

US EPA ARCHIVE DOCUMENT

Texas A&M University - BORDER HEALTH ENVIRONMENTAL COORDINATION PROGRAM – August, 2007

Overview: The population of rural communities along the border of the United States and Mexico has grown dramatically in recent years. Often, the families living in these rural communities, or colonias, are in frequent contact with the surrounding environment. Since these are rural agricultural communities, the use of pesticides on adjacent fields and in homes or gardens is common. Previous studies have demonstrated that pesticide levels are often elevated inside

homes (Figure 1); and, data from 10 years of monitoring confirm that children living in these homes have elevated levels of pesticide metabolites in their urine. The Border Health Coordination program at Texas A&M is designed to continue monitoring pesticide exposure in these communities; and, to implement health education as an intervention to reduce childhood exposures.

Current Activities. The Texas A&M Border Health Coordination program has been supported by the USEPA, HRSA, the CDC and EPA Region 6 (through the Border 2012 program). This includes three integrated projects to measure longitudinal exposure to pesticides (USEPA & CDC), to develop health education materials (NIEHS, HRSA), and to train community health workers (promotoras) to deliver health education to families living in colonias (HRSA, Border 2012). The overall goal of the program is to continue longitudinal monitoring of childhood exposure to pesticides in colonias; and, to investigate the utility of health education as an intervention to reduce pesticide exposure. The specific aims of this program include: (1) train promotoras (and assess knowledge pre- and post-training) to deliver an environmental health module on “Home Safety”; (2) over a two-year period, deliver the “Home Safety” education to 280 families living in four communities; (3) conduct longitudinal monitoring of childhood exposure to pesticides in four rural colonias; (4) employ several forms of assessment (knowledge assessment, behavioral changes, and clinical (urinary pesticide levels) measurements) to evaluate the utility of the health education to modify behaviors and reduce pesticide exposure; and, (5) disseminate the results to partners and other interested parties. All of these activities have been supported by an experienced group of promotoras including Ms. Hermelinda Tamez, Ms. Aurora Ginez, Ms. Epitacia Hinojosa and Ms. Criselda Garibay. The success of the program is largely through the tireless efforts of these outstanding individuals.

The major recent accomplishments of the program include:

Specific Aim 1: provide training to promotoras on the delivery of an environmental health module on “Home Safety”:

The Home Safety module is designed to provide information regarding physical and chemical hazards in the home with a specific focus on pesticides. The main topics covered are loosely based on the EPA’s Worker Protection Standards established in 1992. The majority of participants in the Border Health Environmental Coordination

program are mothers who are not employed as farm workers. However, most of the families do live in close proximity of agricultural fields. Therefore, the topics of the training module are based on the Worker Protection Standards and modified to address the aims and objectives of this study. The content of the "Home Safety" module includes: (1) definitions and examples of pesticides; (2) health effects and symptoms associated with pesticide exposures; (3) first aid measures for pesticide poisonings; (4) ways to reduce pesticide exposure (with a focus on children); and (5) proper pesticide use and storage. A total of 55 promotoras have been trained in the use of the "Home Safety" health education module.

Specific Aims 2 and 3: deliver the "Home Safety" education to families living in four communities; and, assess the utility of the health education to empower families to improve their health:

The populations participating in the Border Health Program were separated into intervention and control groups based on geographic location. A total of 280 families were recruited for the first round of this study, including 70 intervention families and 70 comparison families in two communities near McAllen, TX and 70 intervention families and 70 comparison families in two communities near Laredo, TX. Ninety-one of these families also participated in the EPA/CDC funded longitudinal exposure study. The selection of intervention (receiving the health education) and comparison (no health education) groups was based on geographical location. This separation was used to limit the influence of potential discussions between the intervention and comparison families.

Assessment tools include a Knowledge Assessment, a Technical Assessment, a Pesticide Use survey, and a Visual Assessment of pesticide use and storage. To assess longer-term changes in pesticide use and behaviors, the Knowledge Assessment, Technical Assessment, Pesticide Use survey and Visual Assessment are being administered to each family one month and three months after administration of the Home Safety module (or, for the comparison families, after completion of the pre-test and first set of post-tests). Information obtained through the Visual Assessment includes: (1) where pesticides were stored in the home, (2) the condition of pesticide containers (whether pesticides were stored in the original containers, whether there was pesticide residue on the outside of the containers, etc.), and, (3) the cleanliness of the home (to assess whether pests might be attracted to the home). Table 1 provides details about the number of families from each community who have participated in this project to date.

Of the 280 families who were recruited for this project, a total of 12 have been lost from the study as of May, 2007. The reasons for this attrition include families moving outside the study area and loss of interest in the study following the delays due to IRB issues.

**The surveys that were completed were a Demographic Questionnaire, a Knowledge Assessment, a Technical Assessment, and a Pesticide Use questionnaire. Visual assessments of the homes were also completed to evaluate actual pesticide storage practices.

Specific Aim 4: conduct longitudinal monitoring of childhood exposure to pesticides in four rural colonias.

Urinary elimination of pesticides is being used as a clinical measurement of pesticide exposure. However, additional data are needed to characterize the variability over time of pesticide metabolites in children’s urine. For the study of longitudinal variability in urinary pesticide metabolites among children, three rounds of samples (including a spot sample, a 24 hour composite and first morning void) were collected from 91 families in March-May of 2006. An additional round of samples (first morning void only) was collected from these families in December, 2006.

Table 2. Summary of samples collected for study of Longitudinal Variability in Urinary Pesticide Metabolites in Children

Sampling Round	Location	# Samples collected*	# Families**
1	Laredo colonias	382	48
2	Laredo colonias	465	51
3	Laredo colonias	445	51
4	San Carlos colonias	361	40
5	San Carlos colonias	397	40
6	San Carlos colonias	413	40
Total		2463	91

* # Samples collected includes field blanks.

** In each set of colonias, the same families were sampled in all three rounds.

A summary of previous data for six children with the highest measurements of pesticide exposure (based on hand rinse) is presented in Table 3. These data demonstrate the importance of genetic factors in pesticide retention. For example, exposures for child C7 (a slow metabolizer) and C3 (a fast metabolizer) were almost identical; however, the rate of elimination differed by almost 100-fold.

Table 3. Total Organophosphates (OP) in Hand Rinse, Total OP Metabolites in Urine, and Paraoxonase-1 Genotype of Selected Children.

Subject ID	Total OPs Hand Rinse ($\mu\text{g}/\text{cm}^2$)	Total OPs Urine (ppb)	PON Genotype
C3	15.1	8.6	Fast
A5	10.2	0.22	Fast
A10	1.0	1.31	Fast
C10	97.6	0.14	Slow
C2	28.2	0.09	Slow
C7	14.7	0.09	Slow

Objective 5: disseminate the results to HRSA and US EPA and support subsequent dissemination to partners along the U.S.-Mexico border and to other interested parties:

Community meetings are scheduled at least once each year, and periodic reports are provided to each participant. In addition, annual reports have been provided to all

sponsoring agencies. Presentations have been made by project staff at the Border Health Summit (August, 2006, Phoenix, AZ) and the National Rural Health Association Annual Meeting (May, 2007). The study has also included collaborations with faculty and students at the Universidad Autonoma de Nuevo Leon in Monterrey, MX.



Sampling team on Texas-Mexico border.

Field adjacent to homes in colonia.

Most recently, a physicians' handbook for pesticide exposure has been developed through a collaboration with Dr. H. Gonzales of the Webb County (Laredo) Health Department, the San Antonio and El Paso Poison Control Centers, the University of Texas Health Science Center at San Antonio, and the Universidad Autonoma de Nuevo Leon. This program has been implemented to provide emergency room physicians and Poison Control Centers with information to treat acute pesticide exposures. Dr. Gonzales has prepared a literature review on pesticide exposures, and Texas A&M has prepared a pesticide handbook (which has been reviewed and is currently being revised). The proposed next steps are to develop "flash cards" for specific pesticides; and, in the long term to develop training modules (in English and Spanish) for use in Continuing Education for emergency room physicians and for medical students. These modules would eventually be available for use in medical schools on both sides of the border. Finally, Dr. Gonzales and his staff have prepared a syndromic surveillance software to allow physicians to monitor exposure to pesticides on both sides of the border.

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