnographic sampling was used to obtain a representative sample of farmworker families in the study areas.

We used a community-based participatory framework to develop and evaluate the safety materials. We knew that the behavioral changes necessary to reduce pesticide exposure must occur on many levels, from individual to community to societal. Farmworkers and other community members were incorporated into every stage of the research process to ensure that the final products were appropriate, accessible, and acceptable.

Chemical Risk

Agricultural chemicals, especially pesticides, are a significant source of occupational injury and illness. Many of the food and ornamental crops grown in the US are cultivated or harvested by hand, bringing farmworkers into direct contact with a variety of chemicals. Individuals who mix or apply pesticides are often at risk for acute exposure or poisoning from a spill or other accidental contact with a concentrated chemical. Acute exposure can cause severe illness requiring immediate medical treatment, and can be fatal. Workers who never mix or apply pesticides are at less risk for acute exposure, but are still exposed to residues that remain on the crops they cultivate or harvest. The health effects of long-term, low-level exposure are not well established, but they have been implicated in causing cancer, birth defects, neurological deficits, and reproductive health problems. In either case, the amount of pesticide necessary to precipitate an adverse reaction depends upon such factors as the specific chemical, the means of exposure, steps taken to minimize exposure, the age and body mass of the worker, and any post-contact steps taken to mitigate exposure. The range and severity of the possible effects of short- or long-term exposure to pesticides, coupled with uncertainty about the amount of exposure that would lead to those effects, suggests that the most prudent course of action is to minimize exposure from the outset.

Worker Protection Standard

The US Environmental Protection Agency established the Worker Protection Standard (WPS) in 1992 to address the issue of preventing workplace exposure of agricultural workers to pesticides. The WPS is a regulatory program that mandates the content and timing of pesticide safety education that must be provided to all workers who enter pesticide-treated fields. It also defines the manner in which workers must be notified of any pesticide applications. Different levels of detail are required for educating individuals who perform different types of tasks with pesticides, such as mixing, handling and applying, and working in greenhouses.

The core of the Worker Protection Standard pertains to workers who enter areas where restricted-use pesticides have been applied within the past 30 days. Eleven elements must be covered before they have worked for more than a total of five days in a treated area. These elements include an overview of the types of pesticides that might be encountered while

working on a farm, associated hazards and ways to avoid them, the symptoms of acute exposure, and what to do if symptoms develop. They also cover the employer's responsibilities to notify workers about applications and to assist workers who are injured. Finally, they inform workers that they are protected against any retaliatory acts by their employer if they insist on enforcement of the standards.

The WPS also specifies how training should be delivered. Trainers must pass an exam covering the curriculum and meet other criteria established by the EPA and the local regulating agencies. Training must be offered in a language understood by the workers. A presentation of the EPA's 20-minute Spanish / English video by a designated trainer is sufficient to meet the WPS requirements in North Carolina.

The Worker Protection Standard has been in full effect since the beginning of 1995. Since that time, national evaluations that have taken place review the standards primarily from the employer's point of view. A few regional evaluations have reviewed the implementation from the perspective of the farmworkers. There has been no adequate testing to determine whether the WPS provisions have actually reduced exposure or its negative consequences.

Pesticide Safety Projects

The PACE Project

Our first pesticide safety project, *Preventing Agricultural Chemical Exposure among North Carolina Farmworkers* (PACE), was established to design and test improved education programs to promote appropriate safety behaviors among tobacco and cucumber workers in central North Carolina. The PACE Project was a community-based participatory research project funded by the National Institute of Environmental Health Sciences (NIEHS) for the period 1997–2000. It was a partnership among the Wake Forest University School of Medicine, the University of North Carolina at Chapel Hill, and the North Carolina Farmworkers' Project, a community-based farmworker advocacy agency. The four-year PACE Project included four components: (1) formative research, (2) development of a health education intervention, (3) implementation and evaluation of the intervention, and (4) dissemination of the revised intervention to the community.

The formative research included in-depth interviews with farmworkers, growers and community experts to learn more about agriculture and pesticide use in the study area. Many farmworkers described cultural models of pesticide exposure and prevention that conflict with the scientific model, and were unclear on their legal rights regarding working conditions. These issues were addressed in the preliminary version of the intervention, a fairly standard pesticide safety education program. Evaluation of this intervention found that while it did increase farmworker knowledge about pesticide exposure, it did not produce a corresponding change in behavior or working conditions. In order to determine the reason for this situation, we reviewed the in-depth interviews conducted during the formative research phase, and also held community forums with farmworkers. Three areas needing additional consideration were identified: *focus*, *relevance*, and *control*.

Focus: The material covered in an educational program needed to focus on the key elements that farmworkers need to know in order to protect themselves. Many existing safety programs attempt to cover all eleven required elements of the WPS with uniform emphasis. However, each of those elements includes 4 or 5 points. Farmworkers felt this was simply too much information to absorb in a single session.

Relevance: The material also needed to be made relevant to the farmworkers' experience by emphasizing situations that they encountered in their day-to-day work. Most WPS materials include extensive reviews of the ways that farmworkers can be exposed, such as chemigation (mixing chemicals in irrigation water), being splashed in the eyes, or being sprayed while in the field. Such situations are comparatively rare in North Carolina agriculture. Most farmworkers did not report ever having been sprayed or becoming sick from pesticides, or otherwise feeling exposed to illness or injury. Because of this, many farmworkers told us that they did not feel the need to take precautions. We realized that examples of more common exposure situations needed to be integrated into the training to increase the salience of the information.

Another crucial discovery made during the formative research was that many farmworkers do not recognize residues as an exposure route. Once the pesticide has evaporated or the odor has dissipated, they consider the field to be free of pesticides. Furthermore, the skin is believed to be an effective barrier, even against direct contact. Instead, the primary source of pesticide exposure was considered to be from direct ingestion, breathing or swallowing. This finding led to the development of a health education brochure, "El Terror Invisible."

Control: "Control" refers to a person's perception of how well he or she can bring about beneficial events or avoid harmful events. The PACE Project evaluation found that instruction increases knowledge, but does not necessarily affect the sense of control. During interviews, farmworkers were asked to relate their experiences with pesticides and to identify perceived barriers to work safety. Analysis of these interviews revealed that when farmworkers feel they have control over the level of exposure in their work situation, they take precautions and implement safety measures. When they do not feel they have control, they do not try to change their behavior. The issue of control may reflect power relationships between growers and workers, or it may be a function of unalterable conditions in the work environment. For example, fear of losing their jobs may compel farm-workers to work in a recently-sprayed field without proper protective equipment. Similarly, hot and humid conditions in the field make it difficult to use the proper protective equipment when it is available. Either situation reduces the sense of control and creates a barrier to behavior change. These three concepts of *focus*, *relevance* and *control* formed the basis for the second version of the PACE Safety Program intervention

¡La Familia!

The follow-up project to PACE, *¡La Familia!: Preventing Farmworker Pesticide Exposure*, continues the collaborative efforts of the North Carolina Farmworkers' Project and Wake Forest University School of Medicine to reduce pesticide exposure, this time in western North Carolina and southwestern Virginia. Agriculture in this area is primarily Christmas

trees, ornamental plants, tobacco, and vegetables. Whereas the PACE Project was primarily a workplace intervention, *¡La Familia!* emphasizes pesticide safety in the home, particularly with respect to children. *¡La Familia!* began in late 2000, with funding from NIEHS.

The five-year *¡La Familia!* project consists, like PACE, of four parts: (1) formative research to document and assess farmworker knowledge, beliefs and perceptions of pesticide exposure of all family members, especially children; (2) exploratory research to identify the pesticide exposure pathways of farm-worker children; (3) development, implementation and evaluation of a pesticide exposure Lay Health Advisor program; and (4) dissemination of the revised program throughout the farmworker advocacy and health community.

During the first project year (2001), we conducted in-depth interviews with growers, community leaders, health and social services providers, and agricultural extension agents. From them we learned about the agricultural activities in the area, about the history and situation of the farmworker families in the area, and about the power relations of farmworkers, growers and agencies. We then completed forty interviews with farmworker families about their awareness of pesticide exposure in the home, and collected dust samples to be analyzed for pesticide residue.

Preliminary analysis of the dust samples indicates that agricultural pesticides are present in over half of farmworker homes. However, in-depth interviews revealed that most women were unfamiliar with the pesticides used by their husbands, and many were unclear on the concept of pesticides itself. They were not sure where, how, or if, their children might be exposed. While some were aware of certain exposure prevention measures, such as separating work clothes from other laundry, they were not necessarily clear on the reason. These results reveal a need for pesticide safety education that targets the spouses of farmworkers, which is outside the scope of the WPS.

Casa y Campo

The newest project, *Casa y Campo*, returns the locus of activity to central North Carolina, and continues the focus on farmworker families. It extends the activities of the first two projects to include education for farmworker health care providers, and capacity-building for the community partner, the NC Farmworkers Project, to enable it to sustain the efforts to reduce exposure to pesticides and other environmental hazards. *Casa y Campo* began in late 2001 with funding from the National Institute of Occupational Safety and Health.

Interventions and Products

The findings from these studies have been incorporated into new pesticide safety education materials, including a safety program, a health education brochure, and a video. All materials are available in English and Spanish, and were designed using techniques and concepts from popular and adult education targeting low-literacy populations.

Program: The PACE Safety Program

The concepts of *focus*, *relevance*, and *control* form the foundation of the PACE Safety Program, described in the intervention manual, *Preventing Agricultural Chemical Exposure:*

A Safety Program Manual – Participatory Education with Farmworkers in Pesticide Safety (Arcury et al. 2000. Winston-Salem, NC: Department of Family and Community Medicine, Wake Forest University School of Medicine). The Program was developed based on the needs and recommendations of farmworkers themselves. It includes three distinct activities: (1) a Direct Safety Program that covers the WPS-required elements using discussions, demonstrations, popular education activities, and audiovisual materials; (2) a Promoter Safety Program for individual farmworkers who wish to become Pesticide Safety Promoters, and (3) follow up with the Promoters to ensure that they have the materials and information they need to help their co-workers, and to assist them with problem-solving in their promoter activities. The manual includes Spanish handouts of the key WPS points in language appropriate for a low-literacy population.

The curriculum was created with the issues of *relevance* and *focus* in mind. While all required WPS components are covered, emphasis is placed on those issues identified by workers as being the most relevant to their work situation. The presentation of materials focuses on information they will need and use, instead of supporting detail that is soon forgotten. Workers learn to recognize exposure sources, including residues, and identify ways to take control of their work situation in order to reduce their exposure. For example, they can ask the employer to provide wash water in the fields, or carry their own water. They can also find ways to wash their work and non-work clothes separately, and try to wear clothes that are not too hot but still provide protection.

Brochure: “El Terror Invisible”

Ironically, the exposure route that is relevant to most farmworkers who do hand labor in fields, pesticide residues, is not adequately emphasized by the WPS. Most existing instructional materials do not stress residues because the most immediate danger comes from direct exposure to chemicals during handling or being sprayed in the field. Little attention is paid to why farm-workers need to protect themselves from residues during routine work. To address this issue, the concept of “*El Terror Invisible*” (the Invisible Terror) was created. *El Terror Invisible* is a ghost-like figure that, like residues, cannot be seen, felt, smelled, or tasted. It has been developed into a health education brochure in the form of a small comic book. This format is appealing and accessible to low-literacy groups. The ghost symbol is also used on t-shirts, hats and other educational materials. The comic (as well as the PACE manual) can be downloaded via the Internet at <<http://www.migrantclinician.org/services/Environment/envtools.htm#community>>.

Video: “The Invisible Terror: Pesticide Safety for North Carolina”

We have developed a Spanish language pesticide safety video, *The Invisible Terror: Pesticide Safety for North Carolina* that incorporates our research results and meets the requirements of the US-EPA’s Worker Protection Standard. This culturally and educationally appropriate video also focuses on North Carolina agriculture and situations while still covering the other required elements that are not as relevant to North Carolina. The material is presented in easily-understood Spanish and subtitled in English. This video has three sections.

- *Seguridad con pesticidas: Riesgos de los pesticidas y el terror invisible* (Safety with Pesticides: Pesticide Risk and the Invisible).
- *Manipulador) Qué significa ser un manipulador de pesticidas?* (Pesticide Handler: What's Important to be a Pesticide Handler).
- *El monstruo verde: Enfermedad del tabaco verde* (The Green Monster: Green Tobacco Sickness).

Conclusion

Using anthropological methods and a participatory framework, we have developed a set of culturally and educationally appropriate occupational health and safety materials for migrant and seasonal farmworkers in North Carolina. The in-depth anthropological techniques enabled us to better understand the knowledge, beliefs, and perceptions of the workers so that they could be incorporated into the materials. The participation of the community was crucial to the creation of usable products and programs. The resulting materials and programs reflect the lived experience of the farmworkers themselves, instead of the lived experiences of the academics.

Acknowledgments

[Funded by the National Institute of Environmental Health Sciences, Grant #ES08739.]

Biography

Sara A. Quandt (left), Thomas A. Arcury, and Pamela Rao

Pamela Rao is a Research Associate with the Department of Family and Community Medicine at Wake Forest University School of Medicine. She received her PhD in medical anthropology from the University of Kentucky, for which she did field work on child survival in India. She has worked with migrant and seasonal farmworkers for several years on both research and service projects. She can be reached at <prao@wfubmc.edu>.

Thomas A. Arcury is Professor and Director of Research in the Department of Family and Community Medicine, Wake Forest University School of Medicine. He received his PhD in anthropology from the University of Kentucky. His research focuses on issues of rural and minority health and aging. He can be reached at <tarcury@wfubmc.edu>.

Sara A. Quandt is Professor in the Section on Epidemiology, Department of Public Health Sciences, Wake Forest University School of Medicine. She received her PhD from Michigan State University. Her research focuses on rural and minority health, nutrition and aging, including community and clinical trials. She can be reached at <squandt@wfubmc.edu>.