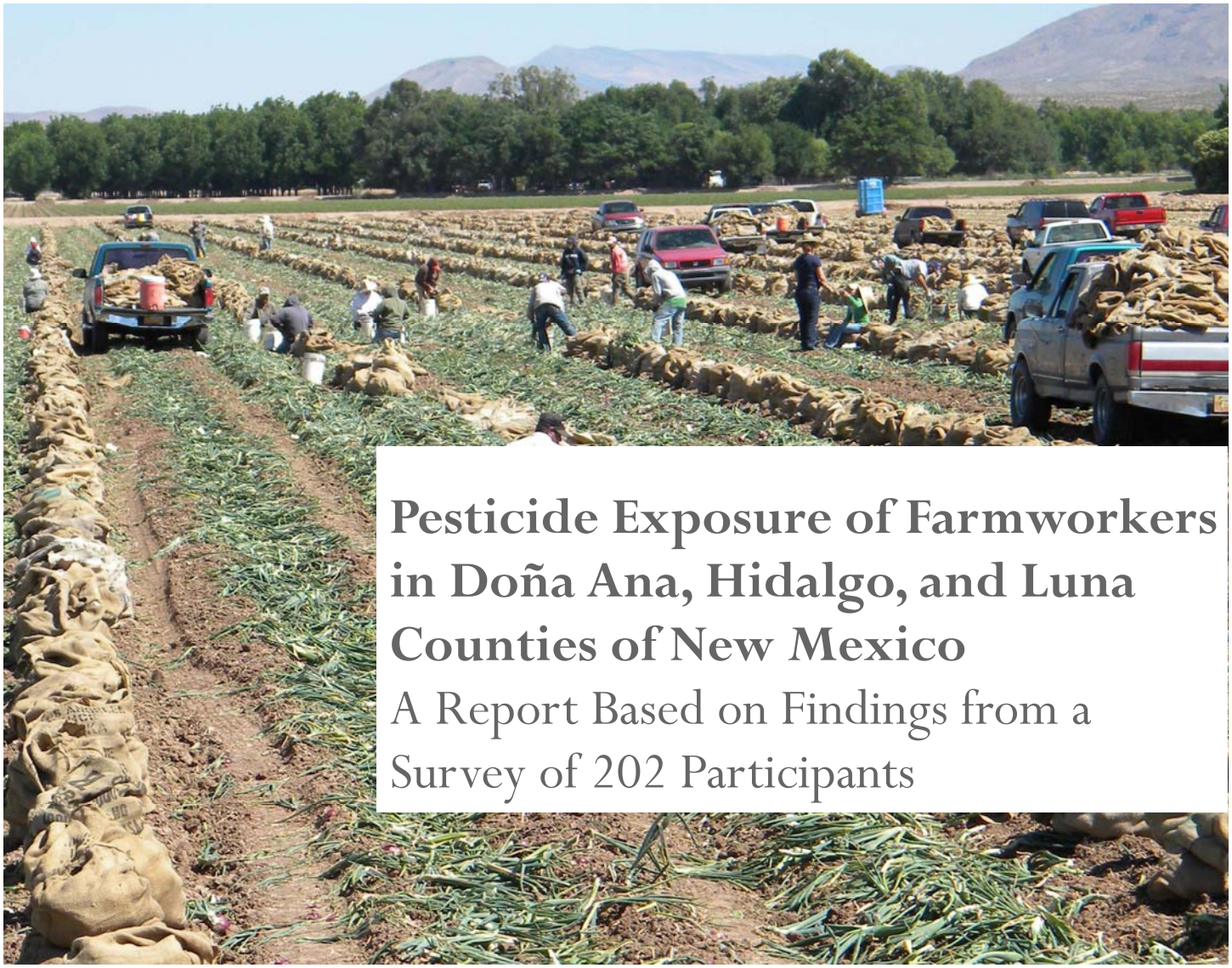
NEW MEXICO DEPARTMENT OF HEALTH
EPIDEMIOLOGY AND RESPONSE DIVISION



Pesticide Exposure of Farmworkers in Doña Ana, Hidalgo, and Luna Counties of New Mexico

A Report Based on Findings from a Survey of 202 Participants

June 2009

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Executive Summary

Background: A 2007 analysis of New Mexico (NM) Poison and Drug Information Center call data for work-related illness and injury due to pesticides found that the southwestern region of the state had the highest rate of calls over any other region. The southwestern region, including Dona Ana, Hidalgo, and Luna Counties along the NM-Mexico border, is highly agricultural, but little is known about the pesticide exposures of farmworkers there. The project described herein characterizes farmworkers' experience, knowledge, beliefs, training, and practices regarding pesticide illness and injury, and exposure prevention.

Methods: A survey previously developed in North Carolina to determine the knowledge, beliefs, experiences, and pesticide exposure prevention training status of farmworkers served as a model for the current survey. In the current study, promotoras (lay health workers) were contracted to orally administer the survey to farmworkers in the three border counties. Eligibility was limited to workers at least 18 years of age who had worked with crops or in a greenhouse within the past 12 months.

Highlights: Men, more frequently than women, stated that they had received information on how to protect themselves against pesticides (59% vs. 38%, p-value <0.01), that they had received any sort of pesticide exposure prevention training (57% vs. 32%, p-value <0.01), and that they could identify the training as being Worker Protection Standard (WPS) certified (26% vs. 12%, p-value=0.03). Men were also more likely to have had training within the last five years (43% vs. 24%, p-value =0.01). Workers who had training were significantly more likely to have worn a long-sleeved shirt (p-value=0.02) and gloves (p-value=0.01) while working than did those without training. However, only those with WPS training were more likely to state that they did anything to protect themselves against pesticide exposure than those with any type of training or without training (p-value=.04). Workers with training expressed less concern over the effects of pesticides on the health of the children of farmworkers, the ability of farmworkers to have children and the health outcomes for unborn children of farmworkers than workers without training (all p-values <0.01).

Conclusions: There is a lack of compliance for training requirements as specified by the WPS among farm employers in the southwestern region of New Mexico. Training, especially if it is identified as WPS certified, positively influences the knowledge and behaviors of farmworkers. At the same time, farmworkers with training expressed less concern about the health effects of pesticides which may foster a sense of complacency about exposure prevention. Pesticide exposure prevention training for farmworkers in the region should be more closely examined.

Introduction

Pesticides, such as organophosphates, carbamates, pyrethroids, and glyphosates, are used to kill insects, rodents, weeds, and fungi, and can disrupt the nervous system of humans by affecting the neurotransmitter acetylcholine regulation among other health effects [1]. The EPA estimated that over 1.2 billion pounds of herbicides, insecticides, fungicides, and other pesticides were used in the United States (US) in 2001 [2]. According to the American Association of Poison Control Centers 2007 Annual Report, there were 96,307 symptomatic exposures to pesticides in the US reported to the National Poison Data System (NPDS) [3]. The number of calls related to pesticide exposure captured by the NPDS, however, is likely to underestimate the true number of pesticide exposures, as the health effects - especially those resulting from lower level chronic exposures - can have a wide variety of symptoms, and exposed individuals may not realize that they have been exposed to pesticides [4]. Agricultural workers can become exposed to pesticides through ingestion, inhalation, or dermal contact while working [5]. Illnesses caused by pesticide exposure can lead to missed work days, decreased productivity on the job, hospitalizations, and death. It is important to understand the level and risks of pesticide exposure in the agricultural population within a region in order to target exposure prevention education programs to protect workers from becoming exposed.

The New Mexico Occupational Health Surveillance program at the University of New Mexico in conjunction with the New Mexico Department of Health (NMDOH) conducted an analysis of five years of pesticide-related work-associated calls to the New Mexico Poison and Drug Information Center (NMPDIC) in 2007. The analysis revealed that organophosphate pesticides were the single most frequently reported pesticide type associated with calls to the center between 2001 and 2006 (N=32) [6]. The southwestern region of New Mexico including Doña Ana, Hidalgo, and Luna Counties where both residents and migrants work in agriculture, was shown to have the highest rate of work-related pesticide illness and injury calls (4.7/100,000 workers), twice the rate of the northern region (2.4/100,000 workers) - see figure 1 [6]. The number of calls to the NMPDIC related to pesticide exposure, however, does not reflect all such exposures in this area. No major studies have been conducted on pesticide exposures in the New Mexico border region with Mexico, and there were no occupational pesticide exposures reported to the NMDOH in 2008, despite pesticide exposures being a reportable condition. Thus the true burden

of exposure to pesticides in this region is largely unknown.

Farmworkers' exposure to pesticides and the illness related to them can be effectively prevented by wearing the appropriate personal protective equipment and by following safety and exposure prevention guidelines. Under the Worker Protection Standard (WPS), the US Environmental Protection Agency (EPA) requires employers to "provide pesticide safety information to untrained workers before they enter treated areas where, within the past 30 days, a pesticide has been applied or a restricted-entry interval has been in effect" [7]. In addition, workers must receive training at least once every five years [7]. Workers must be trained in language and terms that they can understand on the concepts outlined in the text box above [8]. Also, an explanation of the WPS worker protection requirements should be explained to farmworkers, including such aspects as: application and entry restrictions, the design and posting of warning signs, oral warnings, availability of specific information about applications, and protection against retaliatory acts [7].

With unknown numbers of agricultural workers being exposed to pesticides in the border region, it is difficult to determine if current educational efforts are effective in preventing exposure. In addition, it is unknown if pesticide-related illness is being recognized both by the individual worker and by the healthcare provider or hospital where he/she may seek care and adequately treated as such. Therefore, it is important to gain a better understanding of the level of risk factors of exposure in this border region in order to target future exposure and illness prevention efforts appropriately. This project aimed to characterize farmworkers' knowledge, beliefs, training, and practices regarding pesticide exposures in the New Mexico-Mexico border region by conducting a survey of NM farmworkers during the 2008 growing season in Doña Ana, Hidalgo, and Luna Counties.

WPS required training concepts

- Pesticides may be on or in plants, soil, irrigation water, or drifting from nearby applications.
- Prevent pesticides from entering your body by:
  - Following directions and/or signs about keeping out of treated or restricted areas
  - Washing before eating, drinking, using chewing gum or tobacco, or using the toilet
  - Wearing work clothing that protects the body from pesticide residues
  - Washing/showering with soap and water, shampoo hair and put on clean clothes after work
  - Washing work clothes separately from other clothes before wearing them again
  - Washing immediately in the nearest clean water if pesticides are spilled or sprayed on the body, and as soon as possible, showering, shampooing, and changing into clean clothes

Workforce

According to the Bureau of Labor Statistics, the total estimated number of workers employed in agriculture, which includes those that work with crops, greenhouse workers, and workers on dairy farms, ranged from 2809 to 4193 in Doña Ana County, 173 to 1064 in Hidalgo County, and 85 to 1645 in Luna County between April and September of 2008 [9]. These numbers include only documented workers, and are likely to underestimate the true number of agricultural workers in Doña Ana, Hidalgo, and Luna Counties. The farmworker population in this region is typically impoverished and medically underserved. According to the Bureau of Labor Statistics and the Luna County Health Council, Luna County has been designated a Medically Underserved Area (MUA) and Health Professionals Shortage Area (HPSA), as well as a Health Status Disparity Area for racial and ethnic minorities [9, 10]. Furthermore, Luna County ranks the lowest of all the counties in New Mexico for median household income and unemployment has approached 30% in non-harvest seasons [9].

There are 13 Federally Qualified Health Centers in Doña Ana, Hidalgo, and Luna Counties (eight in Doña Ana County, two in Hidalgo County, and three in Luna County). There is a mobile health clinic that provides limited services to those in outreach sites lacking clinical capacity or where high-risk persons congregate. There is also a clinic run by the University of Texas at El Paso within the Centro de Trabajadores Agrícolas Fronterizos specifically for migrant farmworkers. Because the true burden of pesticide exposure in this area is unknown and many workers that may be exposed may not typically seek medical care, this was an ideal population to conduct a study on the knowledge, beliefs, and practices regarding pesticide exposures as a basis for providing future interventions, and improving their understanding of how to protect themselves and how to recognize symptoms and seek care for pesticide poisoning.

Methods

This study was approved by the New Mexico State University Institutional Review Board for human subjects research. It was funded by the New Mexico Office of Border Health under its Environmental Health Program, and conducted by the Environmental Health Epidemiology Bureau of the New Mexico Department of Health.

A questionnaire was developed using a survey previously designed by a Worker Protection Standard assessment project conducted in North Carolina as a reference [11]. The North Carolina project, "Preventing Agricultural Chemical

Exposure among North Carolina Farmworkers", was a four-year community-based project focused on farmworkers in eight counties in East-Central North Carolina [11]. The questions in the North Carolina study were reviewed by focus groups in the counties of interest to ensure that they were understandable and culturally appropriate [11]. The survey that was developed by the NMDOH included 74 items on basic demographics and working patterns, knowledge base and trainings, experiences and exposures, practices, and beliefs regarding pesticide exposure. Focus group meetings were held with promotoras (lay health workers), some of whom were former farmworkers, already working in the counties of interest to ensure participants' ability to understand the questionnaires, and cultural sensitivity. The promotoras were also contracted to conduct the survey. Once content was finalized, the surveys were translated into Spanish and reviewed for comprehension by the promotoras.

The Southern Area Health Education Center, part of New Mexico State University in Las Cruces, NM , which is located in Doña Ana County, was contracted to hire, train, and supervise promotoras in administering the surveys to farmworkers. The promotoras were trained on the appropriate methods to administer the survey and to ensure confidentiality of the participants. Participants were recruited by promotoras in Doña Ana, Luna, and Hidalgo Counties by word of mouth, by employers informing their employees about the project, through site visits to farms, and through home visits with farmworkers. Participants were given informed consent, and all surveys were administered away from work sites to limit potential biases. A log book of participants was kept to ensure that volunteer participation was not duplicated. Corresponding identification numbers for each participant from the log book were entered on the surveys instead of the participants' names. At the conclusion of the data collection portion of the project, the log book was destroyed, and only identification numbers were used for analysis of the surveys. All promotoras were fluent in Spanish, and participants were given the choice to complete the survey in either English or Spanish. Surveys took an average of 30 minutes to administer, and participants were given a $20 gift-card to a local grocery store for participation. The surveys were conducted between June and August, 2008.

Study Population

The population of interest for this study was farmworkers who worked with crops or in a greenhouse in Doña Ana, Hidalgo, or Luna Counties in Southwestern New Mexico. To be eligible, participants had to be at least 18 years of age, and had to have worked with crops or in a greenhouse within the past 12 months.

Data Analysis

After the surveys were conducted by the promotoras, completed surveys were returned to the NMDOH Environmental Health Epidemiology Bureau. Data were checked for errors and anomalies after the surveys were received, and then entered into an inventory database. Data were analyzed using SAS version 9.1 and STATA intercooled version 9. A significance level of 95% as indicated by a p-value of ≤ 0.05 was selected. For most of the data analysis, odds ratios and Cochran Mantel-Haenszel chi-square tests were used to test for significance. For categorically-ranked questions, ordered logistic regression was applied to assess variable relationships.

Results

Basic Demographics

A total of 202 farmworkers participated in this study. Demographic information is listed in Table 1. About 69% of the participants were male and 31% were female. Ages of participants ranged from 18-69 years of age with a mean age of 40.8 years (median 40 years). The majority of participants (54%) had an eighth grade education or less; however 21% had a 12^{th} grade education or more. The majority of participants (87%) were Mexican-born, and the rest (13%) were US-born. About 96% of participants stated that they lived in New Mexico year-round and 25% stated that they moved from place to place to work (with some saying that they moved more frequently when work was scarce). The majority of study participants (57%) stated that they understood no or very little English, while 19% stated that they understood some and the remaining 24% understood all or most English. Time worked in the United States ranged from less than one year up to forty-five years with a median amount of time worked of eight years. Participants' time spent doing farm work in the past year ranged from less than one month to twelve months with an average of about six months worked.

Examining the number of years of farm work in the United States by gender (Table 2); men's amount of time ranged from six months to 45 years with a median of eight years, while women ranged from one year to 36 years with a median of seven years. Examining months spent doing farm work in the last year by gender; men worked on average about six months, while women worked about five months. Men also worked more days of the last seven than women did (median 6 versus 4 days).

Employment Information

The majority of participants (77.9%) stated that they were employed by contractors, while about a quarter (25.1%) were employed directly by farm owners and a

few (2.5%) stated that they were self-employed (Table 3). Major crops participants reported working with included: chile (77.2%), onions (68.8%), pecans (30.7%), and lettuce (13.4%); The complete listing of the crops that participants worked with is found in Table 4. The top five cities where participants indicated having worked during the past 12 months in New Mexico were: Columbus (25.7%), La Union (19.8%), Mesquite (18.8%), Deming (18.3%), and Las Cruces (16.3%); a full listing of cities participants stated that they had worked in during the past 12 months is found in Table 5. Participants also reported having worked in other states including: Arizona, California, Florida, Michigan, Missouri, Oklahoma, and Oregon during the previous 12 months (Table 6). Table 7 lists the participants' reported farm job duties with the potential to expose them to pesticides. There was no significant difference in the job duties with potential for pesticide exposure for men and women (Table 8).

Reported Health and Symptoms

Participants were asked to rate their overall health. About 75% stated that their health was excellent, very good, or good, and 25% stated that their health was fair or poor (Table 9). Participants were also asked whether they had experienced common symptoms of pesticide exposure within the past two months (Table 10). About 6% of participants stated that they had experienced a headache, 4% itching or burning skin or a skin rash, 3% dizziness, 2% blurred, cloudy, or double vision, and 0.5% nausea or vomiting every day. When asked if they had ever felt sick after using pesticides about 14% stated that they had, but only one person reported seeking medical attention or being hospitalized for pesticide-related illness during the past 12 months.

Field sanitation

Questions about the availability of water for drinking and hand washing, and the availability of toilet facilities were asked of participants. The responses were ranked 'never', 'almost never', 'sometimes', 'usually', and 'always'. For the purposes of analysis the categories were collapsed to 'almost never or never', 'sometimes', and 'almost always or always'. Participants who worked for both farmers and contractors, reported self-employment or were employed by 'other' were excluded from the analysis. Table 11 displays participants' answers to these questions. There was no statistical difference between responses from workers employed by farmers or contractors. Overall, 85% of participants said that there was 'always' or 'usually' water to drink in the fields; 80% reported there were usually or always toilets; 71% reported that there were clean cups available for drinking water; and 53% reported that there was usually or always

water to wash hands in the fields. Over 23% of all participants stated that there was never or almost never water available to wash their hands in the fields.

Employer Safety and Communication

Participants were asked 'are you ever told when pesticides are being applied or have recently been applied in areas that you are working?', to which 50.3% of participants employed by contractors answered 'no' versus 32.6% of those that were employed by farm owners or self-employed (p-value=0.04). Another question asked 'when you are doing farm work, does your employer talk to you about or instruct you about "working safely?", 58.4% of participants employed by contractors answered 'never' or 'almost never' versus 34.1% of those employed by farm owners or self-employed (p-value<0.01).

Participants were asked if, during work, their employer/boss talked to them or instructed them about 'working safely' or about how to 'dress safely' for work. Those who worked directly for farm owners were significantly more likely to have been instructed on safety measures than those who worked for contractors (p-value = 0.02); they were also more likely to have their employers tell them to dress safely for work (p-value = 0.03). However, the total percentage of workers who said that their employers always or usually talked to them about working safely was only 23%, while 54% said that their employers almost never or never talked to them about working safely. Likewise, only 23% of workers said that their employer always or usually told them to dress safely for work while 57% said their employer almost never or never mentioned appropriate dress for work. Employer safety and communication results are listed in Table 12.

Participant Training

Only 52.5% of participants reported being given any sort of information about protecting themselves from pesticides (Table 13). About 49% of participants reported receiving some sort of training on how to protect themselves from pesticides. About 37% of participants had received training within the past 5-years as per EPA WPS requirement for training frequency. About 22% of participants reported having received the EPA-sanctioned WPS training, but only about 13% had received the WPS training within the past 5-years, and only 9% were able to show the WPS card that is administered upon completion of the WPS training at the time of the interview. In total, about 65% of participants reported no training or not having had training within the past five years (Figure 2). Whether workers had received training or not directly correlated with how much work they had done in the previous year, which was

measured by the number of months they reported working during the previous 12 months. Participants who had spent more time doing farm work during the previous year were more likely to have received training than those who had worked less (odds ratio 1.09, 95% confidence interval 1.00-1.19). This effect was not modified nor confounded by gender.

Examining training by gender, males were significantly more likely than females (59.0% versus 38.1%, p-value <0.01) to have received any sort of information on how to protect themselves from pesticides (Table 14). Males were significantly more likely to have received training on how to protect themselves from pesticides (56.9% versus 32.3%, p-value <0.01), and to have been trained within the past 5 years (43.1% versus 24.2%, p-value 0.01). Males were also significantly more likely than females to report having received the WPS training (26.0% versus 12.1%, p-value 0.03), and to have had that training within the past 5 years (16.8% versus 5.2%, p-value 0.03).

Examining training by employer type, participants employed by farm owners were more likely to have received any sort of information on how to protect themselves from pesticides (58.0%) than those employed by contractors or those who were self-employed (51.0% and 40.0% respectively) - Table 15). Participants employed by farm owners were also more likely to have been given any sort of training (53.1%) than those employed by contractors or those who were self-employed (46.7% and 40.0% respectively). When WPS training was examined, however, participants that were employed by contractors were slightly more likely to have received WPS training than those that were employed by farm owners (23.1% versus 20.4%). No one who was self employed reported having received the WPS training. Statistical differences by employer were not calculated due to some participants having worked for more than one employer type.

Effects of Training on Knowledge

When asked when one should wash hands to protect themselves against the effects of pesticides, participants who had received training were significantly more likely to answer 'before eating' (99.0% versus 91.1%, p-value=0.01), 'before smoking' (76.3% versus 24.8%, p-value<0.01), and 'before going to the bathroom' (89.7% versus 54.5%, p-value<0.01) than those who had not received training (Table 16). Participants were also asked when they should shower or bathe to protect themselves against the effects of pesticides; participants who reported having received training were significantly more likely to answer 'when you come into direct contact with a chemical' than those who had not received

training (82.5% versus 38.0%, p-value<0.01) (Table 17). Examining participants' responses as to when they should shower or bathe to protect themselves from pesticides resulted in no significant difference between responses from participants who had received training and those who had not had training to answer 'right away after work' (86.6% versus 84.2%, p-value=0.63). Participants who reported receiving the WPS training, however, were significantly more likely than those who had not received the WPS training to answer 'right away after work' as to when they should shower or bathe to protect themselves against the effects of pesticides (100.0% versus 81.0%, p-value<0.01). When participants were asked 'what are the ways to dress that will reduce harmful effects from pesticides?', participants who reported having received training were significantly more likely to answer 'long pants' (94.9% versus 77.2%, p-value<0.1), 'shoes' (92.9% versus 82.2%, p-value=0.02) 'socks'(88.8% versus 44.6%, p-value<0.01), , 'gloves' (96.9% versus 58.4%. p-value<0.01), and 'mask or bandana' than those who reported not receiving training (93.9% versus 61.4, p-value<0.01) (Table 18).

Effects of Training on Behavior

Participants were asked how often in the past seven days that they had worked in the fields how many days they: 'did not wear a shirt', 'wore a long sleeved shirt', 'wore shorts', 'wore sandals', 'did not wear socks', 'wore gloves', 'did not wear a hat or cap', 'ate while working in the fields without washing their hands', 'drank while working in the fields without washing their hands', 'smoked while working in the fields without washing their hands', 'went to the bathroom while working in the fields without washing their hands', 'wore the same work clothes more than one day without washing them', and 'did not take a shower after work' (Table 19). Participants who reported having received training were significantly more likely to report wearing a long-sleeved shirt (97.5% versus 91.0%, p-value=0.02) and gloves (72.5% versus 57.4%, p-value=0.01) 75-100% of the time than those who had not received training. No other significant differences in the factors above were detected between those with and without training.

When asked whether they did anything to protect themselves from pesticides while working in the fields, participants who had WPS training (85.4% versus 65.8%, p-value=0.04), but not general training (74.7% versus 67.4%, p-value=0.34), were significantly more likely to answer 'yes, always' or 'yes, usually' than participants who had not received the WPS training (Table 20).

Effects of Training on Beliefs

Participants were asked how they believed that one could become exposed to pesticides, both while working in the field and at home, the amount of control they believed they had over preventing personal pesticide exposure, how effective safety precautions were at preventing health effects from pesticide exposure, and their level of concern over the health effects of pesticides.

Almost all participants believed that they could come into contact with pesticides by touching plants after pesticides had been applied to them, by breathing in pesticides from the air, and by being sprayed directly by pesticides (Table 21). Farmworkers who did not report having had training were significantly more likely to identify dried pesticides left on equipment (74.5% trained versus 86.1% no training p-value = 0.04), and riding on equipment (68.1% trained versus 83.2% no training, p-value = 0.01) as sources of possible exposure than farmworkers who reported having received training.

Likewise, respondents who reported not having training were significantly more likely to believe that pesticide exposure could happen by bringing home empty pesticide containers (81.4% trained versus 94.1% non-trained, p-value<0.01), by mixing dirty work clothes with other clothes in the wash (85.6% trained versus 96.0% non-trained, p-value<0.01), and by bringing food home from the fields that hasn't been washed (83.3% trained versus 96.0 % non-trained, p-value<0.01) (Table 22).

Participants were asked how much control they felt that they had over certain preventive behaviors measured as 'a lot of control', 'some control' 'a little control' and 'no control'. Participants who had received training believed that they had 'a lot' or 'some' control over personally avoiding the harmful effects of pesticides more often than did participants who had not received training (64.9% versus 62.2%, p-value=0.04) (Table 23). Seventy-six percent of participants who had received training felt as if they had 'a lot of control' or 'some' control regarding washing their hands while in the fields while only 69.3% of those who had not had training felt that they had 'a lot' or 'some' control over their ability to wash their hands while working in the fields (p-value=0.03).

Participants were asked to rate how effective they believed safety precautions were at protecting themselves from the harmful effects of pesticides as 'very good', 'mostly good', 'somewhat good', or 'not at all good'. Participants who had received training were significantly more likely to feel that safety precautions were 'very' or 'mostly' good at keeping them safe from pesticides than those who had not received

training (44% vs.19%, p-value<0.01) (Table 24).

Participants were asked to rate how much concern they had about the health effects of pesticides with concern defined as 'enough to worry a great deal', 'enough to cause a little worry', 'not enough to cause worry', and 'not at all'. There was no statistical difference between trained and non-trained participants regarding their beliefs of how pesticides affect their own health (p-value=0.35), nor how pesticides affect the health of other farmworkers (p-value=0.90) (Table 25). However, participants with training were significantly more likely to report being 'not at all' concerned or 'not enough to cause worry' when it came to their beliefs about the effects of pesticides on the children of farmworkers (53.7% versus 31.7%, p-value<0.01), the effects of pesticides on unborn children of farmworkers (53.1% versus 32.7%, p<0.01), and the ability of farmworkers to have children (56.7% versus 35.6%, p-value<0.01).

Discussion

The data from this study are specific to Southwestern NM, but the findings could be applicable to other regions of the state, especially in terms of conducting outreach to pesticide training providers, farmers, and contractors to improve training rates among farmworkers. The study serves as a pilot for the assessment of farmworkers' trainings in the border region of NM. Study results could be shared with neighboring states and Mexico as data suggest that workers cross borders to perform farm work. The study should also pave the way for the development of improved health-risk communication and exposure prevention strategies that are directed to specific populations that have often been marginalized regarding occupational health messages.

In comparison to the National Agricultural Workers Survey (NAWS), the average farmworker in this study was older than the average farmworker in the US (average 40.8 versus 33 years) [12]. It should be noted that farmworkers under the age of 18 were excluded from the current study thereby upwardly skewing average age of the sample. This study included proportionately more women than those in the NAWS who work with crops (31% versus 21% nationally) [12]. On average nationally, 75% of farmworkers are Mexican-born, while 87% of this study's population were Mexican-born [12]. Education levels and English language proficiency of participants in this study were similar to those in NAWS [12].

The New Mexico Occupational Health and Safety Bureau is the regulatory authority for farm establishments on all aspects of health

and safety other than pesticide use and are responsible for enforcing field sanitation requirements. Participants reported that, on the whole, employers were compliant with field sanitation requirements. However, interviewers often noted comments in the margins of questionnaires that participants qualified their statements with further information on these measures. For example, some stated that there was water available in the fields, only because they brought their own. There were also comments that toilet facilities were placed so far from the worksite that stopping to use them would cause a great deal of inconvenience and cost valuable work time. Of concern, over 23% of all participants stated that there was never or almost never water available to wash their hands in the fields. Further data collection and focus groups could better elucidate these issues.

The key finding of this study is the need for enforcement of the requirement of pesticide safety training for farmworkers in New Mexico in compliance with EPA's Worker Protection Standard (WPS). Approximately 49% of participants reported having ever been trained, and only about 22% reported ever receiving training that they could identify as being WPS certified. Furthermore, 12% of those who had received training had done so more than 5 years ago, bringing the total percentage of participants out of compliance with WPS training requirements to 65%. It is possible that it was not necessary for some participants to receive training under the WPS requirement (i.e. they never entered treated areas where, within the past 30 days, a pesticide had been applied or a restricted-entry interval had been in effect). Because the New Mexico Department of Agriculture's Bureau of Pesticide Management, the agency responsible for overseeing the use of pesticides in New Mexico, does not collect agricultural pesticide application records it would be almost impossible to ascertain whether workers met WPS training requirements.

Another major concern is the disparity between men and women receiving training. Only 32.3% of females reported ever being trained how to protect themselves from pesticides whereas 56.9% of males had been trained. This was not explained by a differential amount of time worked during the previous 12 months, or by the job duties they performed. There should be a focus on increasing and enhancing training for women. Additionally, health hazard messages, especially as heard by women in terms of beliefs, attitudes, and norms, should be further evaluated.

Training appears to have positive effects on farmworkers' knowledge and behavior. Participants who received any sort of training had more knowledge of ways to protect themselves from pesticide exposures than those who didn't have training,

especially on certain hand washing and bathing measures. One measure, 'bathing right away after work' was only significant for participants who had WPS training. The difference between having received any type of training and training that participants could identify as "WPS" certified was also observed for preventive behaviors. Participants who received WPS training were more likely to report using any protective measures against pesticide exposure than those that received any sort of training or no training. There were very few participants who could actually produce the card that demonstrates that their training was WPS certified. The difference in effects on knowledge and behaviors indicate that WPS sanctioned trainings are preferable to any sort of training; participants with any training reported significantly more specific protective behaviors versus those with no training, such as the use of long sleeved shirt and gloves. Our findings on the effect of training influencing behaviors are in contrast to study findings by Salvatore, et al. who found that some protective measures, such as the use of gloves and hand washing with soap, effectively reduced urine metabolites of organophosphate pesticides, but did not find a significant difference between farmworkers who reported that they had received information or training and those who did not regarding protective behaviors [13].

The effects of training on beliefs were often counterintuitive. Farmworkers who had training were less likely to believe that they could be exposed to pesticides both at work and at home through various means. It is possible that respondents with training felt that if they took adequate precautions against exposure they were less likely to be exposed. Farmworkers who had training felt that safety precautions did protect them from exposures, but actual measurement of exposure was not possible in the current study. Measurements of exposure have been conducted by other researchers in the past [13, 14]. Farmworkers who had training did express feeling more in control over their ability to prevent exposure, however they also had less concern over the health effects of pesticides which may lead to a diminished perceived risk.

This study benefited by having a similar or slightly larger sample size in comparison to other studies that examined outcomes of farmworker pesticide exposure prevention training [13, 15]. Additionally, with about one-third of respondents being female, the sample contained a more equitable proportion of women to men than have previous studies [12, 13, 15]. The study also benefited from having a fairly comprehensive questionnaire that asked questions on knowledge, behavior, and beliefs and gathered information on

locations and crop types worked by participants. The use of bilingual promotoras who live within the communities where recruitment took place is another strength. Many of the data collectors had done farm work in New Mexico and are familiar with the culture and descriptive terms used by participants.

There were no biological measures of exposure in the current study and data collected on perceived illness due to pesticide exposures were sparse. The comparison of the training groups ("WPS training", "any training" and "no training") could have been strengthened with the collection of biological urine samples to measure for organophosphate metabolites. Also, many participants described having symptoms that are indicative of pesticide exposure, but the connection between symptoms and exposure may have gone unrecognized. Symptoms may have been linked to exposures if biological sampling had been possible. This study could serve as a pilot to provide baseline information for further studies involving biological sampling. Another drawback to the current study is the use of a convenience sampling strategy. The sample was collected in three different counties from a variety of locations, but participants were not selected randomly, which prevents the ability to generalize findings. In addition, there is the possibility of bias due to self-reporting, rather than measuring observed behaviors.

Conclusion and Follow-up

The current survey demonstrates that employers of farmworkers are not compliant with the WPS training requirement for farmworkers within New Mexico's border counties. There needs to be an increased awareness of pesticide hazards among agricultural workers and how they should protect themselves from being exposed. This survey indicates that knowledge and some behaviors can be improved with farmworker pesticide exposure prevention training programs, especially if they are accompanied by WPS certification. The NM Occupational Health Surveillance Program has proposed a project to the National Institute for Occupational Safety and Health (NIOSH)-funded Southwest Agricultural Education Center that will inventory providers of farmworker pesticide exposure prevention training. The inventory will include a survey that will collect data about the program in the following steps: (1) contact farmers and other pesticide training providers (2) describe the content of programs used for training and (3) characterize training providers by type (farmer, farm contractor, health clinic, etc). Once the inventory is compiled it will be distributed to employers who are accountable for compliance with the WPS as a resource guide to training programs, and to provide comparative information. The survey will be confidential and data from employers and

trainers will be anonymous.

There are many other issues beyond training that should be addressed in order to improve the health outcomes of farmworkers who may be exposed to pesticides. For example, there is a need for increased physician awareness of the recognition of pesticide illness and injury among farmworkers. Better collection of case surveillance data and increased healthcare provider reporting to the NM Occupational Health Registry would allow for a focus on specific factors related to agricultural pesticide exposure. The NM Occupational Health Registry shares data with the NIOSH on pesticide exposures through the Sentinel Event Notification of Occupational Risks (SENSOR) pesticide program. Combined data from other states would also enhance New Mexico's ability to respond to emerging pesticide issues.

Tables and Figures

Figure 1. New Mexico work-related pesticide call rates by region

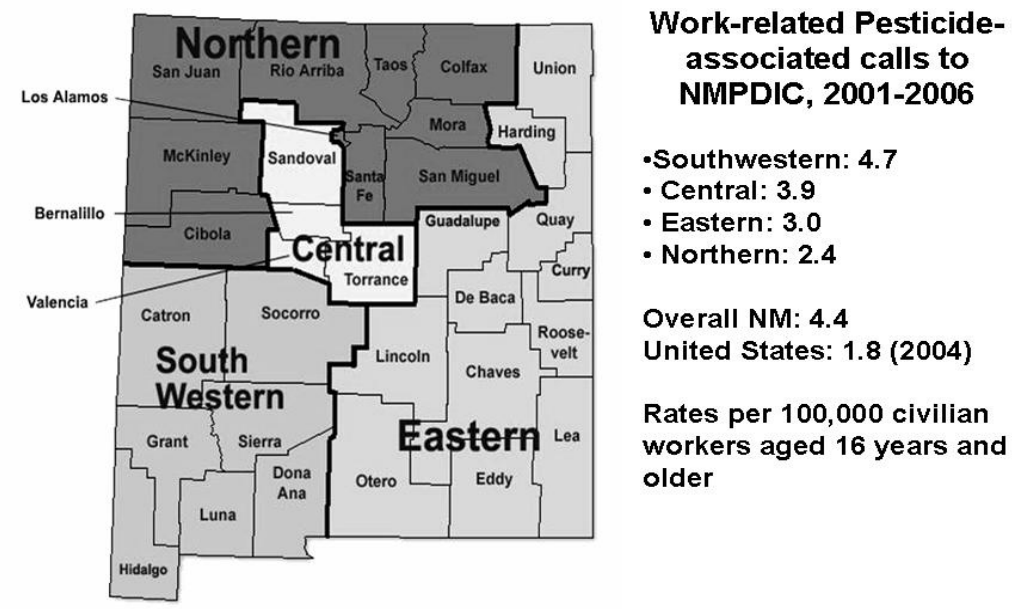

Table 1: Demographic characteristics

Characteristic	No. (%)*
Gender	
Male	139 (68.8)
Female	63 (31.2)
Age (years)	
18-20	12 (6.2)
21-29	38 (19.5)
30-39	47 (24.1)
40-49	42 (21.5)
50-59	34 (17.4)
60+	22 (11.3)
Education	
≤4th grade	40 (19.8)
5th-8th grade	69 (34.2)
9th-11th grade	50 (24.8)
12th grade or higher	43 (21.3)
Birthplace	
Mexico	168 (87.0)
United States	25 (13.0)
Understand English	
None/Very Little	114 (56.7)
Some	38 (18.9)
Most/All	49 (24.4)
No. of years working in agriculture in the US	
<10	116 (57.4)
10 to <20	50 (24.8)
≥20	36 (17.8)

*Percentages may not total to 100 due to rounding.

Table 2: Amount of time worked (days, months and years) - by sex

	Male	Female
Days of last 7 worked	(range 0-7)	(range 0-7)
Mean	4.9	3.1
Median	6.0	4.0
Months of last 12 worked	(range <1-12)	(range <1-12)
Mean	6.2	5.1
Median	6.0	5.0
Years working farm work in US	(range 0.6-45)	(range 1-36)
Mean	11.8	9.3
Median	8.0	7.0

Table 3: Participants' employers

Survey question: For who do you typically do farm work?	No. (%)*
For a contractor	155 (77.9)
Directly for a farm owner	50 (25.1)
On your own farm or for yourself	5 (2.5)

* Total > 100 due to some participants selecting more than one response

Table 4: Crops worked by participants

Survey question: What crops have you worked with during the last 12 months?	No. (%)*
Chile	156 (77.2)
Top city participants reported working with chile	Columbus
Onions	139 (68.8)
Top city participants reported working with onions	Columbus
Pecans	62 (30.7)
Top city participants reported working with pecans	Las Cruces
Lettuce	27 (13.4)
Top city participants reported working with lettuce	Brazito
Cotton	20 (9.9)
Top city participants reported working with cotton	La Union
Alfalfa	13 (6.4)
Cabbage	13 (6.4)
Flowers	12 (5.9)
Grapes	11 (5.5)
Corn	4 (2.0)
Watermelon	3 (1.5)
Oranges	2 (1.0)
Spinach	2 (1.0)
Green Peppers	1 (0.5)
Wheat	1 (0.5)
Apples	1 (0.5)
Fruit Trees	1 (0.5)
Broccoli and Cauliflower	1 (0.5)
Tomatoes and Watermelon	1 (0.5)

* Total > 100 due to some participants selecting more than one response

Table 5: Locations participants worked in New Mexico

Survey question: Where did you work with that crop during the last 12 months?	No. (%)*
Columbus	52 (25.7)
La Union	40 (19.8)
Mesquite	38 (18.8)
Deming	37 (18.3)
Las Cruces	33 (16.3)
Brazito	31 (15.4)
Cotton City	25 (12.4)
Dona Ana	20 (9.9)
La Mesa	19 (9.4)
San Miguel	18 (8.9)
Anthony	16 (7.9)
Hatch	13 (6.4)
Vado	12 (5.9)
Mesilla	10 (5.0)
Berino	9 (4.5)
Chamberino	9 (4.5)
Garfield	3 (1.5)
Mesilla Park	3 (1.5)
Tortugas	2 (1.0)
Hatchita	1 (0.5)
Hobbs	1 (0.5)
Mesita	1 (0.5)
Radium Springs	1 (0.5)
Tucumcari	1 (0.5)
NM	1 (0.5)

* Total > 100 due to some participants selecting more than one response

Table 6: Other states where participants worked

Survey question: Where did you work with that crop during the last 12 months?	No. (%)
Arizona	5 (2.5)
Texas	4 (2.0)
California	2 (1.0)
Florida	2 (1.0)
Michigan	1 (0.5)
Missouri	1 (0.5)
Oklahoma	1 (0.5)
Oregon	1 (0.5)

Table 7: Reported duties with pesticide exposure potential

Survey question: What kind of work are you doing when you are in contact with pesticides?	No. (%)*
Harvesting	86 (56.2)
Topping	80 (52.3)
Cultivating plants	52 (34.0)
Setting plants	41 (26.8)
Applying pesticides	12 (7.8)
Greenhouse work	10 (6.5)
Other duties (weeding, cleaning, driving a tractor, supervising, trimming trees)	17 (8.4)

* Total > 100 due to some participants selecting more than one response

Table 8: Farm tasks performed by participants—by sex

Task	N (%)	N (%)	p-value
Greenhouse work	Male	Female	
Yes	7 (6.6)	3 (6.4)	0.96
No	99 (93.4)	44 (93.6)	
Setting Plants			
Yes	28 (26.4)	13 (27.7)	0.87
No	78 (73.6)	34 (72.3)	
Cultivating plants			
Yes	40 (37.7)	12 (25.5)	0.14
No	66 (62.3)	35 (74.5)	
Topping			
Yes	56 (52.8)	24 (51.1)	0.84
No	50 (47.2)	23 (48.9)	
Harvesting			
Yes	61 (57.6)	25 (53.2)	0.75
No	45 (42.5)	22 (46.8)	
Applying pesticides			
Yes	11 (10.4)	1 (2.1)	0.08
No	95 (89.6)	46 (97.9)	

Table 9: Participants' self-rated health

Survey question: Overall, how would you rate your health?	No. (%)*
Excellent	24 (11.9)
Very Good	44 (21.8)
Good	83 (41.1)
Fair	42 (20.8)
Poor	9 (4.5)

*Percentages may not total to 100 due to rounding

Figure 2. Time since participants' last training

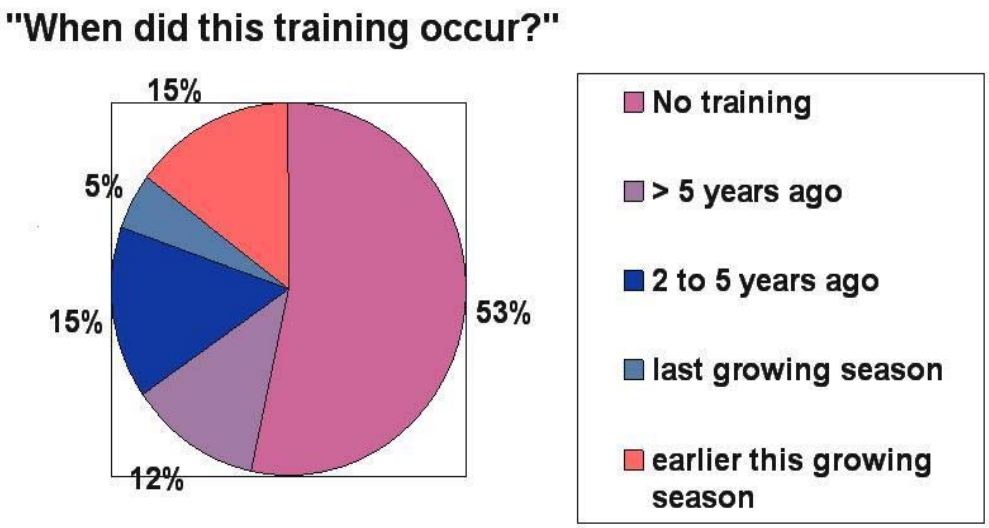

Table 10: Participants' reported symptoms during the past two months

Survey question: During the past two months, how many times have you had the following symptoms?	Zero N (%)	1-13 N (%)	14-30 N (%)	Every Day N (%)
Had a headache	135 (66.8)	48 (23.8)	7 (3.5)	11 (5.5)
Had itching or burning skin or a skin rash	156 (77.2)	37 (18.3)	1 (0.5)	8 (4.0)
Felt dizzy	170 (84.2)	24 (11.8)	2 (1.0)	6 (3.0)
Had blurred, cloudy, or double vision	175 (86.6)	22 (10.9)	1 (0.5)	4 (2.0)
Had nausea or vomiting	182 (91.5)	14 (7.0)	0 (0.0)	2 (0.5)

Table 11: Field sanitation questions

Survey question: When you are doing farm work is there…	Total No. (%)*	Farmer No. (%)*	Contractor No. (%)*	p-value
Water for you to drink in the fields?				
Usually or always	146 (85.4)	26 (76.5)	120 (70.2)	0.41
Sometimes	19 (11.1)	2 (5.9)	17 (9.9)	
Never or almost never	6 (3.5)	6 (17.6)	0 (0.0)	
Enough cups so that each worker can use a clean cup?				
Usually or always	121 (71.2)	24 (72.7)	97 (70.8)	0.73
Sometimes	32 (18.8)	2 (6.1)	30 (21.9)	
Never or almost never	17 (10.0)	7 (21.2)	10 (7.3)	
Water to wash your hands in the fields?				
Usually or always	91 (53.2)	21 (61.8)	70 (51.1)	0.28
Sometimes	40 (23.4)	3 (8.8)	37 (27.0)	
Never or almost never	40 (23.4)	10 (29.4)	30 (21.9)	
A toilet facility in the fields?				
Usually or always	137 (80.1)	25 (73.5)	112 (81.8)	0.95
Sometimes	15 (8.8)	4 (11.8)	11 (8.0)	
Never or almost never	19 (11.1)	5 (14.7)	14 (10.2)	

*Percentages may not total to 100 due to rounding

Table 12: Employer communication

Survey question: Does your employer ever…	Total No. (%)*	Farmer No. (%)*	Contractor No. (%)*	p-value
Talk to you/instruct you about working safely?				
Usually or always	39 (22.8)	12 (35.3)	27 (19.7)	0.02
Sometimes	39 (22.8)	10 (29.4)	29 (21.2)	
Never or almost never	93 (54.4)	12 (35.3)	81 (59.2)	
Tell you to dress safely for work?				
Usually or always	40 (23.4)	9 (26.5)	31 (22.6)	0.03
Sometimes	33 (19.3)	12 (35.3)	21 (15.3)	
Never or almost never	98 (57.3)	13 (38.2)	85 (62.0)	

*Percentages may not total to 100 due to rounding

Table 13: Participants' pesticide exposure information and training

Information or training	No. (%)
Given any sort of information on how to protect themselves from pesticides	106 (52.5)
Given any training on how to protect themselves from pesticides	98 (49.3)
Current on training requirements (within the past 5-years)	74 (37.2)
Given Worker Protection Standard (WPS) training	41 (21.7)
Current on WPS training (within the past 5-years)	25 (13.2)
Showed WPS card	18 (9.0)

Table 14: Participants' pesticide exposure prevention information and training—by sex

	Male	Female	
Information or training	No. (%)	No. (%)	p-value
Given any sort of information on how to protect themselves from pesticides	82 (59.0)	24 (38.1)	<0.01
Given any training on how to protect themselves from pesticides	78 (56.9)	20 (32.3)	<0.01
Current on training requirements (within the past 5-years)	59 (43.1)	15 (24.2)	0.01
Given Worker Protection Standard (WPS) training	34 (26.0)	7 (12.1)	0.03
Current on WPS training (within the past 5-years)	22 (16.8)	3 (5.2)	0.03
Showed WPS card	15 (10.9)	3 (4.8)	0.16

Table 15: Participants' pesticide exposure information and training—by employer*

	Farm Owner	Contractor	Self-employed
Information or training	No. (%)	No. (%)	No. (%)
Given any sort of information on how to protect themselves from pesticides	29 (58.0)	79 (51.0)	2 (40.0)
Given any training on how to protect themselves from pesticides	26 (53.1)	71 (46.7)	2 (40.0)
Given Worker Protection Standard (WPS) training	10 (20.4)	33 (23.1)	0 (0.0)

*Statistical difference between employer categories not calculated

Table 16: Participants' knowledge of when to wash hands to prevent pesticide exposure

Survey question: when should you wash your hands to help protect against the effects of pesticides?	Training No.(%)	No Training No. (%)	p-value
Before eating	96 (99.0)	92 (91.1)	0.01
Before smoking	74 (76.3)	25 (24.8)	<0.01
Before going to the bathroom	87 (89.7)	55 (54.5)	<0.01

Table 17: Participants' knowledge of when to shower or bathe to prevent pesticide exposure

	Training		
Survey question: when should you shower or bathe to help protect against the effects of pesticides?	Yes	No	p-value
	No. (%)	No. (%)	
When you come into direct contact with a chemical	80 (82.5)	38 (38.0)	<0.01
Right away after work	84 (86.6)	85 (84.2)	0.63
	WPS training		
	Yes	No	p-value
Right away after work	41 (100.0)	119 (81.0)	<0.01

Table 18: Participants' knowledge of what to wear to protect themselves from pesticide exposure

	Training		
Survey question: What are the ways to dress that will reduce harmful effects from pesticides?	Yes	No	p-value
	No. (%)	No. (%)	
Any kind of shirt	8 (8.2)	10 (9.9)	0.67
Long-sleeved shirt	95 (96.9)	95 (94.1)	0.33
Long pants	93 (94.9)	78 (77.2)	<0.01
Shoes	91 (92.9)	83 (82.2)	0.02
Socks	87 (88.8)	45 (44.6)	<0.01
Gloves	95 (96.9)	59 (58.4)	<0.01
Hat	90 (91.8)	86 (85.2)	0.14
Mask or bandana	92 (93.9)	62 (61.4)	<0.01

Table 19: Participants' exposure prevention behaviors in the fields

Survey question: Of the days you worked in the fields in the last 7 days, how may days did you…	Training No. (%)*	No Training No. (%)*	p-value
Not wear any kind of shirt			
0-24%	51 (75.0)	48 (75.0)	0.78
25-49%	0 (0.0)	1 (1.6)	
50-74%	0 (0.0)	2 (3.1)	
75-100%	17 (25.0)	13 (20.3)	
Wear a long sleeved shirt			
0-24%	0 (0.0)	4 (6.0)	0.02
25-49%	0 (0.0)	1 (1.5)	
50-74%	2 (2.5)	1 (1.5)	
75-100%	77 (97.5)	61 (91.0)	
Wear shorts			
0%	78 (100.0)	66 (97.1)	0.13
100%	0 (0.0)	2 (2.9)	
Not wear socks			
0%	51 (66.2)	45 (66.2)	0.99
75-100%	26 (33.8)	23 (33.8)	
Wear sandals			
0%	77 (100.0)	66 (97.1)	0.13
100%	0 (0.0)	2 (2.9)	
Wear gloves			
0-24%	11 (13.8)	22 (32.4)	0.01
25-49%	2 (2.5)	2 (2.9)	
50-74%	9 (11.25)	5 (7.4)	
75-100%	58 (72.5)	39 (57.4)	
Not wear a hat or cap			
0-24%	45 (58.4)	38 (56.7)	0.79
50-74%	1 (1.3)	0 (0.0)	
75-100%	31 (40.3)	29 (43.3)	

Table 19 continued: Participants' exposure prevention behaviors in the fields

Survey question: Of the days you worked in the fields in the last 7 days, how may days did you…	Training No. (%)*	No Training No. (%)*	p-value
Eat while working in the fields without washing your hands			
0-24%	47 (59.5)	36 (52.9)	0.75
25-49%	0 (0.0)	1 (1.5)	
50-74%	2 (2.5)	8 (11.8)	
75-100%	30 (38.0)	23 (33.8)	
Drink while working in the fields without washing your hands			
0-24%	41 (53.3)	33 (49.3)	0.86
25-49%	0 (0.0)	1 (1.5)	
50-74%	1 (1.3)	4 (6.0)	
75-100%	35 (45.5)	29 (43.3)	
Smoke while working in the fields without washing your hands			
0%	72 (93.5)	58 (85.3)	0.11
100%	5 (6.5)	10 (14.7)	
Go to the bathroom while working in the fields without washing your hands			
0-24%	41 (54.0)	42 (61.8)	0.31
25-49%	0 (0.0)	1 (1.5)	
50-74%	1 (1.3)	0 (0.0)	
75-100%	34 (44.7)	25 (36.8)	
Wear the same work clothes more than one day without washing them			
0-24%	70 (89.7)	59 (86.8)	0.20
25-49%	4 (5.1)	1 (1.5)	
50-74%	1 (1.3)	0 (0.0)	
75-100%	3 (3.9)	8 (11.8)	
Not take a shower after working			
0-24%	78 (97.5)	67 (98.5)	0.66
75-100%	2 (2.5)	1 (1.5)	

*Percentages may not total to 100 due to rounding.

Table 20: Participants' behaviors regarding exposure prevention protection in the fields—by training

Any Training			
Survey question: do you do anything to protect yourself from pesticides while working in the fields?	Training No. (%)*	No Training No. (%)*	p-value
Yes, always	44 (46.3)	42 (42.9)	0.34
Yes, usually	27 (28.4)	24 (24.5)	
Yes, sometimes	13 (13.7)	17 (17.4)	
No, never	11 (11.6)	15 (15.3)	
WPS Training			
	WPS Training No. (%)*	No WPS Training No. (%)*	p-value
Yes, always	18 (43.9)	60 (42.0)	0.04
Yes, usually	17 (41.5)	34 (23.8)	
Yes, sometimes	6 (14.6)	23 (16.1)	
No, never	0 (0.0)	26 (18.2)	

*Percentages may not total to 100 due to rounding.

Table 21: Beliefs about possible contact with pesticides while working in the fields—by training

Survey question: Do you believe farmworkers can come in contact with pesticides while working…	Training No. (%)*	No Training No. (%)*	p-value
By touching crops after pesticides have been applied?	94 (96.9)	96 (95.1)	0.51
By breathing pesticides in the air?	90 (92.8)	94 (93.1)	0.74
By being sprayed?	88 (91.7)	95 (94.1)	0.52
By swallowing sweat off face?	80 (84.2)	92 (91.1)	0.14
When mixing, loading, or applying pesticides?	76 (79.2)	88 (88.0)	0.10
By touching plants after the pesticides have dried?	82 (85.4)	87 (87.0)	0.75
From dried pesticides left on equipment?	70 (74.5)	87 (86.1)	0.04
When riding on farm equipment?	64 (68.1)	84 (83.2)	0.01

Percent answering "yes"

Table 22: Beliefs about possible contact with pesticides at home—by training

Survey question: Do you believe farmworkers can come in contact with pesticides while at home…?	Training No. (%)*	No Training No. (%)*	p-value
By bringing home pesticides from work?	89 (91.8)	94 (93.1)	0.73
By bringing home empty pesticide containers?	79 (81.4)	95 (94.1)	<0.01
By mixing dirty work clothes with other clothes?	83 (85.6)	97 (96.0)	0.01
By not changing clothes after coming home?	87 (89.7)	101 (100.0)	0.02
By tracking pesticides in on their shoes?	87 (90.6)	94 (93.1)	0.53
By bringing food home from the fields that hasn't been washed?	80 (83.3)	97 (96.0)	<0.01
By not bathing or showering when they get home?	96 (89.6)	101 (100.0)	0.01
From dried pesticides left on objects brought home from work?	84 (88.4)	95 (94.1)	0.16

*Percent answering "yes"

Table 23: Beliefs about personal control over pesticide exposure—by training

Survey question: How much control do you feel you have over…	Training No. (%)*	No Training No. (%)*	p-value
Avoiding harmful health effects of pesticides?			
A lot of control	38 (39.2)	16 (16.3)	0.04
Some control	25 (25.8)	44(44.9)	
A little control	18 (18.6)	23 (23.5)	
No control	16 (16.5)	15 (15.3)	
Wearing clothes that will protect you from the harmful effects of pesticides?			
A lot of control	68 (70.1)	50 (59.4)	0.14
Some control	16 (16.5)	23 (22.8)	
A little control	6 (6.1)	11 (10.9)	
No control	7 (7.2)	7 (6.9)	
Washing your hands in the fields while you are working?			
A lot of control	62 (63.9)	47 (46.5)	0.03
Some control	12 (12.4)	23 (22.8)	
A little control	17 (17.5)	20 (19.8)	
No control	6 (6.2)	11 (10.9)	
Washing your clothes each time you work in them?			
A lot of control	88 (89.8)	86 (85.2)	0.31
Some control	9 (9.2)	11 (10.9)	
A little control	0 (0.0)	4 (4.0)	
No control	1 (1.0)	0 (0.0)	

*Percentages may not total to 100 due to rounding

Table 24: Perceived efficacy of pesticide safety precautions—by training

Survey question: How well do you think the safety precautions are at keeping you safe from pesticides?	Training No. (%)*	No Training No. (%)*	p-value
Very good	18 (18.4)	8 (7.1)	<0.01
Mostly good	25 (25.5)	12 (10.6)	
Somewhat good	50 (51.0)	69 (61.1)	
Not at all	5 (5.1)	12 (10.6)	

*Percentages may not total to 100 due to rounding

Table 25: Beliefs about the health effects of pesticides—by training

Survey question: Do you believe that…	Training	No Training	p– value
Your health is hurt by pesticides?	No. (%)*	No. (%)*	
Not at all	3 (3.1)	6 (6.0)	0.35
Not enough to cause worry	33 (34.0)	23 (23.0)	
Enough to cause a little worry	29 (29.9)	33 (33.0)	
Enough to worry a great deal	32 (33.0)	38 (38.0)	
The health of other farmworkers is hurt by pesticides?			
Not at all	3 (3.1)	5 (5.0)	0.90
Not enough to cause worry	32 (33.0)	30 (29.7)	
Enough to cause a little worry	21 (21.6)	25 (24.8)	
Enough to worry a great deal	41 (42.3)	41 (40.6)	
The health of the children of farmworkers is hurt by pesticides?			
Not at all	21 (21.7)	11 (10.9)	<0.01
Not enough to cause worry	31 (32.0)	21 (20.8)	
Enough to cause a little worry	23 (23.7)	30 (29.7)	
Enough to worry a great deal	22 (22.7)	39 (38.6)	
The health of unborn children of farmworkers is hurt by pesticides?			
Not at all	23 (23.5)	16 (15.8)	<0.01
Not enough to cause worry	29 (29.6)	17 (16.9)	
Enough to cause a little worry	22 (22.5)	22 (21.8)	
Enough to worry a great deal	24 (24.5)	46 (45.5)	
The ability of farmworkers to have children is hurt by pesticides?			
Not at all	24 (24.7)	17 (16.8)	<0.01
Not enough to cause worry	31 (32.0)	19 (18.8)	
Enough to cause a little worry	21 (21.7)	21 (20.8)	
Enough to worry a great deal	21 (21.7)	44 (43.6)	

*Percentages may not total to 100 due to rounding

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