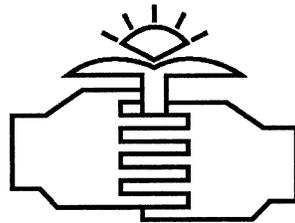


Together for Agricultural Safety

SUMMARY REPORT AND STRATEGY WORKBOOK



TÈT ANSAMN POU SEKIRITE AGRIKILTÌ
UNIDOS PARA LA SEGURIDAD AGRÍCOLA
TOGETHER FOR AGRICULTURAL SAFETY

JUNE 2001

Table of Contents

SECTION 1: INTRODUCTION AND BACKGROUND	1
SECTION 2: DATA	4
SECTION 3: DESIGNING THE PROJECT INTERVENTION.	13
SECTION 4: REFERENCES.	15

1 Introduction and Background

PROJECT DESCRIPTION

The Together for Agricultural Safety/Unidos para la Seguridad Agricola/Tet Ansamn pou Sekirite Agrikilti project (TAS) is a four-year community-based prevention/intervention research project funded by the National Institute of Environmental Health Sciences. The project is a community/academic collaboration between health science researchers from the University of Florida (UF) and the University of South Florida (USF), staff from the Farmworker Association of Florida (FWAF) and Best Start Social Marketing, a nonprofit social marketing firm in Tampa, Florida.

The TAS project was developed in 1997 to design, implement, and evaluate a program to reduce the adverse health effects commonly associated with pesticide exposure. The project focuses on worker communities in the fernery and nursery industries in Volusia, Lake, Seminole, Orange and Polk counties. The FWAF has two offices in this region, UF is located approximately two hours north of the area, and Best Start is in Tampa, approximately two hours west.

This diverse team of academic and community researchers has worked collaboratively to design and implement all phases of the project. The team is using a social marketing research framework that relies on extensive data collection with the target communities during the first phases of the project. The collected data have guided the design of the health intervention.

RATIONALE FOR THE PROJECT

In general, the nation's agricultural workers suffer from poor health (Moses 1989). In the TAS communities, health care providers report the following medical complaints from patients who are agricultural workers: rashes, respiratory problems, fungus, asthma, headaches, back pain, and injuries due to accidents. Many adverse health problems that agricultural worker families suffer are linked directly to their occupational and socioeconomic status. Poverty forces many agricultural workers to live in substandard, unsanitary, and overcrowded housing. Inadequate housing contributes to the spread of bacterial and viral diseases. Agricultural workers often do not have access to adequate health care due to lack of insurance, inability to take time off from work, inadequate financial resources, and inability to communicate in English (Lantz et al. 1994).

Agricultural workers also have frequent dermal, respiratory and oral contact with pesticides. Frequent pesticide exposure can result in a range of acute and chronic adverse health effects (Fenske 1997). It can result in dermatitis, headaches, dizziness, nausea, eye problems, respiratory problems, abdominal pain, and diarrhea (Ciesielski et al. 1994, Brouwer et al. 1992, Wagner 1997). Animal and some human studies have shown that pesticides also can have chronic effects on the neurological, respiratory, immune, and reproductive systems and that they can increase the incidence of cancer (Blair & Zahm 1995, Guillette & Guillette 1996, O'Leary et al. 1992, Sever et al. 1997, Zahm & Blair 1993). If pesticides have weakened a

worker's immune system, then he or she is more susceptible to other diseases (Repetto & Baliga 1996).

There are still many gaps in the knowledge of how pesticides affect human health. There is a limited understanding of how agricultural chemicals cause chronic illnesses (Daniels 1997) and of the additive and synergistic effects of both multiple sources of exposure and of multiple agricultural chemicals (Goldman 1995).

The WPS requires that workers receive pesticide safety information about how to reduce exposure by washing skin and clothing. Agricultural worker safety trainers recommend several precautions to workers for the everyday removal of agricultural chemicals from skin and clothing. They recommend that workers wash their work clothes daily and separately from all other clothes. They recommend that workers wash their hands before they eat, drink, smoke, or use the bathroom at work and that they shower every day after work.

Yet, it is not always possible for workers to follow these precautions. They may not have daily access to facilities where they can wash during the workday or to washing machines or showers after work. Even if they have facilities at work they may feel too pressured by production demands to take a few minutes to wash at certain important intervals.

PROJECT ACTIVITIES

During the first three years of the project, the TAS academic and community researchers built a strong collaborative team and completed extensive formative research to guide project activities. Formative research is essential in social marketing projects to understand the consumers' behavior, to segment and choose target populations and to develop marketing plans that result in products, such as the TAS health intervention (Bryant et al. 2000). The following sections describe the formative research activities that the TAS team conducted.

FOCUS GROUPS. Project team members conducted, translated, and transcribed 16 focus groups with workers. Data from the groups were coded and categorized by key words that arose during the groups. Data were then summarized into a thematic format that responded to inquiries about the knowledge and actions of workers regarding chemical exposure. The summary was examined to develop planning models that identified health behaviors that could be targeted for intervention. This was done mainly by focusing on workers' recommendations for improving protection from chemicals and analyzing each recommendation for feasibility as an intervention.

HEALTH CARE PROVIDER INTERVIEWS. Project team members conducted 16 interviews with primary health care providers including physicians, nurses and health department employees, who serve workers in the project areas. Interviews focused on providers' knowledge and experience in recognizing, managing, treating, and reporting pesticide-related illnesses in agricultural workers. A report on these findings was drafted and has been presented to the project team, to a statewide pesticide poisoning surveillance workgroup, and it was mailed to all participating providers.

EMPLOYER/SUPERVISOR INTERVIEWS. The TAS team developed a structured interview for employers, which incorporated worker recommendations for improving workplace safety. Twenty-five fernery and nursery employers and supervisors were interviewed, and the results were summarized and used by project team members for planning purposes.

The TAS team analyzed data collected in the focus groups, health care provider interviews, and employer/supervisor interviews to determine major safety concerns and potential solutions related to pesticide exposure. The team focused on solutions that were feasible and that shared the burden of change among all groups (workers, employers, and supervisors).

WORKER SURVEYS. To obtain the agricultural workers' perspectives on pesticide exposure, the TAS team developed and administered a survey to a random sample of workers in the target communities. This survey assessed workers' knowledge and attitudes about the risks of pesticide exposure, family member exposure and safety behaviors.

One targeted behavior the TAS team believes is crucial and feasible to change is hand washing. Therefore, the team included many questions about hand washing in the survey. Questions regarding farm worker and family health problems and current preventative behaviors were also included to collect information for the project evaluation phase.

The TAS team is also focusing on worker observance of worksite re-entry regulations. Although there were fewer survey questions about this behavior, the team used data collected from activities such as the focus groups and employer/supervisor interviews concerning re-entry intervals. The following sections present the data that are relevant to understanding and modifying agricultural worker hand-washing and re-entry interval behaviors.

The following summarizes data collected during the above activities on farmworker characteristics, knowledge, beliefs and practices. These findings are summarized according to key factors predicting farmworker behavior.

WORKER AND HOUSEHOLD CHARACTERISTICS

Of the total 382 interviews completed with workers, 151 were fernery workers and 231 were nursery workers. All of the fernery workers were Mexican or Mexican American; nursery workers were both Mexican/Mexican American (64%) and Haitian (36%).

The household surveys provide demographic information on the workers, their households and their work history. In general, most workers surveyed are young and married. More than 60% of the workers have children in the household, with fernery workers reporting more children than nursery workers. Fifty-five percent of all respondents work in companies with 20 or more employees, while 45% work in companies with fewer than 20 workers. Fifty-six percent of nursery workers have been in their industry for only five years compared to 36% of fernery workers. Twenty-six percent of nursery workers have worked 6 to 11 years, compared to 32% of fernery workers, and 18% of nursery workers have worked more than 11 years in their industry, compared to 31% of fernery workers.

TABLE 1
CHARACTERISTICS OF WORKERS SURVEYED

Worker Characteristic	Fernery Workers	Nursery Workers
Age < 45	88%	78%
Children in the household	73%	60%
Married	63%	62%
Company size < 20	45%	45%
Company size 20+	55%	55%
Years in the industry:		
0-5	36%	56%
6-11	32%	26%
11+	31%	18%

EXPOSURE TO CHEMICALS AND SYMPTOMS RELATED TO EXPOSURE

We asked a series of questions to determine how much exposure to workplace chemicals workers experienced and what the effects of this exposure might be. Table 2 shows that 30% of fernery and 21% of nursery workers report chemicals falling on them every day or most days at work. A larger proportion of fernery workers (41%) also report exposure on some days compared to nursery workers (22%), and the largest percent of nursery workers (56%) report never having chemicals fall or drift on them.

TABLE 2
HOW OFTEN CHEMICALS FALL OR DRIFT ON WORKERS

Frequency	Fernery Workers	Nursery Workers	All Workers
Every Day	5%	7%	6%
Most Days	25%	15%	19%
Some Days	41%	22%	31%
Never	30%	56%	44%

Table 3 summarizes the routes through which workers feel they are exposed to pesticides at work. These data show that for fernery workers, cutting or handling plants (28%) and handling wet plants (26%) together constitute the primary routes of exposure followed by working after chemicals are applied (27%). For nursery workers, exposure occurs primarily through working after chemicals are applied (20%), followed by the cutting and handling of plants (12%) and touching wet plants (8%).

TABLE 3
HOW ARE WORKERS MOST OFTEN EXPOSED TO PESTICIDES?

Work Activity	Fernery Workers	Nursery Workers	All Workers
Cutting, handling plants	28%	12%	18%
Working after chemicals are applied	27%	20%	23%
Touching wet plants, working in wet fields	26%	8%	15%
No contact or not exposed	0%	12%	8%
Liquid chemicals fall or drift	7%	2%	4%
Through hands, skin, cuts	0%	7%	5%
By applying fertilizer or wax	0%	8%	5%

Table 4 is a summary of the health problems workers reported experiencing in the previous year that they thought were due to pesticide exposure. As with exposure routes, the health problems attributable to pesticides vary greatly by occupational group. Fernery workers are much more likely to report health problems due to chemicals. Skin rashes (79%) and swollen hands (73%) were the most frequently noted problems. Among nursery workers, 31% report skin rashes and 30% report headaches. Other problems are allergies (51% of fernery workers, 21% of nursery workers) and vision problems (19% of fernery workers, 20% of nursery workers).

TABLE 4
HEALTH PROBLEMS ATTRIBUTED TO PESTICIDE EXPOSURE

Health Problems of Workers	Fernery Workers	Nursery Workers	All Workers
Skin rashes	79%	31%	50%
Swollen hands	73%	10%	35%
Allergies	51%	21%	33%
Headaches	42%	30%	35%
Vision problems	19%	20%	20%

The total number of pesticide-related health problems per worker is also greater among fernery workers: 61% of fernery workers report three or more health problems they attribute to pesticide exposure, compared to 26% of nursery workers. At the other end of the spectrum, only 11% of fernery workers report they have no health problems attributable to pesticide exposure, compared to 45% of nursery workers.

THE TYPICAL HAND WASHING FACILITY FOR FERNERY WORKERS IS A SPIGOT IN THE FIELD OR THE DRINKING WATER THEY BRING THEMSELVES. SOAP AND PAPER TOWELS ARE ALMOST NEVER AVAILABLE TO FERNERY WORKERS.

**TABLE 5
NUMBER OF HEALTH PROBLEMS RELATED TO PESTICIDE EXPOSURE BY TYPE OF WORKER**

	Fernery Workers	Nursery Workers	All Workers
0	11%	45%	32%
1-2	28%	28%	28%
3-4	27%	12%	18%
5-7	26%	10%	16%
8+	8%	4%	5%

HAND WASHING AMONG FERNERY AND NURSERY WORKERS

Table 6 summarizes the frequencies of hand washing by fernery and nursery workers before eating something, drinking something, smoking or chewing gum, going to the bathroom and leaving for home.

**TABLE 6
FREQUENCY OF HAND WASHING AMONG
FERNERY WORKERS PRIOR TO VARIOUS ACTIVITIES**

How often do you wash your hands at work before...

Frequency of washing hands before activity	Eating Something	Drinking Something	Smoking or chewing gum/tobacco	Going to the bathroom	Leaving for home
Always/Most of the time	64%	29%	25%	32%	37%
Sometimes	30%	22%	16%	18%	19%
Never	5%	49%	60%	49%	44%

FREQUENCY OF HAND WASHING AMONG NURSERY WORKERS PRIOR TO VARIOUS ACTIVITIES

How often do you wash your hands at work before...

Frequency of washing hands before activity	Eating Something	Drinking Something	Smoking or chewing gum/tobacco	Going to the bathroom	Leaving for home
Always/Most of the time	94%	78%	72%	89%	90%
Sometimes	6%	16%	14%	5%	7%
Never	0%	6%	14%	5%	2%

Workers are very likely to always wash before eating something at work (64% of fernery workers and 94% of nursery workers), but they are much less likely to wash frequently (i.e., always or most of the time) before drinking (29% of fernery workers and 78% of nursery workers) or smoking and chewing gum (25% of fernery workers and 72% of nursery workers). For certain activities, a large proportion of workers, especially fernery workers, wash very infrequently or not at all. For example, 22% of fernery workers only sometimes wash before drinking and 49% never wash before drinking. Sixty percent of fernery workers never wash before smoking/chewing and 49% never wash before going to the bathroom.

There are also significant differences in hand washing practices *between* the fernery and nursery workers:

- Nursery workers (94%) are much more likely than fernery workers (64%) to always wash their hands before all activities. Nursery workers are also more than twice as likely as fernery workers to always wash before going to the bathroom (89% vs. 32%) and before leaving for home (90% vs. 37%).
- Nursery workers have access to more hand washing facilities than fernery workers. About 90% of both fernery and nursery workers report that they are within 5 minutes of hand washing facilities. The typical hand washing facility for fernery workers is a spigot in the field or the drinking water they bring themselves or that their supervisor brings. Soap and paper towels are almost never available to fernery workers.
- In addition, more nursery workers (93%) than fernery workers (54%) report that their supervisor thinks it is important to wash their hands.

Based on the data collected in the early years of the study and on social marketing principles, the following five factors were determined to be important predictors of washing practices among both fernery and nursery workers:

- Worker and household characteristics;
- Access to washing facilities;
- Beliefs about protective practices;
- Social norms or the influence of the behavior of other workers; and
- Knowledge of safety behaviors.

We asked workers about these factors to determine their association with hand washing, and the data analysis is summarized below.

WORKER AND HOUSEHOLD CHARACTERISTICS. When the worker characteristics (summarized in Table 1) are analyzed with hand washing behaviors, we find that workers who have young children in their homes are three times more likely than those who live with adults only to wash their hands before eating. Most workers believe that children are more vulnerable than adults to pesticide exposure because their defenses are lower and children are “weaker” than adults.

Older fernery workers are two times more likely than younger workers to wash their hands before going to the bathroom or drinking beverages. Women are more likely than men to wash their hands before using the bathroom, and married workers are five times more likely than non-married workers to wash their hands before going to the bathroom.

The length of time a worker has cut ferns is also associated with hand washing before eating, using the bathroom, drinking beverages or smoking, with hand washing most frequent among those who have cut ferns the longest. Many new fern cutters are recent immigrants who are not familiar with the importance of hand washing nor are comfortable asking their supervisors for clean water or soap.

WORKERS WHO ONLY HAVE A FEW PLACES TO WASH THEIR HANDS ARE HALF AS LIKELY TO WASH BEFORE GOING TO THE BATHROOM AS WORKERS WITH ACCESS TO MORE PLACES.

ACCESS TO HAND WASHING FACILITIES. Access to clean water and soap is one of the most important factors influencing hand washing. Workers are 10 times more likely to wash their hands if clean water is available where they usually go to the bathroom. To determine the availability and access of workers to washing facilities, we asked about the number of hand washing facilities at their workplace, where these facilities were located, the number of minutes it took them to reach these facilities, and whether the water was clean.

Table 7 summarizes the access and availability data for hand washing. Although 94% of nursery workers report that hand washing facilities are available where they go to the bathroom, only 39% of fernery workers report the same. This availability does not simply reflect access to a bathroom, it reflects the type of facility and the inclusion of a sink (i.e., outside portable toilets versus indoor bathrooms with sinks). Seven percent of fernery workers report no hand washing facilities and 68% report only one.

**TABLE 7
ACCESS AND AVAILABILITY TO HAND WASHING FOR WORKERS**

Access Question	Fernery Workers	Nursery Workers	All Workers
Is there water for washing where you go to the bathroom? (yes)	39%	94%	72%
Number of hand washing facilities?			
0	7%	.5%	3%
1	68%	57%	61%
2+	25%	42%	36%
Minutes to hand washing: < 5 minutes	85%	91%	88%

More than 90% of nursery workers and 85% of fernery workers report access to bathrooms within five minutes. However, the fernery workers report that most of the bathroom facilities are “in the woods” or at portable toilets. When asked if the hand washing water is clean enough to drink, 77% of fernery workers and 35% of nursery workers report clean water. This differential is due to the large number of fernery workers who report washing their hands in bottled drinking water – often the only water available – that they or their supervisor bring to the worksite. Working sinks and soap dispensers are almost never available in the fields where fernery workers are cutting.

The number of places workers can go to wash their hands at work is significantly associated with the likelihood that they will wash before eating or before using the bathroom. Workers who only have a few places to wash their hands are half as likely to wash before going to the bathroom as workers with access to more places.

Interviews show that although some owners believe workers have access to clean water or soap and routinely wash their hands whenever necessary, the supervisors realize workers do not have access to hand washing facilities. A few supervisors assume the responsibility of bringing clean water each day. In addition to a cooler of ice-cold drinking water, they may take a second cooler filled with tap water for workers to use to wash their hands. Some supervisors said they take soap with them for workers to use in the fields. Some supervisors resent having responsibility for purchasing soap and bringing water to work each day because they make only a little more money than the workers.

FERNERY WORKERS
 ARE MORE THAN
 NINE TIMES MORE
 LIKELY TO WASH
 BEFORE LEAVING
 FOR HOME AT THE
 END OF THE DAY IF
 THEY THINK THEIR
 COWORKERS
 ALWAYS WASH
 THEIR HANDS
 AT THE END
 OF THE DAY.

SOCIAL NORMS. To measure the impact of other workers on safety practices, we asked the following questions:

- Does your supervisor think it is important to wash your hands?
- How often do other workers wash their hands at your workplace?

TABLE 8
SOCIAL NORMS – WHAT WORKERS REPORT OF THEIR COWORKERS AND SUPERVISORS

Reported Behaviors/Beliefs	Fernery Workers	Nursery Workers	All Workers
Coworkers wash always/often	51%	89%	73%
Coworkers wash sometimes	42%	11%	24%
Supervisor believes that it is important to wash	54%	93%	74%

The data in Table 8 summarize workers’ reports of the behaviors and beliefs of coworkers and supervisors; they do not reflect actual coworker behavior or assessed supervisor belief. Nonetheless, these data are powerful in their impact on worker behaviors. When we associate these data with hand washing frequency, we find that fernery and nursery workers are more likely to wash at important intervals during the workday if they think their coworkers always wash. For example, fernery workers are more than 9 times more likely to wash before leaving for home at the end of the day if they think their coworkers always wash their hands at the end of the day. Nursery workers are 9 times more likely to wash before using the bathroom if they think their coworkers always wash before using the bathroom. These data highlight the importance of peer behavior on workers.

Similar to coworker influence on washing behavior, we found that workers who believe their supervisors think hand washing is important are significantly more likely to wash at certain important intervals during the workday. The interviews with supervisors show that many are concerned about their workers’ health and productivity and understand the importance of hand washing. They recognize that their workers often eat, use the bathroom and leave for home without engaging in important safety behavior such as washing.

KNOWLEDGE OF SAFETY BEHAVIORS. To measure the extent of worker knowledge of pesticides and safety practices, we asked them about the training they received on pesticides and who they could turn to for information. The data in Table 9 show the proportion of workers who have had pesticide training, how often the training was in the workers’ native language, and what sources of pesticide information they have at their worksite.

TABLE 9
KNOWLEDGE FACTORS AND SOURCES OF INFORMATION ABOUT PESTICIDES

Knowledge/Information Measure	Fernery Workers	Nursery Workers	All Workers
Had pesticide training (yes)	70%	75%	73%
Training not in native language and not translated	12%	57%	40%
Sources of Information about Pesticides			
Supervisor/Mayordomo	48%	51%	50%
Company Owner	28%	17%	21%
Coworker	2%	18%	12%

BELIEFS ABOUT SAFETY PRACTICES. To determine worker beliefs about safety practices, we asked the following questions:

- Does washing your hands reduce your exposure to chemicals?
- Does washing your hands reduce skin rashes?
- Is the water ever too cold to wash your hands?
- Does washing hot hands in cold water cause cramps?

**TABLE 10
BELIEFS ABOUT WASHING HANDS**

Beliefs	Fernery Workers	Nursery Workers	All Workers
Washing reduces exposure to chemicals	54%	87%	73%
Washing prevents skin rashes	55%	80%	70%
Water too cold to wash	33%	14%	21%
Washing in cold water causes cramps	96%	79%	86%

These data show that both fernery and nursery workers hold important beliefs about the impact of washing on their health. Most workers, especially nursery workers, believe that washing hands reduces exposure to chemicals (54% of fernery workers and 87% of nursery workers) and that washing reduces skin rashes (55% and 80%). However, the vast majority of workers also believe that washing hot hands in cold water causes cramps (96% of fernery workers and 79% of nursery workers). Also, 33% of fernery workers and 14% of nursery workers believe that the water at the workplace is too cold for washing. These beliefs may affect workers' washing practices.

RE-ENTRY INTO TREATED WORK AREAS – PRACTICES AND PROCEDURES AMONG FERNERY AND NURSERY WORKERS

Although most workers know it is dangerous to enter a work area too soon after a pesticide application, some do not know and are not informed of the specific re-entry intervals for pesticides used at the workplace. In focus groups, many workers indicated they do not have even the most basic information about the minimum re-entry times for commonly used pesticides and that there is much confusion about re-entry intervals. Of special concern is the failure to post signs advising workers when it is safe to re-enter and/or to verbally warn them that an area is still unsafe to enter. These policies and practices that negatively impact worker safety are described below.

FAILURE TO VERBALLY WARN. More than 50% of workers report that someone tells them to stay out of work areas that have been sprayed by pesticides every day. However, more than 30% of fernery workers and 10% of nursery workers say they have never been warned to stay out of areas that have been sprayed with pesticides.

**TABLE 11
RE-ENTRY WARNING PRACTICES**

How often does someone tell you to stay out of an area that has been sprayed?	Fernery Workers	Nursery Workers
Every Day	51%	59%
Most Days	<1%	12%
Some Days	17%	10%
Never	32%	10%

MOST FERNERY WORKERS SAY THEY CANNOT EVEN RELY ON THE WARNING SIGNS BECAUSE THE SIGNS ARE EITHER DISPLAYED ALL THE TIME OR ARE NEVER DISPLAYED, REGARDLESS OF WHETHER OR NOT THERE HAS BEEN AN APPLICATION.

FAILURE TO POST RE-ENTRY SIGNS PROPERLY. While more than 61% of fernery workers and 81% of nursery workers report that signs are posted always or every day warning them to stay out of sprayed areas, another 25% of fernery workers and 9% of nursery workers report that re-entry signs are never posted at their workplace. Table 12 summarizes these data. There are important qualifications to these data based on information gathered during participant observation and the focus groups. Table 12 should not be read without consideration of this additional data. Workers in the focus groups report that in some nurseries and many ferneries, warning signs are permanently displayed rather than rotated between areas that have been sprayed, making it difficult for workers to notice when the specific re-entry times and dates have been changed. Most fernery workers say they cannot even rely on the warning signs because the signs are either displayed all the time or are never displayed, regardless of whether or not there has been an application.

**TABLE 12
RE-ENTRY SIGNS POSTED AT THE WORKSITE**

How often is a sign posted telling you to stay out of an area that has been sprayed?	Fernery Workers	Nursery Workers
Always/Most Day	61%	81%
Some Days	13%	5%
Never	25%	9%

FAILURE TO COMPLY WITH WARNING SIGNS. Even when the re-entry time and date are easily noticed, some workers ignore them because they feel pressured to meet a shipping deadline or fill an order quickly.

OTHER PROBLEMS WITH RE-ENTRY SIGNS. Some nursery workers report that signs are displayed, but the re-entry times are not posted or the signs are folded so they cannot be read. Also, some workers understand the re-entry guidelines and other safety procedures but do not follow them because they believe it is impossible to avoid exposure to the chemicals in the air, dirt and water around them.

LACK OF SUPERVISION. Supervisors are extremely busy throughout the day and may not have time to monitor worker safety.

OWNERS' ATTITUDES. Owners want to protect themselves from legal liability for workers' safety. However, they feel over regulated and view inspectors as adversaries. Many believe re-entry policies are being implemented in their nurseries, whether or not this is the case.

ATTITUDES AND BELIEFS ABOUT RE-ENTRY INTERVALS

Most owners believe compliance with re-entry guidelines will significantly minimize workers' exposure to pesticides. They want their workers to have more training so that they can protect themselves from pesticide exposure. They also believe pesticides are safe if used correctly, but recognize that failure to comply with re-entry policies represents the greatest health risk associated with pesticide use. Most owners think re-entry policies are being implemented in their nurseries and believe their workers are protected from pesticide exposure.

In contrast, supervisors and applicators realize that workers do not always avoid restricted areas. They share workers' skepticism about the length of re-entry intervals when smells linger after the official interval has lapsed. Supervisors are concerned about their own safety as well as that of their workers and claim to encourage workers to avoid restricted areas. Applicators believe pesticide labels and dismiss workers' complaints about smells that linger after the re-entry interval has lapsed. However, they are also concerned about workers' health and try to encourage them to avoid restricted areas.

Most workers know it is important to respect the no entry warning signs when they are posted correctly. They realize that exposure to pesticides that have been sprayed recently can have important health consequences. Some also know to ask a supervisor if they suspect an area has been sprayed recently.

Workers want access to more information about pesticides. They want to know the names and types of chemicals being used, when they are being used, and what kinds of harm those specific pesticides can cause. Many would like more thorough pesticide training than they currently receive, conducted in their own language, as well as reminders or updates throughout the year to reinforce their understanding of the chemicals with which they work.

In focus groups and personal interviews, workers and supervisors made the following recommendations regarding re-entry intervals:

- Do not ask workers to go into sprayed areas before the re-entry time;
- Extend the recommended re-entry times;
- Apply pesticides on Friday evenings or weekends when possible, to ensure that workers do not have to work in sprayed areas during the week;
- Use verbal as well as written notification;
- Provide verbal warnings during morning safety meetings; and
- Properly display signs in English and Spanish in locations where they can easily be read.

3 | Designing the Project Intervention

The TAS team used research results to identify the audiences that should be reached and parties who could potentially influence the target audience, behavioral objectives, and recommended activities. This section summarizes the recommendations made for promoting hand washing among fernery workers and recommendations for promoting compliance with re-entry intervals in nurseries.

PROMOTING HAND WASHING AMONG FERNERY WORKERS

Primary Target Audience: Fernery Workers

Other People Who Can Influence Workers

- Older, more experienced workers who already wash their hands regularly.
- Supervisors/Mayordomos.
- Spouses and other relatives.
- Health care providers.

Behavioral Objectives

- Wash hands before eating.
- Wash hands before using the bathroom.
- Wash hands before leaving to go home.

Recommendations to Improve Access to Hand Washing Facilities

- Design a mobile hand washing unit, including soap and disposable towels, that can be brought to ferneries and placed near work areas.
- Work with the units designers to field test and revise the equipment and promote its use by workers.
- Encourage fernery owners to support use of the units and make them available to workers.
- Encourage supervisors to maintain and bring units to worksites daily.
- Encourage day care center operators to install units in locations accessible to workers when they arrive from work to pick up their children.

Recommendations to Encourage Workers to Wash Hands

- Develop multilingual educational materials, such as posters and brochures that will be available at the nursery and fernery worksites that remind workers about the importance of washing hands and other important safety precautions. Focus on the group of workers who are already washing their hands before eating, going to the bathroom, and leaving work at the end of the day. Reinforce the impression that these behaviors are being adopted by more experienced workers who have learned how to protect themselves and their families.

- Develop a brief training program for supervisors focusing specifically on the benefits of hand washing and methods for promoting it among workers.
- Encourage integration of TAS project data and recommendations in other standard EPA and community-based training programs for workers.
- Disseminate research findings to owners, supervisors, workers and their family members.
- Present findings to Spanish-speaking radio stations for use in public service announcements and to other media.
- Collaborate with Area Health Education Centers (AHC), growers' associations, faith organizations and health care providers to improve field sanitation. Encourage partners to disseminate findings to their members, support policy changes, and participate in public relations activities.

Recommendations for Developing a Health Care Providers' Kit

- Develop a package for health care providers (including doctors, nurses, physicians' assistants and other personnel who have contact with agricultural workers) to provide information on recognizing, managing, and treating pesticide related illness.
- Include developed informative material such as the EPA's "Recognition and Management of Pesticide Poisonings" as well as TAS brochures that can be distributed to patients and TAS posters that can be displayed in waiting and examination rooms.
- Present the package to M.D.s who specialize in this area and to Florida Department of Health staff for review and comments before distributing.
- Present the package to Florida Department of Health staff for review.
- Request Florida DOH, Florida Medical Association, Florida Chapter of Family Practice and/or other professional associations to write a letter encouraging health care providers to review the kit's contents and adopt procedures for helping workers minimize their pesticide exposure.

PROMOTING COMPLIANCE WITH RE-ENTRY INTERVALS IN NURSERIES

Primary Target Audience: Supervisors and Owners

People Who Can Influence Nursery Workers

- Supervisors.
- Spouses and other relatives.
- Coworkers.

Behavioral Objectives

- Post re-entry signs as required.
- Maintain and update signs as required.
- Offer verbal warnings in addition to posted warnings.

Recommendations to Improve Compliance with Re-Entry Policies and other Worker Safety Practices

- Share research findings and marketing recommendations at public meetings that focus on occupational health and safety.
- Explore the promotion of successful safety campaigns in ferneries and nurseries.
- Promote compliance with re-entry regulations by all parties through new and existing safety programs and projects.
- Ask employers for their suggestions on how to promote industry-wide compliance with re-entry regulations.

3 | References

Blair, A., & Zahm, S.H. Agricultural exposures and cancer. *Environmental Health Perspectives*, 103(8): 205-208. 1995.

Brouwer, R., Marquart, H., de Mik, G., & van Hemmen, J. Risk assessment of dermal exposure of greenhouse workers to pesticides after re-entry. *Archives of Environmental Contamination and Toxicology*, 23: 273-280. 1992.

Bryant, C.A., Forthofer, M.S., McCormack Brown, K., Landis, D., & McDermott, R.J. Community-based prevention marketing: The next steps in disseminating behavior change. *American Journal of Health Behavior*, 24(1): 61-68. 2000.

Ciesielski, S., Loomis, D.P., Mims, S.R., & Auer, A. Pesticide exposures, cholinesterase depression and symptoms among North Carolina migrant farmworkers. *American Journal of Public Health*, 84(3): 446-451. 1994.

Daniels, J., Olshan, A.F., & Savitz, D.A. Pesticides and childhood cancers. *Environmental Health Perspectives*, 105(10): 1068-1077. 1997.

Fenske, R.A. Pesticide exposure assessment of workers and their families. In M.C. Keifer (Ed.), *Occupational medicine state of the art reviews: Human health effects of pesticides* (pp. 221-238). Philadelphia, PA: Hanley & Belfus. 1997.

Goldman, L.R. Children – unique and vulnerable: Environmental risks facing children and recommendations for response. *Environmental Health Perspectives*, 103(6): 13-18. 1995.

Guillette, L.J., & Guillette, E. Environmental contaminants and reproductive abnormalities in wildlife: Implications for public health. *Toxicology Ind Health*, 12(3): 537-550. 1996.

Lantz, P.M., Dupuis, L., Reding, D., Krauska, M., & Lappe, K. Peer discussion of cancer among Hispanic migrant farm workers. *Public Health Reports*, 109(4): 512-520. 1994.

Moses, M. Pesticide related health problems and farmworkers. *American Association of Occupational Health and Nursing Journal*, 37(3): 115-130. 1989.

O'Leary, L.M., Hicks, A.M, Peters, J.M., & London, S. Parental occupational exposures and risk of childhood cancer: A review. *American Journal of Industrial Medicine*, 20: 17-35. 1992.

Repetto, R. & Baliga, S. *Pesticides and the immune system: The public health risks*. Washington, DC: World Resources Institute. 1996.

Sever, L.E., Arbuckle, T.E., & Sweeney, A. Reproductive and developmental effects of occupational exposure: The epidemiologic evidence. In M.C. Keifer (Ed.), *Occupational medicine state of the art reviews: Human health effects of pesticides* (pp. 305-325). Philadelphia, PA: Hanley & Belfus. 1997.

Wagner, S. Diagnosis and treatment of organophosphate and carbamate intoxication. In M.C. Keifer (Ed.), *Occupational medicine state of the art reviews: Human health effects of pesticides* (pp. 239-249). Philadelphia, PA: Hanley & Belfus. 1997.

Zahm, S.H., & Blair, A. Cancer among migrant and seasonal farmworkers: An epidemiologic review and research agenda. *American Journal of Industrial Medicine*, 24: 753-766. 1993.