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A PILOT STUDY TO COLLECT  
MICRO-ACTIVITY DATA OF 2-4 YEAR  
OLD FARM LABOR CHILDREN IN SALINAS  
VALLEY, CALIFORNIA

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by

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A PILOT STUDY TO COLLECT MICRO-ACTIVITY DATA  
OF 2-4 YEAR OLD FARM LABOR CHILDREN IN SALINAS VALLEY, CALIFORNIA

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## ABSTRACT

This paper presents an account of a pilot study conducted in Salinas Valley, California by seven researchers in September, 1993. The pilot study carried two main purposes: 1) to collect an initial database of activity patterns of 2-4 year old farm labor children, via videotaping and questionnaire administration, in order to conduct a subsequent pesticide exposure assessment, and 2) to develop general methodologies for videotaping micro-activities of a population in order to quantify human exposure and dose through all three exposure pathways (inhalation, ingestión, and dermal). Comparing parent's recall of their children's activities to actual videotapes from the pilot study supports the hypothesis that videotaping is necessary for accurately quantifying activity information necessary to compute dermal and ingestión exposures.

In addition to providing the first detailed set of videotape and questionnaire data on farm labor children, a high-risk population to pesticide exposures, this is the first project in the exposure assessment field to use direct observation videotaping for collecting micro-activity data in order to quantify dermal and ingestión exposure. Without tools to accurately determine exposure and dose through all three pathways (inhalation, ingestion, and dermal), public policy makers cannot effectively assess and manage health risks posed by environmental pollutants.

This paper will justify the selection of the study population, describe the methods used to implement the pilot study, and summarize the lessons learned from the four case studies. Although the discussion focuses on the population of Mexican-American farm labor children, the lessons learned and data collection methods developed can be applied to other populations.

## INTRODUCTION

### *Justification of the Sample Population*

Pesticide poisoning is a primary reason that agriculture is ranked the most dangerous occupation in the United States (National Safety Council, 1989). Because the majority of agricultural

workers in the southwest are among the most poorly paid and least protected in the United States workforce today (Migrant Clinician's Network, 1990), many workers and their families live in conditions which expose them chronically to toxic agrochemicals. Our study population consists of Mexican-American children, ages 2-4, of farm workers in the Salinas Valley of California. This population is particularly vulnerable to the health effects of pesticides because of their living circumstances, participation in family activities, and physiological characteristics.

The life circumstances of the study population provide numerous opportunities for contact to pesticides through all three exposure pathways. Most of these farm labor families live in old, sub-standard housing in close proximity to pesticide applications. One of the families in our pilot study lives approximately twenty feet from strawberry and lettuce fields where pesticides are applied, in a trailer with holes in the walls and no screens on the windows. Such housing conditions allow for greater penetration of airborne pesticides, which settle on surfaces contacted by children (e.g., carpets, floors, clothing, food). The crowded conditions of the houses (e.g., eleven people living in five rooms) may also lead to greater potential for contact with pesticides. Young farm labor children are likely to be taken into the fields sprayed with pesticides since many of the families cannot afford day care.

Young children are particularly susceptible to environmental toxins because of their developing nervous systems and immune systems, low body weights, high metabolic rates, and high exertion levels (Noyes, 1985). They also have high incidence of hand-to-mouth contact (Madden et al., 1980) and possibly greater dermal contact with contaminated objects than older children.

At present, little is known of the exact risk to these children, though various studies have been published regarding children's health problems associated with pesticides (Zweiner and Ginsburg, 1988; Slesinger et al., 1986; O'Leary et al., 1991; Moses, 1989). Despite the fact that farm labor children are particularly susceptible to pesticide exposure, no detailed total exposure

assessment of this high risk group has been undertaken to date. Several studies suggest that results of time/activity diaries and questionnaires may not be consistent with actual observations of the subject's behavior patterns (Stock and Morandi, 1989; Schwab et al., 1989). This discrepancy is likely to be greater when a person (e.g., parent) other than the subject of interest (e.g., child) tries to recall the target subject's activities.

Thus, a justification for administering an activity recall questionnaire in conjunction with videotaping is to test the hypothesis that direct observation of activity patterns is a significantly more reliable method of data collection than recall questionnaires for exposure studies that require detailed information on dermal contact for children. In addition, a questionnaire allows us to determine associations between high exposures for all three pathways with variables such as hygiene habits, household characteristics, laundry practices, and household cleaning habits.

## **METHODS**

### *Preliminary Studies*

Initially, we had planned to observe the children and record by hand the activity pattern data (exposed body parts, locations, activities, objects contacted, and durations) required to compute total exposure (i.e., through inhalation, ingestion, and dermal pathways). However, several brief episodes with two researchers observing one child on a Stanford campus residence demonstrated that this technique was extremely fatiguing and inaccurate (i.e., the researchers recorded very different duration data). This experiment prompted the idea of videotaping the children to capture all necessary details, and extract information from the videotapes afterward.

The Center for Rural Development in Salinas, California put us in contact with two children (a boy age two and a girl age seven) from different families. One of our researchers videotaped each child on separate days, one for 4.5 hours and one for 6.5 hours. Even though the activities were limited (e.g., the girl spent most of the day writing at the kitchen table; the boy watched

television) and restricted to a limited area (i.e., inside the house), the researcher found videotaping for that length of time to be extremely fatiguing. This second experiment convinced us that we need teams of at least two people for videotaping, so that one can provide relief to the other after fatigue sets in.

### *Site Selection*

Project coordinators chose the Salinas Valley as the specific site of the target population for the following reasons: the site is in close proximity to Stanford; its strawberry production relies heavily on the use of pesticides; the agricultural cycle requires labor nearly year-round; and its labor force consists of a large Mexican-American population with permanent residence in the area.

### *Questionnaire Development*

Although questionnaires are inadequate for collecting detailed data about activities related to dermal and ingestion exposures, they are useful for collecting information which may help to identify sources of exposure for the population. The project team has developed a questionnaire (Rivera et al., 1994) designed specifically for the population of farm labor children, including sociodemographic questions (e.g., household income, number of household members), exposure-related questions for each pathway (e.g., laundry and hygiene practices), and an activity recall section administered to the caregiver. Four existing questionnaires were used in designing our own questionnaire (Wiley et al., 1991; Schwab, 1993; U.S. EPA, 1990; Akland, 1992), with some questions added or tailored for our particular population and study.

Part 1, Section 1 of the questionnaire requires the interviewer to sketch the location and surroundings of the dwelling, to answer questions regarding the interior and exterior of the dwelling, and to ask the participant about the dwelling (e.g., age of house, age of carpeting) and the child (e.g., age, ethnicity). Part 1, Section 2 contains questions regarding dermal exposure,

such as household cleaning practices, laundry practices, and handling of work clothes. Part 1, Section 3 contains questions regarding ingestion exposure (e.g., whether the family owns a garden and the source of household water). Part 1, Section 4 pertains to inhalation exposure, and contains questions such as whether aerial pesticide spraying occurs near the home and what precautions are taken for the children. Part 2, Section 1 is the activity recall section, in which the interviewer asks the child's caregiver to remember everything possible about the duration of locations and activities of the child the previous day. In Part 2, Section 2, the interviewer asks the participants about household pesticides, their frequency of application, and precautions taken. Part 2, Section 3 contains questions regarding pesticide handling at work, including mixing and application. Part 2, Section 4 contains sociodemographic questions, such as household income and education level of family members. Part 1 was administered on the day of videotaping, and Part 2 the following day.

Statistical techniques will eventually be employed to determine variables that are correlated, and to determine predictor variables for high exposure and/or dose levels. A total exposure model being developed by Stanford's Environmental Engineering and Science Program (Zartarian and Leckie, 1994) will estimate an exposure level for each individual in the study based on input activity pattern and concentration information. Questionnaire answers may be compared among individuals with high exposure and those with low exposure, in order to determine appropriate exposure control strategies.

Although the current state-of-the-art technique for collecting activity pattern data involves recall questionnaires and real-time diaries, no studies have verified that these methodologies provide an accurate account of human activity information. Based on our preliminary work, we hypothesize that activity recall is not sufficiently accurate for use in total exposure studies, particularly for computing children's dermal and ingestion exposures. Comparing parent's responses in the activity-pattern recall portion of our questionnaire to the videotapes of the children supported this

hypothesis. In the pilot study we found that the recalled number of durations of activities and locations differed from the actual activity patterns. For example, the mother of one boy forgot to mention a major activity of the day, the only activity in which the child left the house. To conduct more rigorous statistical analyses of the severity of the discrepancies, we will administer this portion of the questionnaire to more subjects in the larger field study.

### *Contacting Families*

Pesticide exposure and related health risks are politically sensitive issues to California farmers. Farmers' sensitivity to the legal, economic and political ramifications of their workers' exposure to pesticides has made it imperative that we recruit farmworkers with extreme care. The controversial nature of pesticide exposure makes it difficult to obtain consent to enter farmers' fields and farm laborers' homes with videotape cameras. Thus, we have been developing relations with farmers in the Salinas Valley over the past several years to enlist their support for our study. On the advice of local agricultural experts and sympathetic farmers, we have been cultivating relationships with farmers identified as potentially receptive to the project's goals. Because our study will consist only of farm workers willing to participate in the study, a probability sample is not feasible. Our analyses of the data will take this fact into account.

### *Itinerary of Pilot Study*

Three teams, each consisting of two researchers, were organized to videotape and apply Part 1 of the questionnaire on Day 1. Each team had previously arranged with the families to arrive at the children's house soon after the time the child normally awakes. The teams agreed with the parents to videotape until the child went to sleep for the night. During Day 1 researchers arranged with the family to return the following day to administer Part 2 of the questionnaire. The same procedure, with two different families, was repeated on Days 3 and 4. On Day 1, one team consisted of a female bilingual Latina and a male bilingual Anglo, and the other consisted of a female bilingual Latina and a male bilingual Latino. On Day 2, one team consisted of a

female bilingual Latina and a male bilingual Latino, and the other consisted of a female Spanish-speaking Anglo and a male bilingual Anglo. Two of the researchers (a female bilingual Latina and a male bilingual Anglo) conducted the field work on all four days.

## **RESULTS**

Although the selection of the four subjects was not a random sample of the population, the four children who participated in the pilot studies exhibited a variety of situations and potential problems due to their different ages, genders, dwellings, and family situations. The following sections describe each of the four case studies in detail, in order to illustrate how the living conditions and lifestyle of this population makes videotaping particularly difficult (e.g., crowded conditions that make maneuvering with a camera awkward) and how their setting can provide ample opportunity to pesticide exposure.

### **Case Study 1**

#### *Background Information*

Pablo is a 4-year old Mexican-American male living in Castroville, California. Artichoke fields are located approximately 500 yards west of his family's house. A small cornfield for family use is located on the side of the house. The house contains two bedrooms (one of which is artificially divided into two rooms by an incomplete partition), a kitchen, a common room, 1.5 baths, and a laundry room in the basement of the house. At the time of the pilot study, ten people lived in the house: six children (Pablo and his siblings) and Pablo's mother and father, grandmother, uncle, and cousin. His father is a farm worker (-\$15,000 annual income); his grandfather works in the canning industry; and his uncle works for parks and recreation-park maintenance (\$10,000 annual income). Neither the grandparents nor the uncle contribute to the family's household income. On the day we videotaped Pablo, his grandmother was taking care of him but normally his mother does (she was in Mexico because of a family emergency).

### *Events on the Day of Videotaping*

The two researchers (one Latina female medical school graduate student and one bilingual Anglo male post-doctoral anthropologist) arrived at the house at approximately 8:00 a.m. Monday morning when Pablo's siblings were getting ready to go to school. Our researchers were able to put the battery recharger out of sight so that it was not a distraction. Other equipment was placed on a couch in the living room. The use of the tripod was not appropriate for such confined quarters. Pablo was dressed for the day, sitting on the bed watching television when our researchers began videotaping him. Pablo's siblings left for school soon after our researchers' arrival; he, his grandmother, and his uncle remained at home. Shortly after his siblings left, another boy (of approximately the same age), whom the grandmother babysits, arrived. The two children did not interact extensively.

Although Pablo did not react negatively to our researchers or to the equipment, he did have the initial shyness and curiosity that may be expected of a young child when confronted with two strangers in his house. Some of this behavior, e.g., clinging to his grandmother, may be attributed to the facts that the study day was his siblings' first day back to school, and that his mother, who usually cares for him, was not present. On several isolated occasions during the day Pablo approached our researchers and wanted to look through the camera lens. After they allowed him to do so, his curiosity was satisfied and he continued with his normal activities. Our bathroom scale (used to weigh the children so that pesticide dose per kilogram can eventually be computed) caused more disruption than we had anticipated, but also distracted him from the filming. To make Pablo feel more comfortable while our researchers weighed him, they first weighed his brother. This technique was successful. After they weighed Pablo, however, the rest of his siblings wanted to be weighed as well.

It was apparent that the presence of our researchers caused the family to modify their normal activities. Pablo's uncle, who had that day off from work, was awoken from his couch in the

living room upon our researchers' arrival and moved to one of the bedrooms. Pablo's grandmother admitted that Pablo is not normally allowed to play outside, yet while our researchers were filming, a significant amount of his time was spent playing outside. The family's behavior was also modified because they treated our researchers as guests. During the day the grandmother and the uncle seemed obliged to entertain our two researchers, conversing with the researcher team member who was not videotaping, and offering beverages and food.

### *Major Locations and Activities of the Subject*

Pablo spent part of the morning watching television while sitting on the bed in his room. He ate both breakfast and lunch at the kitchen table; played in his room with a toy car; took a nap in his room in the middle of the day; and went with his grandmother to pick up his brother and sisters from school. He spent the majority of the afternoon outside running, picking up his cat, climbing into and on top of an unused car in their backyard, and playing with some toys in his neighbors' back yards.

### *Questionnaire Administration*

Our female researcher did not administer Part 1 of the questionnaire in one sitting. For the most part, she did not have to take Pablo's uncle and grandmother away from their normal routine to ask them the questions; she was able to ask many of the questions as they went about their normal activities. For example, she found it very natural to ask Pablo's grandmother questions about laundering practices as she did the laundry. She asked some of the questions while the grandmother and the uncle conversed with her as they sat in the living room while the male researcher videotaped Pablo. Administering the questionnaire in this fashion worked well.

The male researcher administered Part 2 of the questionnaire. On the day of filming, the grandmother was taking care of the children, whereas the mother usually does. For this reason, the respondent had only vague recollections of the child's activities. This portion of the

questionnaire took between 5 and 10 minutes to complete; the interviewer did not feel comfortable probing the grandmother for extensive details. The pesticide application portion of the questionnaire did not take long to administer because the respondent used only two products in the home, and no one in the family works directly with pesticides. Administering the sociodemographic questions took a surprisingly brief 20 minutes to administer, despite the fact that six adults live in the household. None of the questions seemed to upset or embarrass the respondents.

## **Case Study 2**

### *Background Information*

Our second subject is a 4- year-old Mexican-American female named Maria, residing in Watsonville, California. Maria's home, situated in an industrial area containing packing and distributing facilities and processing plants, has three bedrooms (one of which they rent to a couple with two children), a bathroom inside the house and one outside, a kitchen, and a living room. Maria spent the study day in the house of a babysitter, which contains two bedrooms, a kitchen, a small room in between the kitchen and the living room, a living room and a bathroom. The household members include Maria, her sister, mother, father, aunt, grandparents (seasonally, they alternate between Watsonville and Mexico), and a couple with their two children. The mother, father, aunt, and grandfather are farm workers who harvest flowers and berries, and their annual incomes are, respectively, \$9000, \$11000, <\$ 10000, <\$ 10000. Maria is usually cared for in her own home by her grandmother who was in Mexico at the time. In the absence of the grandmother she is cared for by the female tenant.

### *Events on the Day of Videotaping*

The team of researchers that videotaped Maria consisted of the same female researcher that videotaped Pablo and a male Latino environmental engineering undergraduate student from Stanford. When they arrived at Maria's home shortly after 7:00 a.m. on Tuesday morning, they

encountered the unanticipated situation of Maria's absence. The female tenant who takes care of Maria in the absence of Maria's grandmother had a personal problem and was unable to baby-sit Maria. That morning Maria's mother had taken her to her aunt's house where a non-related person took care of Maria for the day. This created an uncomfortable situation for the research team, who had to obtain permission to enter the aunt's home to videotape Maria. Maria was at the aunt's home until 5:00 p.m.. She spent most of the day with the woman who was taking care of her and the woman's own two-month-old baby. At approximately 3:00 p.m., Maria's nine-year-old sister and her two cousins came home from school.

The video camera seemed to cause everyone involved to modify their behavior. Maria was very conscious of the camera focused on her. While Maria's cousins were around her, they made her aware of our researchers and the videotaping. During the day when the cousins were away she seemed to be less aware of the camera and went about her normal activities. At 5:00 pm her father came to pick her up to take her home. The researchers went to her house and continued videotaping there. A short time after they arrived at her house she grew tired of the researchers following her around with the video camera. On several occasions she told the male researcher to stop following her. In order to escape from the camera, she pretended on several occasions to use the bathroom, and she also locked herself in her room. The bathroom scale was also a source of disruption; all of the children in the house wanted to weigh themselves, so approximately fifteen minutes of videotape contains scenes of the children weighing themselves and weighing some of their toys.

#### *Major Locations and Activities of the Subject*

After Maria sat in the living room talking to her sister and cousins before they left for school, she had breakfast in the kitchen. She spent the remainder of the day doing the following activities: playing with the baby in the baby's room and in the room between the kitchen and living room; standing in her aunt's room as her aunt got ready to go to work; sitting on the steps outside the

kitchen; napping for four hours in the baby's room; eating lunch at the kitchen table; playing with her cousins and sister when they came home; playing with the bathroom scale and watching her cousins and sister weighing themselves; riding in the back of her father's pick-up truck on the way back to her house; playing with her doll; walking around the house trying to avoid the camera (for most of the afternoon); eating dinner at the kitchen table; and playing outside in her front yard.

### *Questionnaire Administration*

The same female researcher who interviewed Pablo's mother administered the questionnaire to Maria's mother shortly after the research team arrived at Maria's home. Again, she did not have to administer the questionnaire formally; while the male researcher was videotaping Maria, she sat in the kitchen and administered the questionnaire to the mother while she made dinner. Maria's aunt, who was also in the kitchen helping with dinner, contributed some of the answers.

## **Case Study 3**

### *Background Information*

The third case study is Dolores, a 2 1/2-year-old Mexican-American female living in Watsonville, California. The house is on a cul-de-sac lined with small wooden houses, in an industrial neighborhood. A large processing plant and a bottling plant are one block away and a railroad yard is located across the street. Dolores' family lives in one of a set of attached trailers (raised on concrete posts) which are in bad condition, i.e., leaking roof, holes in the wall, no screens on the windows, cockroaches in the kitchen. The trailers are located approximately twenty feet east and fifty feet south from lettuce fields and strawberry fields (where pesticide spraying occurs). The housing area is separated from the fields by a wire fence on which laundry is hung to dry. A public washing machine is located outside the trailer next to the fence. There is no vegetation around the trailers. Dolores lives with her parents and three brothers (ages eleven, nine, and five) in four rooms (a kitchen, two bedrooms, a bathroom). There are few

visual stimuli in the house. None of the floors is carpeted. Both of Dolores' parents pick strawberries for their jobs. Her mother makes approximately \$4300 annually and her father \$7000. Dolores' mother cares for her when she is not working, and her mother's sister (who lives in the adjacent trailer) cares for Dolores when Dolores' mother is working.

### *Events on the Day of Videotaping*

The two researchers (a female Anglo Spanish-speaking engineering graduate student and the same male researcher who videotaped Pablo) arrived at 8:00 a.m. on Tuesday morning, as had been previously arranged with Dolores' mother. Dolores' siblings were leaving for school and Dolores was playing with one of the neighbors in her bedroom. The researchers set the equipment (tripod, batteries, battery charger, backpacks), with permission, on the bed in one of the bedrooms. The battery charger was a source of curiosity for Dolores, and our researchers had to repeatedly ask her to not try to unplug it. Although our researchers attempted to set up the tripod several times, it was impractical because Dolores changed rooms as soon as it was set up, and because the quarters were so small that the tripod was a major intrusion.

Several of Dolores' friends came over to visit her during the day, but her mother told them to stay away because our researchers were filming Dolores. Dolores and all of the children were intrigued by the video camera and the researchers. At first, she was acutely aware of the camera and was acting dramatically in front of it. She tried playing with the researchers, but when she realized they would not play, she seemed to forget the camera for most of the time.

Dolores's mother seemed a bit wary of the videocamera, and purposely tried to stay out of its way. At first, she did not let our researchers out of her sight, but as the day wore on she seemed to trust them to be alone with her daughter. Her sister and niece stayed in the other bedroom watching television all day, and did not allow Dolores (or our researchers) to enter.

### *Major Locations and Activities of the Subject*

Dolores spent most of her time playing in her bedroom and kitchen. Because there were no toys except a few stuffed animals, she played with photographs, a plastic ring, and paper towels. She also tried catching a cockroach on the kitchen floor, but her mother stopped her. She ate lunch at the kitchen table. Outside she played with friends, eating dirt near a car and splashing her hands in a barrel of water next to the laundry machine that was outside. Weighing her and measuring her took approximately fifteen minutes because she made the task into a game, and then her friends joined the activity. In the late afternoon Dolores took a nap. The researchers waited for 1 1/2 hours for her to awaken, during which time her father came home from work. Both of her parents and both researchers talked in the bedroom while Dolores slept, until the parents said Dolores would probably not wake up until the middle of the night. At that time, the researchers packed the equipment and left.

### *Questionnaire Administration*

After the researchers were in the house for several hours, it was convenient to administer the questionnaire to the mother because, until then, she was uncomfortable and always watching our researchers and the child. The household observations were easy for one researcher to conduct while the other researcher videotaped. The female researcher administered Part 1 of the questionnaire to Dolores' mother in a more formal way (i.e., in order rather than in conversation) than the other case studies, because there was no real rapport between the researchers and the mother. Asking the questions was awkward for several reasons. First, because there were no carpets in the home, the first relevant questions that were asked related to their sewage system, and she did not understand our Spanish word for septic tank. This inappropriate vocabulary made the session awkward from the beginning. The next questions related to household and laundry cleaning practices, and she seemed skeptical of our reasons for asking. However, she did not refuse to answer any questions. Second, because the interviewer is not bilingual, she had difficulty rewording questions that the mother did not understand.

The male researcher administered Part 2 of the questionnaire. The mother had a fairly good idea of Dolores' activities and durations (though not in real time), and did not require much probing. The activity recall of the questionnaire took approximately ten to fifteen minutes. The home pesticide application questions did not take long to ask because the respondent uses only one product. Although the father picks strawberries, he does not mix or apply pesticides, so the work-related pesticide questions were not applicable. The sociodemographic questions did not take long to ask because Dolores' parents are the only two adults in the household.

#### **Case Study 4**

##### *Background Information*

The fourth case study, Mariano, is a 3 1/2 year old Mexican-American male living in Watsonville, California. His duplex house, which appeared recently painted, is located in an industrial area containing numerous factories and warehouses. There are several fields in the area, one of which is a lettuce field less than a mile away. The air seemed dusty, possibly because of the dirt roads, the traffic, and the road work that was being conducted at the nearest large intersection. Vegetation is quite limited within several miles of the house; there is a scarcity of trees and lawn areas around the houses. The area surrounding the duplex contained a large amount of waste materials such as plastic and glass containers, fast-food wrappings, miscellaneous paper wastes, and rubber tires. The area also contained some discarded furniture items and large cardboard boxes containing aluminum cans. Many clothes were drying on outside clothes-lines.

Mariano's house consists of two bedrooms, one living room, one kitchen, one bathroom, and one laundry/toy room, all of which are relatively small. The bedrooms are the only carpeted rooms. Nine people in total live in the house: four adults, one teenage girl, and four young children (2.5 - 5 years of age), which comprise two nuclear families (the mothers are sisters and the fathers are

brothers). The annual income of the Mariano's nuclear family is approximately \$7,000 plus the checks that his pregnant mother received because she cannot work in the fields. All four adults are strawberry field workers. There is another contribution to the total household income from the other nuclear family living in the house, but we did not obtain information on this. Mariano's mother was taking care of her two children since she was on pregnancy-leave, and the other parents took care of their own children on the day of the filming. Our researchers did not inquire about other day care practices.

#### *Events on the Day of Videotaping*

The team of researchers that videotaped Mariano consisted of a female bilingual Latina environmental engineering graduate student and a male bilingual Latino environmental engineering undergraduate student from Stanford. Upon the arrival of our research team at 7:30 a.m. on Monday morning, thirty minutes later than scheduled, the mother greeted our researchers as she dressed her two sons, who had just awoken. The father had left for work and the rest of the household members slept for another half hour. As our female researcher confirmed permission to film her child, our male researcher set up the camera equipment. Within a half-hour of arrival they began filming.

Mariano and his mother were present the entire day of filming. Mariano's five-year-old brother went to school from 11:00 a.m.- 4:00 p.m.. The father returned home from work at approximately 5:00 p.m., and remained at home for the rest of the day. During the early evening, he played with the children and answered the pesticide application section of our questionnaire. The rest of the household members came in and went out of the house sporadically throughout the day. Extended family members and friends visited during the day, as well.

In general, Mariano's reaction to the camera was quite negative. At first, he seemed very shy and reserved, and took no interest in our researchers and in the camera. Later, he seemed to be frightened of the camera, and consequently never became accustomed to the researchers. He had several crying tantrums during the day, which stemmed from annoyance over the researchers' presence. At one point he slammed the bathroom door, attempting to hide from the camera. There were several portions of the day, however, when he played with his brother and/or father, or was in the close vicinity of his mother, in which he seemed to forget that he was being filmed.

Other household members seemed to make an effort to stay away from where our researchers were filming. The mother was an exception, as she remained neutral in the presence of the camera. She seemed to take an interest in what our research team was doing.

#### *Major Locations and Activities of the Subject*

Generally, Mariano played with toys in the living room or played outside in the back area with his brother and his father. He also slept for part of the day in his mother's arms and then in the bedroom. Intermittently, he had his breakfast and numerous snacks in the living room, but had lunch and dinner in the kitchen. Additionally, he watched television while sitting on the living room sofa for many scattered hours throughout the day. At mid-day and in the afternoon, he went with his mother to drop off and then pick up his brother at the bus stop, less than two blocks away.

#### *Questionnaire Administration*

Our researcher administered the questionnaire over the course of the day, rather than formally (i.e., questions asked in order). She asked questions to the mother only when she seemed to have time and interest. This technique worked well, perhaps because the mother felt less defensive in answering personal questions since it was administered in the course of conversation. The activity pattern recall section flowed well, but the researcher was unclear about how much detail

to elicit through probing questions. Both the mother and father were hesitant to answer all of the questions, although they did answer most of them.

For these parents, the questionnaire administration did not take long, primarily because no one in the family applies pesticides.

## **DISCUSSION**

Because of the different family situations and home environments of the four case studies, we learned a variety of lessons to be considered in future field studies. These general lessons are discussed below.

### *Need for an Initial Meeting with the Family*

Although we met briefly with each family several days prior to videotaping, the importance of at least several more extensive initial meetings between us and the family became apparent in all four cases. This observation was also made in the Lower Rio Grande Environmental Monitoring Pilot Study (Schwab, 1994). Such meetings would allow us to establish trust, rapport, and a higher comfort level with the family, and would allow the children to become familiar with the equipment. In addition to making the family more comfortable with the intrusive nature of our project, such meetings may help us to obtain more accurate information via the questionnaire and videotapes. In the meetings, we should discuss the purpose of the study, encourage the family to ask questions, explain what they should expect to happen, show them the equipment, and discuss their rights as participants (e.g., refuse to answer a question or ask that we not videotape certain activities of the child).

### *Need for Backup Crews*

The importance of a backup crew on call to help with unexpected situations requiring special equipment or supplies became apparent in the pilot study. For example, the backup crew was

needed to bring camera lens wipes after one of the children touched the camera lens when the researcher was kneeling to videotape her. We recommend that the videotaping teams call the backup crew with a beeper, after asking the family permission to use the phone and repaying them for the call.

#### *Need for Training Materials*

All researchers developed their own technique for handling the equipment, awkward situations, and questionnaire administration. We all felt the need for extensive training in all areas before the larger field study, and have been developing training materials (regarding videotaping procedures, cultural sensitivity, and questionnaire administration) based on the pilot experience.

#### *Lessons from Questionnaire Administration*

Our researchers found that, in some sections, the questionnaire lacked continuity in content and style. After the pilot study, all seven researchers collectively revised the questionnaire to facilitate smoother administration. Common lessons learned from questionnaire administration in the pilot study include the following: questions should be phrased more simply; the questionnaire should include proper transitional statements that explain each portion of the questionnaire; questions that need to be skipped in the case of a negative response should be marked clearly for the interviewer; researchers should record open-ended responses in the language of the interviewee, to avoid errors in on-the-spot interpretation; and researchers should be trained uniformly in administering the activity recall portion of the questionnaire (i.e., regarding the extent of probing for details).

Furthermore, there are two main ways to administer a questionnaire: working the questions into conversation throughout the day, or asking them in order. Although the research team needs to decide which is more appropriate for each subject, the first approach worked better for the

subjects in this pilot study. The researcher that administered it in order found that method awkward.

Finally, we found that day-after recall of the caregiver was poor in most cases with respect to durations of specific activities and locations of the child. For example, one mother did not recall the one time her child had gone outside. However, the caregivers did not know on the day of videotaping that they would be asked to recall the children's activities.

### *Socio-Cultural Considerations*

All of our researchers agreed that it is necessary to be as "invisible" as possible. In several cases, it was not very feasible for both researchers to remain in the house because of the small, crowded living conditions, so one person waited in the car or took a walk. Along this line, all materials that are not needed should be stored in the car so that children do not play with them and so that we do not take up any more space than necessary. Furthermore, each research team should be self-sufficient so as not to intrude on the family any more than necessary. Thus, we should have access to everything we may need on-site, such as food, electricity, telephone service, and miscellaneous materials (in addition to equipment and materials). Although the family is very giving and welcoming, materials or services they provide may be an economic burden to the family.

Furthermore, we agreed on the importance of being sensitive to the particular culture of the study participants. It is important to realize that each ethnic group has a rich and unique culture. When working with an ethnic group, in addition to speaking the language of the particular group, it is important to also understand the culture. We should not assume that what is acceptable in our society will hold true for them as well.

Research teams should be composed of at least one female and at least one person of the same ethnicity as the study group. Furthermore, the following should be considered: nonverbal communication particular to a culture; regional, social class and gender differences in the spoken language; religious beliefs and superstitions ( e.g., if you are in the presence of a Latino baby, many Latinos believe that someone who just looks at the child without touching it could give the child "mal de ojo," or bad luck); proper ways in which to address people (e.g., in the Latino culture this depends on the age, sex and social status of the speaker and the addressee); how to treat elders (e.g., the Latino culture treats elders with tremendous respect); how to properly introduce yourself; how the culture views authority figures (e.g., researchers with professional standing and extensive education); the importance of family dynamics; common courtesies (e.g., how to handle invitations to eat with the family); and standards of dress (e.g., in the Latino culture men do not wear shorts and women dress very conservatively).

#### *Improvements in the Videotaping Methodology*

This pilot study is a precursor to a larger field study that will provide a database of activities for 50-100 Mexican-American farm labor children in California's Salinas Valley. The database of activity patterns, along with microenvironmental concentrations contacted by the population and personal monitor concentrations (e.g., from hand rinses or skin wipes) will eventually be used to quantify total pesticide exposure (inhalation, dermal, and ingestión) for the study population. Combined with questionnaire information, the exposure calculations will provide information on how to reduce pesticide exposure to this high risk group. The use of videotaping to quantify micro-activities will allow for the most accurate estimates of dermal and ingestión exposures to date.

Before the methodology can be applied in the larger field study and in studies focusing on other populations, however, several issues discovered in this pilot study need to be addressed. It was evident in the four pilot study cases that the presence of the researchers with the video camera

altered, to some extent, the behavior of the child and the child's family. Also, because we only videotaped each child for one day, we may not have captured a "typical" day, which is more desirable for estimating population exposures. Thus, for subsequent studies, additional creativity needs to be applied to evaluate what constitutes a "typical day" of each child, and how to determine the extent to which activities of the children are altered by the videotaping process. It is not yet clear that perturbed behavior of young children (e.g., if they watch a researcher while playing with a toy) will result in different exposure profiles.

Such determinations will require a series of experiments to evaluate what combination of data collection techniques will yield unaltered exposure-related activity patterns. These experiments may include 1) comparing the results of parent's recall or diary data for their children's activities to those of a remotely positioned researcher's, in order to determine whether parents can record accurately the gross activities, locations, and durations of a child on a "typical day" so that they can be subsequently videotaped, and 2) comparing activity data collected when a researcher follows a child with a video camera to videotaped activity data collected from hidden cameras; for example, by using a pedometer to compare the level of activity in a day when each method is used.

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