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A Pilot Program Using Promotoras de Salud to Educate Farmworker Families About the Risks from Pesticide Exposure

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A Pilot Program Using *Promotoras de Salud* to Educate Farmworker Families About the Risks from Pesticide Exposure

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ABSTRACT. This paper reviews a successful community-based education effort to minimize pesticide exposure to migrant and seasonal farmworkers and their families through innovative training curricula, informal participatory educational techniques and culturally sensitive outreach methods. In 2004, Migrant Clinicians Network, Inc., trained lay health educators, or *promotoras de salud*, from local agencies in southern New Mexico in pesticide safety and in ways to successfully promote safety information in the farmworker community. Through home visits and small group workshops, the *promotoras* trained 273 farmworkers and farmworker family members on ways to reduce exposures to pesticides in their homes and at work, with an emphasis on protecting children. The families received a Spanish language comic book that reinforced the pesticide safety information, emphasizing the health effects of acute and chronic pesticide exposure and steps to protect farmworker children from pesticide exposure. The project resulted in a significant increase in knowledge regarding the routes of exposure, the vulnerability of children, the signs and symptoms of pesticide poisonings and the ways to minimize pesticide exposures. Additionally, the project showed improved behaviors aimed at minimizing pesticide exposure through accidental poisonings in the home. This pilot project proved the efficacy of an in-home, one-on-one approach with a culturally appropriate educational comic book as an instrument to help transfer education to the community. Moreover, the educational method involving promotoras offers a training-of-trainer approach that is easy to implement and potentially replicate. doi:10.1300/J096v12n02_04

KEYWORDS. Pesticides, migrant and seasonal farmworkers, pesticide training and education, health promoters, outreach

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BACKGROUND

According to data collected from the American Association of Poison Control Centers, in 2004 alone, an estimated 71,000 children were involved in common household pesticide-related poisonings or exposures.[1] A survey by the U.S. Environmental Protection Agency (EPA) regarding pesticides used in and around the home showed that 47% of all households with children under the age of 5 had at least one pesticide stored in an unlocked cabinet, within the reach of children.[1]

Moreover, children from agricultural families are exposed to higher levels of pesticides than those whose parents do not work in agriculture and do not live close to farms.[2,3] Migrant farmworker children and children living in agricultural areas may be exposed to higher pesticide levels than other children because pesticides may be brought into their homes by working parents or by pesticide drift.[4-7] Additionally, some children are exposed to pesticides by playing or working in nearby fields. Children face particular risks from pesticides as their developmental patterns, behavior and physiology make them more susceptible than adults.[8,9] First, children are more exposed to pesticides than adults because of their smaller size; pound-for-pound, children eat more food, drink more water and breathe more air than adults. Second, children are more exposed to pesticides due to their behavior. They engage in hand-to-mouth activity, increasing their ingestion of any toxic chemicals in dust or soil. Children also crawl and play on the ground, increasing their exposures to contaminants in dust, soil and carpets. Lastly, children's developing bodies are less able to detoxify and excrete certain toxins.

Exposure to pesticides is one of the numerous environmental and occupational health issues facing farmworkers and their families. This poor, mobile, primarily Mexican-born population faces additional risks. Substandard housing, poor working conditions (e.g., lack of drinking water, hand-washing facilities or toilets) and limited access to health care services are among the problems confronting agricultural workers.[10,11]

The Worker Protection Standard (WPS) is the EPA's primary means to reduce farmworker risk from exposure to pesticides. EPA established the WPS in 1974 and made major revisions to the Standard in the 1990s, including the prohibition of spraying pesticides while anyone is working in the field. Additionally, the WPS now requires employers to provide farmworkers with: (1) information about when and where pesticides were applied; (2) basic pesticide safety training; and (3) supplies such as soap and water to use to decontaminate themselves.

EPA and others have assessed several aspects of the WPS in recent years. Improvements are needed to ensure the safety of farmworkers and their children.[12] Compliance with workplace regulations, including the provision of pesticide safety training, varies considerably. Some of the important preventative aspects of the WPS, such as training, reach only a portion of farmworkers. Several studies have found that as few as 35-60% of the farmworkers interviewed participated in some type of pesticide safety training.[13-15] This is due to several reasons, including the high turnover of farmworkers as well as employer failure to comply with the regulations.

The content and quality of the training also vary significantly. Some workers participate in a formal class, while others are shown a video or receive informal training from their supervisors. The trainings tend to focus primarily on farmworker protection, and the effectiveness of the training varies, depending on quality.[16] More importantly, there is limited emphasis on ways to protect family members of farmworkers from pesticide exposure.[17] Few trainings have integrated theories of non-formal, participatory adult education into their curriculum and used *promotoras de salud* or lay health workers to promote pesticide education and safety practices.

The use of *promotoras de salud* to promote health messages builds on the tradition of *educación popular* (popular education or non-formal participatory adult education) in Mexico and other developing countries. Popular education is experiential learning that is relevant to the everyday lives of the learners. It involves active participation and is based on sharing knowledge and experiences. There is generally immediate application to address life problems. Popular education was used heavily

in the 1960s and 1970s and was central to the community-based approach to primary health care services, in which local residents are trained to provide preventative and simple curative care. Much of the theory surrounding popular education or non-formal adult education is based on Paulo Freire's work outlined in the *Pedagogy of the Oppressed*.[18] Other theorists who contributed to popular education include Malcolm Knowles and Kurt Lewin. It was David Werner, however, in his book *Donde No Hay Doctor/Where There Is No Doctor*[19] that helped popularize the use of lay health workers and *educación popular*. In the past 10 to 15 years, popular education techniques have been more widely accepted in the United States, and they are now frequently incorporated into many farmworker and community-based health programs. The *promotora* model is perhaps the most common application of popular education in this country. Additionally, *fotonovelas* and comic books are often used as tools to assist in the promotion of health messages. Both the comic book and *fotonovela* are popular media in Mexico in which *novelas,* or short stories, are published. These media are used to promote health by weaving health education messages into stories with characters that reflect real life circumstances.

Community Overview

The pilot intervention took place in small, mostly rural communities and neighborhoods in Doña Ana County, New Mexico, where many farmworker families reside. Only one of the towns, Sunland Park, is more peri-urban than rural. While the county is largely agricultural, the families who participated in this project generally did not reside on the farm where they worked. The majority of the families were first-generation Mexican immigrants. The legal status of the household members was mixed with some of the family members having proper authorization to live and work in the United States and other members in the same family not having proper authorization. Many of the families' children, however, were U.S. citizens.

Previous research and programs in the area documented in-home use of pesticides and the presence of pests. In a study examining childhood asthma in 106 households in Southern Doña Ana County, about 30% of the households were bothered by cockroaches and 13% reported the presence of rodents. The use of pesticides inside the home was common, with about 70% of the caregivers reporting indoor pesticide applications. About 40% reported using pesticides around the outside of the home.[20] One of the partner organizations in this project previously worked with families in Doña Ana County regarding environmental health hazards in and around homes, and observed that use of pesticides at home was very common. Moreover, they found that in areas of Doña Ana County where farmworker families lived, it was not uncommon to see agricultural pesticide containers being used around the house. Clients would sometimes tell them that they used agricultural pesticides around their homes. They also reported that when they talked to families about pesticides, many did not think that household products like Raid® were pesticides and many did not understand the health risks associated with pesticides.

We do not have specific demographic information for the participating families. The organizations and their *promotoras* focused primarily on a simple, easy to administer assessment to examine the effectiveness of their intervention, and felt strongly that families understood that this was not another survey and specifically requested not to collect additional data.

County data from 2000-2003, however, give a general overview of Doña Ana County, New Mexico. In 2003 Doña Ana County had a total population of 182,165 with 64.9% of Hispanic or Latino ethnicity compared with 43.2% in New Mexico. The per capita income in Doña Ana in 2002 was $20,573 compared with $24,823 in New Mexico. In 2002 in Doña Ana County, 34.9% of children under 18 lived below the poverty level compared to 25.2% in the New Mexico and 16.7% in the United States.[21] The educational attainment is relatively low in Doña Ana County with 18.2% of adults having less than a 9th grade education compared with 9.3% in New Mexico and 7.5% in the United States. About 30% of adults did not complete high school compared with 11.9% in New Mexico and 12.1% in the United States.[22] Again, this disparity is far greater in the northern and southern parts of Doña Ana County.

Lastly, more than half (52.6%) of all households in the county report Spanish as the primary language spoken at home compared with 28.7% in New Mexico and 10.7% in the United States.[22]

PROGRAM DESIGN AND METHODS

With funding from the Paso del Norte Health Foundation, in 2004 Migrant Clinicians Network (MCN) developed and piloted a culturally sensitive training curriculum and outreach project to educate farmworker families in Southern New Mexico. The project addressed pesticide safety for the entire family, not just the farmworker. The approach emphasized education to the primary caregiver, mainly the mother, as a means to help prevent exposure to children in the home. The curriculum included information regarding why children are vulnerable to pesticide exposure and ways to minimize farmworker children's exposure to pesticides. Additionally, the curriculum employed popular education techniques and considered local health information and the general border milieu. Using the curriculum, MCN worked with lay health educators or *promotoras de salud* from local agencies to educate them in both pesticide safety and in ways to successfully promote safety information in the farmworker community. The *promotoras* trained farmworkers and their families during home visits and small group workshops. To help reinforce pesticide safety messages, each family received *Aunque Cerca . . . Sano,* a 16-page, Spanish language comic book targeting farmworker families to educate parents about children's risks to pesticide exposure and ways to minimize these risks. The comic book was developed in 2002 by MCN and Farm Safety 4 Just Kids with funding from the National Children's Center for Rural and Agricultural Health and Safety. The majority of families participated in two educational encounters.

Project staff developed a six-hour bilingual pesticide and community education curriculum for *promotoras*. The curriculum incorporated theories of participatory adult education so that it could train *promotoras* with a minimum of an eighth-grade education. The curriculum addressed a number of topics and began with a general overview of environmental health including the definition of toxicity, factors that influence toxicity and the vulnerability of children to environmental exposures. The curriculum then focused specifically on pesticides–the routes of exposure, children's exposure to pesticides, acute and chronic health effects, ways to minimize exposure, ways to respond to a pesticide poisoning, pesticide alternatives in the home and the Worker Protection Standard. Lastly, the curriculum emphasized how to effectively communicate pesticide safety messages in the community and ways to evaluate an educational intervention with low-literate populations.

Project staff successfully tested the curriculum in a workshop that trained 16 *promotoras* employed at three community organizations serving Doña Ana County in New Mexico. These organizations conducted health and environmental health education outreach projects in Doña Ana County. Two organizations were awarded grants to participate in the pilot project. The *promotoras* were selected based on their association with the participating organization. In other words, project staff partnered with the organizations and the organization sent their *promotoras* to the training. It is important to note that, although in many instances *promotoras* work solely on a volunteer basis, the *promotoras* in this project were paid staff of an organization and the organization received funding to implement the pilot project. All of the *promotoras* had previous training on other health topics. A few had training regarding the Worker Protection Standard. More importantly, a small minority of the *promotoras* had previous training regarding ways to effectively communicate health education messages and conduct public health interventions. *Promotoras* often receive education and training, but are not necessarily given the tools and strategies to take the information to the community in an effective way.

In the training, project staff suggested ways the organizations could develop effective interventions and assess families to determine the families' needs and any changes as a result of the intervention. The partnering organizations were asked to develop a work plan and evaluation methods. Within a month of the training,

project staff reviewed the assessment forms the organizations developed.

The organizations determined the key areas of knowledge and behavior to assess and piloted the questions with participating families. The organizations felt they were limited in the number of behavioral changes they could assess, and therefore focused primarily on changes in knowledge. The organizations assessed six variables: (1) Understanding the term "pesticides" and the various uses of pesticides. The *promotoras* knew that many of the families did not understand that pesticides are not only used in agriculture, but they are also used in and around the home. They felt it was important to make sure families understood that education surrounding pesticides applied to pesticides used in the both agriculture and the home; (2) Understanding the routes of exposure; (3) Understanding the reasons children are more vulnerable to pesticide exposure than adults; (4) Understanding actions to take to protect children from pesticide exposure; (5) Recognizing the symptoms of pesticide poisoning; (6) Changing behavior regarding the location of where the family stores pesticides. Observing where parents placed pesticides before and after the intervention was the only behavioral change that the organizations chose to assess.

Farmworker households with at least one child under the age of 6 years were selected to participate in the pilot intervention. The selection method was based on a combination of networking and snowball sampling. The *promotoras* implementing the intervention were very familiar with their surrounding communities. Many of the *promotoras* lived or had once resided in the communities participating in the project. All of the *promotoras* had conducted other projects in the target communities. Numerous participating families referred the *promotoras* to their neighbors and friends.

The *promotoras* conducted two home visits per family. A total of 190 farmworker families participated in the project and the *promotoras* conducted 358 home visits. Approximately 10 percent of the participating families could not be located for the second home visit. The home visits primarily involved one-on-one educational talks between the *promtora* and the primary caregiver, generally the mother. The *promotoras* did not follow a predetermined script, but had a check list of topics to discuss. During the first visit, the *promotoras* offered education and resources. The *promotoras* addressed topics such as the acute and chronic health effects of pesticide exposure, what to do in case of an emergency, routes and sources of exposure in adults and children, ways to minimize pesticide exposure at home and at work, and ways to protect children from pesticide exposure. The *promotoras* also gave the primary caregivers the *Aunque Cerca . . . Sano* comic book to reinforce the educational messages, particularly the reasons why children are vulnerable to pesticide exposure and the steps families can take to minimize exposure to children. The *promotoras* read the comic book with the mother and further discussed the comic book's content, story and characters of the comic book. This approach gave *promotoras* the opportunity to address pesticide issues, clarifying myths and misunderstandings. The comic book was a tool to help take what caregivers may perceive as blame away from the family. Using the characters in the book, the *promotora* was able to talk about the characters and not the particular family with whom she was visiting. Reading the comic book, as opposed to simply leaving it at the home, further assured that the primary caregiver received the information in this resource. The *promotoras* gave the families lunch bags with pesticide safety messages and a $15 gift certificate to use at a local hardware store, in appreciation for their participation.

Emphasis on children was a critical component of the educational intervention. Much of the previously developed educational efforts around pesticides and farmworkers focused on the worker and the Worker Protection Standard. The focus on children in this pilot program was to help the primary caregiver and the family understand that actions workers could take to safeguard themselves from pesticide exposure could also protect their children. Furthermore, it stressed the necessity to take additional steps in the home to protect children.

Prior to delivering the educational intervention during the first home visit, the *promotoras* orally administered a simple one-page pre-assessment instrument with the primary caretaker in the home. The entire first visit lasted between 20 minutes and one hour. Within four weeks, the *promotoras* returned to the home for a sec-

ond visit and administered a post-assessment instrument. The *promotoras* offered additional education if they saw that the primary caregivers did not understand critical concepts.

In addition to the evaluation tools, the project staff conducted monitoring visits with *promotoras* to offer feedback for improvement as necessary. While most of the intervention involved two in-home visits with the primary caregiver of the farmworker family, one organization conducted seven group educational workshops directly with the workers, reaching 83 farmworkers.

RESULTS

The project team examined the results of the pre- and post-assessments that the *promotoras* administered during the home visits to determine participant gain in knowledge. While the project reviewed all of the assessments conducted in 190 households (Table 1), we include results only from the *promotora* who was directly trained by project staff to administer the assessment. Due to administrative changes in one of the organizations, several *promotoras* trained by project staff did not participate in the intervention. Instead, these *promotoras* used a training-of-trainer approach and facilitated a separate workshop for their peers. During monitoring visits with the *promotoras* trained by their peers, project staff observed improper administration of the assessment tool. The *promotoras* were not using it as a tool to assess pre- and post-intervention changes. The *promotoras*, in these cases, were educating the families about the specific information in the assessment prior to administering it. The information that they offered focused intensely on the assessment and making sure the families would answer all of the questions correctly. Therefore it is impossible to isolate and document changes in knowledge and behavior as a result of the intervention. Despite the lack of understanding and inappropriate administration of the assessment tool, project staff reported satisfactory implementation of the educational intervention. The results outlined below, therefore, only include 40 farmworker households from the Hatch area of Doña Ana County, but offer an excellent snapshot of the outcome of the overall intervention.

TABLE 1. Number of Participants Reached by Activity and Area

Type of Educational Activity	Number of Participants	Area Served
In-home, one on one educational sessions: Visit 1	N=150	Lower Doña Ana County, New Mexico: Anthony, Sunland Park, Chaparral, San Miguel
In-home, one on one educational sessions: Visit 2	N=128	Lower Doña Ana County, New Mexico: Anthony, Sunland Park, Chaparral, San Miguel
*In-home, one on one educational sessions: Visit 1	N=40	Upper Doña Ana County, New Mexico: Hatch
*In-home, one on one educational sessions: Visit 2	N=40	Upper Doña Ana County, New Mexico: Hatch
**Small group workshops	N=83	Doña Ana County, New Mexico: Hatch, Arrey, Rincon
Total Home Visits	N=358	
Total Educational Sessions/Visits	N=441	
Total Participants Reached	N=273	

**Represents the households in which assessment results are detailed.*

***Small group workshops were conducted directly with workers, largely men.*

While 78% of primary caretakers understood that pesticides are used to control or kill pests, the use of such chemicals for weed control was not as widely understood prior to the intervention (Figure 1). Since the majority of pesticides used in the United States are herbicides, this lack of understanding is important to clarify, as farmworkers may potentially perceive the risk differently if there is any confusion that herbicides are pesticides with similar human health effects as insecticides.

The pilot intervention resulted in a dramatic increase in knowledge regarding the routes of exposure (Figure 2). Prior to the education, only 53% of the caregivers understood that pesticides may enter the body through dermal absorption and 43% knew that pesticide exposure could occur due to inhalation. Even fewer (20%) understood that ingestion of pesticides was another possible route of entry. All or almost all of the caregivers understood that pesticides could enter the body through dermal absorption (100%) and inhalation (95%) after receiving education.

The pilot intervention also showed an increase in knowledge regarding the reasons why children are more vulnerable than adults. The concepts that children are smaller and engage in different behavior than adults were much better understood than the idea that pound per pound children actually eat more food and drink more liquids than adults (Figure 3).

After the intervention the primary caretakers showed a significant increase in knowledge regarding other ways to protect their children from pesticide exposure. This is particularly evident for such practices as bathing or hand washing before touching children, storing and washing work clothes separately and changing clothes before touching/holding children (Table 2).

Primary caretakers better understood the symptoms of pesticide poisonings following the pilot intervention. Caretakers were asked to list symptoms of pesticide poisoning. Headaches, dizziness, itching or rashes, and blurry vision were well understood as symptoms of pesticide poisoning (Figure 4).

The results demonstrate a change in behavior related to pesticide storage practices. There was a slight change in self-reported behavior regarding safe storage practices (Figure 5). Sixty-three percent reported safe storage practices prior to the intervention and 88% reported such practices after receiving the education. Safe storage of pesticides in the home was better understood prior to the intervention than knowledge surrounding other ways to protect children from pesticide exposure.

DISCUSSION

The assessment tool was designed by community organizations to assist the *promotoras*

FIGURE 1. Understand the Uses of Pesticides (N = 40 households)

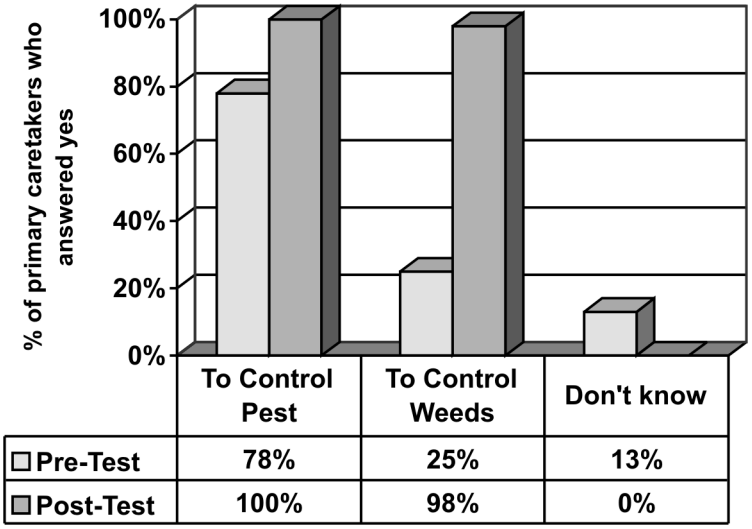


FIGURE 2. Understand Routes of Exposure (N = 40 households)

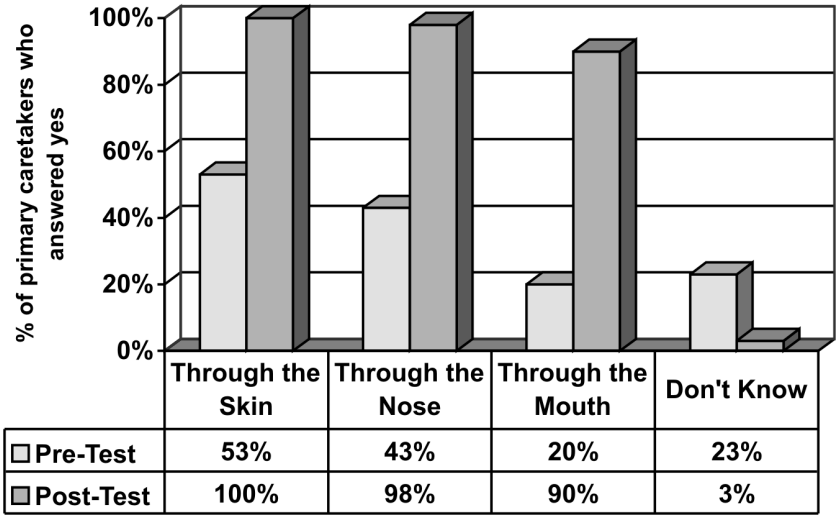
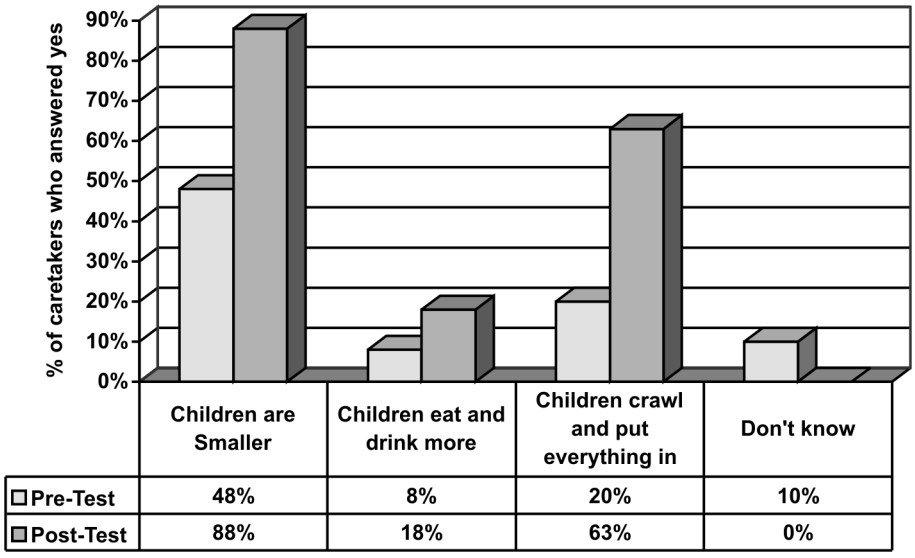


FIGURE 3. Understand Why Children Are Vulnerable to Pesticide Exposure (N = 40 households)



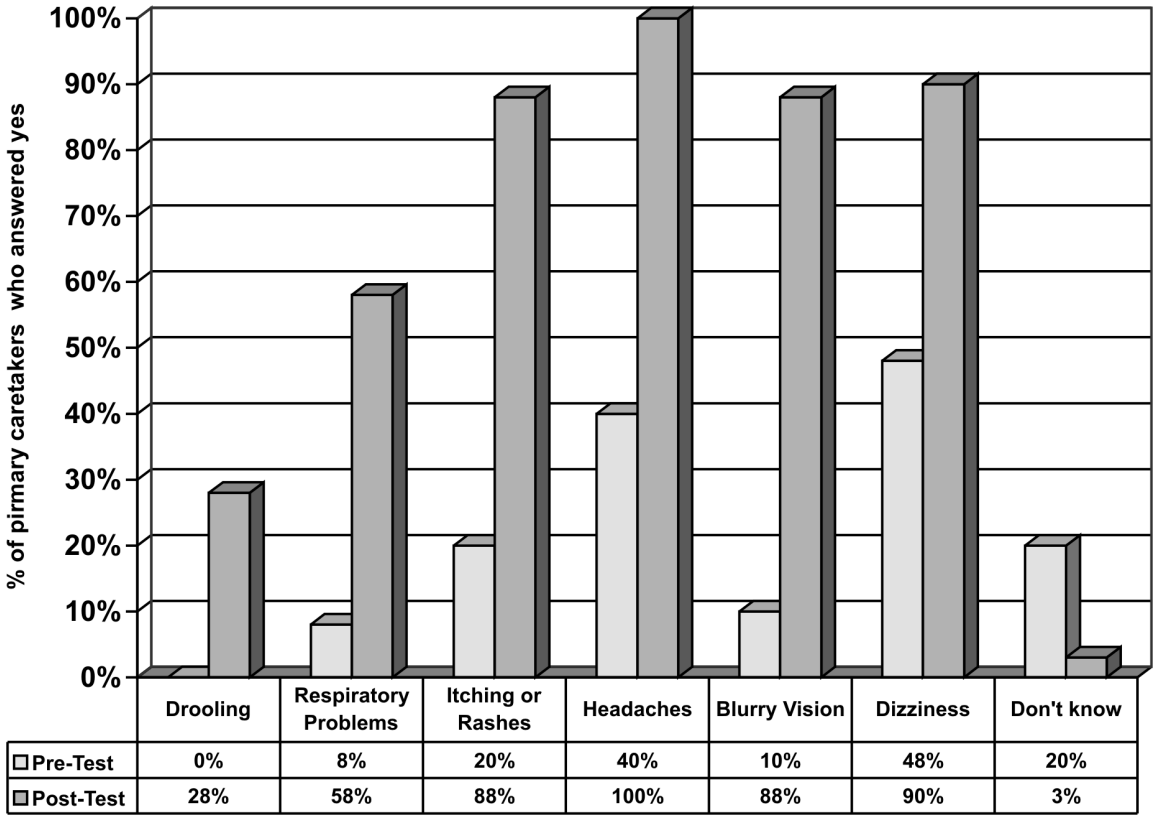
in evaluating the impact of their work and not for use as a rigorous research instrument. The project staff encountered programmatic challenges when we observed the *promotoras* focusing more on the assessment tool as part of the educational intervention itself as opposed to a tool to examine effectiveness of the intervention. Through monitoring and feedback, project staff strengthened the intervention techniques used by the *promotoras.*

More research studies are needed to demonstrate the impacts of such programs. *Promotoras* often serve as an excellent resource for data collection. Caution, however, is warranted, as it is often difficult to do both unbiased research and education. While the assessment results of the other 150 household visits show very positive outcomes, the administration of the instrument was not carefully implemented. The 40 pre-assessments and 40 post-assess-

TABLE 2. Understand Ways to Protect Children from Pesticide Exposure (N = 40 Households)

Protective Behavior	Pre	Post
Take off shoes before entering house	18%	60%
Shower/wash hands before touching children after work	28%	93%
Wash hands (adult/children) more often	18%	43%
Wash fruits and vegetables before eating	13%	38%
Shower/wash hands before touching children after work	28%	60%
Store and wash work clothes separately	10%	80
Do not know	23%	0%

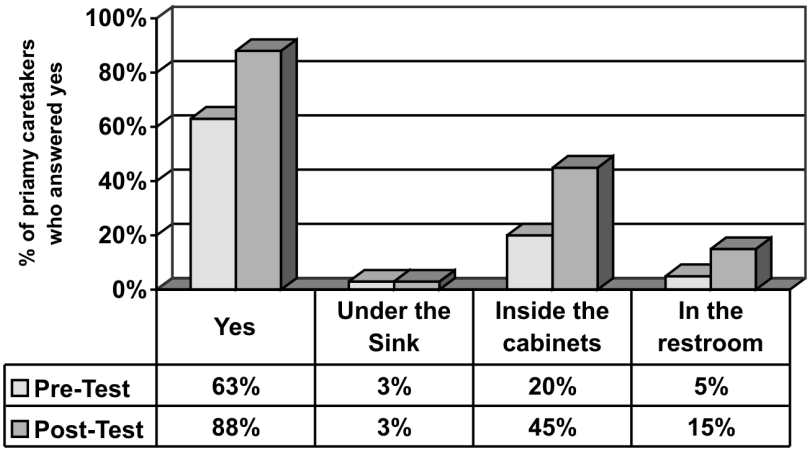
FIGURE 4. Understand Symptoms of Pesticide Poisoning (N = 40 households)



ments that we describe here were conducted by a very well-trained *promotora* with a lot of prior community and research experience. While many research efforts successfully utilize *promotoras* to conduct the research, extensive training and monitoring in both data collection and educational techniques is highly recommended.

Whether programmatic or investigatory in approach, it is critical to involve those conducting the education or the research in the design of the methods. In this pilot intervention, the *promotoras* largely selected the criteria to assess their efforts. The assessment was limited by the *promotoras'* insistence to keep the tool as simple and as brief as possible. Their desire

FIGURE 5. Store Pesticides Out of the Reach of Children (N = 40 households)



	Yes	Under the Sink	Inside the cabinets	In the restroom
Pre-Test	63%	3%	20%	5%
Post-Test	88%	3%	45%	15%

for simplicity and brevity is justified, as the educational intervention was their priority. More in-depth training, however, could have been done to help the *promotoras* understand how to implement the assessment tool and use it as a way to demonstrate their impact with the families. The training could be strengthened so that if a training-of-trainers approach is used by other organizations, new trainees would better understand the reasons for evaluation and ways to conduct assessments. Project staff could have also suggested additional variables to assess to better determine attitudes or other knowledge criteria such as steps to take when symptoms of pesticide poisoning occur, but felt it was important to give the organizations and their *promotoras* final say in the areas to assess.

There are numerous elements to examine in a pilot intervention such as the one described here. Given funding limitations and the programmatic emphasis of the effort, it is difficult to further incorporate additional assessment criteria. To further study or evaluate attitudes and behavior as well as additional areas of knowledge, it is recommended that organizations partner with academic researchers to rigorously design a study that is scientific, culturally competent, accepted by community organizations, and most importantly, by the community members, themselves.

Consideration should be given to applying the information about knowledge and behaviors to a future educational intervention, which could focus on correcting areas with the least understanding.

CONCLUSION

The importance of protecting children and other family members of farmworkers from para-occupational pesticide exposure is often neglected in worker protection training measures. By targeting caretakers in a home-based educational intervention, the importance of preventative measures that can be done in the home is reinforced. The pilot intervention offers practitioners a way to make pesticide safety training relevant to farmworkers and their families: emphasize children as a motivating reason to take steps to protect not only the worker but his or her family members. This pilot project proves the efficacy of an in-home, one-on-one approach with a culturally appropriate educational comic book as an instrument to help transfer education to the community. Additionally, this project's educational method involving the training of *promotras* offers a training-of-trainers approach that is easy to implement and replicate.

In future investigations it would be valuable to test retention of the information imparted through the educational intervention beyond four weeks through additional follow-up interviews.

The utilization of culturally appropriate popular education methodology in community-based interventions is an effective way to promote pesticide safety and education to farmworker families. The *promotora* model offers an excellent vehicle to educate community members. Health programs already utilizing this model can easily integrate pesticide education into existing community outreach services.

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