

**THE IMPACT OF LIFESTYLE AND EMPLOYMENT  
FACTORS ON THE HEALTH OF HIRED FARMWORKERS**

**by**

**Andrea Lynn Steege**

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Doctoral Committee:

Professor Siobán D. Harlow, Co-Chair  
Emeritus Professor David H. Garabrant, Co-Chair  
Associate Professor Michael R. Elliott  
Medical Officer Sherry Baron, National Institute for Occupational Safety and  
Health

***¡SI, SE PUEDE!***

***César Chávez & Dolores Huerta, United Farm Workers co-founders.***

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**Dedicated to U.S. farmworkers in honor of their labor,  
and to Shelley Davis for her dedication and service  
to the improvement of farmworkers' lives.  
Thank you**

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**LIST OF ABBREVIATIONS**

NAWS.....National Agricultural Workers Survey  
NIOSH .....National Institute for Occupational Safety and Health  
OSH Supplement .....Occupational Safety and Health Supplement

## ABSTRACT

**BACKGROUND:** Living and working conditions of farmworkers have been difficult throughout United States agricultural history. Farmworkers experience low wages, unstable work availability, and numerous hazards. As they are immigrant, mobile, and often undocumented, they are usually missed in population-based surveys.

**METHODS:** Data from the unique National Agricultural Workers Survey (NAWS) were analyzed to determine the prevalence of, and the employment and lifestyle characteristics associated with, use of U.S. health care, alcohol consumption, and dermatitis. The NAWS is a workplace-based multi-stage sample, representative of U.S. farmworkers. SAS survey procedures accounted for multi-stage sampling.

**RESULTS:** Between 1999 and 2004 the NAWS interviewed 19,987 farmworkers. Sample sizes were 16,678, 9,906, 16,945 for analysis of health care, alcohol, and dermatitis, respectively. Fewer than half (43%) of farmworkers utilized health care. Men were more likely to drink (59%) and binge drink (23%) than women (14% and 4%, respectively). Dermatitis prevalence was significantly higher in women than men (12% versus 7%, respectively). Significant associations exist with economic variables (wages, assets); cultural integration variables (English speaking ability and immigration and mobility); and employment characteristics (employer, number of workers, years of U.S. farm work, and peach workers). Higher hourly wages were generally associated with better outcomes—higher odds of utilizing health care and lower odds of dermatitis in women—although in men the highest wages predicted higher odds of binge drinking. Among Hispanic men, speaking English “well” was associated with utilization of health care while intermediate English ability was associated with binge drinking. Male farmworkers employed by farm labor contractors had lower odds of utilizing health care but also lower odds of binge drinking.

**CONCLUSIONS:** The NAWS provides a unique data source addressing the health of farmworkers, a population not captured in surveys requiring workers to have permanent addresses or stable employment. Farmworkers' risk of not receiving health care, binge drinking, and dermatitis are associated with employment and lifestyle factors. Outreach efforts should focus on the lowest income workers and farmworkers who lack English skills. The health impact of working for farm labor contractors should be explored further. Farmworkers who labor to feed Americans should not work at the expense of their own health.

## **CHAPTER I**

### **Overview and Background**

#### **INTRODUCTION**

Hired farmworkers are a vulnerable work force. They have many economic and social characteristics that set them apart from other worker populations and prevent them from enjoying a high quality of life. These characteristics include very low wages, family separation, need to adapt to a different cultural environment, isolation in rural locations, itinerant lifestyle with the consequent need to find new lodgings for work, crowded and substandard housing, uncertain employment, possible exploitation and discrimination due to immigration status or ethnicity.

This project focused on a population of hired farmworkers who worked in crop agriculture. Family members were not included and neither were H2a workers, a type of agricultural guest worker. The data that were used were from the core and occupational health supplement of the National Agricultural Workers Survey (NAWS), conducted by the Department of Labor, Employment and Training Administration. The NAWS is a workplace-based survey, which takes seasonal and geographical variation in farm activity into consideration when choosing the multi-stage probability sample. A new sample of approximately 3000 workers is chosen each year. Data from 1999 through 2004 are available for this analysis. The NAWS is the only national survey that developed methods to capture a representative sample of farmworkers that is culturally sensitive to the special circumstances involved in being an agricultural worker in the U.S. today.

In this dissertation, I determined how lifestyle and employment factors influence the health of hired farmworkers, focusing on their use of health care, use of alcohol, and dermatitis.

## **BACKGROUND AND PUBLIC HEALTH SIGNIFICANCE**

The living and working conditions of farm laborers have been dire throughout the history of United States agriculture starting from African slavery in the East and South, to the near enslavement of Native Americans in the West. In California, as the Native American workers died out, they were replaced by out-of-work gold miners. These were the first migrant workers and were called “bindlemen” because they carried their possessions wrapped in a bindle, or blanket. Chinese railroad workers followed but were eventually replaced through attrition when unemployment in the white population turned public opinion against them. Japanese farmworkers replaced the Chinese, but many Japanese were able to transition to a position of farm ownership, which once more left a farm labor gap (Street 2004). The bindlemen dominated in the beginning of the 20<sup>th</sup> century until WWII created a labor shortage that was eventually filled by Mexican “guest workers” through the Bracero Program begun in 1942. Mexico-born workers are the dominant workers in U.S. agriculture today. Although the composition of farmworkers has changed over the years, they remain one of the most vulnerable worker populations in the United States.

Determining the number of hired farmworkers in the United States is complicated due to seasonal employment, part-time employment, and differential definitions of who is a farmworker. The United States Department of Agriculture (USDA), using data from the Current Population Survey (CPS) conducted by the U.S. Census Bureau, estimates that the number of farmworkers varies from 589,000 in January to 1,117,000 in July based on 1997 data. This estimate includes both livestock and crop workers (USDA Economic Research Service 1998). The CPS is a national telephone survey that may miss farmworkers who live in unconventional housing, who have other jobs at that time of the month to supplement their agricultural income, and who may avoid official-looking people due to immigration status. The National Center for Farmworker Health (NCFH) cites a report from the U.S. Bureau of Primary Health Care, Office of Minority Health (1993) estimating that there are over 3 million migrant and seasonal farmworkers in the U.S. (designation of crop or livestock workers not given)(NCFH 2002). The U.S. Department of Labor which is responsible for the National Agricultural Workers Survey (NAWS), the data that was analyzed in this dissertation, estimates that there are 1.8



million crop agricultural workers in the United States. Farmworkers make up a small percentage of the total U.S. workforce but deserve attention due to the conditions under which they live and work as well as the important role they serve in making fresh produce available to people throughout the country.

### **Demographic Characteristics of Farmworkers**

Consensus does exist on the general demographic characteristics of farmworkers; the following are the most recently published NAWS data. Farmworkers today are poor, young, mostly male, and predominantly foreign-born. The NAWS estimates that 28% of farmworker families earn less than \$10,000 per year and another 50% earn less than \$20,000. Three-fourths of farmworkers were born in Mexico, 3% were born in other countries outside the U.S., and slightly less than one-fourth were born in the U.S. More than half of farmworkers report that they are undocumented immigrants (53%). Less than half migrate for farm work (42%) but 57% report living away from all nuclear family members. Males predominate in the fields, being 79% of the labor force (Carroll *et al* 2005). The median age of farmworkers is 31 years (Carroll *et al* 2005) compared to a median age for all wage and salary workers of 39 years (Runyan 2002).

Farmworkers have low educational and English language skills attainment. The mean highest grade completed for farmworkers is 7<sup>th</sup> grade. Only 18% of farmworkers have completed high school. The highest grade completed for U.S.-born farmworkers is higher than for foreign-born farmworkers (11<sup>th</sup> grade versus 6<sup>th</sup> grade, respectively). A majority of farmworkers (53%) report not being able to read English at all; slightly fewer than half (44%) report being unable to speak English at all (Carroll *et al* 2005).

### **Employment Characteristics**

Farmworkers are employed an average of 34 weeks per year and work approximately 42 hours per week when they are working. They work in non-agricultural jobs five weeks per year and are not working approximately nine weeks per year. Approximately 79% of farmworkers are hired directly by a grower with the remaining working for a farm labor contractor. Sixteen percent of workers work and are paid on a piece rate; they are paid by how many buckets or containers of produce they pick. Eighty percent of farmworkers

report that drinking water is available every day. Hand washing water and toilets are provided more often; 93% of farmworkers report that hand washing water is available, and 95% report that toilets are available every day (Carroll *et al* 2005).

The combination of these demographic and employment characteristics may make farmworkers vulnerable to adverse health outcomes such as low health care utilization, excessive use of alcohol, and dermatitis.

## **Health Care**

Concern over the health care needs of migrant and seasonal farmworkers prompted Congress to enact the Migrant Health Act in September 1962. The Migrant Health Program funds community and state agencies to provide health care as well as resources to facilitate provision of health care such as transportation, outreach, dental care, and pharmaceuticals. These services are available to migrant and seasonal farmworkers and their families in some locations. The Migrant Health Program was combined with Community Health Centers in the Health Centers Consolidated Act of 1996. Funding of these services has shifted from grant funding to Medicaid payments which may have implications for immigrant farm workers (Bureau of Primary Health Care 2006). Unfortunately, only 15% to 20% of the eligible population is served through this mechanism (Villarejo & Baron 1999).

A few studies have looked at predictors for use of health care services among farmworkers. In upstate New York, Orange County, White-Means (1992) identified several predictors of health care use by farmworkers including economic resources, mental health status, health insurance coverage, language, and education. A study in California conducted by the California Institute for Rural Studies and funded by the California Endowment found that 74% of female farmworkers, but only 48% of male farmworkers, had visited a health care provider within the last two years. Language difficulties were mentioned as one of the major reasons for not seeking health care (Villarejo *et al* 2000).

Health care utilization among Hispanics in the United States is also lower than non-Hispanics. A four-city study of undocumented immigrants found an even lower proportion with physician visits (27% to 50%) compared to Hispanics nationwide (66%)

and the total U.S. population (75%) as reported to the National Health Interview Survey. When asked if they might avoid seeking health care because of fear about their immigration status, the proportion of respondents answering yes ranged from 33% of undocumented participants in Houston to 50% of undocumented persons in El Paso (Berk *et al* 2000). Rehm (2003) reports that even Hispanics with legal documents may be hesitant about seeking health care due to fear of putting family members without legal documents at risk of legal consequences.

### **Alcohol Use**

Alcohol use has been cited as a problem among migrant and seasonal farmworkers although the scientific literature is sparse, regional, and includes no study based on a representative sample (Chi and McClain 1992; Trotter 1985; Alaniz 1994). Excess alcohol use can have both short-term and long-term health consequences. Motor vehicle accidents, alcohol poisoning, risky sexual behaviors, work-related injuries, and drowning are potential short-term risks. Arcury *et al* (2002) reported a high prevalence of farmworkers drinking alcohol while participating in recreational water activities such as swimming, boating, and fishing. They also noted that over one-third of these farmworkers did not know how to swim. Long-term consequences of excessive alcohol consumption include liver damage, hypertension, coronary heart disease, ischemic stroke, alcohol-related brain damage, cancer, psychiatric conditions, and general poor health (Cargiulo 2007; Okosun *et al* 2005).

It is thought that acculturation to U.S. culture comes with increased risk of substance abuse (Orozco and Lucas 2000). A study of acculturation and emergency room (ER) visits of Mexican-Americans in Santa Clara, California U.S. and Mexicans in Pachuca, Hidalgo Mexico found that in the U.S. sample, acculturation was positively associated with drinking and drug use before the event that brought them to the ER. Heavy drinking, drug use, and adverse consequences were related to drinking in the past year. The study defined acculturation using a six-item scale developed to measure their “degree of adaptation to U.S. culture.” Items in the scale included English versus Spanish speaking and reading, and the language of media they patronized. Those scoring lower on

the acculturation scale were more similar to the Mexican study participants on substance use variables (Cherpitel and Borges 2001).

Environmental factors hypothesized to be related to alcohol use that may be relevant for farmworkers include employment frustration (Finch *et al* 2003); stress including economic stress (Dee 2001); social isolation and social context (Neff 1997; Treiman and Beck 1996); acculturation (Cherpitel and Borges 2001); and adverse working conditions (San Jose *et al* 2000; Wiesner *et al* 2005). Alderete *et al* (2000) studied psychiatric disorders including alcohol abuse and dependence among Mexican migrant farmworkers in California. They found a lifetime prevalence of alcohol dependence of 8.9% for men and 1.0% for women. Male gender, young age, low education, and U.S. residence (compared to Mexican) were significantly associated with alcohol dependence.

### **Dermatitis**

Data from the Bureau of Labor Statistics (BLS) in 2001 indicates that the highest incidence rate of dermatitis is found in the “Agriculture, Forestry and Fishing” (AFF) Sector. This sector reports 1.3 cases per 10,000 full-time workers compared to 0.5 cases per 10,000 full-time workers in all private sectors. “Manufacturing” and “Transportation and Public Utilities” had the second highest rate with 0.7 cases per 10,000 full-time workers, almost half that of the AFF Sector. Dermatitis dropped from almost 6.0 to 1.3 cases per 10,000 full-time workers between 1992 and 2001 (NIOSH 2004). Dermatitis cases in hired farmworkers may be less likely to be included in BLS data since the employer reports the cases to the BLS. Farmworkers may be less likely to report dermatitis to the employer due to temporary work status, not recognizing it as an occupational problem, worries about immigration status, or for other reasons.

Many exposures in agricultural are linked to dermatitis and include crop and other plant materials, solar radiation, combined sun and plant exposures, agricultural chemicals, insects and other animal bites and stings, thorns, sharp-edged leaves, and hot, cold and damp working conditions (Burke 1997; Hogan and Lane 1986).

The severity of dermatitis in agriculture ranges from acute conditions such as sun rash or temporary pruritis to more severe conditions including allergic contact dermatitis

requiring avoidance of certain materials and potentially a change of occupation, a difficult proposition for some farmworkers who may not have other employment options (Zug 1999; Spiewak *et al* 2001; Kaufman *et al* 1998; Burke 1997). The most severe case of this was seen in workers in India after the non-native plant, feverfew, was unintentionally imported causing widespread allergic contact dermatitis and defoliative dermatitis and death in some cases (Hogan and Lane 1986). Chronic exposures may result in problems that persist over time or, after repeated assaults, skin may become scarred and fail to repair itself. In addition, skin that is damaged may be less able to provide a barrier against exposures such as pesticides (O'Malley 1997). Other conditions include irritant dermatitis, pigmentary disorders, mechanical injuries that may lead to infections, as well as skin cancer and frostbite (Zug 1999). Phytophotodermatitis may occur when skin is exposed to a combination of sunlight and plant materials, either the actual crops such as limes, celery, carrots, parsley, and dill or weeds that grow alongside crops such as Queen Anne's lace, cow parsnip, and hogweed (Burke 1997).

Although some farming has become more mechanized with less contact of skin and plant materials, hired farmworkers may be more likely to develop dermatitis than other agricultural workers because many hired farmworkers work in tasks that require sustained contact including picking fruit, tying herbs in bundles, weeding around crops, tying back vines, and carrying tobacco leaves under an arm (Schuman and Dobson 1985; Schenker and McCurdy 1990; Abraham *et al* 2007). Farmworkers may also have inadequate personal protective equipment, inadequate training on the safe use of pesticides, or inadequate access to field sanitation (Arcury *et al* 2001; Arcury *et al* 1999).

Farmworker accommodations in the U.S. vary widely due to temporary employment and mobility from a plot of land, to a tent, a garage, an apartment, a motel room, or a house (Sherman *et al* 1997; Washington State no date). According to a 2001 Housing Assistance Council report, 52% of farmworker units were considered crowded, having more than one person per room. This does not include workers living in dormitories or barracks, which have an average of 4.8 people per room (Holden 2001). A 1997 study found that 46% of farmworkers—but only 3% of other—very low-income rural households were crowded (Early *et al* 2006). Farmworkers may have difficulty keeping themselves or their clothing clean due to lack of adequate facilities at their

residence which may contribute to their exposure to chemicals or plant sap for longer periods of time, or to re-exposure to the same substance, if it were not removed completely from clothing. Cultural integration factors such as English language proficiency, time spent in the U.S., and immigration status may also affect whether workers develop dermatitis if they feel intimidated about asking for acceptable field sanitation facilities or repairs to facilities at rented residences or farmworker housing.

Although a few studies of dermatitis in hired farmworkers have been conducted, population-based data on dermatitis and agricultural workers are lacking. The National Agricultural Workers Survey Occupational Health Supplement data provided the opportunity to assess the prevalence of dermatitis in a nationally representative sample of hired farmworkers and to explore potential associations with work conditions, crops, economic and social farmworker characteristics.

## **RESEARCH METHODS**

### **Overview**

Data from the National Agricultural Workers Survey, an ongoing cross-sectional survey run by the U.S. Department of Labor, were used to examine associations of job and lifestyle factors with health outcomes or risk factors for adverse health outcomes in hired farmworkers. Three outcomes were explored: use of health care in the last two years; frequency and volume of alcohol consumed; and dermatitis. Potential risks were assessed in four domains: cultural integration, economic status, social support, employment, and demographic factors. *Cultural integration factors* were English speaking ability, years living in the U.S., and immigration status and mobility. *Economic status* included hourly wages, U.S. assets, and number of people per sleeping room in residence. *Social support factors* included whether they were married and if they were living with family members. *Employment factors* included crops, type and number of employers, number of employees on the farm, months worked in last year, availability of hand washing facilities, and glove use. In addition, the demographic factors age, gender, and education were considered as alternative explanations.

## **Data Source**

Data were from the National Agricultural Workers Survey (NAWS) and NAWS Occupational Health Supplement (OHS) 1999 through 2004. The NAWS is a national in-person cross-sectional survey that is administered for the U.S. Department of Labor by Aguirre International. The NAWS has been conducted each year since 1988; the OHS has been included since 1999, although not all OHS questions are asked each year. For this reason, analyses were limited to these five years of data.

## **NAWS Sample Selection**

Each year a sample of between 2,500 and 3,600 hired farmworkers is included in the survey. The sample is divided between three cycles where each of 12 sampling regions is included with the number of interviews per region proportional to the region's farm labor employment during that quarter. The seasonal level of farm employment is determined by the United States Department of Agriculture's (USDA) Quarterly Agricultural Labor Survey (QALS) and is adjusted to correspond to the three 12-week cycles of the NAWS (October through December, February through April, and June through August). See **Figure 1.1** for a flow chart of the sampling scheme starting with the stratification variable (Region).

The sample is selected using probability proportional to size at four different levels of sampling: Farm Labor Area (FLA), county, employer, and farmworker. The primary sampling units for the survey are the FLAs, of which there are 47 in the continental U.S. The FLAs are groupings of several counties with similar agricultural properties, including farm labor expenses. For FLA, the attribute that size refers to is the amount of farm labor expenses for the district. The USDA's Census of Agriculture supplies data to determine this. The next level of sampling is the county level. Counties are selected using probability proportional to the size of the farm labor expense. Information from the Bureau of Labor Statistics and the Agricultural Soil and Conservation Service are aggregated to make up the list of growers in the selected counties. The contractor supplements these sources with information from extension agents, grower organizations, and farmworker service providers. The employers are also selected using simple random sampling so as not to influence their selection toward

larger farms. The number of farmworkers selected from each farm depends on the number of workers employed. For farms with fewer than 25 workers the maximum number of interviews is five. For farms with 76 or more workers the maximum number of interviews from that farm is 12. Farmworkers are approached at worksites and invited to participate in the survey; for those who agree and are eligible, a time and place are arranged for a meeting.

Data used in this analysis included both weights for analyzing a single year of data and weights for analyzing multiple years of data and included components to adjust for four factors: the differing length of farmworker work day and work week, the region, cycle, and year of data collection. Composite weights are calculated as the product of the week, cycle (season), and region weights, each of which is the inverse probability of being sampled in that period or place. The multi-year weight also adjusted for the relative size of one year of data compared to other years based on USDA's QAL Survey (U.S. Department of Labor 2005).

### **Study Population**

The NAWS includes all farmworkers working in crop agriculture who fall within the Standard Industrial Classification (SIC) Major Group 01, Agricultural Production Crops within Division A: Agriculture, Forestry, and Fishing. Excluded from participating in the survey are secretaries, mechanics, H2A temporary farmworkers, and farmworkers who have not worked in agriculture in the last 15 days. The NAWS also requires respondents to be at least 14 years of age.

H2A workers are employed in the U.S. under a temporary visa program created by the U.S. government to address a perceived labor shortage in agriculture. They are different from non-H2A workers in that they can only work for the employer who applied for their visa. Housing conditions, wages, hours worked and compensation for injuries are regulated for these workers, although it is not clear if they are enforced. These conditions combined make these workers both more and less vulnerable than other hired farmworkers, but fundamentally different (Congressional Research Service 2004).



### **Human Subjects Considerations**

Data are de-identified by the contractor who collects data before they are submitted to the Department of Labor or other interested parties. Institutional Review Board (IRB) review at both the National Institute for Occupational Safety and Health and the University of Michigan classified this secondary data analysis as exempt.

### **Explanation of Variables to be Used in Analysis**

Many of the variables to be used in the analyses come directly from the questionnaire (Appendix 2).

#### **Dependent Variables**

*Use of health care.* Participants were asked “In the last two years have you used any type of health care services from doctors, nurses, dentists, clinics, or hospitals in the US?” The answer is either yes or no and will not need to be transformed further.

*Alcohol consumption.* To assess alcohol use, participants were first given a definition of what was considered alcohol and occasions when it might be consumed, “These next few questions are about the use of beer, wine, wine coolers, cocktails, or liquor, such as tequila, vodka, gin, rum, or whiskey--all kinds of alcoholic beverages people drink at meals, special occasions, or when just relaxing.” They were then asked, “In the last month, how many days did you drink any alcoholic beverages, on average?” Next, they were instructed that “A drink is one can or bottle of beer, one glass of wine, one can or bottle of wine cooler, one cocktail or one shot of liquor.” And asked, “On the days when you drank, about how many drinks did you drink on average?” Men who answered five or more drinks, and women who answered four or more drinks, were considered binge drinkers. This is the definition that is used by the National Institute on Alcohol Abuse and Alcoholism (NIAAA) and is “the amount of drinking associated with increased risk of developing alcohol dependence and abuse” (Cargiulo 2007). The four- versus five-drink definition has been used in studies of binge drinking on college campuses to account for differences in proportion and metabolism of men and women (Wechsler 1998).

*Dermatitis.* To assess dermatitis, participants were asked “The following questions regarding skin problems refer to the last 12 MONTHS, (In the last 12 MONTHS) Have

you had any skin problems such as redness, inflammation, discoloration, or rash on your...(Hands? Arms? Face? Other body part?).”

### **Independent Variables**

*Cultural integration.* Respondents were asked whether they read and speak English not at all, a little, somewhat, or well. The immigration status and mobility variable combines information from two questions. Farmworkers were asked, “What is your current residence status?” Choices are provided if necessary and include: U.S. citizen by birth; naturalized U.S. citizen; permanent resident; have a border crossing card; a pending status; am undocumented; am a temporary resident; and none of the above. If they are not a U.S. citizen by birth, they are asked follow-up questions about the type of program through which they received their status. A four-category variable was then constructed (citizen by birth/ naturalized citizen/ green card/ and unauthorized). Those reporting border crossing card, visitor status, implausible program, or undocumented are classified as undocumented. Migrant, also referred to as mobile, is based on the work history grid. Workers are categorized as migrants if one farm work job is more than 75 miles from another farm work job or their home so that they need to establish a temporary residence. The final combined variable used in this analysis includes two levels for each of the immigration status levels: undocumented mobile and undocumented settled; green card or other authorization mobile and green card or other authorization settled; and citizen mobile and citizen settled. In order to minimize reporting bias related to the sensitivity of the question, immigration status was the last question asked, after the interviewer had established a rapport with the farmworker who had been reassured that his/her response would be confidential.

*Economic factors.* Economic factors include the number of U.S. assets owned (car, house, mobile home, business), hourly wages, and crowded living conditions. Farmworkers are asked about the number of rooms used for sleeping and the number of people who sleep in these rooms. These two variables will be combined into a measure of crowding indicating whether or not they have fewer than two people sleeping in a room.

*Social Support.* Social support would include whether or not a worker is married, or has children and whether these family members are living with the farmworker. This variable

is asked as part of the work history and as part of the household composition chart. The household composition chart enumerates all household and family members and elicits demographic information including age, sex, and relationship for the farmworker and other household members.

*Employment factors* include whether a farmworker is directly employed by a grower or by a farm labor contractor, number of employers in last 12 months, number of months of farm work performed in the last 12 months, number of years of farm work done in the U.S. in the farmworker's lifetime, availability of hand washing facilities (including water, soap, and towels), personal protective equipment used (including cloth gloves, thin rubber gloves, or thick rubber gloves), and finally if they loaded, mixed or applied pesticides in the last 12 months with their current employer. Exposure to individual crops and tasks was determined from the work grid—a listing of every crop and task period that the farmworker had worked in the last 12 months. Number of employees working on farm was ascertained from the grower.

### **Statistical Analysis and Data Management**

Data were analyzed using SAS SURVEY procedures (SURVEYFREQ, SURVEYMEANS, SURVEYREG, SURVEYLOGISTIC) due to the complex sampling design. Interviews were stratified by 12 geographic regions of the continental U.S. to ensure that each was represented in each cycle of the survey. "Region12" was used as the stratification variable. Each region was divided up into clusters of counties with similar agricultural practices and crops. "FLA" was the primary sampling unit variable. Data for the NAWS included both weights for analyzing a single year of data and weights for analyzing multiple years of data and included components to adjust for four factors. These were the differing length of farmworker work day and work week, the region, cycle, and year of data collection. Composite weights are calculated as the product of the week, cycle (season), and region weights, each of which is the inverse probability of being sampled in that period or place. The multi-year weight also adjusted for the relative size of one year of data compared to other years based on USDA's QAL Survey (U.S. Department of Labor 2005).

### **Descriptive Statistics**

All variables were first examined using descriptive statistics. Frequencies were computed for dichotomous and categorical variables to obtain the crude prevalence of each of the dependent variables, the independent variables, and other covariates. Each of the hypothesized independent predictors was examined using cross-tabulations to determine if bivariate associations existed between the predictor and the outcome. Other covariates were also examined in relation to both the independent predictors and the outcomes.

### **Multiple Regression**

After these preliminary steps were taken, hypothesized predictors, apparent confounders, and effect modifiers were included in a logistic regression model. Prevalence odds ratios (PORs) and confidence intervals were computed based on the adjusted model. Logistic regression was used to calculate prevalence odds ratios for the odds of the outcome given exposure, controlling for other covariates. PORs can be calculated from logistic regression in SAS, taking the complex sample design into consideration. Because our outcomes are not rare (<10%) the PORs do not approximate the prevalence ratio. If the sample design were not complex, a log-binomial model could be used to calculate prevalence ratios (Deddens and Petersen 2008).

### **Design Effect**

The NAWS is conducted using a complex sample design as described in the section on sample design. One of the concerns of using survey data is how much the sampling design influences estimation of variance for given parameters. The sampling design can be accounted for in the analysis by using programs or procedures that are specifically designed for survey data. In this case, SAS was used with SURVEY procedures that incorporate the strata, cluster, and unequal weights of observations.

With some of these procedures there is the option to calculate the design effect. “The design effect for an estimate is the ratio of the actual variance (estimated based on the sample design) to the variance of a simple random sample with the same number of observations” (SAS Help, quoting Lohr (1999) and Kish (1965)). The effective sample size can then be calculated by dividing the unweighted sample size by the design effect.

To examine the design effect in the NAWS data, frequencies were run on outcome as well as predictor variables using PROC SURVEYFREQ using the strata, cluster, and weight. Design effects ranged from 1.8 to 363. Because of the very large design effects for some variables, and in order to better understand what was influencing them, design effects using the strata, cluster, and weight were compared to design effects when frequencies were computed three more times either not using strata, or not using cluster, or not using weight.

The design effect was generally larger when not using strata (1.8 to 551) than when using strata (1.8 to 363), but slightly smaller when not using weight (1.7 to 298) and much smaller when not using cluster (1.7 to 4.9). Following this step as an exercise, SURVEYFREQ was used with only the weights (no cluster or strata). The design effects were very similar when ignoring the cluster, whether the stratification variable is used or not. Both have design effects that range from 1.7 to 4.9.

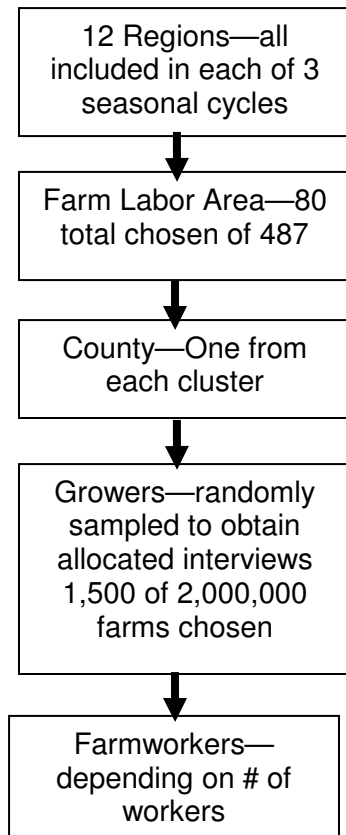
Design effects should be smaller with regression analysis. For example, although farmworkers in each cluster may all be working in one crop, it is unlikely that they would be working in one crop and that they also received health care in the last two years. To explore this, the procedure SURVEYLOGISTIC was used to run logistic regression with the dependent variable “received health care in the last 2 years” and the predictor variables—the main independent variables being considered for the study. Since the SURVEYLOGISTIC procedure does not have the option of obtaining the design effect automatically, it was calculated. This is done by running each logistic regression model in SAS with the SURVEYLOGISTIC procedure twice, once with strata, cluster, and weight and once without strata, cluster, or weight. The ratio of the standard errors (SE with design/SE without design) squared is the design effect for that parameter estimate. See **Table 1.1** for components of the design effect estimate for each independent variable.

Although these design effects are large, all aspects of the sample design (strata, cluster, weight) must be used for data analysis; ignoring any part of the sample design would create inaccurate estimation of the standard errors. Because of the large sample size there should still be enough power to detect differences in the data.

## **Summary**

Agriculture is known to be one of the most dangerous U.S. industries. Health hazards include chemicals, plants, machinery, exposure to the elements, as well as the variability in work practices and exposure conditions of the agricultural workplace settings that make it difficult to control hazards. Farmworkers are often hired to work on manually intensive tasks with little control over their work pace or work practices, potentially causing more sustained contact with plants and with chemicals on plants and awkward working postures for extended periods of time. Aspects of the organization of work may contribute to health disparities between farmworkers and other U.S. workers, including seasonal unstable employment, need to travel to find work, and working through labor intermediaries. In addition, conditions related to work but not explicitly work conditions may also have a negative impact on farmworkers' health. These conditions include low living standard, substandard housing, cultural differences, discrimination, family separation, and rural isolation.

The objective of this dissertation was to describe how employment and lifestyle factors affect the health of hired farmworkers. This objective was achieved by focusing on three outcomes and four domains. The outcomes were utilization of health care, alcohol consumption, and dermatitis. The domains were cultural integration, economic status, social support, and employment characteristics.



**Figure 1.1.** Sampling

**Table 1.1 Design Effect of Various Independent Variables When Predicting “Health Care Use in the Last 2 Years” Using “Proc Surveylogistic” in SAS**

Variable	Dummy Variables	SE* without region, cluster, & weight	SE* with region, cluster, & weight	Ratio	Design Effect (Ratio squared)
<b>Health care</b>					
Age groups		0.013	0.038	2.976	8.858
Crop — 4 categories	Fruits & nuts	0.053	0.172	3.242	10.510
	Horticulture	0.059	0.161	2.744	7.532
	Vegetables	0.059	0.182	3.106	9.645
	Misc/multiple	0.092	0.240	2.607	6.797
Ethnicity		0.059	0.142	2.404	5.780
FLC		0.046	0.122	2.623	6.879
English is not 1st language		0.057	0.105	1.827	3.339
Gender		0.047	0.100	2.134	4.554
Hispanic		0.059	0.142	2.404	5.780
Legal status — 4 categories	Green card	0.054	0.119	2.210	4.884
	Some authorization	0.211	0.253	1.197	1.433
	Undocumented	0.050	0.127	2.540	6.452
Migrant type — 3 categories	Shuttle	0.049	0.134	2.731	7.456
	FTC	0.068	0.173	2.544	6.473
	Newcomer	0.083	0.134	1.626	2.644
Migrant y/n		0.039	0.134	3.419	11.693
Place of birth		0.050	0.122	2.457	6.036
Read English		0.017	0.042	2.444	5.975
Speak English		0.017	0.042	2.441	5.959
Task — 5 categories	Harvest	0.056	0.136	2.430	5.905
	Post-harvest	0.077	0.192	2.515	6.325
	Semi-skilled	0.056	0.173	3.059	9.354
	Supervisor	0.818	1.227	1.500	2.251
	Other	0.054	0.128	2.400	5.760

\*SE=Standard Error



## REFERENCES

1. Abraham NF, Feldman SR, Vallejos Q, Whalley LE, Brooks T, Cabral G, Earp P, Fleischer Jr AB, Quandt SA, Arcury TA. 2007. Contact dermatitis in tobacco farmworkers. *Contact Dermatitis*. 57:40–43.
2. Alaniz ML. 1994. Mexican farmworker women's perspectives on drinking in a migrant community. *Int J Addict*. 29(9):1173–1188.
3. Alderete E, Vega WA, Kolody B, Aguilar-Gaxiola S. 2000. Lifetime prevalence of and risk factors for psychiatric disorders among Mexican migrant farmworkers in California. *Am J Public Health*. 90(4):608–614.
4. Arcury TA, Quandt SA, Austin CK, Preisser J, Cabrera LF. 1999. Impementation of EPA's Worker Protection Standard training for agricultural laborers: an evaluation using North Carolina data. *Public Health Rep*. 114:459–468.
5. Arcury TA, Quandt SA, Cravey AJ, Elmore RC, Russell GB. 2001. Farmworker reports of pesticide safety and sanitation in the work environment. *Am J Ind Med*. 39(5):487–498.
6. Arcury TA, Quandt SA, Elmore RC, Russell GB. 2002. Water safety among Latino farmworkers in North Carolina. *J Agromedicine*. 8(2):77–83.
7. Berk ML, Schur CL, Chavez LR, Frankel M. 2000. Health care use among undocumented Latino immigrants. *Health Aff*. 51–63.
8. Bureau of Primary Health Care. 2006. Health Resources and Services Administration. [www.bphc.hrsa.gov/migrant/default.htm?CFID=3894501&CFTOKEN=29198612](http://www.bphc.hrsa.gov/migrant/default.htm?CFID=3894501&CFTOKEN=29198612). (Accessed June 12, 2006).
9. Burke WA. 1997. Skin diseases in farmers. In Langley RL, McLymore RL, Meggs WJ, Roberson GT, eds. *Safety and Health in Agriculture, Forestry, and Fishing*. Rockville, MD: Government Institutes. 321–352.
10. Cargiulo T. 2007. Understanding the health impact of alcohol dependence. *Am J Health-Syst Pharm*. 64 Supp:S5–S11
11. Carroll D, Samardick RM, Bernard S, Gabbard S, Hernandez MT. 2005. Findings from the National Agricultural Workers Survey (NAWS) 2001–2002: A demographic and employment profile of United States Farm Workers. Washington, DC: U.S. Department of Labor.
12. Cherpitel CJ, Borges G. 2001. A comparison of substance use and injury among Mexican-American emergency room patients in the United States and Mexicans in Mexico. *Alcohol Clin Exp Res*. 25(8):1174–1180.

13. Chi PS and McClain J. 1992. Drinking, farm and camp life: a study of drinking behavior in migrant camps in New York State. *J Rural Health*. 8(1):41–51.
14. Congressional Research Service. 2004. [www.farmworkerlaw.org/resource.2005-05-31.2060068437/file0/at\\_download](http://www.farmworkerlaw.org/resource.2005-05-31.2060068437/file0/at_download). (Accessed July 11, 2006).
15. Deddens JA, Petersen MR. 2008. Approaches for estimating prevalence ratios. *Occup Environ Med*. 2008;65:501–506.
16. Dee TS. 2001. Alcohol abuse and economic conditions: evidence from repeated cross-sections of individual-level data. *Health Econ*. 10:257–270.
17. Early J, Davis SW, Quandt SA, Rao P, Snively BM, Arcury TA. 2006. Housing characteristics of farmworker families in North Carolina. *J ImmigrMinor Health*. 8(2):173–84.
18. Finch BK, Catalano RC, Novaco RW, Vega WA. 2003. Employment frustration and alcohol abuse/dependence among labor migrants in California. *J Immigr Health*. 5(4):181–186.
19. Hogan DJ, Lane P. 1986. Dermatologic disorders in agriculture. *Occup Med*. 1(2):285–300.
20. Holden C. Housing Assistance Council Migrant Health Issues Monograph Series: No. 8. [www.ncfh.org/docs/08%20-%20housing.pdf](http://www.ncfh.org/docs/08%20-%20housing.pdf) (Accessed January 5, 2008).
21. Housing Assistance Council. 2001. *No Refuge from the Fields: Findings from a Survey of Farmworker Housing Conditions in the United States*. Washington, DC: Housing Assistance Council. Available at: <http://www.ruralhome.org/> (Accessed July 10, 2008).
22. Kaufman JD, Cohen MA, Sama SR, Shields JW, Kalat J. 1998. Occupational skin diseases in Washington state, 1989 through 1993: Using Workers' Compensation data to identify cutaneous hazards. *Am J Public Health*. 88:1047–1051.
23. NCFH. 2002. Facts about farmworkers. [www.ncfh.org/docs/fs-Facts%20about%20Farmworkers.pdf](http://www.ncfh.org/docs/fs-Facts%20about%20Farmworkers.pdf) (Accessed July 6, 2006).
24. Neff JA. 1997. Solitary drinking, social isolation, and escape drinking motives as predictors of high quantity drinking, among Anglo, African American and Mexican American males. *Alcohol Alcohol*. 32(1):33–41.
25. NIOSH. 2004. *Worker Health Chartbook*. NIOSH: Cincinnati OH DHHS (NIOSH) Publication No. 2004-146;180–192.
26. O'Malley M. 1997. Skin Reactions to pesticides. *Occup Med*. 12:327–345.

27. Okosun IS, Seale JP, Daniel JB, Eriksen MP. 2005. Poor health is associated with episodic heavy alcohol use: evidence from a national survey. *Public Health*. 119:509–517.
28. Orozco S, Lukas S. 2000. Gender differences in acculturation and aggression as predictors of drug use in minorities. *Drug Alcohol Depend*. 59:165–172.
29. Rehm RS. 2003. Legal, financial, and ethical ambiguities for Mexican American families: Caring for children with chronic conditions. *Qual Health Res*. 13(5):689–702.
30. Runyan JL. 2002. Hired Farmworkers' Earnings increased in 2001 but still trail most occupations. *Rural America*. 17(3):71.
31. San Jose B, van de Mheen H, van Oers JAM, Mackenbach JP, Garretsen HFL. 2000. Adverse working conditions and alcohol use in men and women. *Alcohol Clin Exp Res*. 24(8):1207–1213.
32. SAS Help. 2003. Quoting Lohr (1999) and Kish (1965).
33. Schenker MB, McCurdy SA. 1990. Occupational Health among migrant and seasonal farmworkers: the specific case of dermatitis. *Am J Ind Med*. 18:345–351.
34. Schuman SH, Dobson RL. 1985. An outbreak of contact dermatitis in farm workers. *J Am Acad Dermatol*. 13(2):220–223.
35. Sherman J, Villarejo D, Garcia A, et al. 1997. *Finding invisible farmworkers: the Parlier Survey*. Davis, CA: The California Institute for Rural Studies.
36. Spiewak R Gora A, Dutkiewicz J. 2001. Work-related skin symptoms and type I allergy among eastern-Polish farmers growing hops and other crops. *Ann Agric Environ Med*. 8:51–56.
37. Street RS. 2004. *Beasts of the Field: A Narrative History of California Farmworkers, 1769–1913*. Stanford, CA: Stanford University Press.
38. Treiman KA, Beck KH. 1996. Adolescent gender differences in alcohol problem behaviors and social contexts of drinking. *J Sch Health*. 66(8):299–304.
39. Trotter RT. 1985. Mexican-American experience with alcohol: South Texas examples. *The American experience with alcohol: Contrasting cultural perspectives*. L Bennett and G Ames. New York: Plenum Press. 279–296.
40. USDA Economic Research Service. 1998. *Hired Farm Labor in U.S. Agriculture. Agricultural Outlook*. [www.ers.usda.gov/Publications/Agoutlook/oct1998/ao255f.pdf](http://www.ers.usda.gov/Publications/Agoutlook/oct1998/ao255f.pdf) (Accessed October 21, 2007).

41. U.S. Department of Labor (DOL), Employment and Training Administration. 2005. [www.doleta.gov/agworker/statmethods.cfm](http://www.doleta.gov/agworker/statmethods.cfm). (Accessed October 21, 2007).
42. Villarejo D, Baron S. 1999. The occupational health status of hired farm workers. *Occup Med.* 14(3):613–635.
43. Villarejo D, Lighthall D, Williams D, Souter A, Mines R, Bade B, Samuels S, McCurdy SA. 2000. *Suffering in Silence: A Report on the health of California's agricultural workers*. Davis, CA:California Institute for Rural Studies.
44. Washington State Department of Health. *Migrant Farmworker Housing*. Available at: [www.doh.wa.gov/hsqa/fsl/arcs/mfh/default.htm](http://www.doh.wa.gov/hsqa/fsl/arcs/mfh/default.htm) (Accessed August 1, 2008).
45. Wechsler H. Binge drinking: the five/four measure. 1998. *J Stud Alcohol.* 58:122–123.
46. White-Means SI. 1992. Health characteristics and utilization of public sector health facilities among migrant agricultural workers in Orange County, New York. *J Health Soc Policy.* 4(1):57–75.
47. Wiesner M, Windle M, Freeman A. 2005. Work stress, substance use, and depression among young adult workers: an examination of main and moderator effect models. *J Occup Health Psychol.* 10(2):83–96.
48. Zug KA, Marks JG. 1999. Plants and Woods. In:Adams RM: *Occupational skin disease 3<sup>rd</sup> Edition*. Philadelphia, PA: Saunders. 567–596.

## CHAPTER II

### **Characteristics Associated with Hired Farmworkers' Use of Health Care Services in the U.S.: The National Agricultural Workers Survey, 1999–2004.**

#### **ABSTRACT**

**BACKGROUND:** Hired farmworkers are designated as a vulnerable worker population by the National Institute for Occupational Safety and Health due to the high proportion of workers who are low-paid, seasonal, itinerant, immigrant and non-English speaking.

**METHODS:** Data from the National Agricultural Workers Survey (NAWS) 1999–2004 were analyzed to determine the prevalence of and the employment and cultural characteristics associated with use of U.S. health care in the last 12 months. The NAWS is a workplace-based multi-stage sample, representative of farmworkers employed in the continental U.S. SAS survey procedures that account for multi-stage sampling were used to conduct multiple logistic regression analyses.

**RESULTS:** Workers were mainly Hispanic (87%), and male (78%), with a median age of 30. Approximately 22% worked for farm labor contractors (FLC) and 71% had one employer in the last year. Fewer than half (43%) reported use of any type of U.S. health care services in the last two years. Hispanic farmworkers had 70% lower odds of utilizing health care compared with non-Hispanic farmworkers. Controlling for gender, age, and year interviewed, the odds of receiving health care were lower for those who had no assets (Prevalence Odds Ratio (POR)=0.34) or only one asset (POR=0.66) compared to those with two or more assets; for those who worked for a FLC (POR=0.73) compared to those who worked for a grower. Higher hourly wages predicted higher odds of utilizing U.S. health care. In a model of Hispanic workers only, we added to the model English speaking ability, and immigration status and mobility. Hispanic farmworkers who did not

those who speak English “at all” were half (POR=0.55) as likely to have used U.S. health care, those who spoke some were one-fourth (POR=0.77) as likely to have used U.S. health care compared to those who spoke English “well.” For U.S.-born non-Hispanic farmworkers, only higher wages predicted increased odds of utilizing U.S. health care (POR=1.08) adjusting for age and gender.

**CONCLUSIONS:** Farmworkers are at risk of not receiving health care services due to economic as well as cultural factors. Outreach efforts should focus on those with the lowest incomes as well as seeking out farmworkers who lack English language skills, and those undocumented and mobile.

## INTRODUCTION

Access to health care is a growing cause of concern in the United States with more people falling through the cracks, especially within the most vulnerable populations. There is reason to believe that farmworkers are one of these populations. From demographic and employment records we know that migrant and seasonal farmworkers are predominantly immigrant, Hispanic, male, young, low paid, live in rural areas, non-English speakers and have low educational attainment (Carroll 2005); all characteristics of those less likely to access U.S. health care (NHIS 2005; Smith 2001; Mueller *et al* 1999).

Furthermore, we know that farm work and much of the housing available to farmworkers and their families are not conducive to good health. Some of the risks of farm work include: exposure to chemicals; ergonomic exposures including repetitive lifting, bending and stooping; machinery; respiratory irritants; plant materials, such as poison ivy; and weather-related exposures (sun, cold, dampness) (Villarejo & Baron 1999; Villarejo 2003). Quality of farmworker housing varies widely throughout the country but the few studies that have been done have found overcrowding, inadequate sanitary facilities, non-working appliances (stoves, refrigerators, and/or washing machines), and structural defects. Lack of working showers and washing machines is of note due to potential need for pesticide decontamination (Holden 2001; Early *et al* 2006; Flocks and Burns 2006).

Although the extent of health care's contribution to health is debated, access to primary health care has been associated with higher rated health status, life expectancy, and total mortality (Andrulis 1998; Pollitzer 2001; Lasser *et al* 2006). Some mechanisms through which this may take place are counseling on certain lifestyle choices, treatment of acute conditions before and after they escalate, and management of chronic conditions (CDC Healthy People 2010).

In addition to the well-being of farmworkers themselves, farmworker health care access is important to general public health for at least three reasons. First, farmworker access to care is important to public health when considering the potential impact of an influenza pandemic. In the case of a pandemic, those living outside the radar of the health care infrastructure, including farmworkers, would be less likely to receive disease prevention messages in as timely a manner as those who do have regular health care

providers, would not receive regular vaccines such as a yearly influenza vaccine, and so may be more vulnerable to a potential infectious disease. Since a large proportion of migrant and seasonal farmworkers are mobile, they have the potential to spread infection in rural areas that may not otherwise be affected.

Second, farmworkers' access to health care is important to protect the safety of the food they handle daily that goes directly or indirectly to America's dinner tables. There have been several large food-borne outbreaks related to fruits and vegetables in recent years (CDC 2003, 2004, 2006). Although none so far has been attributed to ill farmworkers, they are a potential source of exposure, especially if field sanitation facilities are poorly maintained or absent.

Third, farmworkers' untreated or undiagnosed health problems that worsen may require more extensive and more expensive treatment than if they were caught at an earlier stage. For low-wage workers without health insurance, these expenses would likely to be absorbed by the public.

This study examined demographic, cultural, economic, and employment characteristics that predict use of health care for U.S. farmworkers. Data from the National Agricultural Workers Survey (NAWS) present a unique opportunity to examine such factors in a nationally representative sample of farmworkers. Because the NAWS uses data collection procedures that are specific to farmworkers, it is able to capture a representative sample of this hard-to-reach population which other surveys would be likely to miss due to lifestyle and political factors.

## **METHODS**

We analyzed data from the U.S. Department of Labor's National Agricultural Workers Survey (NAWS), 1999–2004 to determine characteristics associated with use of health care services in the last two years in the United States (U.S.) by hired farmworkers.

The NAWS is an ongoing national survey conducted by the U.S. Department of Labor (DOL) with the purpose of collecting data on crop farmworkers. It was launched in 1988 in response to the Immigration Reform and Control Act (IRCA) of 1986; the NAWS was commissioned by the DOL to examine shortages of seasonal agricultural services workers while simultaneously observing wages and working conditions. In 1999,



in collaboration with the National Institute for Occupational Safety and Health (NIOSH), an occupational health supplement was added. This dissertation will yield a series of articles that examine these health-related data.

### **Sample Selection**

The NAWS uses a workplace-based multi-stage sample, representative of farmworkers employed in the continental United States. Each year a sample of between 2,500 and 3,600 hired farmworkers is included in the survey. The sample is divided between three seasonal cycles in 12 sampling regions, with the number of interviews per region being proportional to the region's farm labor employment during that quarter. The seasonal level of farm employment is determined by the United States Department of Agriculture's (USDA) Quarterly Agricultural Labor Survey (QALS) and is adjusted to correspond to the three 12-week cycles of the NAWS (October through December, February through April, and June through August).

The sample is selected using probability proportional to size at four different levels of sampling: Farm Labor Area (FLA), county, employer, and farmworker. The primary sampling units for the survey are the 487 FLAs in the continental U.S. The FLAs are groupings of several counties with similar agricultural properties, including farm labor expenses. For FLA, the attribute "size" refers to the amount of farm labor expenses for the district, as assessed by USDA's Census of Agriculture. Counties are then selected using probability proportional to the size of the farm labor expense. Information from the Bureau of Labor Statistics and Agricultural Soil and Conservation Service are aggregated to serve as the initial list of growers in the selected counties. The Department of Labor supplements these sources with information from extension agents, grower organizations, and farmworker service providers. Employers are selected using simple random sampling so as not to influence selection toward larger farms. The number of farmworkers selected from each farm depends on the number of workers employed. For farms with fewer than 25 workers, the maximum number of interviews is five. For farms with 76 or more workers, the maximum number of interviews is 12. Farmworkers are approached at worksites and invited to participate in the survey; for those who agree and are eligible, a time and place are arranged for the interview. Data are de-identified by the contractor

who collects data before they are submitted to the Department of Labor or others. Institutional Review Board (IRB) review at both the National Institute for Occupational Safety and Health and the University of Michigan classified this secondary data analysis as exempt.

The NAWS dataset includes weights for analyzing multiple years of data adjusting for four factors: the differing length of farmworker work day and work week, the region, cycle, and year of data collection. Composite weights are calculated as the product of the week, cycle (season), and region weights, each of which is the inverse probability of being sampled in that period or place. The multi-year weight also adjusts for the relative size of one year of data compared to other years based on USDA's Quarterly Agricultural Labor Survey (U.S. Department of Labor 2005).

### **Study Population**

Workers aged 14 or older performing crop agriculture [all crops included in the North American Industry Classification System code 111] are eligible for the survey. The definition of crop agriculture by the USDA includes field work in the majority of nursery products, cash grains, and field crops, as well as in all fruits and vegetables. Crop agriculture also includes the production of silage and other animal fodder (Mehta *et al* 2000). The eligible NAWS population consists of nearly all farmworkers in crop agriculture, including field packers and supervisors, including those also holding non-farm jobs. Ranch, greenhouse, and nursery workers are included as long as they perform crop work that is included in the definition above. The survey excludes livestock workers, unemployed agricultural workers, secretaries, mechanics, and H2A temporary farmworkers. (The H2A Visa program has been in place since 1943 and revised in 1986, for non-immigrant, alien workers to work on a seasonal or temporary basis to ensure sufficient workers for employers and to protect U.S. jobs and wages (USDA Economic Resource Service 1988).) Farmworkers who have not worked in agriculture at least one day in the 15 days prior to being asked to participate are not eligible for the survey.

Data presented in this analysis are based on face-to-face interviews with 16,678 hired farmworkers completed between October 1, 1998 and September 30, 2004. Farmworkers who had lived in the U.S. for less than two years (n=3,140) were excluded

since they have not had the opportunity to seek U.S. health care for two full years. Non-Hispanic foreign-born farmworkers were also excluded due to their small number (n=142).

Interviews were conducted in the language of the worker's choice—Spanish or English. The interviewers were almost exclusively native Spanish speakers with experience in farm work. The structured interviews lasted approximately 40 minutes and included questions on demographic characteristics of the farmworker respondent; composition and demographic characteristics of the farmworker's household; 12 month-employment and migration profile; income, wages, benefits, and working conditions; housing; assets, social services and immigration status; and access to health care.

To assess use of health care, participants were asked “In the last two years have you used any type of health care services from doctors, nurses, dentists, clinics, or hospitals in the U.S.?” Information was also obtained on ethnic category, age, gender, years of education, and the year of the interview.

Independent variables were assessed in three categories: cultural integration, economic status, and employment factors. *Cultural integration* was measured by the farmworker's reported English-speaking ability (“not at all”/“a little, somewhat”/“well”), the farmworker's need to move for work and by his/her immigration status. Need to move for work and immigration status combines information from two questions. They are asked, “What is your current residence status?” Choices are provided if necessary and include: U.S. citizen by birth; naturalized U.S. citizen; permanent resident; have a border crossing card; a pending status; am undocumented; am a temporary resident; and none of the above. If they are not a U.S. citizen by birth, they are asked follow-up questions about the type of program through which they received their status. A four-category variable was then constructed (citizen by birth/ naturalized citizen/ green card/ and unauthorized). Those reporting border crossing card, visitor status, implausible program, or undocumented are classified as undocumented. Migrant, also referred to as mobile, is based on the work history grid. Workers are categorized as migrant if one farm work job is more than 75 miles from another farm work job or their home so that they need to establish a temporary residence. The combined variable includes two levels for each of the immigration status levels: undocumented mobile and undocumented settled; green

card or other authorization mobile and green card or other authorization settled; and citizen mobile and citizen settled. In order to minimize reporting bias related to the sensitivity of the question, immigration status is the last question asked, after the interviewer has established a rapport with the farmworker and been reassured that responses will be confidential.

*Economic status* was assessed by number of U.S. assets owned (car, house, mobile home, business), and hourly wages. *Employment factors* include whether a farmworker is directly employed by a grower or by a farm labor contractor, number of employers in last 12 months, number of months of farm work performed in the last 12 months, crop category currently working in, and the number of years of farm work done in the U.S. in the farmworker's lifetime. Number of employees working on farm was ascertained from the grower.

### **Statistical Analysis**

Frequencies of each of the variables included in the analysis, as well as the prevalence of U.S. health care use in the last two years, were computed. Prevalence odds ratios (POR) and 95% Wald confidence intervals were computed for each variable using logistic regression models and estimated by the maximum likelihood method. Non-linear trends for age and years of farm work were investigated. Stratified analyses were performed by Hispanic ethnicity (yes/no) in addition to analysis of the full dataset. Multivariable regression models were first constructed separately for integration variables, economic variables, and work variables. Then, a comprehensive model was built including variables having a  $p < 0.05$  in each of the separate models. Analyses were adjusted for year of interview. Variables were also checked for collinearity by including them in a linear model, ensuring that the variance inflation factor (VIF) was less than 10. We also examined cross-tabulations of each of the potential covariates with a chi-square statistic to examine if they were associated. Variables in the final model were assessed for significant interactions.

To account for sample design effects on the analysis, SAS v9.1.3 SURVEY procedures were used that allow for estimation of standard errors and confidence

intervals in the presence of stratification and clustering. All percentages reported are weighted to reflect the prevalence in the population of farmworkers.

## **RESULTS**

### **Univariate Analysis**

Of farmworkers who have lived in the U.S. for two or more years, the majority were Hispanic (84%), male (76%), had less than a 7<sup>th</sup> grade education (52%), and were younger than 35 (54%) (Table 2.1). Approximately one-third of farmworkers reported that they spoke English “not at all” (34%); 40% reported that they were undocumented; 32% had green cards or some other authorization to work; and 28% were U.S. citizens. The majority of workers in each of these groups had not moved within the last year for work. More than one-third of the workers had no major assets (38%) and mean hourly wages were \$7.37.

Approximately one-fifth of workers worked for a farm labor contractor, 71% had only one employer in the last year. Seventeen percent worked on farms with 10 or fewer workers, and 23% worked on large farms with more than 150 workers. The mean number of days worked was 189, or slightly more than half of all days in the year. On average, farmworkers who had been in the U.S. for two or more years had worked for 12.8 years in U.S. farm work.

Table 2.2 shows prevalence of use of health care for all farmworkers interviewed who had spent two or more years in the U.S. by different characteristics. Slightly more than half (51%) of the respondents said they had received health care in the U.S. in the previous two years.

Unadjusted odds ratios are presented in Table 2.3. Analyzing all farmworkers together, those farmworkers of Hispanic ethnicity, male gender, and education abroad all had lower odds of having used health care in the last two years. Those who spoke less English were less likely to report having used health care than those who spoke English more proficiently. Immigration status (undocumented or with a green card or other work authorization) and migrant work patterns were also associated with lower odds of reporting use of health care. The odds of an undocumented and mobile farmworker receiving health care were 90% less than for a farmworker who was a U.S. citizen and

settled. A farmworker with a green card or other work authorization and who moved for work had 75% lower odds of receiving health care compared to a U.S. citizen who did not move for work.

Higher hourly wages and more assets were associated with higher odds of using health services. Workers who were employed by a farm labor contractor, had more than one employer, and worked on farms with more employees had lower odds of receiving health care than workers employed by a grower, who had only one employer, or who worked on farms with fewer employees, respectively. Farmworkers who worked in nursery and floricultural crops had higher odds of reporting use of health care than those who worked in field crops, fruit and nut crops, and vegetable crops.

When stratified by Hispanic ethnicity, similar results were seen for the Hispanic farmworkers, who make up the majority of the population. However, number of employees on the farm, working in field crops or vegetable crops, and having higher wages were not associated with odds of using health services in this subgroup. Also, for Hispanic farmworkers, the odds of receiving health care for farmworkers who are U.S. citizens did not depend on whether they moved for work or not. In contrast, only four of the variables examined were predictive of use of health care in the last two years for U.S.-born non-Hispanic farmworkers: male gender, 12 or more years of school, having no assets compared to having two or more assets, and having higher wages.

Although not collinear they had variance inflation factors less than 10 and were felt to be sufficiently independent that they could be considered for inclusion in the model. Many variables tended to be highly associated, which we confirmed with cross tabulations of the covariates with each other and chi-square statistics. For this reason, some covariates that were significantly associated with the outcome in bivariate analysis no longer were associated in multivariate analysis.

Table 2.4 shows the results of multivariable models for all farmworkers, for Hispanic farmworkers, and for U.S.-born non-Hispanic farmworkers. Higher age and wage, and more assets predicted increased odds of health care use in the adjusted model for all farmworkers. Men had 75% lower odds of health care use than women, Hispanic farmworkers had less than a third the odds of using health care as U.S.-born non-Hispanic farmworkers, and farmworkers employed by farm labor contractors had 25% lower odds

of utilizing health care than those who worked for a grower directly. We observed a significant interaction of age by Hispanic ethnicity (Figure 2.1). For the youngest farmworkers the odds of accessing health care was more than 80% lower for Hispanic farmworkers compared to U.S.-born non-Hispanic farmworkers. Hispanic farmworkers' odds of accessing health care increased, but not substantially, with increasing age. In contrast, young U.S.-born non-Hispanic farmworkers had the highest odds of accessing care but this diminished for older U.S.-born non-Hispanic farmworkers.

For Hispanic farmworkers, integration factors were significantly associated with use of U.S. health care in addition to the economic, demographic, and employment factors retained in the adjusted model for all farmworkers. Hispanic farmworkers who reported no English speaking ability had half the odds of receiving health care compared to those who said they spoke English well. Even after adjusting for English language skills, those who were without documentation and mobile had 50% lower odds of accessing health care than those who had papers to work in the U.S. and were settled, or were U.S. citizens. Only male gender and wage were significant predictors of access to health care in a model of U.S. born, non-Hispanic farmworkers. In this subgroup male farmworkers had one-third the odds of accessing health care compared to female farmworkers. Those with higher wages had higher odds of obtaining health care.

## **DISCUSSION**

This is the first nationally representative occupational health survey that focuses specifically on migrant and seasonal farmworkers. Some of the characteristics of migrant and seasonal farmworkers that may cause them to be missed in national household-based surveys include mobility, non-traditional housing, and fear of authorities due to immigration status. The NAWS methods overcome these barriers through sampling workers in the farm workplace and carefully selecting and training survey staff to be culturally sensitive and unthreatening. Health care access is one measure that reflects the well-being of a population.

Health care utilization is a function of both perceived need for services and ability to access them. As farm work tends to be a strenuous job, the workforce is young and unlikely to be disabled or chronically ill. Nonetheless, we found that the proportion of

farmworkers who reported use of health services in the past two years was quite low (51%). In the U.S., 88% of all 18–44 year olds and 78% of all male Hispanics had seen or talked to a doctor or other health care professional in the last two years (NHIS 2005). These populations are demographically similar to farmworkers but we see a wide disparity in use of health care services for farmworkers compared to this general population.

We found that economic and employment factors were related to use of health care among all farmworkers; and for Hispanic farmworkers, integration factors were also related to use of health care. Both wages and assets independently predicted use of health care for all farmworkers and Hispanic farmworkers, whereas wages but not assets predicted use of health care for U.S.-born non-Hispanic farmworkers. Wages and assets are likely to play a role in perception of ability to pay for services but assets may play a more elemental role in that farmworkers with a car may simply be better able to access a health care facility. Since we found that farmworkers with two or more assets were better able to access health care than those with only one asset, having a car is not the only mechanism at work.

Of the employment factors that we examined, only employment by a farm labor contractor predicted lower odds of utilizing health care. A 2001 report published by the California Rural Legal Assistance Foundation documents several infractions of California law by farm labor contractors. In that study, no data were collected on grower infractions of California law, so it is not clear whether workers employed by FLCs experienced poorer working conditions than those employed directly by growers. It is possible that workers employed by farm labor contractors are more vulnerable due to being an extra step removed from the grower. They may make less money than other farmworkers if the crew boss takes a cut of their wages, or charges for food and transportation. They may have been picked up at day laborer assembling points and not have reliable work; since they do not have a personal relationship with the boss they may be treated worse in general. It is also possible that they are less likely to have personal transportation if they work for a contractor and therefore would be less likely to be able to get to a health care provider. Work schedules may be less predictable so that they would not be able to take time off to go to a clinic or doctor's office.



We found that Hispanic farmworkers had 77% lower odds of receiving health care compared to U.S.-born non-Hispanic farmworkers. Integration factors such as immigration status and mobility and English language ability were associated with use of health care. Farmworkers who were both undocumented and mobile had the lowest odds of utilizing health care compared to settled farmworkers with documentation and U.S. citizens. Language ability was also associated with use of health care. These findings are consistent with previous reports from California (Villarejo 2000) and upper New York (White-Means 1991). We adjusted each of the models for age. For Hispanic farmworkers, higher age predicted higher odds of use of health care. For U.S.-born, non-Hispanic farmworkers, age was borderline significant in predicting health care use which declined among older farmworkers. One explanation could be that only very healthy workers remained in farm work up into older ages. Another possible explanation is that only the farmworkers who have the least skills and earn the least money, and consequently are the least able to pay for health care, remain in farm work instead of moving on to a better paying job elsewhere.

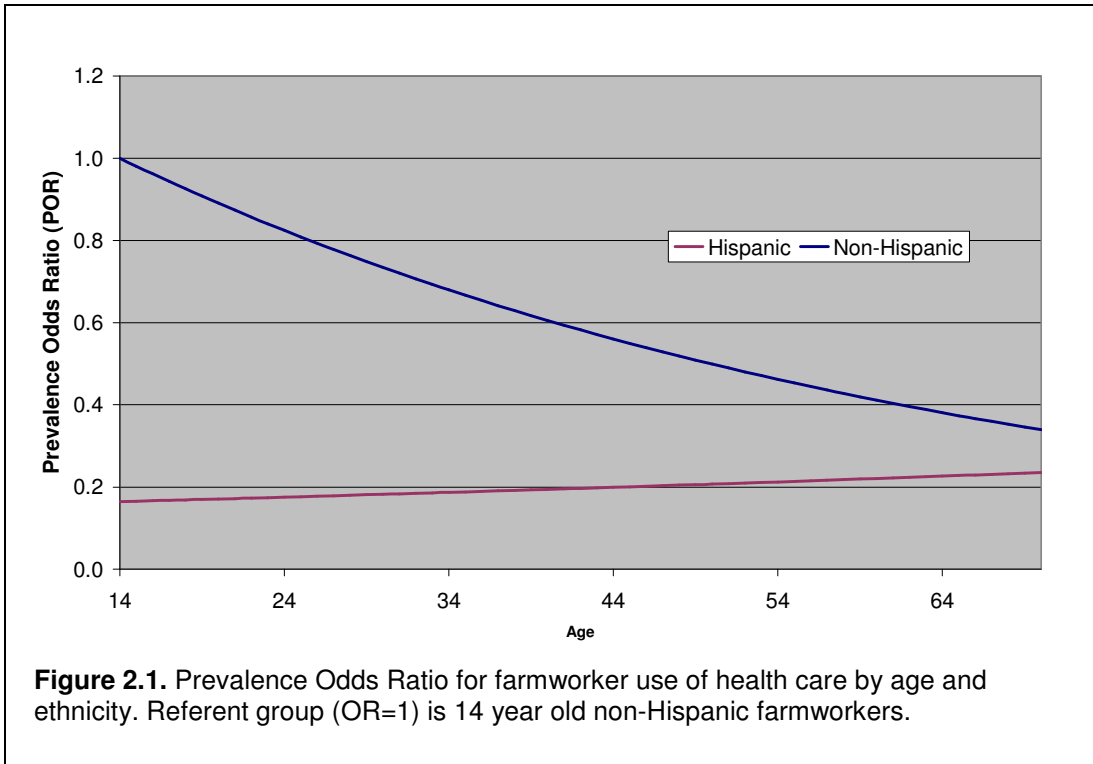
This study has some limitations. We observed an apparent increase in health care use between the periods 1999–2001 and 2002–2004. We queried the Department of Labor and contractor staff to determine if any changes took place in the questionnaire, sampling, or manner of administering the questionnaire but no such changes had taken place. One possible explanation is a shift in the population due to the changing political situation. Over this time period, data showed a shift to more U.S.-born farmworkers, more farmworkers on the farms with the least number of workers, fewer farmworkers in the lowest wage category, and fewer farmworkers with more than one employer (NAWS data not shown).

Although farmworker participation in the survey was high, 78% of those asked, it is more difficult to calculate the participation of the farm operators who give the interviewers access to the farmworkers as is discussed in depth in Department of Labor documentation of the survey on the internet as well as a National Institute for Occupational Safety and Health publication (DOL 2005). It is possible that on farms where farm operators refuse access of survey staff to workers, the workers may have worse working and/or housing conditions and may have more need for health care

services, although it is unclear if they would be able to access services. In order to be eligible for the survey, farmworkers had to have worked in farm work in the last 15 days, likely requiring a certain degree of health. Those who were ill or injured and could not work, possibly due to work-related factors, would not be included in the sample. The NAWS is representative only of all working farmworkers, and not of recently or currently ill individuals, which may introduce some bias. Nonetheless, a major strength of this analysis is that the NAWS is a large national probability sample of a hard-to-reach population. Care is taken to ensure the confidence of the farmworker; this is evident in the high percentage who are classified as undocumented when asked about immigration status. The survey sample was designed to specifically capture the experience of this population which varies by season and by geographic location.

Additionally, because the question on use of health care uses the time frame of the “last two years” we found it necessary to limit our analysis to farmworkers who were in the U.S. for at least two years. This could exclude from the analysis those workers who are in the most vulnerable circumstances and may feel even more intimidated at the prospect of seeking care for any health problem that may arise.

In conclusion, farmworker utilization of health care is low, even compared to other marginalized populations in the U.S., and suggests there may be an unmet need for health care in this population. We found that economic resources and integration into U.S. society play a part in this deficit. Language is either a perceived barrier or an actual barrier to farmworkers accessing health care. Immigration status has become an even more prominent issue since these interviews took place. The only workplace factor that was associated with access to health care after controlling for other variables was working for a farm labor contractor. Outreach should focus on those workers least served by currently available services, including Hispanic farmworkers, farmworkers earning the lowest wages and those without assets, undocumented and mobile farmworkers, farmworkers without English language skills, and farmworkers employed by farm labor contractors.



**Table 2.1. Distribution of Sample Characteristics of Farmworkers Who Have Lived in the U.S. for at Least 2 Years, National Agricultural Workers Survey 1999–2004**

Characteristics		N	% (weighted)
U.S. health care in last 2 years	Yes	8375	51.2%
	No	8303	48.8%
<b>DEMOGRAPHIC CHARACTERISTICS</b>			
Hispanic	No	2746	16.3%
	Yes	13,932	83.7%
Gender	Male	13,419	76.1%
	Female	3,259	23.9%
Age (mean=34.9)	<25	3,552	23.7%
	25–34	5,117	30.5%
	35–44	4,134	24.7%
	45+	3,875	21.1%
Highest grade & location	<7th grade	9,066	51.6%
	7–11th grade (Abroad)	2,881	17.7%
	12+ grade (Abroad)	678	4.2%
	7–11th grade (U.S.)	1,653	11.4%
	12+ grade (U.S.)	2,333	15.1%
<b>TIME VARIABLE</b>			
Year of interview	1999–2001	8,093	49.4%
	2002–2004	8,585	50.6%
<b>INTEGRATION FACTORS</b>			
English speaking ability	Well	3,945	25.8%
	Somewhat / a little	6,817	40.0%
	Not at all	5,785	34.2%
Immigration & mobility status	Undocumented / Mobile	2,459	15.5%
	Undocumented / Settled	4,597	24.5%
	Green card & other / Mobile	1,579	11.9%
	Green card & other / Settled	3,399	19.7%
	Citizen / Mobile	541	4.1%
	Citizen / Settled	3,887	24.2%
<b>ECONOMIC FACTORS</b>			
# U.S. Assets	No assets	6,054	37.8%
	1 asset	7,128	41.1%
	2+ assets	3,491	21.1%
Hourly wage (mean=\$7.37)	<\$5.26	1,216	9.0%
	\$5.26–\$6.74	5,600	35.4%
	\$6.75–\$7.74	4,534	26.6%
	\$7.75–\$9.55	3,038	17.1%
	>\$9.55	1,934	11.9%

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**Table 2.1. Distribution of Sample Characteristics of Farmworkers Who Have Lived in the U.S. for at Least 2 Years, National Agricultural Workers Survey 1999–2004 (continued)**

Characteristics		N	% (weighted)
<b>WORK FACTORS</b>			
<b>Employer</b>	Grower	13,907	80.6%
	Farm Labor Contractor	2,768	19.4%
<b>Number of employers</b>	1 Employer	11,740	71.0%
	2+ Employers	4,938	29.0%
<b># Employees (mean=142.2)</b>	1–10	5,155	16.5%
	11–50	7,479	39.5%
	51–150	2,412	21.0%
	151+	1,598	23.1%
<b>Days worked in FW in last year (mean=189.4)</b>	<31 days	474	7.0%
	31–90 days	1,044	13.2%
	91–270 days	10,278	58.3%
	271–366 days	4,777	21.5%
<b>Crop at time of interview</b>	Field crops	2,961	17.7%
	Fruit and Nut crops	5,921	32.6%
	Nursery & Floriculture	3,567	18.7%
	Vegetables	3,345	26.1%
	Miscellaneous	884	4.9%
<b>Years of farm work (mean=12.8)</b>	<1 year	389	4.4%
	1 year	423	3.3%
	2–5 years	4,121	24.7%
	6–15 years	5,699	34.7%
	16–25 years	3,563	19.9%
	26+ years	2,435	13.0%

**Table 2.2. Prevalence of Farmworker Use of U.S. Health Care in the Last 2 Years, NAWS 1999–2004**

		% (weighted)
<b>DEMOGRAPHIC CHARACTERISTICS</b>		
<b>All farmworkers</b>		51.2%
<b>Hispanic</b>	No	79.6%
	Yes	45.7%
<b>Gender</b>	Male	43.3%
	Female	76.4%
<b>Age</b>	<25	48.9%
	25–34	47.3%
	35–44	51.6%
	45+	59.0%
<b>Highest grade &amp; location</b>	<7th grade	42.8%
	7–11th grade (Abroad)	45.3%
	12+ grade (Abroad)	45.8%
	7–11th grade (U.S.)	66.5%
	12+ grade (U.S.)	76.9%
<b>TIME VARIABLE</b>		
<b>Year of interview</b>	1999–2001	44.1%
	2002–2004	58.1%
<b>INTEGRATION FACTORS</b>		
<b>English speaking ability</b>	Well	73.4%
	Somewhat / a little	49.3%
	Not at all	36.4%
<b>Immigration &amp; mobility status</b>	Undocumented / Mobile	23.7%
	Undocumented / Settled	41.8%
	Green card & other / Mobile	42.4%
	Green card & other / Settled	58.3%
	Citizen / Mobile	64.8%
	Citizen / Settled	74.4%
<b>ECONOMIC FACTORS</b>		
<b># U.S. Assets</b>	No assets	34.6%
	1 asset	55.8%
	2+ assets	72.0%
<b>Hourly wage</b>	<\$5.26	43.3%
	\$5.26–\$6.74	46.5%
	\$6.75–\$7.74	53.5%
	\$7.75–\$9.55	55.8%
	>\$9.55	61.0%

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**Table 2.2. Prevalence of Farmworker Use of U.S. Health Care in the Last 2 Years, NAWS 1999–2004 (continued)**

		% (weighted)
<b>WORK FACTORS</b>		
<b>Employer</b>	Grower	53.9%
	Farm Labor Contractor	40.0%
<b>Number of employers</b>	1 Employer	55.9%
	2+ Employers	39.7%
<b># Employees</b>	1–10	62.9%
	11–50	51.5%
	51–150	43.2%
	151+	49.6%
<b>Days worked in FW in last year</b>	<31 days	52.9%
	31–90 days	56.2%
	91–270 days	49.6%
	271–366 days	51.3%
<b>Crop at time of interview</b>	Field crops	52.7%
	Fruit and Nut crops	44.0%
	Nursery & Floriculture	63.2%
	Vegetables	49.5%
	Miscellaneous	56.6%
<b>Years of farm work</b>	<1 year	66.8%
	1 year	64.7%
	2–5 years	43.9%
	6–15 years	47.8%
	16–25 years	52.0%
	26+ years	64.3%

**Table 2.3. Unadjusted Prevalence Odds Ratios and 95% Confidence Intervals for Use of U.S. Health Care in the Last 2 Years for All (N=16,314), Hispanic (N=13,448) and U.S.-Born Non-Hispanic (N=2,707) Farmworkers, NAWs 1999–2004**

U.S. health care in last 2 years Variable Categories	All POR (95% CI)	Hispanic POR (95% CI)	U.S.-born Non- Hispanic POR (95% CI)
<b>DEMOGRAPHIC CHARACTERISTICS</b>			
<b>Hispanic</b>			
No	1.000		
Yes	<b>0.228 (0.181, 0.289)</b>		
<b>Gender</b>			
Male	<b>0.236 (0.193, 0.289)</b>	<b>0.218 (0.174, 0.273)</b>	<b>0.360 (0.238, 0.545)</b>
Female	1.000	1.000	1.000
<b>Age (continuous)</b>	<b>1.012 (1.007, 1.017)</b>	<b>1.012 (1.006, 1.017)</b>	0.996 (0.985, 1.006)
<b>Highest grade &amp; location</b>			
<7th grade	1.000	1.000	n/a
7–11th grade (Abroad)	1.118 (0.919, 1.361)	1.117 (0.917, 1.360)	n/a
12+ grade (Abroad)	1.166 (0.849, 1.603)	1.087 (0.777, 1.521)	n/a
7–11th grade (U.S.)	<b>2.653 (2.167, 3.249)</b>	<b>2.049 (1.550, 2.710)</b>	n/a
12+ grade (U.S.)	<b>4.474 (3.605, 5.552)</b>	<b>2.412 (1.653, 3.518)</b>	n/a
<b>Highest grade (non-Hispanic)</b>			
<12 grade	n/a	n/a	1.000
12+ grade	n/a	n/a	<b>1.642 (1.089, 2.474)</b>
<b>TIME VARIABLE</b>			
<b>Year of interview</b>			
1999–2001	<b>0.567 (0.485, 0.662)</b>	<b>0.626 (0.535, 0.732)</b>	<b>0.589 (0.939, 0.882)</b>
2002–2004	1.000	1.000	1.000
<b>INTEGRATION FACTORS</b>			
<b>English speaking ability</b>			
Well	1.000	1.000	
Somewhat/a little	<b>0.354 (0.293, 0.427)</b>	<b>0.573 (0.464, 0.707)</b>	n/a
Not at all	<b>0.210 (0.173, 0.254)</b>	<b>0.339 (0.258, 0.445)</b>	n/a
<b>Immigration status &amp; Mobility</b>			
Undocumented / Mobile	<b>0.108 (0.083, 0.140)</b>	<b>0.170 (0.117, 0.247)</b>	n/a
Undocumented / Settled	<b>0.247 (0.200, 0.306)</b>	<b>0.393 (0.290, 0.534)</b>	n/a
Green card or other / Mobile	<b>0.254 (0.188, 0.343)</b>	<b>0.403 (0.267, 0.610)</b>	n/a
Green card or other / Settled	<b>0.479 (0.361, 0.637)</b>	0.764 (0.577, 1.011)	n/a
Citizen / Mobile	<b>0.634 (0.490, 0.821)</b>	0.892 (0.632, 1.258)	0.826 (0.410, 1.662)
Citizen / Settled	1.000	1.000	1.000
<b>ECONOMIC FACTORS</b>			
<b># U.S. Assets</b>			
No assets	<b>0.206 (0.157, 0.270)</b>	<b>0.232 (0.167, 0.322)</b>	<b>0.517 (0.303, 0.882)</b>
1 asset	<b>0.492 (0.399, 0.606)</b>	<b>0.523 (0.411, 0.666)</b>	0.764 (0.471, 1.239)
2+ assets	1.000	1.000	1.000
<b>Hourly wage (continuous)</b>	<b>1.087 (1.050, 1.126)</b>	<b>1.056 (1.018, 1.096)</b>	<b>1.078 (1.014, 1.146)</b>

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**Table 2.3. Unadjusted Prevalence Odds Ratios and 95% Confidence Intervals for Use of U.S. Health Care in the Last 2 Years for All (N=16,314), Hispanic (N=13,448) and U.S.-Born Non-Hispanic (N=2,707) Farmworkers, NAWs 1999–2004 (continued)**

U.S. health care in last 2 years			
Variable Categories	All POR (95% CI)	Hispanic POR (95% CI)	U.S.-born Non- Hispanic POR (95% CI)
<b>WORK FACTORS</b>			
<b>Employer</b>			
Grower	1.000	1.000	1.000
Farm Labor Contractor	<b>0.560 (0.406, 0.683)</b>	<b>0.729 (0.599, 0.887)</b>	0.400 (0.140, 1.138)
<b>Number of employers</b>			
1 Employer	1.000	1.000	1.000
2+ Employers	<b>0.519 (0.432, 0.624)</b>	<b>0.651 (0.537, 0.789)</b>	0.647 (0.379, 1.104)
<b># Employees on farm</b>			
1–10	<b>1.591 (1.342, 1.886)</b>	1.276 (0.987, 1.650)	1.228 (0.802, 1.880)
11–50	1.000	1.000	1.000
51–150	<b>0.719 (0.579, 0.893)</b>	0.873 (0.710, 1.072)	1.126 (0.415, 3.053)
151+	0.915 (0.710, 1.178)	1.223 (0.963, 1.553)	0.399 (0.101, 1.565)
<b># days worked in FW in last year</b>			
<31 days	1.106 (0.745, 1.642)	0.899 (0.604, 1.339)	1.361 (0.637, 2.905)
31–90 days	<b>1.297 (1.010, 1.666)</b>	1.180 (0.867, 1.608)	1.163 (0.629, 2.149)
91–270 days	1.000	1.000	1.000
271–366 days	1.064 (0.939, 1.206)	1.032 (0.896, 1.188)	0.811 (0.563, 1.170)
<b>Crop at time of interview</b>			
Field crops	<b>0.644 (0.486, 0.853)</b>	0.723 (0.502, 1.043)	<b>0.443 (0.278, 0.706)</b>
Fruit and Nut crops	<b>0.450 (0.333, 0.609)</b>	<b>0.722 (0.542, 0.962)</b>	0.520 (0.177, 1.527)
Nursery & Floriculture	1.000	1.000	1.000
Vegetables	<b>0.567 (0.423, 0.759)</b>	0.870 (0.655, 1.156)	<b>0.513 (0.272, 0.965)</b>
Miscellaneous	0.751 (0.498, 1.134)	0.849 (0.643, 1.121)	0.546 (0.206, 1.447)
<b># years of farm work</b>			
<1	<b>2.199 (1.511, 3.201)</b>	1.502 (0.987, 2.287)	1.517 (0.618, 3.725)
1	<b>2.001 (1.513, 2.647)</b>	<b>1.676 (1.075, 2.613)</b>	<b>2.402 (1.075, 5.366)</b>
2–5	1.000	1.000	1.000
6–15	0.855 (0.712, 1.027)	1.192 (0.976, 1.456)	0.874 (0.528, 1.448)
16–25	<b>1.185 (1.004, 1.398)</b>	<b>1.441 (1.125, 1.845)</b>	0.629 (0.374, 1.056)
25+	<b>1.970 (1.618, 2.399)</b>	<b>2.128 (1.728, 2.621)</b>	0.746 (0.479, 1.164)

**Table 2.4. Adjusted Prevalence Odds Ratios (95% Confidence Intervals)\*  
for All, Hispanic, and U.S.-Born Non-Hispanic Farmworker Utilization of  
Health Care in the U.S., NAWS<sup>1</sup> 1999–2004**

	All	Hispanic	U.S.-born non-Hispanic
	POR (95% CI) <sup>2</sup>	POR (95% CI) <sup>2</sup>	POR (95% CI) <sup>2</sup>
Ethnicity			
Hispanic	0.291 (0.232, 0.365)		
Non-Hispanic	1.000		
Sex		0.239 (0.198, 0.288)	0.341 (0.222, 0.522)
Male	0.241 (0.200, 0.290)		
Female	1.000		
Age (continuous)	1.002 (0.996, 1.007)	1.007 (1.001, 1.013)	0.989 (0.979, 1.000)
Wage (continuous)	1.047 (1.025, 1.070)	1.038 (1.018, 1.059)	1.080 (1.024, 1.139)
# U.S. Assets			
No assets	0.343 (0.257, 0.457)	0.470 (0.338, 0.655)	
1 asset	0.655 (0.526, 0.815)	0.749 (0.590, 0.949)	
2+ assets	1.000	1.000	
Employer		0.755 (0.636, 0.896)	
Farm labor contractor	0.732 (0.623, 0.861)		
Grower	1.000		
English speaking ability			
Well		1.000	
Some		0.767 (0.594, 0.990)	
None		0.547 (0.408, 0.732)	
Immigration status and mobility			
Undocumented/Mobile		0.457 (0.349, 0.600)	
Undocumented/Settled		0.690 (0.558, 0.853)	
Green card & other/Mobile		0.623 (0.467, 0.830)	
Green card & other/Settled;			
Citizen/ Mobile & Settled		1.000	

\*Survey weighted.

<sup>1</sup>NAWS=National Agricultural Workers Survey.

<sup>2</sup>POR=Prevalence odds ratios were adjusted for year of interview and all variables presented in each column of the table.

## REFERENCES

1. Andrulis DP. 1998. Access to care is the centerpiece in the elimination of socioeconomic disparities in health. *Ann Intern Med.* 129(5):412–416.
2. Carroll D, Samardick RM, Bernard S, Gabbard S, Hernandez MT. 2005. Findings from the National Agricultural Workers Survey (NAWS) 2001–2002: A demographic and employment profile of United States Farm Workers. Washington, DC: U.S. Department of Labor.
3. CDC. Healthy People 2010. [www.healthypeople.gov/data/midcourse/html/focusareas/FA01Objectives.htm](http://www.healthypeople.gov/data/midcourse/html/focusareas/FA01Objectives.htm) (Accessed January 5, 2008).
4. CDC. 2003. Hepatitis A outbreak associated with green onions at a restaurant—Monaca, Pennsylvania, 2003. *MMWR.* 52(47):1155–1157.
5. CDC. 2004. Outbreak of cyclosporiasis associated with snow peas—Pennsylvania, 2004. *MMWR.* 53(37):876–878.
6. CDC. 2006. Ongoing multistate outbreak of *Escherichia coli* serotype O157:H7 infections associated with consumption of fresh spinach—United States, September 2006. *MMWR.* 55(38):1045–1046.
7. Early J, Davis SW, Quandt SA, Rao P, Snively BM, Arcury TA. 2006. Housing characteristics of farmworker families in North Carolina. *J Immigr Minor Health.* 8(2):173–84.
8. Flocks JD, Burns AF. 2006. Stakeholder analysis of Florida farmworker housing. *J Agromedicine.* 11(1):59–67.
9. Housing Assistance Council. 2001. *No Refuge from the Fields: Findings from a Survey of Farmworker Housing Conditions in the United States.* Washington, DC: Housing Assistance Council. Available at: <http://www.ruralhome.org/> (Accessed July 10, 2008).
10. Lasser KE, Himmelstein DU, Woolhandler S. 2006. Access to care, health status, and health disparities in the United States and Canada: results of a cross-national population-based survey. *Am J Public Health.* 96(7):1300–1307.
11. Mehta K, Gabbard SM., Barrat V, Lewis M, Carroll D, Mines R. 2000. *Findings from the National Agricultural Workers Survey (NAWS) 1997–1998: a demographic and employment profile of United States farmworkers (Research Report No. 8).* Washington, DC: U.S. Department of Labor. Available at: [www.doleta.gov/agworker/naws.cfm](http://www.doleta.gov/agworker/naws.cfm).

12. Mueller KJ, Ortega ST, Parker K, Patil K, Askenazi A. 1999. Health status and access to care among rural minorities. *J Health Care Poor Underserved*. 10(2):230.
13. Politzer RM, Yoon J, Shi L, Hughes RG, Regan J, Gaston MH. 2001. Inequality in America: the contribution of health centers in reducing and eliminating disparities in access to care. *Med Care Res Rev*. 58:234–248.
14. Smith LS. 2001. Health of America's newcomers. *J Community Health Nurs*. 18(1):53–68.
15. USDA Economic Research Service. 1998. *Hired Farm Labor in U.S. Agriculture. Agricultural Outlook*. [www.ers.usda.gov/Publications/Agoutlook/oct1998/ao255f.pdf](http://www.ers.usda.gov/Publications/Agoutlook/oct1998/ao255f.pdf) (Accessed October 21, 2007).
16. U.S. Department of Labor (DOL), Employment and Training Administration. 2005. [www.doleta.gov/agworker/statmethods.cfm](http://www.doleta.gov/agworker/statmethods.cfm). (Accessed October 21, 2007).
17. Villarejo D, Baron S. 1999. The occupational health status of hired farm workers. *Occup Med*. 14(3):613–635.
18. Villarejo D, Lighthall D, Williams D, Souter A, Mines R, Bade B, Samuels S, McCurdy SA. 2000. *Suffering in Silence: A Report on the Health of California's Agricultural Workers*. Davis, CA:California Institute for Rural Studies.
19. Villarejo D. 2003. The health of U.S. hired farm workers. *Annu Rev Public Health*. 24:175–93.
20. White-Means SI. 1992. Health characteristics and utilization of public sector health facilities among migrant agricultural workers in Orange County, New York. *J Health Soc Policy*. 4(1):57–75.

## CHAPTER III

### **Alcohol Use Among U.S. Hired Farmworkers: the National Agricultural Workers Survey 1999–2001**

#### **ABSTRACT**

**BACKGROUND:** Alcohol use has been cited as a problem among migrant and seasonal farmworkers although the scientific literature is sparse, regional, and includes no studies using representative samples.

**METHODS:** Data from the National Agricultural Workers Survey (NAWS) 1999–2001 were analyzed to determine the prevalence of and the employment and cultural characteristics associated with drinking/binge drinking in the last month. The NAWS is a workplace-based multi-stage sample, representative of farmworkers employed in the continental U.S. SAS survey procedures that account for multi-stage sampling were used to conduct multiple logistic regression analyses.

**RESULTS:** Workers were mainly Hispanic (91%), and male (80%), with a median age of 29. Men were significantly more likely to drink than women and were analyzed separately. Hispanic and non-Hispanic male farmworkers' drinking habits were remarkably similar (58.6% versus 57.3% reported drinking, and 22.6% and 22.4% reported binge drinking, respectively). In contrast, Hispanic female farmworkers were significantly less likely to drink alcohol / binge drink than non-Hispanic female farmworkers (10.9% versus 35.2% for drinking, and 3.0% versus 13.0% for binge drinking, respectively). For all males and for Hispanic males the odds of drinking for someone earning less than \$5.26/hour were lower, while the odds of binge drinking for someone making more than \$9.55 were elevated compared to those with an hourly wage

of \$5.26–\$7.74. Controlling for age, other factors associated with binge drinking for men included working on farms with fewer than 150 employees, and working directly for growers. For male Hispanic farmworkers, intermediate English speaking ability was associated with binge drinking compared with those who spoke English well and those who did not speak English at all. Female Hispanic farmworkers with fewer than seven years or 12 or more years abroad, or seven or more years of U.S. education had higher odds of drinking while those who were undocumented and settled had one-third lower odds controlling for age and years of farm work.

**CONCLUSIONS:** Although binge drinking prevalence was similar to national estimates of binge drinking, it was quite high, with one in five farmworker men so classified. Resources for those with a problem should be offered taking culture, economic circumstances, and geographic isolation into consideration.

## INTRODUCTION

Alcohol use has been cited as a problem among migrant and seasonal farmworkers although the scientific literature is sparse, regional, and includes no study based on a representative sample (Chi and McClain 1992; Trotter 1985; Alaniz 1994). Excess alcohol use can have both short-term and long-term health consequences. Motor vehicle accidents, alcohol poisoning, risky sexual behaviors, work-related injuries, and drowning are potential short-term risks. Arcury *et al* (2002) reported a high prevalence of farmworkers drinking alcohol while participating in recreational water activities such as swimming, boating and fishing. They also noted that over one-third of these farmworkers did not know how to swim. Long-term consequences of excessive alcohol consumption include liver damage, hypertension, coronary heart disease, ischemic stroke, alcohol-related brain damage, cancer, psychiatric conditions, and general poor health (Cargiulo 2007; Okosun *et al* 2005).

It is thought that acculturation to U.S. culture comes with increased risk of substance abuse (Orozco and Lucas 2000). A study of acculturation and emergency room (ER) visits of Mexican-Americans in Santa Clara, California U.S. and Mexicans in Pachuca, Hidalgo Mexico found that in the U.S. sample, acculturation was positively associated with drinking and drug use before the event that brought them to the ER, heavy drinking, drug use, and adverse consequences related to drinking in the past year. They defined acculturation using a six-item scale developed to measure their “degree of adaptation to U.S. culture.” Items in the scale include English versus Spanish speaking and reading, and the language of media they patronized. Those scoring lower on the acculturation scale were more similar to the Mexican study participants on substance use variables (Cherpitel and Borges 2001).

Environmental factors that have been hypothesized to be related to alcohol use that may be relevant for farmworkers include employment frustration (Finch *et al* 2003), stress including economic stress (Dee 2001), social isolation and social context (Neff 1997; Treiman and Beck 1996), acculturation (Cherpitel and Borges 2001), and adverse working conditions (San Jose *et al*, 2000; Wiesner *et al*, 2005). Alderete *et al* (2000) studied psychiatric disorders including alcohol abuse and dependence among Mexican migrant farmworkers in California. They found a lifetime prevalence of alcohol

dependence of 8.9% for men and 1.0% for women. Male gender, young age, low education, and U.S. residence (compared to Mexican) were significantly associated with alcohol dependence.

This study assessed the prevalence of drinking and binge drinking in a representative sample of U.S. hired farmworkers and examined employment, economic, social support and cultural integration factors potentially associated with drinking and excess drinking in this population.

## **METHODS**

We analyzed data from the U.S. Department of Labor's National Agricultural Workers Survey (NAWS), 1999–2001 to determine occupational and socioeconomic characteristics associated with alcohol use by hired farmworkers. The NAWS is an ongoing nationally representative survey of hired crop farmworkers conducted by the U.S. Department of Labor (DOL) since 1988 with the purpose of collecting data on wages, living and working conditions. In 1999, in collaboration with the National Institute for Occupational Safety and Health (NIOSH), an occupational health supplement was added.

### **Sample Selection**

The NAWS uses a workplace-based multi-stage sample, representative of farmworkers employed in the continental United States. Each year a sample of between 2500 and 3600 hired farmworkers is included in the survey. The sample is divided between 12 sampling regions, with the number of interviews per region being proportional to the region's farm labor employment during that quarter. The seasonal level of farm employment is determined by the United States Department of Agriculture's (USDA) Quarterly Agricultural Labor Survey (QALS) (U.S. Department of Labor 2005) and the NAWS sample is adjusted to correspond to the three 12-week cycles of the NAWS (October through December, February through April, and June through August). The NAWS dataset includes weights for analyzing multiple years of data adjusting for four factors: the differing length of farmworker work day and work week, the region, the cycle, and the year of data collection. The multi-year weight also adjusts



for the relative sample size of a given year of data compared to other years, based on USDA's QALS (Department of Labor, 2005). A more detailed explanation of the sample can be found on the Department of Labor's web site (Department of Labor, 2005).

Data are de-identified by the contractor who collects data before they are submitted to the Department of Labor or other interested parties. Institutional Review Board (IRB) review at both the National Institute for Occupational Safety and Health and the University of Michigan classified this secondary data analysis as exempt.

### **Study Population**

Workers aged 14 or older performing crop agriculture [all crops included in the North American Industry Classification System code 111] were eligible for the survey. The USDA definition of crop agriculture includes field work in the majority of nursery products, cash grains, and field crops, as well as all fruits and vegetables. Crop agriculture also includes the production of silage and other animal fodder (Mehta et al. 2000). The eligible NAWS population consists of nearly all farmworkers in crop agriculture, including field packers and supervisors, including those also holding non-farm jobs in addition to their farm work job. Ranch, greenhouse, and nursery workers are included as long as they perform crop work included in the definition above. The survey excludes livestock workers, unemployed agricultural workers, secretaries, mechanics, and H2A temporary farmworkers. (The H2A Visa program has been in place since 1943 and revised in 1986, for non-immigrant, alien workers to work on a seasonal or temporary basis (USDA 1988).) Farmworkers who have not worked in agriculture at least one day in the 15 days prior to being asked to participate are not eligible for the survey.

Data presented in this analysis are based on face-to-face interviews with 9,906 hired farmworkers completed between October 1, 1998 and September 30, 2001. Interviews were conducted in the language of the worker's choice—Spanish or English. The interviewers were almost exclusively native Spanish speakers with experience in farm work. The structured interviews lasted approximately 40 minutes and included questions on demographic characteristics of the farmworker respondent; composition and demographic characteristics of the farmworker's household; 12-month employment and

migration profile; income, wages, benefits, and working conditions; housing; assets, social services and immigration status and alcohol use.

To assess alcohol use, participants were first given a definition of what was considered alcohol and occasions when it might be consumed, “These next few questions are about the use of beer, wine, wine coolers, cocktails, or liquor, such as tequila, vodka, gin, rum, or whiskey—all kinds of alcoholic beverages people drink at meals, special occasions, or when just relaxing.” They were then asked, “In the last month, how many days did you drink any alcoholic beverages, on average?” Next, they were instructed that “A drink is one can or bottle of beer, one glass of wine, one can or bottle of wine cooler, one cocktail or one shot of liquor.” And asked, “On the days when you drank, about how many drinks did you drink on average?” Men who answered five or more drinks, and women who answered four or more drinks, were considered binge drinkers. This is the definition that is used by the National Institute on Alcohol Abuse and Alcoholism (NIAAA) and is “the amount of drinking associated with increased risk of developing alcohol dependence and abuse”(Cargiulo 2007). The four-versus five-drink definition has been used in studies of binge drinking on college campuses to account for differences in proportion and metabolism of men and women (Wechsler 1998).

Potential risks were assessed in five domains: cultural integration, economic status, social support, employment, and demographic factors. Although a formal scale to measure acculturation was not available in the questionnaire, a few questions in the core NAWS approximated a measurement; we called this domain cultural integration. *Cultural Integration* was measured by the farmworker’s reported English-speaking ability (“not at all” / “a little, somewhat” / “well”), and the farmworker’s need to move for work and immigration status. Need to move for work and immigration status combines information from two questions. They are asked, “What is your current residence status?” Choices are provided if necessary and include: U.S. citizen by birth; naturalized U.S. citizen; permanent resident; have a border crossing card; pending status; undocumented; temporary resident; and none of the above. If they are not a U.S. citizen by birth, they are asked follow-up questions about the type of program through which they achieved their status. For this analysis we constructed a three-category variable (citizen / green card or other authorization / and unauthorized). Those reporting border

crossing card, visitor status, implausible program, or undocumented are classified as undocumented. Migrant, also referred to as mobile, is based on the 12-month work history grid. Workers are categorized as migrant if one farm work job is more than 75 miles from another farm work job or from their home so that they need to establish a temporary residence. We created a combined variable that included two mobility levels for each of the immigration status levels: undocumented mobile and undocumented settled; green card or other authorization mobile and green card or other authorization settled; and citizen mobile and citizen settled. In order to minimize reporting bias related to the sensitivity of the question, immigration status was asked last, after the interviewer had established a rapport with the farmworker who was also reassured that their responses would be confidential.

*Economic factors* were assessed by the number of U.S. assets owned (car, house, mobile home, business), and hourly wages. *Social support factors* included marital status and whether a nuclear family member was currently residing in the household, as determined by a family grid where all members of the household were enumerated. *Employment factors* included whether a farmworker was directly employed by a grower or by a farm labor contractor, number of employers in last 12 months, number of months of farm work performed in the last 12 months, crop category currently working in, and the number of years of farm work done in the U.S. in the farmworker's lifetime. The number of employees working on a farm was ascertained from the grower. Information was also obtained on Hispanic ethnicity, age, gender, years of education, and the year of the interview.

### **Statistical Analysis**

Frequencies of each of the variables included in the analysis, as well as the prevalence of drinking and binge drinking were computed. We examined cross-tabulations of each pair of potential covariates with a chi-square statistic to examine collinearity. Weighted mean, median, interquartile range, and range were computed for number of drinks and number of days when farmworkers reported they drank in the last month. Prevalence odds ratios (POR) and 95% Wald confidence intervals were computed using logistic regression models and estimated by the maximum likelihood method. Stratified analyses were

performed by gender and ethnicity. Multivariable regression models were first constructed using a forward selection process using  $p < 0.05$  as the selection criteria to remain in the model. Hispanic ethnicity was forced into the all male models. All analyses were adjusted for year of interview. Final models were checked for potential collinearity by examining the variance inflation factor (VIF) and ensuring that it was less than 10. All variables in the final models were evaluated for potential significant interactions. Data were too sparse to conduct logistic regression on non-Hispanic women data for drinking and for data on all, Hispanic and non-Hispanic women, for binge drinking.

To account for sample design effects on the analysis, SAS v9.1.3 SURVEY procedures were used that allow for estimation of standard errors and confidence intervals in the presence of stratification and clustering. All percentages reported are weighted to reflect prevalence in the population of farmworkers.

## **RESULTS**

### **Population Characteristics**

Hired farmworkers are predominantly Hispanic (91%) and male (80%). Of Hispanic farmworkers, 91% were born in Mexico, 7% in the U.S., and 2% elsewhere (data not shown). Since male and female drinking patterns are different, demographic characteristics are presented by gender (Table 3.1). Most male farmworkers were between the ages of 21 and 49 years old although a smaller proportion of Hispanic male farmworkers compared to non-Hispanic male farmworkers were younger than 18 (6% versus 10%, respectively) and 50 and older (9% versus 24%, respectively). Almost two-thirds of male Hispanic farmworkers had less than a 7<sup>th</sup> grade education (64%) while approximately half of non-Hispanic male farmworkers had completed less than 12 years of school. More than half of Hispanic male farmworkers did not speak English “at all” and slightly less than half have lived in the U.S. for five years or fewer (47%). A majority of Hispanic male farmworkers were undocumented (65%) and mobile (58%). Of non-Hispanic male farmworkers, only 8% were mobile.

Almost two-thirds (64%) of Hispanic male farmworkers had no assets in the U.S. (land, house, mobile home, car/truck, or business), for non-Hispanic male farmworkers slightly more than one-fourth did not have any assets (26%). A lower proportion of

Hispanic than non-Hispanic male farmworkers earned more than \$9.55 (8% versus 17%) and a higher proportion earned between \$5.26 and \$7.74 (67% versus 55%). More male Hispanic than non-Hispanic farmworkers were married (56% versus 37%) but fewer were living with immediate family members (29% versus 42%).

Approximately one-fourth (28%) of Hispanic male farmworkers worked for a farm labor contractor versus only 6% of non-Hispanic male farmworkers. Approximately the same proportion of Hispanic and non-Hispanic male farmworkers worked for employers with 11 to 150 employees although a larger proportion of Hispanics were more likely to work for employers with more than 150 workers (29%). Non-Hispanic farmworkers were more likely to work for employers with fewer than 11 employees (29%). For Hispanic male farmworkers, the highest proportion worked in fruit and nut crops (40%) with the second highest proportion in vegetable crops (29%). For non-Hispanic male farmworkers field crops (41%) followed by nursery and floriculture crops (24%) were most common. Fewer Hispanic than non-Hispanic male farmworkers reported working the full year and fewer reported working more than 25 years than non-Hispanic male farmworkers (17% versus 28%, and 8% versus 27%, respectively).

Almost nine-tenths (89%) of female farmworkers were Hispanic and almost 80% were 21 to 49 years old. A smaller proportion of Hispanic female farmworkers compared to non-Hispanic female farmworkers were aged 50 or older (5% versus 13%, respectively) and a higher proportion were less than 21 (17% versus 9%) (See Table 3.1: Data for non-Hispanic women are not shown due to small numbers in many categories). The majority of Hispanic women, like Hispanic men, had less than a 7<sup>th</sup> grade education (59%) while less than one-fourth of non-Hispanic women had fewer than 12 years (22%) of education. Half (52%) of the Hispanic female farmworkers reported that they did not speak English “at all.” Approximately four of ten Hispanic female farmworkers had been in the U.S. for five or fewer years, while only 11% were born in the U.S.. Of Hispanic female farmworkers, 51% were undocumented and 43% were mobile. Of non-Hispanic female farmworkers, 8% were mobile.

Almost half of Hispanic farmworker women had no assets (45%) compared to one-tenth of non-Hispanic women (11%). Hispanic female farmworkers also tended to

make less per hour than non-Hispanic female farmworkers with 91% versus 65% making less than \$7.74 per hour.

More Hispanic than non-Hispanic female farmworkers were married (57% versus 48%) but approximately the same proportion were living with nuclear family members (72% versus 69%). Hispanic women were also much more likely to work for a farm labor contractor (29%) compared to non-Hispanic women (2%). Hispanic women, like Hispanic men, were more likely to work on farms with more than 150 employees compared to non-Hispanic women (42% versus 10%). The highest proportion of Hispanic women worked in fruit and nut crops (40%) and vegetables (30%) while non-Hispanic women were most likely to work in nursery and floriculture crops (63%) and fruit and nut crops (15%).

### **Alcohol Use**

Approximately half of all farmworkers reported that they had drunk alcohol in the last month and slightly less than one-fifth reported drinking an amount considered binge drinking ( $\geq 5$  drinks for men,  $\geq 4$  drinks for women)(Table 3.2). Prevalence of both drinking and binge drinking were significantly higher for male farmworkers compared to female farmworkers ( $p < 0.0001$ ). Hispanic and non-Hispanic male farmworkers' drinking habits were remarkably similar (58.6% versus 57.3% reported drinking, and 22.6% and 22.4% reported binge drinking, respectively). In contrast, Hispanic female farmworkers were significantly less likely to drink/binge drink than non-Hispanic female farmworkers (10.9% versus 35.2% reported drinking ( $p < 0.0001$ ), and 3.0% versus 13.0% reported binge drinking ( $p = 0.0002$ ), respectively). If we had used the same definition of binge drinking for men and women, this prevalence would be much lower (1.6% and 5.2% for Hispanic and non-Hispanic women, respectively)(data not shown). Hispanic males who drank alcohol drank an average of 4.8 drinks each time they drank compared to non-Hispanic males who drank 5.3 drinks. Hispanic women also drank fewer drinks and drank on fewer days than non-Hispanic women on average (2.8 versus 3.2 for number of drinks; and 4.9 versus 7.7 for days drink, respectively).

### **Predictors of Alcohol Use**

In bivariate analyses, male farmworkers younger than 21 and older than 49 had lower odds of drinking compared to those aged 21 to 49 (Table 3.3). This age difference in risk was most pronounced for farmworkers 14 to 17 years of age whose odds were less than one-tenth that of farmworkers aged 21 to 49. Farmworkers aged 18 to 20 had one-half and farmworkers older than 49 had one-fourth lower odds of drinking compared to farmworkers aged 21 to 49. This non-linear pattern with age was similar in Hispanic- and non-Hispanic male farmworkers. Hispanic female farmworkers aged 14 to 17 had approximately one-sixth the odds of drinking compared to all other age categories. Drinking behavior did not differ for male farmworkers by educational backgrounds except for those Hispanic males who attended but did not complete high school in the U.S. Their odds of drinking were one-half that of Hispanic males who completed 7 to 11 years of school abroad. For Hispanic female farmworkers the odds of drinking were three to eight times higher for those who had fewer than seven or more than 11 years of education abroad, and those with up to 11 years of U.S. education, compared to female Hispanic farmworkers with seven to 11 years of education abroad, although with wide confidence intervals (Table 3.3).

For Hispanic male farmworkers who speak English “not at all” or “some,” the odds of drinking were two to three times higher than Hispanic male farmworkers who reported that they speak English “well.” For female farmworkers, English speaking ability was not associated with likelihood of drinking alcohol. Male farmworkers with fewer than six years in the U.S. had lower odds of drinking than those with more years, except for those who were born in the U.S., whose odds of drinking were also lower. Female farmworkers who had lived in the U.S. for more than 15 years were more likely to report that they drank. The prevalence odds ratios were also elevated for Hispanic women in the U.S. older than 25 years, but confidence intervals included one.

Immigration and mobility were not associated with drinking for male farmworkers. The odds of drinking for Hispanic farmworker women who were undocumented and settled were one-fifth that of settled citizen Hispanic women. Although number of assets was not associated with drinking for men or for women, Hispanic men making less than \$5.26 per hour had lower odds of drinking and those

making \$7.74 to \$9.55 per hour had higher odds of drinking compared to Hispanic men making \$5.26 to \$7.74 per hour. The odds of drinking for married male farmworkers were 30% higher than those who were not married. Having family members in the same household was not associated with alcohol use.

Type of employer and number of employees on the farm were not associated with drinking. Crop was not associated with drinking except for non-Hispanic men working in the crop category “vegetables” whose odds were two-and a-half fold higher than that of farmworkers working in “nursery and floriculture” crops and 1.7 times higher than for farmworkers working in “field crops” (Table 3.3). Increasing number of days and increasing number of years working in agriculture predicted increased odds of drinking for all men and for Hispanic men. Non-Hispanic men with fewer than 31 days working in farm work had one-tenth the odds of drinking compared to non-Hispanic farmworkers who worked more days per year. Non-Hispanic farmworkers who had been working in farm work less than a year had one-fifth the odds of drinking as those who had worked six to 15 years.

In the adjusted models, relatively few variables were retained as independent predictors of likelihood of drinking (Table 3.5). For all male farmworkers, hourly wages less than \$5.26 were associated with drinking. This risk was only slightly attenuated from the unadjusted estimate. Working in farm work for less than one year was also associated with lower odds of drinking. The final model for Hispanic males also includes English speaking ability. The effect of speaking English “well” on whether a farmworker drank alcohol depended on whether they had had less than one year or one or more years of working in farm work. Those with the lowest odds of drinking were farmworkers who spoke English “well” and had less than one year of farm work with one-fifth the odds of drinking, followed by those who spoke English “well” and had one or more years of farm work with two-thirds the odds, compared to farmworkers who spoke English “less than well” and had less than one year of farm work. Those with the greatest odds of drinking were farmworkers who spoke English “less than well” and had a year or more of farm work with a 25% increased odds of drinking. Models were adjusted for age and year of interview.



A final model of alcohol use in the last month for female Hispanic farmworkers included education, immigration and mobility, and years of farm work. Female Hispanic farmworkers with seven to 11 years of school abroad were the least likely to drink. Those with fewer than seven and more than 11 years of education abroad and those with more than seven years of education in the U.S. had 3.4, 7.9, and 3.9 times the odds of drinking as those with seven to 11 years of education abroad adjusting for age, immigration and mobility, years of farm work, and year of interview. Confidence intervals for these prevalence odds ratios were wide as the sample size is small. Being undocumented but settled predicted lower odds of drinking alcohol compared to other immigration and mobility statuses. The relationship of years of farm work to alcohol use was non-linear (Table 3.3; Figure 3.1).

### **Predictors of Binge Drinking**

Demographic predictors of binge drinking were similar to those for drinking but integration and work characteristics predictors differed (Table 3.4). For Hispanic and non-Hispanic men, the odds of reporting binge drinking if they were less than 21 or 50 and older were significantly lower compared to Hispanic men aged 21 to 49. For non-Hispanic men, those younger than 18 and 50 and older had lower odds of binge drinking. For Hispanic women binge drinking did not differ by age.

Hispanic men had higher odds of binge drinking when they spoke “some” English compared to those who spoke English “well.” The odds of those who did not speak English “at all” did not differ from those who spoke English “well.” Hispanic farmworkers who had lived in the U.S. for a year or less, for more than 25 years, and those born in the U.S. had lower odds of binge drinking than those who had lived in the U.S. for six to 15 years. The odds of binge drinking for Hispanic women living in the U.S. for two to five years were one-fifth that of Hispanic women in the U.S. for six to 15 years. In contrast to males, Hispanic women born in the U.S. had six times higher odds of binge drinking than Hispanic women who had been in the U.S. for six to 15 years, albeit the confidence intervals are wide. Non-citizen Hispanic women, mobile or settled, had lower odds of binge drinking than female farmworkers who were U.S. citizens. Male Hispanic farmworkers who earned more (hourly wages were more than \$9.55 per hour)

had almost two times the odds of binge drinking than those who made from \$5.26 to \$7.74 per hour. Marriage was not associated with binge drinking in males, but was in Hispanic females. Married female Hispanic farmworkers had 4.5 times the odds of binge drinking compared to unmarried Hispanic women.

Both male and female Hispanic farmworkers who worked for farm labor contractors had lower odds of binge drinking compared to Hispanic farmworkers who worked for growers directly, men had one-half the odds and women had less than one-fifth the odds. Male Hispanic farmworkers who worked on farms with more than 150 workers had half the odds of binge drinking compared to those who worked on farms with 11 to 150 workers. For female Hispanic farmworkers odds of binge drinking for those working in field crops was 15.5 times that of working in nursery and floriculture, although the confidence interval is wide. Male Hispanic farmworkers' odds of binge drinking increased with their number of days of farm work in the last year. Male Hispanic farmworkers with more than 25 years of farm work had one-third lower odds of binge drinking than those with six to 15 years of farm work.

In stepwise logistic regression, four variables remained significantly related to binge drinking for men, including wage > \$9.55 per hour, employment by farm labor contractor, working on a farm with fewer than 151 workers, and age (Table 3.5). Higher wages (>\$9.55 per hour) and working on a farm with fewer than 151 workers predicted higher odds of binge drinking (1.45 and 1.99, respectively) while working for a farm labor contractor and age less than 21 and older than 49 predicted lower odds. In Hispanic men, two additional variables contributed to the model, English speaking ability and days of farm work in the last year. As in the unadjusted analysis of English speaking ability, those who spoke English "some" were more likely to binge drink than those who spoke English either "well" or "not at all" adjusted for other variables in the model including age.

## **DISCUSSION**

This is the first study to look at prevalence and predictors of alcohol use in a nationally representative sample of hired farmworkers. The National Agricultural Workers Survey is tailored to overcome the cultural, emotional, and logistical barriers inherent in

surveying a population that is rural, immigrant, mobile, and poor. We found that although there were large differences in demographic, economic, social support and work characteristics between Hispanic and non-Hispanic male farmworkers, their drinking behavior was quite similar. Female farmworkers were significantly less likely to drink or binge drink than male farmworkers, while Hispanic female farmworkers were significantly less likely to drink and binge drink than non-Hispanic female farmworkers.

Prevalence of alcohol use for men in the Behavioral Risk Factor Surveillance System (BRFSS) (median percent in states where the question was asked=63%) was very similar to the prevalence among men in this study (59%)(CDC 1999). Prevalence of binge drinking for all men in the BRFSS (24%) was also similar to our observation among this farmworker population (23% and 7.0%, respectively) although the question on binge drinking asked in the BRFSS varies from the question on alcohol consumption asked in the NAWS in that BRFSS prevalences are reported by whether a person had consumed five or more drinks *on one occasion* in the last month, while the NAWS by whether they had consumed five or more drinks *on average* in the past month. Based on this, prevalences in the NAWS should tend to be higher than in the BRFSS, but it is unclear how much of an adjustment should be made. The question on drinking is equivalent although prevalences are also not adjusted for age in comparisons with BRFSS data. Farmworkers are a younger population than the general population so prevalence of drinking may be inflated due to having proportionately fewer older people in the sample to influence the average downward.

In contrast, prevalence of drinking among women in the BRFSS (46%) was higher than the NAWS estimate for non-Hispanic women (35%), and much higher than our estimate for Hispanic women (11%). Recalculating the prevalence of binge drinking for farmworker women using the BRFSS definition ( $\geq 5$  drinks on one occasion), the prevalence of binge drinking in farmworker women (1.6%) was also lower than the BRFSS estimate (7.5%)(CDC 1999). Using this definition, Hispanic farmworker women had a prevalence of 1.1% while non-Hispanic farmworker women had a prevalence of 5.2% of binge drinking.

### **Cultural Integration**

A recently published review reported that acculturation in Latino adults in the U.S. was consistently associated with higher odds of drinking for women while the relationship was less consistent for men (Zemore 2007). Although this study did not include a formal scale to measure acculturation, three variables were available to look at integration: English speaking ability, years in the U.S., and immigration and mobility. Education location may also be related to integration. English speaking ability was not associated with drinking for women. Results of this study did not support a trend of more integration being related to women being more likely to drink. Those who receive some education in the U.S. had similar odds of drinking as women who received less than 7<sup>th</sup> grade education abroad. Examining the immigration and mobility variable, only farmworker women who are undocumented and settled are significantly different than those who are citizens and settled.

As for men, those Hispanic male farmworkers who spoke English “well” were less likely to drink than those who spoke English less than well. Working in farm work for less than a year modified this effect, those who had worked in farm work for less than a year had even lower odds of drinking than those who worked in farm work for more than a year. Intermediate English speaking ability for Hispanic men was associated with binge drinking. This finding suggests that Hispanic men who are in transition may be at greater risk of participating in binge drinking than those who either have not integrated into the English-speaking world at all or have integrated more fully.

### **Economic Factors**

The literature on alcohol use and farmworkers has not examined associations between wages or assets and alcohol use. We found wages to affect drinking and binge drinking behaviors in men; very low wages were associated with not drinking, while higher wages were associated with binge drinking.

### **Social Support Factors**

Findings of two studies of migrant farmworkers in New York state, one in upstate New York and one in western New York, found family members to be a moderating influence

on alcohol intake in a migrant camp. In our analysis of NAWS data, although accompaniment by a family member predicted higher odds of binge drinking in male Hispanic farmworkers in bivariate analysis, this relationship did not hold up in the multivariate model after adjusting for age. Interestingly in the New York study although the demographic characteristics of the population differed, mainly African American and Haitian, the prevalence of heavy drinking was similar to the prevalence of binge drinking in men in the NAWS (approximately 20%)(Chi and McClain 1992).

### **Work Factors**

Farm jobs and home life of farmworkers may be more intimately tied together than is true in other occupations since they often actually live and work in the same location and workers may need to relocate to find employment one or more times a year. Some farmworkers rely on the farm labor contractor for food and housing while they are employed. We had initially hypothesized that those farmworkers who worked for farm labor contractors (FLC) might have worse working conditions and be more likely to binge drink. We found the opposite, that working for a farm labor contractor predicted lower odds of binge drinking for Hispanic and non-Hispanic male farmworkers. It may be the case that those who work for FLCs have less autonomy to acquire alcohol than those men who work directly for a grower. Working on farms with fewer than 151 workers predicted higher odds of binge drinking controlling for age and working for a FLC. No information exists in the literature to explain this phenomenon.

This analysis has some limitations. Data are self-reported, therefore farmworkers may under-report their actual intake and we do not have an objective means of confirming or disproving their self-report. The study population includes only currently employed farmworkers; those farmworkers who are unable to work due to a drinking problem, or related co-morbidities would not be included. Low numbers of non-Hispanic female farmworkers precludes multivariate analysis for that segment of the population. With these limitations in mind, the NAWS is an established survey with data collected on a national sample, representative of employed U.S. hired farmworkers. Methods of the survey are tailored to fit this specific population accounting for seasonal and geographic variations in the population over the course of the year. Interviewers are selected based

on their knowledge of the population and language of farmworkers. Farmworkers are interviewed directly in face-to-face interviews. Potentially sensitive questions on topics such as use of alcohol or immigration status are asked at the end of the 30- to 40-minute interview so farmworkers have gained confidence in the interviewers before they are asked.

In conclusion, although alcohol consumption by farmworkers appears to be similar to overall U.S. drinking patterns, combined with farm work activities that may include knives, chemicals, and machinery it could be hazardous. Overall we found more than one-fifth of farmworker men to be binge drinkers, a threshold considered by the NIAAA to be “the amount of drinking associated with increased risk of developing alcohol dependence and abuse”(Cargiulo 2007). Resources for those with a problem or a potential should be made available taking culture, economic circumstances, and geographic isolation into consideration. Further study is needed to understand the relationship of farm size and employer type to drinking patterns and what kinds of activities accompany drinking, such as work activities, water activities, or driving motor vehicles.

**Table 3.1. Population Characteristics by Sex and Ethnicity, National Agricultural Workers Survey 1999–2001**

		All		Men				Women			
		N	wtd %	N	wtd %	Non-Hispanic N	wtd %	N	wtd %	N	wtd %
<b>DEMOGRAPHIC CHARACTERISTICS</b>											
Hispanic	No	765	8.8%					290	11.5%		
	Yes	7296	91.2%					1555	88.5%		
Age (4 GPS) (median=29)	14-17	266	6.0%			34	10.2%	41	3.4%	32	3.4%
	18-20	817	11.3%			64	9.1%	150	12.4%	136	13.3%
	21-49	6058	72.4%			490	56.9%	1480	78.4%	1271	78.4%
	50+	920	10.2%			177	23.8%	174	5.9%	116	5.0%
Highest grade & location	<7th grade	N/A		4770	63.6%	N/A		N/A		931	59.1%
	7–11th grade (Abroad)			1708	24.4%					322	23.8%
	12+ grade (Abroad)			317	4.6%					73	2.9%
	7–11th grade (US)			307	5.7%					142	9.1%
	12+ grade (US)			134	1.6%					81	5.1%
Education (US only)	Less than 12 <sup>th</sup> grade	N/A		N/A		348	49.7%	N/A			
	12 <sup>th</sup> grade plus					416	50.3%				
<b>INTEGRATION FACTORS</b>											
Speak English	Well	N/A		456	7.2%	N/A		N/A		206	13.1%
	Some			3034	37.6%					581	35.3%
	Not at all			3793	55.2%					763	51.6%
Years in US	<1 year	N/A		834	20.0%	N/A		N/A		112	10.3%
	1 year			748	10.9%					128	11.4%
	2–5 years			1367	15.7%					312	20.3%
	6–15 years			2110	25.9%					519	32.0%
	16–25 years			1295	15.2%					226	10.8%
	26+ years			620	7.3%					97	4.1%
Immigration status & mobility	Born in US			313	5.0%					159	11.0%
	Undocumented & Mobile	N/A		2485	43.2%					234	23.1%
	Undocumented & Settled			1959	21.8%	N/A		N/A		503	28.2%
	Green Card/other & Mobile			831	11.7%					143	13.8%
	Green Card/other & Settled			1306	14.9%					403	20.7%
	Citizen & Mobile			203	2.8%					82	6.1%
Mobility	Citizen & Settled			390	5.5%					158	8.2%
	Mobile	N/A				41	7.6%	N/A			
	Settled					704	92.4%				

(continued on next page)

**Table 3.1. Population Characteristics by Sex and Ethnicity, National Agricultural Workers Survey 1999–2001 (continued)**

		All		Men				Women			
		N	wtd %	Hispanic		Non-Hispanic		N	wtd %	Hispanic	
				N	wtd %	N	wtd %			N	wtd %
<b>ECONOMIC FACTORS</b>											
# Assets US	No assets	4310	60.5%	4156	63.8%	154	26.3%	625	41.3%	589	45.2%
	1 asset	2747	28.7%	2408	27.2%	339	44.2%	725	36.0%	609	35.3%
	2+ assets	1002	10.7%	730	8.9%	272	29.5%	495	22.6%	357	19.4%
Hourly wage (median=\$6.25)	<\$5.26	869	12.2%	818	12.1%	51	13.0%	222	15.7%	210	16.8%
	\$5.26–\$7.74	5275	66.1%	4844	67.2%	431	55.1%	1299	72.6%	1145	74.4%
	\$7.75–\$9.55	1107	13.2%	974	13.0%	133	15.4%	187	7.1%	121	5.2%
	>\$9.55	617	8.5%	486	7.7%	131	16.5%	87	4.6%	48	3.6%
<b>SOCIAL SUPPORT FACTORS</b>											
Married	Yes	4674	53.9%	4334	55.6%	340	36.9%	1130	55.5%	980	56.5%
Family members in house hold	Yes	2809	29.8%	2427	28.7%	382	41.8%	1387	71.6%	1191	71.9%
<b>WORK FACTORS</b>											
Employer	Grower	6474	74.3%	5742	72.4%	732	94.2%	1417	74.1%	1134	71.1%
	Farm Labor Contractor	1586	25.7%	1553	27.6%	33	5.8%	427	25.9%	420	28.9%
# Employees (median=70)	1–10	1700	9.5%	1328	7.6%	372	29.4%	359	8.8%	238	6.4%
	11–150	5294	63.7%	4916	63.6%	393	70.6%	1164	53.2%	1001	52.0%
	151+	1042	26.8%	1027	28.8%	*		320	38.1%	315	41.6%
Crop at time of interview	Field crops	1366	16.9%	1001	14.6%	365	40.6%	124	7.8%	108	8.3%
	Fruit & Nut crops	3066	37.1%	2981	39.6%	85	11.9%	719	37.1%	687	39.9%
	Nursery & Floriculture	1347	13.7%	1148	12.8%	199	23.8%	564	25.3%	370	20.5%
	Vegetables	1825	27.1%	1758	28.6%	67	11.9%	395	27.7%	360	29.8%
	Miscellaneous	457	5.1%	408	4.5%	49	11.7%	43	2.1%	30	1.5%
Days worked in FW in last year (median=169)	<31 days	353	10.1%	318	9.7%	35	14.5%	116	15.5%	103	16.2%
	31–90 days	777	18.1%	717	18.6%	60	12.7%	268	23.9%	226	23.3%
	91–270 days	4881	54.0%	4462	54.9%	419	44.5%	1247	53.7%	1053	54.1%
	271–366 days	1975	17.8%	1728	16.8%	247	28.3%	192	7.0%	151	6.4%
Years of farm work (median=5.0)	<1 year	980	21.3%	933	22.2%	47	12.8%	212	18.6%	179	18.6%
	1 year	828	10.9%	787	11.3%	41	6.7%	187	10.1%	166	11.0%
	2–5 years	1589	16.7%	1489	17.1%	100	12.5%	481	27.8%	413	27.4%
	6–15 years	2347	26.8%	2165	27.2%	182	23.7%	587	29.6%	510	31.0%
	16–25 years	1396	14.7%	1256	14.5%	140	17.1%	235	8.7%	191	7.9%
	26+ years	892	9.4%	642	7.7%	250	27.3%	140	5.2%	93	4.1%

\*Fewer than 30 farmworkers in category, combined with 11–150 category.

N/A = Not applicable



**Table 3.2. Prevalence of Alcohol Use, Binge Drinking<sup>1</sup>, and Frequency and Quantity of Alcohol Consumed by Sex and Ethnicity, NAWS 1999–2001**

		MEN			WOMEN		
N		All 8061	Hispanic 7296	Non-Hispanic 765	All 1845	Hispanic 1555	Non-Hispanic 290
		wtd% (95% CI <sup>2</sup> )	wtd% (95% CI <sup>2</sup> )	wtd% (95% CI <sup>2</sup> )	wtd% (95% CI <sup>2</sup> )	wtd% (95% CI <sup>2</sup> )	wtd% (95% CI <sup>2</sup> )
<b>Consume alcohol</b>	<b>Yes (%)</b>	58.5 (55.8, 61.3)	58.6 (55.7, 61.5)	57.3 (48.2, 66.5)	13.7 (10.2, 17.1)	10.9 (7.5, 14.3)	35.2 (23.7, 46.6)
<b>Binge drinker</b>	<b>Yes (%)</b>	22.6 (16.9, 28.2)	22.6 (16.5, 28.7)	22.4 (15.3, 29.4)	4.2 (2.0, 6.4)	3.0 (0.9, 5.2)	13.0 (6.4, 19.6)
<b>Number of drinks<sup>3</sup></b>	<b>Mean</b>	4.82	4.77	5.34	2.90	2.78	3.17
	<b>Median</b>	4	4	3	2	2	3
	<b>IQR<sup>4</sup></b>	4	4	4	2	2	2
	<b>Range</b>	1-40	1-40	1-40	1-20	1-12	1-20
<b>Days drink<sup>3</sup></b>	<b>Mean</b>	9.12	9.10	9.38	5.71	4.86	7.72
	<b>Median</b>	5	5	4	3	2	4
	<b>IQR<sup>4</sup></b>	6	6	8	4	3	8
	<b>Range</b>	1-30	1-30	1-30	1-30	1-30	1-30

<sup>1</sup>Binge drinker = ( $\geq 4$  drinks for women on average, per occasion); ( $\geq 5$  drinks for men on average, per occasion).

<sup>2</sup>Confidence Interval.

<sup>3</sup>For those who drink.

<sup>4</sup>Interquartile range.

**Table 3.3 Unadjusted Prevalence Odds Ratios for Alcohol Use by Sex and Ethnicity, NAWS 1999–2001**

Drink (Y/N)	Variable Categories	Men			Women	
		All POR (95% CI)	Hispanic POR (95% CI)	Non-Hispanic POR (95% CI)	Hispanic POR (95% CI)	Non-Hispanic POR (95% CI)
<b>DEMOGRAPHIC CHARACTERISTICS</b>						
<b>Age group</b>	14–17	0.085 (0.048,0.150)	0.083 (0.051,0.137)	0.087 (0.009,0.814)	0.162 (0.030,0.877)	N/A
	18–20	0.502 (0.386,0.653)	0.514 (0.389,0.678)	0.371 (0.180,0.764)	1.568 (0.633,3.885)	0.489 (0.138,1.733)
	21–49	1.000	1.000	1.000	1.000	1.000
	50+	0.711 (0.526,0.959)	0.728 (0.531,0.999)	0.579 (0.368,0.912)	1.646 (0.464,5.837)	0.179 (0.070,0.456)
<b>Highest grade &amp; location</b>	<7th grade	N/A	1.215 (0.988,1.494)	N/A	3.629 (1.169,11.267)	N/A
	7–11th grade (Abroad)		1.000		1.000	
	12+ grade (Abroad)		1.256 (0.770,2.047)		8.311 (1.869,36.953)	
	7–11th grade (US)		0.499 (0.294,0.847)		4.693 (1.236,17.815)	
	12+ grade (US)		1.183 (0.644,2.176)		3.364 (0.866,13.068)	
<b>Education (US only)</b>	Less than 12th grade	N/A	N/A	1.000	N/A	1.000
	High school graduate			1.315 (0.639,2.704)		2.026 (0.995,4.123)
<b>INTEGRATION FACTORS</b>						
<b>Speak English</b>	Well	N/A	1.000	N/A	1.000	N/A
	Some		3.049 (2.111,4.404)		0.962 (0.406,2.280)	
	Not at all		2.252 (1.712,2.963)		0.571 (0.294,1.109)	
<b>Years in US</b>	<1 year	N/A	0.483 (0.369,0.633)	N/A	2.268 (0.719,7.154)	N/A
	1 year		0.598 (0.458,0.780)		1.528 (0.465,5.025)	
	2–5 years		0.820 (0.672,1.001)		1.431 (0.481,4.255)	
	6–15 years		1.000		1.000	
	16–25 years		1.071 (0.803,1.429)		4.625 (1.858,11.513)	
	26+		0.827 (0.619,1.106)		3.870 (0.934,16.033)	
	Born in US		0.448 (0.273,0.737)		3.905 (1.348,11.309)	
<b>Immigration status &amp; mobility</b>	Undocumented & Mobile	N/A	0.869 (0.516,1.465)	N/A	0.567 (0.133,2.425)	N/A
	Undocumented & Settled		1.057 (0.634,1.764)		0.194 (0.057,0.655)	
	Green Card/other & Mobile		1.378 (0.881,2.156)		0.382 (0.064,2.284)	
	Green Card/other & Settled		1.304 (0.757,2.245)		0.453 (0.134,1.533)	
	Citizen & Mobile		0.528 (0.260,1.074)		0.883 (0.227,3.425)	
	Citizen & Settled		1.000		1.000	
<b>ECONOMIC FACTORS</b>						
<b># Assets US</b>	No assets	0.835 (0.598,1.164)	0.802 (0.552,1.164)	0.841 (0.358,1.978)	0.520 (0.147,1.837)	0.779 (0.166,3.660)
	1 asset	1.139 (0.864,1.502)	1.114 (0.811,1.531)	1.135 (0.651,1.978)	0.458 (0.175,1.195)	1.046 (0.265,4.137)
	2+ assets	1.000	1.000	1.000	1.000	1.000
<b>Hourly wage</b>	<\$5.26	0.652 (0.475,0.894)	0.713 (0.531,0.958)	0.251 (0.061,1.035)	1.739 (0.835,3.623)	0.486 (0.126,1.878)
	\$5.26–\$7.74	1.000	1.000	1.000	1.000	1.000
	\$7.75–\$9.55	1.219 (1.005,1.479)	1.250 (1.002,1.559)	0.945 (0.393,2.271)	1.803 (0.483,6.723)	0.317 (0.108,0.931)
	>\$9.55	1.200 (0.886,1.625)	1.217 (0.859,1.724)	1.030 (0.559,1.896)	0.915 (0.168,4.977)	0.490 (0.190,1.260)

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**Table 3.3 Unadjusted Prevalence Odds Ratios for Alcohol Use by Sex and Ethnicity, NAWS 1999–2001 (Continued)**

Drink (Y/N)	Variable Categories	Men			Women	
		All POR (95% CI)	Hispanic POR (95% CI)	Non-Hispanic POR (95% CI)	Hispanic POR (95% CI)	Non-Hispanic POR (95% CI)
<b>SOCIAL SUPPORT FACTORS</b>						
<b>Married</b>	No	1.000	1.000	1.000	1.000	1.000
	Yes	1.325 (1.101,1.594)	1.356 (1.133,1.622)	1.024 (0.558,1.880)	1.064 (0.453,2.503)	0.993 (0.340,2.899)
<b>Family members in house hold</b>	No	1.000	1.000	1.000	1.000	1.000
	Yes	1.230 (0.984,1.536)	1.238 (0.982,1.560)	1.208 (0.605,2.409)	0.660 (0.361,1.207)	0.436 (0.187,1.013)
<b>WORK FACTORS</b>						
<b>Employer</b>	Grower	1.000	1.000	1.000	1.000	1.000
	Farm Labor Contractor	0.908 (0.673,1.225)	0.919 (0.679,1.245)	0.428 (0.120,1.528)	0.734 (0.401,1.345)	*
<b># Employees (mean=142.2)</b>	1-10	0.912 (0.626,1.328)	0.849 (0.530,1.360)	1.127 (0.671,1.894)	1.890 (0.882,4.049)	1.232 (0.448,3.390)
	11-150	1.000	1.000	1.000	1.000	1.000**
	151+	1.099 (0.881,1.37)	1.115 (0.883,1.407)	0.479 (0.086,2.676)	1.749 (0.952,3.212)	
<b>Crop at time of interview</b>	Field crops	0.977 (0.656,1.455)	0.855 (0.560,1.308)	1.734 (1.050,2.864)	2.076 (0.676,6.375)	1.490 (0.545,4.077)
	Fruit & Nut crops	1.207 (0.952,1.529)	1.168 (0.900,1.515)	1.084 (0.436,2.700)	1.343 (0.506,3.559)	0.998 (0.215,4.636)
	Nursery & Floriculture	1.000	1.000	1.000	1.000	1.000
	Vegetables	0.930 (0.697,1.239)	0.865 (0.626,1.195)	2.627 (1.199,5.753)	2.462 (0.924,6.561)	0.595 (0.174,2.031)
<b>Days worked in FW in last year</b>	<31 days	0.602 (0.407,0.888)	0.729 (0.496,1.073)	0.110 (0.033,0.369)	1.621 (0.624,4.215)	2.244 (0.391,12.887)
	31-90 days	0.724 (0.579,0.905)	0.726 (0.579,0.910)	0.723 (0.389,1.343)	0.814 (0.392,1.691)	1.174 (0.285,4.834)
	91-270 days	1.000	1.000	1.000	1.000	1.000
	271-366 days	1.054 (0.877,1.267)	1.105 (0.906,1.347)	0.671 (0.394,1.145)	0.498 (0.192,1.294)	0.922 (0.385,2.206)
	continuous	1.002 (1.001,1.003)	1.002 (1.001,1.003)	1.004 (1.000,1.007)	0.998 (0.994,1.002)	0.997 (0.991,1.003)
<b>Years of farm work</b>	<1 year	0.469 (0.354,0.621)	0.484 (0.366,0.639)	0.273 (0.087,0.856)	1.722 (0.836,3.546)	1.489 (0.332,6.669)
	1 year	0.577 (0.456,0.729)	0.585 (0.456,0.751)	0.455 (0.141,1.464)	1.400 (0.373,5.247)	1.377 (0.553,3.429)
	2-5 years	0.758 (0.622,0.923)	0.760 (0.623,0.928)	0.730 (0.363,1.468)	0.829 (0.425,1.618)	1.071 (0.317,3.622)
	6-15 years	1.000	1.000	1.000	1.000	1.000
	16-25 years	1.065 (0.809,1.402)	1.106 (0.833,1.469)	0.764 (0.319,1.830)	0.984 (0.438,2.211)	0.451 (0.131,1.552)
	26+ years	0.741 (0.549,1.000)	0.730 (0.529,1.008)	0.745 (0.345,1.609)	3.415 (1.035,11.266)	0.289 (0.118,0.708)
	continuous (cent at 6 yrs)	1.014 (1.003,1.025)	1.016 (1.003,1.029)	1.009 (0.991,1.028)	1.016 (0.974,1.060)	0.955 (0.913,1.000)

\*Cell size too small to compute POR \*\*Reference for Non-Hispanic women=11+ employees. N/A=Not applicable

**Table 3.4. Unadjusted Prevalence Odds Ratios for Binge Drinking<sup>1</sup> by Sex and Ethnicity, NAWS 1999–2001**

Binge Drink (Y/N)		Men						Women	
		All		Hispanic		Non-Hispanic		Hispanic	
Variable Categories		POR	95% CI	POR	95% CI	POR	95% CI	POR	95% CI
<b>DEMOGRAPHIC CHARACTERISTICS</b>									
<b>Age</b>	14-17	<b>0.138</b>	<b>(0.065,0.294)</b>	<b>0.147</b>	<b>(0.066,0.328)</b>	<b>0.085</b>	<b>(0.019,0.372)</b>	0.451	(0.039,5.270)
	18-20	<b>0.534</b>	<b>(0.403,0.708)</b>	<b>0.518</b>	<b>(0.384,0.697)</b>	0.738	(0.376,1.447)	1.271	(0.199,8.133)
	21-49	1.000		1.000		1.000		1.000	
	50+	<b>0.466</b>	<b>(0.329,0.660)</b>	<b>0.484</b>	<b>(0.336,0.698)</b>	<b>0.360</b>	<b>(0.207,0.628)</b>	4.863	(0.845,27.999)
<b>Highest grade &amp; location</b>	<7th grade	N/A		1.011	(0.751,1.361)	N/A		1.382	(0.212,9.017)
	7-11th grade (Abroad)			1.000				1.000	
	12+ grade (Abroad)			0.887	(0.471,1.671)			<.001	
	7-11th grade (US)			0.877	(0.500,1.538)			2.268	(0.282,18.260)
	12+ grade (US)			1.548	(0.773,3.100)			1.152	(0.095,14.036)
<b>Education (US only)</b>	Less than high school	N/A		N/A		1.000		N/A	
	High school graduate					1.104	(0.666,1.829)		
<b>INTEGRATION FACTORS</b>									
<b>Speak English</b>	Well	N/A		1.000		N/A		1.000	
	Some			<b>1.624</b>	<b>(1.046,2.521)</b>			1.141	(0.259,5.020)
	Not at all			0.980	(0.611,1.571)			0.262	(0.044,1.571)
<b>Years in US</b>	<1 year	N/A		<b>0.431</b>	<b>(0.307,0.606)</b>	N/A		2.611	(0.344,19.82)
	1 year			<b>0.597</b>	<b>(0.368,0.967)</b>			0.287	(0.026,3.133)
	2-5 years			0.910	(0.659,1.256)			<b>0.180</b>	<b>(0.038,0.853)</b>
	6-15 years			1.000				1.000	
	16-25 years			1.143	(0.889,1.470)			0.679	(0.188,2.458)
	26+			<b>0.717</b>	<b>(0.552,0.932)</b>			7.174	(0.883,58.27)
	Born in US			<b>0.602</b>	<b>(0.385,0.941)</b>			<b>6.671</b>	<b>(1.263,35.23)</b>
<b>Immigration status &amp; mobility</b>	Undocumented & Mobile	N/A		0.832	(0.487,1.422)	N/A		0.158	(0.016,1.604)
	Undocumented & Settled			1.271	(0.799,2.023)			<b>0.071</b>	<b>(0.011,0.466)</b>
	Green Card/other & Mobile			0.990	(0.613,1.598)			<b>0.030</b>	<b>(0.004,0.203)</b>
	Green Card/other & Settled			1.198	(0.706,2.033)			<b>0.123</b>	<b>(0.020,0.770)</b>
	Citizen & Mobile			1.150	(0.632,2.094)			0.764	(0.099,5.905)
	Citizen & Settled			1.000				1.000	

<sup>1</sup>Binge drinker = (>=4 drinks for women); (>=5 drinks for men).

(continued on next page)

**Table 3.4. Unadjusted Prevalence Odds Ratios for Binge<sup>1</sup> Drinking by Sex and Ethnicity, NAWS 1999–2001 (continued)**

Binge Drink (Y/N)		All		Men		Non-Hispanic		Women	
		POR	95% CI	POR	95% CI	POR	95% CI	POR	95% CI
<b>ECONOMIC FACTORS</b>									
<b># Assets US</b>	No assets	1.041	(0.759,1.429)	1.082	(0.791,1.481)	0.905	(0.461,1.777)	0.259	(0.040, 1.692)
	1 asset	1.298	(0.937,1.797)	1.379	(0.982,1.936)	0.995	(0.604,1.638)	0.303	(0.066, 1.391)
	2+ assets	1.000		1.000		1.000		1.000	
<b>Hourly wage</b>	<\$5.26	1.153	(0.721,1.845)	1.260	(0.777,2.042)	0.373	(0.086,1.618)	1.767	(0.24, 12.99)
	\$5.26-\$7.74	1.000		1.000		1.000		1.000	
	\$7.75-\$9.55	1.022	(0.789,1.325)	1.019	(0.769,1.351)	0.991	(0.514,1.912)	3.857	(0.547,27.178)
	>\$9.55	<b>1.729</b>	<b>(1.251,2.390)</b>	<b>1.873</b>	<b>(1.283,2.733)</b>	1.030	(0.580,1.831)	3.764	(0.546,25.967)
<b>SUPPORT FACTORS</b>									
<b>Married</b>	No	1.000		1.000		1.000		1.000	
	Yes	1.156	(0.961,1.392)	1.195	(0.979,1.459)	0.815	(0.530,1.254)	<b>4.496</b>	<b>(1.295,15.606)</b>
<b>Family members in house hold</b>	No	1.000		1.000		1.000		1.000	
	Yes	<b>1.269</b>	<b>(1.020,1.579)</b>	<b>1.327</b>	<b>(1.058,1.664)</b>	0.860	(0.507,1.458)	0.760	(0.194, 2.987)
<b>WORK FACTORS</b>									
<b>Employer</b>	Grower	1.000		1.000		1.000		1.000	
	Farm Labor Contractor	<b>0.523</b>	<b>(0.357,0.767)</b>	<b>0.521</b>	<b>(0.355,0.766)</b>	0.334	(0.059,1.892)	<b>0.179</b>	<b>(0.063, 0.505)</b>
<b># Employees (mean=142.2)</b>	1-10	1.157	(0.771,1.734)	1.207	(0.746,1.950)	1.184	(0.698,2.007)	3.254	(0.821,12.894)
	11-150	1.000		1.000		1.000		1.000	
	151+	<b>0.464</b>	<b>(0.283,0.761)</b>	<b>0.455</b>	<b>(0.281,0.737)</b>	0.600	(0.068,5.311)	0.622	(0.085, 4.542)
<b>Crop at time of interview</b>	Field crops	0.995	(0.740,1.340)	0.993	(0.712,1.385)	1.021	(0.577,1.809)	<b>15.508</b>	<b>(2.902,82.876)</b>
	Fruit & Nut crops	0.655	(0.366,1.171)	0.656	(0.361,1.191)	0.469	(0.161,1.366)	3.978	(0.687,23.038)
	Nursery & Floriculture	1.000		1.000		1.000		1.000	
	Vegetables	0.786	(0.482,1.280)	0.773	(0.470,1.273)	0.991	(0.315,3.115)	5.911	(0.792,44.137)
<b>Days worked in FW in last year</b>	<31 days	0.800	(0.548,1.167)	0.885	(0.600,1.305)	0.298	(0.076,1.169)	2.231	(0.424,11.755)
	31-90 days	0.759	(0.534,1.080)	0.756	(0.523,1.093)	0.824	(0.405,1.678)	0.526	(0.114, 2.430)
	91-270 days	1.000		1.000		1.000		1.000	
	271-366 days	<b>1.334</b>	<b>(1.042,1.708)</b>	<b>1.407</b>	<b>(1.097,1.803)</b>	0.875	(0.431,1.776)	0.895	(0.136, 5.871)
	continuous	<b>1.002</b>	<b>(1.001,1.003)</b>	<b>1.002</b>	<b>(1.001,1.003)</b>	1.002	(0.999,1.005)	0.998	(0.991, 1.005)
<b>Years of farm work</b>	<1 year	<b>0.524</b>	<b>(0.372,0.739)</b>	<b>0.506</b>	<b>(0.352,0.729)</b>	0.859	(0.291,2.538)	1.290	(0.167, 9.949)
	1 year	0.651	(0.412,1.029)	<b>0.610</b>	<b>(0.372,1.000)</b>	1.637	(0.520,5.149)	4.000	(0.499,32.075)
	2-5 years	0.996	(0.759,1.307)	0.949	(0.707,1.275)	1.870	(0.917,3.812)	0.558	(0.142, 2.187)
	6-15 years	1.000		1.000		1.000		1.000	
	16-25 years	1.241	(0.980,1.573)	1.198	(0.935,1.535)	1.907	(0.977,3.724)	1.093	(0.307, 3.890)

<sup>1</sup>Binge drinker = (>=4 drinks for women); (>=5 drinks for men).

**Table 3.5. Multivariable Models<sup>1</sup> for Alcohol and Binge Drinking<sup>2</sup> for All Men, Hispanic Men and Alcohol Use for Hispanic Women, NAWS 1999–2001**

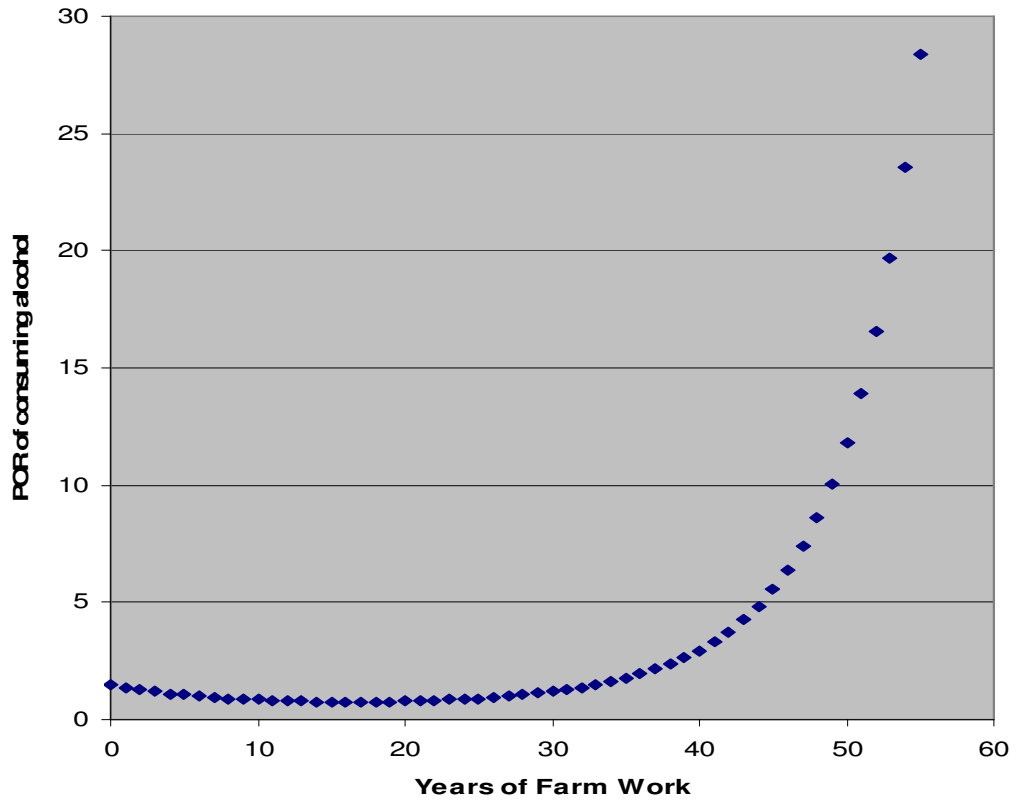
Drink Y/N												
All men				Hispanic men				Hispanic women				
Variable	POR	95% CI	p	Variable	POR	95% CI	p	Variable	POR	95% CI	p	
Hispanic	0.916	(0.684,1.226)	0.555	Age 14 – 17	0.106	(0.065,0.175)	<.001	Age 14-17	0.067	(0.012,0.392)	0.003	
Age 14 – 17	0.095	(0.055,0.166)	<.001	18 – 20	0.525	(0.404,0.682)	<.001	Education & location				
18 – 20	0.545	(0.417,0.713)	<.001	21 – 49	1.000			<7th grade	3.379	(1.052,10.848)	0.041	
21 – 49	1.000			50+	0.674	(0.500,0.909)	0.010	7 – 11th grade abroad	1.000			
50+	0.656	(0.491,0.877)	0.004	Hourly wage <\$5.26	0.796	(0.610,1.039)	0.093	12+ abroad	7.934	(1.692,37.192)	0.009	
Hourly wage <\$5.26	0.800	(0.624,1.025)	0.078	Speak English well /	0.209	(0.086,0.508)	<.001	7+ US	3.887	(1.146,13.185)	0.029	
Farm work <1 year	0.754	(0.629,0.905)	0.002	Farm work <1 year				Immigration & Mobility				
				Speak English well /	0.697	(0.525,0.927)	0.013	Undocumented/Settled	0.362	(0.171,0.766)	0.007	
				Farm work ≥1 year				Yrs farm work +	Curvilinear		0.043	
				Speak English <well /	1.000			Yrs farm work <sup>2</sup>				
				Farm work <1 year								
				Speak English <well /	1.246	(1.051,1.477)	0.011					
				Farm work ≥1 year								

Binge Y/N												
All men				Hispanic men								
Variable	POR	95% CI	p	Variable	POR	95% CI	p					
Hispanic	1.078	(0.686,1.693)	0.744	Age 14 – 17	0.177	(0.080,0.395)	<.001					
Age 14 – 17	0.151	(0.072,0.318)	<.001	18 – 20	0.574	(0.427,0.770)	<.001					
18 – 20	0.559	(0.423,0.739)	<.001	21 – 49	1.000							
21 – 49	1.000			50+	0.420	(0.302,0.583)	<.001					
50+	0.406	(0.308,0.536)	<.001	Wage >\$9.55	1.567	(1.076,2.280)	0.019					
Wage >\$9.55	1.453	(1.071,1.971)	0.016	Employed by FLC	0.648	(0.451,0.930)	0.019					
Employed by FLC	0.631	(0.438,0.909)	0.013	# Employees ≤150	2.014	(1.222,3.319)	0.006					
# Employees ≤150	1.991	(1.178,3.366)	0.010	Speak English								
				Well	0.968	(0.656,1.427)	0.868					
				Some	1.378	(1.157,1.642)	<.001					
				Not at all	1.000							

<sup>1</sup>All models adjusted for year of interview.

<sup>2</sup>Binge drinker = (≥ 4 drinks for women); (≥ 5 drinks for men).



**Figure 3.1.** Prevalence odds ratio of alcohol use by years of farm work for Hispanic women.

## REFERENCES

1. Alaniz ML. 1994. Mexican farmworker women's perspectives on drinking in a migrant community. *Int J Addict.* 29(9):1173–1188.
2. Alderete E, Vega WA, Kolody B, Aguilar-Gaxiola S. 2000. Lifetime prevalence of and risk factors for psychiatric disorders among Mexican migrant farmworkers in California. *Am J Public Health.* 90(4):608–614.
3. Arcury TA, Quandt SA, Elmore RC, Russell GB. 2002. Water safety among Latino farmworkers in North Carolina. *J Agromedicine.* 8(2):77–83.
4. Cargiulo T. 2007. Understanding the health impact of alcohol dependence. *Am J Health-Syst Pharm.* 64 Supp:S5–S11
5. CDC. 1999. BRFSS.  
<http://apps.nccd.cdc.gov/brfss/page.asp?cat=AC&yr=1999&qkey=4430&state=UB#AC> (Accessed September 30, 2008).
6. Cherpitel CJ, Borges G. 2001. A Comparison of Substance Use and Injury among Mexican-American emergency room patients in the United States and Mexicans in Mexico. *Alcohol Clin Exp Res.* 25(8):1174–1180.
7. Chi PS and McClain J. 1992. Drinking, farm and camp life: a study of drinking behavior in migrant camps in New York State. *J Rural Health.* 8(1):41–51.
8. Finch BK, Catalano RC, Novaco RW, Vega WA. 2003. Employment frustration and alcohol abuse/dependence among labor migrants in California. *J Immigr Health.* 5(4):181–186.
9. Neff JA. 1997. Solitary drinking, social isolation, and escape drinking motives as predictors of high quantity drinking , among Anglo, African American and Mexican American males. *Alcohol Alcohol.* 32(1):33–41.
10. Okosun IS, Seale JP, Daniel JB, Eriksen MP. 2005. Poor health is associated with episodic heavy alcohol use: evidence from a national survey. *Public Health.* 119:509–517.
11. Orozco S, Lukas S. 2000. Gender differences in acculturation and aggression as predictors of drug use in minorities. *Drug Alcohol Depend.* 59:165–172.
12. San Jose B, van de Mheen H, van Oers JAM, Mackenbach JP, Garretsen HFL. 2000. Adverse working conditions and alcohol use in men and women. *Alcohol Clin Exp Res.* 24(8):1207–1213.
13. Treiman KA, Beck KH. 1996. Adolescent gender differences in alcohol problem behaviors and social contexts of drinking. *J Sch Health.* 66(8):299–304.



14. Trotter RT. 1985. Mexican-American experience with alcohol: South Texas examples. *The American experience with alcohol: Contrasting cultural perspectives*. L Bennett and G Ames. New York: Plenum Press. 279–296.
15. USDA Economic Research Service. 1998. *Hired Farm Labor in U.S. Agriculture. Agricultural Outlook*.  
[www.ers.usda.gov/Publications/Agoutlook/oct1998/ao255f.pdf](http://www.ers.usda.gov/Publications/Agoutlook/oct1998/ao255f.pdf) (Accessed October 21, 2007).
16. U.S. Department of Labor (DOL), Employment and Training Administration. 2005. [www.doleta.gov/agworker/statmethods.cfm](http://www.doleta.gov/agworker/statmethods.cfm). (Accessed October 21, 2007).
17. Wechsler H. Binge drinking: the five/four measure. 1998. *J Stud Alcohol*. 58:122–123.
18. Wiesner M, Windle M, Freeman A. 2005. Work stress, substance use, and depression among young adult workers: an examination of main and moderator effect models. *J Occup Health Psychol*. 10(2):83–96.
19. Zemore SE. 2007. Acculturation and alcohol among Latino adults in the United States: A comprehensive review. *Alcohol Clin Exp Res*. 31(12):1968–1990

## CHAPTER IV

### **Dermatitis in U.S. Hired Farmworkers: Data from the National Agricultural Workers Survey 1999–2003**

#### **ABSTRACT**

**BACKGROUND:** The Agricultural, Forestry and Fishing sector has the highest incidence rate of dermatitis, with almost three times the rate of all private sectors. Hired farmworkers may be at higher risk due to intense sustained contact with crops and other plants, chemicals used on these plants, inadequate personal protective equipment, and lack of sanitary facilities in the field and at their residence.

**METHODS:** Data from the National Agricultural Workers Survey (NAWS) 1999–2003 were analyzed to determine the prevalence of and the employment and personal characteristics associated with dermatitis in hired farmworkers. The NAWS is a workplace-based multi-stage sample, representative of farmworkers employed in the continental U.S. SAS survey procedures that account for multi-stage sampling were used to calculate prevalences and conduct logistic regression analyses.

**RESULTS:** Prevalence of dermatitis on any body part was significantly higher for women than men (11.8% versus 6.7%, respectively). Women also reported significantly higher prevalence of dermatitis on their hands and their face. For women the prevalence of reported facial dermatitis was significantly higher for Hispanic women than non-Hispanic women (5.4% versus 0.7%, respectively), but not for other body parts. Young and old age, higher education, fewer assets, wages more than \$9.55 per hour, and working with pesticides were associated with lower odds of facial dermatitis for Hispanic women. For all women, having wages over \$9.55 per hour, compared to having wages

\$6.75 to \$7.74 per hour, was protective for any (POR=0.26), hand (POR=0.28), and arm (POR=0.07) dermatitis in the last 12 months. For all farmworkers, prevalence of dermatitis ranged from 5.8% in farmworkers who worked in bedding plants to 11.8% in farmworkers who worked in tobacco plants, though only farmworkers who worked in peach crops had a significantly higher prevalence of dermatitis compared to those who did not work in peach crops, 11.8% versus 8.2%.

**CONCLUSIONS:** The National Agricultural Workers Survey is an important source of data on dermatitis in this population that is not captured in other surveys that require workers to have permanent addresses or stable employment. Workers should be educated on avoidance of plants that are known to cause dermatologic reactions such as poison ivy and oak and to seek care when skin abnormalities appear. Further study is needed to better understand farmworker risks for dermatitis.

## INTRODUCTION

Data from the Bureau of Labor Statistics (BLS) in 2001 indicates that the highest incidence rate of dermatitis is found in the “Agriculture, Forestry and Fishing” (AFF) Sector. This sector reports 1.3 cases per 10,000 full-time workers compared to 0.5 cases per 10,000 full-time workers in all private sectors. “Manufacturing” and “Transportation and Public Utilities” had the second highest rate with 0.7 cases per 10,000 full-time workers, about half that reported in the AFF Sector. Dermatitis has declined from almost 6.0 to 1.3 cases per 10,000 full time workers between 1992 and 2001 (NIOSH 2004). Dermatitis cases in hired farmworkers may be less likely to be included in BLS data since the employer reports the cases to the BLS. Farmworkers may be less likely to report dermatitis to the employer due to temporary work status, not recognizing it as an occupational problem, worries about immigration status, or for other reasons.

Many exposures in agricultural are linked to dermatitis and include: crop and other plant materials, solar radiation, combined sun and plant exposures, agricultural chemicals, insects and other animal bites and stings, thorns, sharp-edged leaves, and hot, cold, and damp working conditions.

The severity of dermatitis in agriculture ranges from acute conditions such as sun rash or temporary pruritis to more severe conditions including allergic contact dermatitis requiring avoidance of certain materials and potentially a change of occupation, a difficult proposition for some farmworkers who may have no other employment options (Zug 1999; Spiewak 2001; Kaufman 1998; Burke 1997). The most severe case of allergic contact dermatitis was seen in workers in India after the non-native plant, feverfew, was unintentionally imported, causing allergic contact dermatitis and defoliative dermatitis leading to death in some cases (Hogan 1986). Chronic exposures may result in problems that persist over time or, after repeated assaults, skin may become scarred and fail to repair itself. In addition, skin that is damaged may be less able to provide a barrier against exposures such as pesticides (O’Malley 1997). Other conditions include irritant dermatitis, pigmentary disorders, mechanical injuries that may lead to infections, as well as skin cancer and frostbite (Zug 1999).

Phytophotodermatitis may occur when skin is exposed to a combination of sunlight and plant materials, either the actual crops such as limes, celery, carrots, parsley,

and dill, or weeds that grow alongside crops such as Queen Anne's lace, cow parsnip, and hogweed (Burke 1997).

Although some farming has become more mechanized with less contact of skin and plant materials, hired farmworkers may be more likely to develop dermatitis than other agricultural workers because many hired farmworkers work in tasks that require sustained contact including picking fruit, tying herbs in bundles, weeding around crops, tying back vines, and carrying tobacco leaves under an arm (Schuman 1985; Schenker 1990; Abraham 2007). Farmworkers may also have inadequate personal protective equipment, inadequate training on the safe use of pesticides, or inadequate access to field sanitation in the fields (Arcury 2001; Arcury 1999).

Farmworker accommodations in the U.S. vary widely due to temporary employment and mobility from a plot of land, to a tent, a garage, an apartment, a motel room, or a house (Arcury 1998; Sherman 1997; Washington State no date; Housing Assistance Council 2001; Early 2006). Farmworkers may have difficulty keeping themselves or their clothing clean due to lack of adequate facilities at their residence which may contribute to their exposure to chemicals or plant sap for longer periods of time, or to re-exposure to the same substance, if it were not removed completely from clothing. Cultural integration factors such as English language proficiency, time spent in the U.S., and immigration status may also affect whether workers develop dermatitis if they feel intimidated about asking for acceptable field sanitation facilities or repairs to facilities at rented residences or farmworker housing.

Although a few studies of dermatitis in hired farmworkers have been conducted, population-based data on dermatitis and agricultural workers are lacking. The National Agricultural Workers Survey Occupational Health Supplement data provide the opportunity to assess the prevalence of dermatitis in a nationally representative sample of hired farmworkers and to explore potential associations with work conditions, crops, economic and social farmworker characteristics. We analyzed data from the U.S. Department of Labor's National Agricultural Workers Survey (NAWS), 1999–2003 to determine characteristics associated with dermatitis in the 12 months previous to participating in the survey.

## **METHODS**

The NAWS is an ongoing national survey conducted by the U.S. Department of Labor (DOL) with the purpose of collecting data on crop farmworkers launched in 1988. The core NAWS collects information on wages and work. In 1999, in collaboration with the National Institute for Occupational Safety and Health (NIOSH), an occupational health supplement was added including questions on dermatitis.

### **Sample Selection**

The NAWS uses a workplace-based multi-stage sample, representative of farmworkers employed in the continental United States. Each year a sample of between 2500 and 3600 hired farmworkers is included in the survey. The sample is divided between three seasonal cycles in 12 sampling regions, with the number of interviews per region proportional to the region's farm labor employment during that quarter. The seasonal level of farm employment is determined by the United States Department of Agriculture's (USDA) Quarterly Agricultural Labor Survey (QALS) and is adjusted to correspond to the three 12-week cycles of the NAWS (October through December, February through April, and June through August).

The sample is selected using probability proportional to size at four different levels of sampling: Farm Labor Area (FLA), county, employer, and farmworker. The primary sampling units for the survey are the 487 FLAs in the continental U.S. The FLAs are groupings of several counties with similar agricultural properties, including farm labor expenses. For FLA, the attribute "size" refers to the amount of farm labor expenses for the district, as assessed by USDA's Census of Agriculture. Counties are then selected using probability proportional to the size of the farm labor expense. Information from the Bureau of Labor Statistics and the Agricultural Soil and Conservation Service are aggregated to serve as the initial list of growers in the selected counties and supplemented with information from extension agents, grower organizations, and farmworker service providers. Employers are selected using simple random sampling so as not to influence selection toward larger farms. The number of farmworkers selected from each farm depends on the number of workers employed, with a maximum of 12 workers sampled per farm. Farmworkers are approached at worksites and invited to participate in the

survey; for those who agree and are eligible, a time and place are arranged for the interview. Data are de-identified by data collection contractor before they are submitted to the Department of Labor or others. Institutional Review Board (IRB) review at both the National Institute for Occupational Safety and Health and the University of Michigan classified this secondary data analysis as exempt.

The NAWS dataset includes weights for analyzing multiple years of data adjusting for four factors: the differing length of farmworker work day and work week, the region, cycle, and year of data collection. Composite weights are calculated as the product of the week, cycle (season), and region weights, each of which is the inverse probability of being sampled in that period or place. The multi-year weight also adjusts for the relative size of one year of data compared to other years based on USDA's Quarterly Agricultural Labor Survey (Department of Labor 2005).

### **Study Population**

Workers aged 14 or older performing crop agriculture [all crops included in the North American Industry Classification System code 111] are eligible for the survey. The definition of crop agriculture by the USDA includes field work in the majority of nursery products, cash grains, and field crops, as well as in all fruits and vegetables. Crop agriculture also includes the production of silage and other animal fodder (Department of Labor 2005). The eligible NAWS population consists of nearly all farmworkers in crop agriculture, including field packers and supervisors, including those also holding non-farm jobs. Ranch, greenhouse, and nursery workers are included as long as they perform crop work that is included in the definition above. The survey excludes livestock workers, unemployed agricultural workers, secretaries, mechanics, and H2A temporary farmworkers. (The H2A Visa program has been in place since 1943 and revised in 1986, for non-immigrant, alien workers to work on a seasonal or temporary basis (USDA 1988).) Farmworkers who have not worked in agriculture at least one day in the 15 days prior to being asked to participate are not eligible for the survey.

Data presented in this analysis are based on face-to-face interviews with 16,945 hired farmworkers completed between October 1, 1998 and September 30, 2003. Interviews were conducted in the language of the worker's choice—Spanish or English.

The interviewers were almost exclusively native Spanish speakers with experience in farm work. The structured interviews lasted approximately 40 minutes and included questions on demographic characteristics of the farmworker respondent; composition and demographic characteristics of the farmworker's household; 12 month-employment and migration profile; income, wages, benefits, and working conditions; housing; assets, social services; and immigration status and health outcomes including dermatitis.

To assess dermatitis, participants were asked "The following questions regarding skin problems refer to the last 12 MONTHS, (In the last 12 MONTHS) Have you had any skin problems such as redness, inflammation, discoloration, or rash on your...(Hands? Arms? Face? Other body part?)."

Independent variables were assessed in four domains: cultural integration, economic status, social support, and employment factors. *Cultural Integration* was measured by the farmworkers' reported English speaking ability ("not at all"/"a little, somewhat"/"well"), the farmworkers' need to move for work and by their immigration status. Need to move for work and immigration status combines information from two questions. They are asked, "What is your current residence status?" Choices are provided if necessary and include: U.S. citizen by birth; naturalized U.S. citizen; permanent resident; have a border crossing card; a pending status; am undocumented; am a temporary resident; and none of the above. If they are not U.S. citizens by birth, they are asked follow-up questions about the type of program through which they received their status. A four-category variable was then constructed (citizen by birth/ naturalized citizen/ green card/ and unauthorized). Those reporting border crossing card, visitor status, implausible program, or undocumented are classified as undocumented. Migrant, also referred to as mobile, is based on the work history grid. Workers are categorized as migrants if one farm work job is more than 75 miles from another farm work job or their home so that they need to establish a temporary residence. The final combined variable used in this analysis includes two levels for each of the immigration status levels: undocumented mobile and undocumented settled; green card or other authorization mobile and green card or other authorization settled; and citizen mobile and citizen settled. In order to minimize reporting bias related to the sensitivity of the question, immigration status was the last question asked, after the interviewers had established a



rapport with the farmworkers who had been reassured that their response would be confidential.

*Economic status* was assessed by number of U.S. assets owned (car, house, mobile home, business), hourly wages, and the number of people per bedroom/room that people sleep in at the farmworker's place of residence. Hourly wages of those farmworkers who are paid by the piece (or bucket, basket) are computed from number of hours worked, the number of "pieces," and the rate per piece. *Social support factors* included marital status and whether a nuclear family member was currently residing in the household, as determined by a family grid where all members of the household were enumerated. *Employment factors* include whether a farmworker is directly employed by a grower or by a farm labor contractor, number of employers in last 12 months, months of farm work performed in the last 12 months, the number of years of farm work done in the U.S. in the farmworker's lifetime, availability of hand washing facilities (including water, soap, and towels), personal protective equipment used (including cloth gloves, thin rubber gloves, or thick rubber gloves), and finally if they loaded, mixed or applied pesticides in the last 12 months with their current employer. Number of employees working on farm was ascertained from the grower.

Exposure to individual crops and tasks was determined from the work grid—a listing of every crop and task period that the farmworker had worked in the last 12 months. The number of days the farmworkers worked in each crop in each work period in the previous 12 months was summed. If the farmworker worked in a crop for more than 14 days in the last 12 months they were considered exposed to this crop. The Department of Labor requires that statistics reported on any specific crop be based on cell sizes of 30 farmworkers or more, limiting this analysis to the following crops: apples, bedding plants, blueberries, cherries, corn, cotton/cottonseed, cucumbers, cut flowers, raisin grapes, table grapes, wine grapes, lettuce, nursery products, onions, oranges, peaches, strawberries, tobacco, and tomatoes.

### **Statistical Analysis**

Frequencies of each of the variables included in the analysis, as well as the prevalence of dermatitis, were computed. Prevalence odds ratios (POR) and 95% Wald confidence

intervals (CI) were computed for each variable using logistic regression models and estimated by the maximum likelihood method. Stratified analyses were performed by gender. To account for sample design effects, SAS v9.1.3 SURVEY procedures were used that allow for estimation of standard errors and confidence intervals in the presence of stratification and clustering. All percentages reported are weighted to reflect the prevalence in the population of farmworkers.

## **RESULTS**

Hired farmworkers in this study were predominantly male and Hispanic (See Table 4.1). More than half had fewer than seven years of education, did not speak English at all, and had lived in the U.S. for one year or less. Half of working farmworkers made less than \$6.50 per hour and had no assets, and more than one-third slept in rooms with three or more people. Although more than half of farmworkers were married, only two-fifths lived with family members.

Approximately one-fifth of farmworkers worked year round. Only one-tenth reported working directly with pesticides. One-fifth of farmworkers reported that they did not have hand washing facilities available to them in the field. The largest proportion of farmworkers (35%) were working in “fruit and nut” crops at the time of the interview, although women were most likely to work in vegetable crops (33%).

Prevalence of dermatitis was significantly higher for women than men (11.8% versus 6.7%, respectively) (Table 4.2). Women reported significantly higher prevalence for dermatitis on their hands and their face. Dermatitis prevalence on arms and on legs or feet was not significantly different for women versus men.

For men, dermatitis prevalence did not differ significantly by ethnicity. For women, the prevalence of reported dermatitis on the face was significantly higher for Hispanic women than non-Hispanic women (5.4% versus 0.69%, respectively), but not for other body parts. Given the very low prevalence of face dermatitis in non-Hispanic women, prevalence odds ratios were calculated only for Hispanic women for facial dermatitis.

Very few patterns emerged when we examined potential demographic, cultural integration, economic, social support or employment correlates of dermatitis (See Table

4.3 and Table 4.4). However, younger and older age, higher education, fewer assets, working with pesticides for Hispanic women, and high wages for all women were associated with lower odds of dermatitis. For all women, having wages over \$9.55 per hour, compared to having wages \$6.75 to \$7.74 per hour, was protective for any (POR=0.26), hand (POR=0.28), and arm (POR=0.07) dermatitis in the last 12 months. For Hispanic women, the odds of having dermatitis on the face when making more than \$9.55 per hour was also lower (POR=0.15).

Hispanic female farmworkers aged younger than 20 and older than 49 had three-tenths and one-tenth the odds, respectively, of having facial dermatitis compared to Hispanic women aged 25 to 29. Higher education and education in the U.S. was also protective for Hispanic female farmworkers developing facial dermatitis. Compared to Hispanic female farmworkers with fewer than seven years of education, Hispanic female farmworkers with 12 or more years of education in the U.S. had one-twentieth the odds of having dermatitis, and those with more than 12 years of education abroad had one-eighth the odds of having facial dermatitis. Hispanic female farmworkers who loaded, mixed, or applied pesticides had lower odds of developing facial dermatitis (POR=0.08).

Table 4.4 presents prevalences of dermatitis in farmworkers by individual crops with which they worked. The NAWS survey includes farmworkers in 106 individual crops, however, for this analysis only 19 had a sufficient number of respondents to calculate stable estimates. Also, because of limited sample size, results were not stratified by body location of the dermatitis or by gender. Prevalence of dermatitis ranged from 5.8% in farmworkers who worked in bedding plants to 11.8% in farmworkers who worked in tobacco plants, although these differences in prevalence were not statistically significant. Only farmworkers who worked in peach crops had a significantly higher prevalence of dermatitis compared to those who did not work in peach crops, 11.8% versus 8.2%, respectively. This finding may have been due to chance given the number of comparisons that were made.

## **DISCUSSION**

This paper is the first to report the prevalence of dermatitis in a representative sample of U.S. hired farmworkers and to document associations between dermatitis and the

occupational, economic, and social conditions in which farmworkers work and live. The self-reported prevalence of dermatitis was 11.8% in women and 6.7% in men. Overall, cultural integration, social support, and work characteristics were not predictive of having dermatitis, although high wages may be a protective factor against dermatitis in women. For facial dermatitis, old and young age as well as high wages predicted lower odds of having dermatitis.

The prevalence of dermatitis observed in this study is similar to findings from a representative sample of the U.S. working population, the National Health Interview Survey 1988 Occupational Health Supplement, where self-reported dermatitis was 12.4% of women and 10.2% of men. In that study, the prevalence was 8.8% for those in “agriculture, forestry & fishing and related occupations” (Behrens et al 1994). On the California Agricultural Workers Health Survey, a survey carried out with a representative sample of hired farmworkers in California, 3.5% of respondents reported dermatitis (Villarejo et al 2000), although upon physical examination 11% of men and 5% of women were found to have physician-diagnosed dermatitis (Villarejo, in press). A survey of a representative sample of farmworkers in two counties, one in Florida and one in Illinois, reported a much higher prevalence of dermatitis in the last 12 months: 31% in farmworkers in Florida, while in Illinois the prevalence was 29% in women but only 14% in men (Cameron 2006). A small study in North Carolina reported a very high proportion of dermatitis in farmworkers in migrant farmworker camps; 77% of men (42 of 54) and all five women in this study were diagnosed with dermatitis by a physician. Contact dermatitis was found in 5.6% of the sample (Krejci-Manwaring 1998). Another study in NC reported the prevalence of self-reported skin symptoms to be 24% to 37%, depending on the time of the season when people were asked. Blueberry work, not having a work contract, not showering after work, and age 25–34 versus age >34 were associated with dermatitis. Differences across these studies may be due to differences in definition of dermatitis, differences in interview methods, or differences in living and working conditions at specific locations.

Literature on dermatitis in farmworkers frequently attributes dermatitis to poison ivy/oak, pesticides, and reactions to specific crops (Earle-Richardson 2003; Kaufman 1998; Hogan 1986; Abraham 2007; Schuman 1985). A pilot project in New York and

Pennsylvania conducted surveillance of farmworkers in migrant health clinics and emergency rooms and found poison ivy to be the third most common complaint, after muscle strain and falls. Of the 49 poison ivy cases identified, eight were so severe that they resulted in the farmworkers filing for Workers' Compensation. The majority of these cases were working in apple and peach orchards, at tasks such as cutting weeds and working in trees (Earle–Richardson 2003). A study of workers' compensation in Washington state found the highest rate of occupational dermatitis claims from fruit and tree nut workers who had a claim rate of 3.7 per 1000 full–time employee years (Kaufman 1998). It is possible that our finding of dermatitis associated with working in peach trees may also be due to poison ivy.

A California study found that contact dermatitis to poison oak was the most frequently reported occupational skin disease in agricultural workers. Pesticide–associated contact dermatitis was the second most common. The pesticides associated with the largest number of cases of skin injury in that study were: inorganic sulfur, omite, petroleum and coal tar derivatives, and methyl bromide. The authors suggested that the contaminants or additives in pesticides may also be allergens (Hogan 1986).

A case study in North Carolina investigated dermatitis in farmworkers working in tobacco (Abraham 2007). Authors speculated that the tobacco itself might be an irritant or that their dermatitis may have been due to the chemicals that were applied, such as growth regulators (maleic hydrazide) and ripening agents (ethephon) (Abraham 2007). In an outbreak of dermatitis among tomato/strawberry workers who had symptoms so severe that they were hospitalized, their illness was attributed to the pesticide Dyrene (fungicide). After sensitization to Dyrene, protective clothing was not useful to prevent recurrences of their dermatitis (Schuman 1985).

Other studies have found associations between dermatitis and working in specific crops. In California a study compared dermatitis in grape workers to dermatitis in tomato workers and found grape workers significantly more likely to report dermatitis in the last three months. Physical exams of the workers found no difference in prevalence by crop. An association was found between lichenified hand dermatitis and not wearing gloves (Gamsky 1992; Schenker 1990). In the current study, we did not find reported dermatitis

an association between dermatitis and working in either grapes or tomatoes, or with wearing gloves.

This analysis had several limitations. The survey included only currently employed farmworkers. Farmworkers who left work due to a dermatologic problem would not be included in the survey, leaving only those farmworkers with less severe symptoms eligible to participate. Some farmworkers may not feel that their symptoms are abnormal if they do not prevent them from working. They might feel that their condition is just a “normal” part of their job, leading to underreporting of skin problems. The interview questions used to assess dermatitis and other exposures were general to ensure that they could be asked by non-medical interviewers without need for extensive clarification. Since data were from a questionnaire that covered many topics, and since the specific dermatitis question was a general question, we could not explore dermatitis in the depth that may have allowed us to differentiate the type of dermatitis. Physical exams and patch testing were beyond the scope of this survey so confirmation of reported dermatitis was not done. Nonetheless, this study is the first information on prevalence of self-reported dermatitis from a nationally representative sample of hired farmworkers.

Differentiation of occupational risk factors for dermatitis may not be possible in a cross-sectional study because farmworkers may experience too many exposures that are potentially related to dermatitis during the course of a year working on several crops in different locations. Prospective studies or frequent panel studies over the course of a year with physical exams may need to be conducted to get a better understanding of dermatitis in the farmworker population. Finally, of those surveyed, many crops had too few people interviewed who had been working more than 14 days, thus we were unable to evaluate many crops as exposures.

In summary, the NAWS provides an important and unique source of data to estimate the national prevalence of dermatitis in this hard to survey population of hired farmworkers. Dermatitis is an important health outcome for agricultural workers due to the many exposures they are subject to. Future NAWS occupational health supplements should include dermatitis as an outcome to track changes in prevalence over time. It is also important to support studies that collect data both on self-reports of dermatitis as well as physical examination given the differences in reported and physician-confirmed

cases of dermatitis. Workers should be educated to avoid plants that are known to cause dermatologic reactions such as poison ivy and oak and to seek care when skin abnormalities appear.

**Table 4.1. Hired Farmworker Characteristics by Sex,  
National Agricultural Workers Study 1999–2003**

		All	Men	Women
		n=16,945	n=13,819	n=3126
Variable Categories		weighted %	weighted %	weighted %
<b>DEMOGRAPHIC CHARACTERISTICS</b>				
<b>Hispanic</b>	No	12%	11%	15%
	Yes	88%	89%	85%
<b>Age (median=30)</b>	14–19	12%	13%	9%
	20–24	21%	13%	21%
	25–29	16%	16%	17%
	30–34	14%	13%	14%
	35–39	11%	11%	13%
	40–49	16%	15%	20%
	50+	10%	11%	7%
<b>Highest grade &amp; location</b>	<7th grade	55%	56%	49%
	7–11th grade (Abroad)	21%	22%	18%
	12+ grade (Abroad)	4%	4%	4%
	7–11th grade (US)	9%	8%	10%
	12+ grade (US)	11%	9%	18%
<b>INTEGRATION FACTORS*</b>				
<b>Speak English</b>	Well	9%	8%	15%
	Some	38%	39%	35%
	Not at all	53%	54%	50%
<b>Years in US</b>	<1 year	16%	18%	9%
	1 year	10%	10%	10%
	2–5 years	17%	17%	20%
	6–15 years	26%	25%	31%
	16–25 years	16%	17%	13%
	26+ years	7%	8%	4%
<b>Immigration status &amp; mobility</b>	Born in US	7%	6%	13%
	Undocumented & Mobile	36%	41%	20%
	Undocumented & Settled	25%	23%	31%
	Green Card/other & Mobile	11%	11%	11%
	Green Card/other & Settled	17%	16%	21%
	Citizen & Mobile	3%	3%	5%
	Citizen & Settled	8%	7%	11%
<b>ECONOMIC FACTORS</b>				
<b># Assets US</b>	No assets	52%	56%	38%
	1 asset	33%	32%	37%
	2+ assets	15%	12%	24%
<b>Hourly wage (median=\$6.50)</b>	<\$5.26	12%	11%	16%
	\$5.26–\$5.94	16%	15%	18%
	\$5.95–\$6.74	25%	24%	27%
	\$6.75–\$7.74	24%	24%	24%
	\$7.75–\$9.55	14%	16%	10%
	>\$9.55	9%	10%	5%
<b># sleeping/room</b>	≤2	62%	62%	64%
	>2	38%	38%	37%

(continued on next page)



**Table 4.1. Hired Farmworker Characteristics by Sex,  
National Agricultural Workers Study 1999–2003 (Continued)**

Variable Categories		All n=16,945 weighted %	Men n=13,819 weighted %	Women n=3,126 weighted %
<b>SOCIAL SUPPORT FACTORS</b>				
<b>Married</b>	Yes	56%	55%	59%
<b>Family members in house hold</b>	Yes	41%	33%	73%
<b>WORK FACTORS</b>				
<b>Employer</b>	Grower	76%	75%	77%
	Farm Labor Contractor	24%	25%	23%
<b># Employers</b>	1	70%	68%	75%
	2	19%	20%	17%
	3+	11%	12%	8%
<b># Employees (median=50)</b>	1–10	13%	14%	11%
	11–50	39%	40%	36%
	51–150	23%	23%	21%
	151+	25%	24%	32%
<b>Days worked in FW in last year (median=174)</b>	<31 days	11%	10%	14%
	31–90 days	19%	18%	24%
	91–180 days	22%	20%	29%
	181–270 days	33%	33%	25%
	271–366 days	17%	20%	8%
<b>Worked with pesticides</b>	Yes	9%	11%	3%
	No	91%	89%	97%
<b>Hand washing facilities available**</b>	Yes	80%	78%	88%
	No	20%	22%	12%
<b>Crop at time of interview</b>	Field crops	15%	17%	7%
	Fruit & Nut crops	35%	36%	31%
	Nursery & Floriculture	17%	14%	26%
	Vegetables	29%	28%	33%
	Miscellaneous	4%	5%	2%
<b>Years of farm work (median=6)</b>	<1 year	19%	20%	16%
	1 year	10%	10%	10%
	2–5 years	20%	18%	27%
	6–15 years	27%	26%	31%
	16–25 years	15%	16%	10%
	26+ years	9%	11%	6%

\*Hispanic farmworkers only.

\*\*Data only available for first year of data collection (1999).

**Table 4.2. Prevalence of Dermatitis by Body Location, Sex, and Ethnicity, NAWS 1999–2003**

Location	MEN			WOMEN		
	All N=13,819 % (95%CI)	Hispanic N=12,126 % (95%CI)	Non-Hispanic N=1,110 % (95%CI)	All N=3,126 % (95%CI)	Hispanic N=2,288 % (95%CI)	Non-Hispanic N=587 % (95%CI)
Any*	<b>6.67** (5.68, 7.67)</b>	6.88 (5.81, 7.96)	5.04 (2.83, 7.25)	<b>11.82 (9.11, 14.54)</b>	11.87 (8.86, 14.89)	11.57 (5.90, 17.23)
Hands	<b>3.03** (2.40, 3.67)</b>	3.18 (2.50, 3.86)	1.90 (0.88, 2.92)	<b>5.43 (3.82, 7.05)</b>	5.51 (3.75, 7.27)	5.03 (2.02, 8.03)
Arms	2.69 (2.04, 3.35)	2.72 (2.03, 3.41)	2.51 (1.16, 3.87)	3.98 (2.72, 5.24)	3.27 (2.12, 4.43)	7.92 (2.66, 13.17)
Face	<b>1.90** (1.34, 2.46)</b>	2.00 (1.40, 2.61)	1.09 (0.29, 1.89)	<b>4.64 (3.06, 6.21)</b>	<b>5.35*** (3.65, 7.05)</b>	<b>0.69 (0.00, 1.52)</b>
Legs/Feet	0.83 (0.55, 1.12)	0.84 (0.53, 1.14)	0.80 (0.27, 1.33)	1.52 (0.79, 2.25)	1.44 (0.68, 2.19)	1.97 (0.00, 4.55)

\*Any = hands, arms, face, legs/feet, & torso.

\*\*Men and women are significantly different at the p<0.05 level.

\*\*\*Hispanic and non-Hispanic women are different at the p<0.05 level.

**Table 4.3. Unadjusted Prevalence Odds Ratios (POR) of Dermatitis for Men by Body Part, NAWS 1999–2003**

		<b>Any POR</b>	<b>95% CI</b>	<b>Hand POR</b>	<b>95% CI</b>	<b>Arm POR</b>	<b>95% CI</b>
<b>DEMOGRAPHIC CHARACTERISTICS</b>							
<b>Age group</b>	14–19	<b>0.657</b>	<b>(0.471, 0.916)</b>	<b>0.625</b>	<b>(0.409, 0.953)</b>	0.747	(0.296, 1.885)
	20–24	0.766	(0.511, 1.150)	0.739	(0.382, 1.429)	0.922	(0.579, 1.468)
	25–29	1.000		1.000		1.000	
	30–34	0.723	(0.493, 1.061)	0.775	(0.407, 1.475)	0.937	(0.575, 1.527)
	35–39	<b>0.632</b>	<b>(0.422, 0.948)</b>	<b>0.442</b>	<b>(0.261, 0.749)</b>	1.126	(0.548, 2.316)
	40–49	0.706	(0.492, 1.013)	<b>0.470</b>	<b>(0.258, 0.858)</b>	0.956	(0.537, 1.702)
	50+	0.815	(0.555, 1.197)	0.708	(0.381, 1.318)	0.967	(0.532, 1.756)
<b>Highest grade &amp; location</b>	<7th grade	1.000		1.000		1.000	
	7–11th grade (Abroad)	1.078	(0.867, 1.341)	0.939	(0.682, 1.292)	1.096	(0.759, 1.583)
	12+ grade (Abroad)	1.235	(0.816, 1.870)	1.129	(0.599, 2.129)	1.362	(0.642, 2.888)
	7–11th grade (US)	1.151	(0.706, 1.879)	1.361	(0.751, 2.467)	0.868	(0.379, 1.988)
	12+ grade (US)	0.692	(0.416, 1.150)	0.525	(0.263, 1.048)	0.917	(0.510, 1.648)
<b>INTEGRATION FACTORS*</b>							
<b>Speak English</b>	Well	1.193	(0.625, 2.278)	1.462	(0.684, 3.125)	0.746	(0.342, 1.625)
	Some	1.213	(0.907, 1.621)	1.223	(0.801, 1.866)	1.126	(0.723, 1.756)
	Not at all	1.000		1.000		1.000	
<b>Years in U.S.</b>	<1 year	0.718	(0.402, 1.282)	0.937	(0.467, 1.879)	0.619	(0.290, 1.322)
	1 year	<b>0.689</b>	<b>(0.493, 0.962)</b>	<b>0.328</b>	<b>(0.135, 0.795)</b>	<b>0.449</b>	<b>(0.243, 0.827)</b>
	2–5 years	1.231	(0.931, 1.627)	1.437	(0.931, 2.219)	0.961	(0.658, 1.405)
	6–15 years	1.000		1.000		1.000	
	16–25 years	0.772	(0.581, 1.027)	0.764	(0.503, 1.162)	<b>0.618</b>	<b>(0.388, 0.984)</b>
	26+	1.092	(0.749, 1.592)	0.763	(0.443, 1.316)	0.936	(0.393, 2.228)
	Born in US	1.148	(0.426, 3.093)	1.805	(0.425, 7.660)	<b>0.342</b>	<b>(0.154, 0.759)</b>
<b>Immigration status &amp; mobility</b>	Undocumented & Mobile	1.000		1.000		1.000	
	Undocumented & Settled	1.108	(0.773, 1.589)	1.101	(0.691, 1.756)	1.288	(0.743, 2.236)
	Green Card/other & Mobile	1.026	(0.632, 1.668)	0.883	(0.439, 1.779)	1.252	(0.593, 2.647)
	Green Card/other & Settled	0.922	(0.570, 1.492)	1.218	(0.653, 2.271)	0.729	(0.441, 1.303)
	Citizen & Mobile	1.412	(0.681, 2.930)	1.302	(0.417, 4.066)	0.861	(0.390, 1.901)
	Citizen & Settled	1.612	(0.660, 3.937)	2.468	(0.696, 8.755)	0.959	(0.475, 1.938)

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**Table 4.3. Unadjusted Prevalence Odds Ratios (POR) of Dermatitis for Men by Body Part, NAWS 1999–2003 (continued)**

		Any		Hand		Arm	
		POR	95% CI	POR	95% CI	POR	95% CI
<b>ECONOMIC FACTORS</b>							
<b># Assets US</b>	No assets	1.000		1.000		1.000	
	1 asset	1.165	(0.637, 2.131)	1.031	(0.436, 2.440)	1.231	(0.689, 2.199)
	2+ assets	1.064	(0.604, 1.875)	0.773	(0.317, 1.889)	1.181	(0.780, 1.787)
<b>Hourly wage</b>	<\$5.26	1.010	(0.531, 1.920)	1.423	(0.608, 3.332)	0.706	(0.294, 1.695)
	\$5.26–\$5.94	0.842	(0.566, 1.254)	0.795	(0.419, 1.508)	0.956	(0.453, 2.015)
	\$5.95–\$6.74	0.941	(0.702, 1.262)	0.940	(0.559, 1.581)	1.057	(0.578, 1.932)
	\$6.75–\$7.74	1.000		1.000		1.000	
	\$7.75–\$9.55	1.070	(0.716, 1.599)	0.963	(0.44, 2.108)	1.135	(0.650, 1.982)
	>\$9.55	1.008	(0.690, 1.472)	0.949	(0.54, 1.666)	0.998	(0.458, 2.173)
<b># sleeping/room</b>	≤2	1.000		1.000		1.000	
	>2	1.156	(0.867, 1.542)	0.902	(0.642, 1.267)	1.222	(0.825, 1.811)
<b>SUPPORT FACTORS</b>							
<b>Married</b>	No	1.000		1.000		1.000	
	Yes	1.032	(0.785, 1.356)	1.156	(0.781, 1.710)	0.934	(0.629, 1.389)
<b>Family members in house hold</b>	No	1.000		1.000		1.000	
	Yes	0.989	(0.746, 1.311)	0.938	(0.642, 1.370)	1.033	(0.727, 1.469)
<b>WORK FACTORS</b>							
<b>Employer</b>	Grower	1.000		1.000		1.000	
	Farm Labor Contractor	0.849	(0.576, 1.252)	<b>0.531</b>	<b>(0.350, 0.807)</b>	1.166	(0.669, 2.033)
<b># Employers</b>	1	1.000		1.000		1.000	
	2+	1.152	(0.845, 1.571)	1.031	(0.644, 1.650)	1.030	(0.693, 1.533)
<b># Employees (mean=142.2)</b>	1–10	1.446	(0.841, 2.487)	1.607	(0.660, 3.914)	1.233	(0.817, 1.860)
	11–50	0.955	(0.721, 1.265)	0.907	(0.552, 1.488)	0.832	(0.533, 1.298)
	51–150	1.000		1.000		1.000	
	151+	1.333	(0.912, 1.948)	0.996	(0.567, 1.749)	1.285	(0.728, 2.269)
<b>Days worked in FW in last year</b>	<31 days	0.723	(0.404, 1.297)	<b>0.240</b>	<b>(0.092, 0.629)</b>	0.818	(0.308, 2.172)
	31–90 days	0.936	(0.645, 1.357)	1.145	(0.553, 2.370)	0.730	(0.383, 1.391)
	91–180 days	1.000		1.000		1.000	
	181–270 days	0.974	(0.689, 1.375)	0.877	(0.588, 1.308)	0.999	(0.660, 1.511)
	271–366 days	0.942	(0.642, 1.383)	1.035	(0.646, 1.658)	0.692	(0.447, 1.071)

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**Table 4.3. Unadjusted Prevalence Odds Ratios (POR) of Dermatitis for Men by Body Part, NAWS 1999–2003**

		<b>Any POR</b>	<b>95% CI</b>	<b>Hand POR</b>	<b>95% CI</b>	<b>Arm POR</b>	<b>95% CI</b>
<b>WORK FACTORS</b>							
<b>Load, Mix, Apply pesticides</b>	No	1.000		1.000		1.000	
	Yes	1.250	(0.871, 1.792)	1.355	(0.873, 2.102)	1.208	(0.749, 1.949)
<b>Hand washing facilities**</b>	No	1.000		1.000		1.000	
	Yes	0.631	(0.342, 1.166)	0.736	(0.336, 1.61)	0.586	(0.254, 1.354)
<b>Gloves</b>							
<b>Cloth**</b>	No			1.000			
	Yes			0.598	(0.301, 1.189)		
<b>Thin rubber**</b>	No			1.000			
	Yes			0.518	(0.229, 1.173)		
<b>Thick rubber**</b>	No			1.000			
	Yes			1.008	(0.569, 1.785)		
<b>Years of farm work</b>	<1 year	0.808	(0.497, 1.313)	1.039	(0.584, 1.846)	0.869	(0.468, 1.612)
	1 year	0.798	(0.535, 1.191)	0.443	(0.195, 1.009)	0.589	(0.299, 1.160)
	2–5 years	<b>1.243</b>	<b>(1.000, 1.544)</b>	<b>1.529</b>	<b>(1.136, 2.059)</b>	1.056	(0.703, 1.587)
	6–15 years	1.000		1.000		1.000	
	16–25 years	0.785	(0.594, 1.036)	0.810	(0.525, 1.25)	0.617	(0.364, 1.045)
	26+ years	1.250	(0.802, 1.947)	1.346	(0.617, 2.934)	1.187	(0.677, 2.082)

Table 4.4. Unadjusted Prevalence Odds Ratios (POR) of Dermatitis for Women by Body Part, NAWS 1999–2003

		Any		Hand		Arm		Face (Hispanic)	
		POR	95% CI	POR	95% CI	POR	95% CI	POR	95% CI
<b>DEMOGRAPHIC CHARACTERISTICS</b>									
<b>Age group</b>	14–19	1.061	(0.519, 2.170)	1.758	(0.735, 4.206)	0.514	(0.167, 1.587)	<b>0.290</b>	<b>(0.118, 0.711)</b>
	20–24	0.896	(0.563, 1.428)	0.966	(0.583, 1.600)	0.497	(0.220, 1.126)	0.701	(0.272, 1.805)
	25–29	1.000		1.000		1.000		1.000	
	30–34	0.835	(0.474, 1.470)	0.770	(0.334, 1.777)	0.898	(0.361, 2.234)	0.512	(0.202, 1.300)
	35–39	0.862	(0.376, 1.977)	0.857	(0.373, 1.969)	0.563	(0.213, 1.493)	0.794	(0.266, 2.369)
	40–49	1.116	(0.606, 2.054)	0.741	(0.350, 1.572)	1.749	(0.763, 4.012)	1.056	(0.408, 2.735)
	50+	0.901	(0.342, 2.376)	0.644	(0.187, 2.222)	1.618	(0.345, 7.584)	<b>0.092</b>	<b>(0.026, 0.322)</b>
<b>Highest grade &amp; location</b>	<7th grade	1.000		1.000		1.000		1.000	
	7–11th grade (Abroad)	0.666	(0.372, 1.190)	1.138	(0.593, 2.183)	0.769	(0.270, 2.194)	0.468	(0.188, 1.167)
	12+ grade (Abroad)	0.885	(0.334, 2.341)	1.467	(0.369, 5.834)	0.492	(0.121, 2.006)	<b>0.137</b>	<b>(0.028, 0.667)</b>
	7–11th grade (US)	0.634	(0.400, 1.003)	1.138	(0.551, 2.350)	0.598	(0.230, 1.556)	<b>0.317</b>	<b>(0.121, 0.832)</b>
	12+ grade (US)	0.710	(0.390, 1.292)	0.985	(0.493, 1.972)	1.493	(0.604, 3.695)	<b>0.048</b>	<b>(0.013, 0.174)</b>
<b>INTEGRATION FACTORS*</b>									
<b>Speak English</b>	Well	0.693	(0.382, 1.256)	1.297	(0.590, 2.853)	<b>0.298</b>	<b>(0.100, 0.895)</b>	<b>0.197</b>	<b>(0.063, 0.616)</b>
	Some	1.140	(0.580, 2.242)	1.256	(0.559, 2.822)	1.211	(0.599, 2.450)	0.825	(0.370, 1.836)
	Not at all	1.000		1.000		1.000		1.000	
<b>Years of farm work</b>	<1 year	0.961	(0.423, 2.180)	0.792	(0.217, 2.882)	1.356	(0.334, 5.516)	1.781	(0.705, 4.502)
	1 year	1.300	(0.620, 2.726)	1.266	(0.309, 5.187)	0.589	(0.205, 1.692)	1.484	(0.672, 3.277)
	2–5 years	1.202	(0.701, 2.059)	1.540	(0.768, 3.085)	1.680	(0.787, 3.584)	0.909	(0.377, 2.190)
	6–15 years	1.000		1.000		1.000		1.000	
	16–25 years	1.389	(0.731, 2.639)	1.064	(0.433, 2.617)	1.125	(0.549, 2.303)	2.072	(0.694, 6.186)
	26+	1.693	(0.681, 4.210)	0.390	(0.100, 1.515)	<b>5.920</b>	<b>(1.932, 18.14)</b>	0.588	(0.162, 2.125)
	Born in US	1.505	(0.773, 2.929)	1.232	(0.540, 2.81)	0.346	(0.102, 1.169)	1.813	(0.560, 5.875)
<b>Immigration status &amp; mobility</b>	Undocumented & Mobile	1.000		1.000		1.000		1.000	
	Undocumented & Settled	0.815	(0.426, 1.560)	0.848	(0.387, 1.856)	0.817	(0.345, 1.936)	0.529	(0.239, 1.172)
	Green Card/other & Mobile	0.638	(0.142, 2.872)	<b>0.311</b>	<b>(0.102, 0.946)</b>	<b>0.119</b>	<b>(0.017, 0.859)</b>	0.989	(0.176, 5.559)
	Green Card/other & Settled	0.958	(0.484, 1.894)	0.611	(0.252, 1.479)	1.285	(0.434, 3.802)	1.185	(0.511, 2.752)
	Citizen & Mobile	1.509	(0.587, 3.879)	1.441	(0.407, 5.097)	2.321	(0.49, 10.984)	<b>0.138</b>	<b>(0.036, 0.537)</b>
	Citizen & Settled	1.291	(0.647, 2.574)	0.487	(0.175, 1.359)	0.657	(0.142, 3.031)	1.833	(0.623, 5.391)

\*Hispanic farmworkers only.

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**Table 4.4. Unadjusted Prevalence Odds Ratios (POR) of Dermatitis for Women by Body Part, NAWS 1999–2003 (continued)**

		Any		Hand		Arm		Face (Hispanic)	
		POR	95% CI	POR	95% CI	POR	95% CI	POR	95% CI
<b>ECONOMIC FACTORS</b>									
<b># Assets US</b>	No assets	0.745	(0.474, 1.170)	1.498	(0.780, 2.880)	0.594	(0.305, 1.158)	0.406	(0.157, 1.050)
	1 asset	<b>0.499</b>	<b>(0.276, 0.900)</b>	0.651	(0.323, 1.315)	0.788	(0.325, 1.909)	<b>0.252</b>	<b>(0.098, 0.652)</b>
	2+ assets	1.000		1.000		1.000		1.000	
<b>Hourly wage</b>	<\$5.26	1.003	(0.523, 1.925)	1.281	(0.490, 3.345)	1.019	(0.401, 2.588)	0.855	(0.416, 1.759)
	\$5.26–\$5.94	<b>0.288</b>	<b>(0.129, 0.640)</b>	0.472	(0.169, 1.315)	<b>0.296</b>	<b>(0.102, 0.865)</b>	<b>0.201</b>	<b>(0.063, 0.637)</b>
	\$5.95–\$6.74	<b>0.702</b>	<b>(0.507, 0.973)</b>	<b>0.419</b>	<b>(0.176, 1.000)</b>	0.830	(0.483, 1.428)	0.972	(0.495, 1.910)
	\$6.75–\$7.74	1.000		1.000		1.000		1.000	
	\$7.75–\$9.55	0.963	(0.404, 2.291)	0.428	(0.128, 1.433)	0.802	(0.151, 4.257)	1.794	(0.775, 4.157)
	>\$9.55	<b>0.255</b>	<b>(0.113, 0.576)</b>	<b>0.279</b>	<b>(0.083, 0.940)</b>	<b>0.068</b>	<b>(0.014, 0.327)</b>	<b>0.146</b>	<b>(0.035, 0.606)</b>
<b># sleeping/room</b>	≤2	1.000		1.000		1.000		1.000	
	>2	0.652	(0.408, 1.043)	<b>0.574</b>	<b>(0.333, 0.991)</b>	<b>0.369</b>	<b>(0.193, 0.705)</b>	0.769	(0.445, 1.329)
<b>SUPPORT FACTORS</b>									
<b>Married</b>	No	1.000		1.000		1.000		1.000	
	Yes	1.343	(0.870, 2.072)	1.183	(0.746, 1.876)	1.989	(1.129, 3.505)	1.195	(0.555, 2.573)
<b>Family members in house hold</b>	No	1.000		1.000		1.000		1.000	
	Yes	1.454	(0.906, 2.335)	0.987	(0.604, 1.613)	1.672	(0.761, 3.674)	1.479	(0.644, 3.395)
<b>WORK FACTORS</b>									
<b>Employer</b>	Grower	1.000		1.000		1.000		1.000	
	Farm Labor Contractor	0.938	(0.521, 1.689)	0.618	(0.290, 1.315)	1.025	(0.411, 2.560)	1.429	(0.748, 2.729)
<b># Employers</b>	1	1.000		1.000		1.000		1.000	
	2+	1.232	(0.808, 1.879)	0.959	(0.577, 1.593)	1.434	(0.698, 2.944)	1.220	(0.632, 2.355)
<b># Employees (mean=142.2)</b>	1–10	1.168	(0.607, 2.249)	0.654	(0.335, 1.274)	<b>3.420</b>	<b>(1.390, 8.417)</b>	0.561	(0.202, 1.559)
	11–50	1.211	(0.644, 2.277)	1.256	(0.665, 2.370)	1.719	(0.726, 4.074)	1.100	(0.430, 2.814)
	51–150	1.000		1.000		1.000		1.000	
	151+	1.410	(0.694, 2.868)	1.008	(0.401, 2.531)	0.967	(0.558, 1.677)	2.035	(0.772, 5.366)

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Table 4.4. Unadjusted Prevalence Odds Ratios (POR) of Dermatitis for Women by Body Part, NAWS 1999–2003 (continued)

		Any		Hand		Arm		Face (Hispanic)	
		POR	95% CI	POR	95% CI	POR	95% CI	POR	95% CI
<b>WORK FACTORS</b>									
<b>Days worked in FW in last year</b>	<31 days	0.779	(0.324, 1.874)	0.868	(0.376, 2.006)	0.848	(0.269, 2.669)	0.836	(0.178, 3.940)
	31–90 days	0.747	(0.425, 1.311)	0.669	(0.350, 1.278)	1.023	(0.367, 2.855)	0.639	(0.285, 1.433)
	91–180 days	1.000		1.000		1.000		1.000	
	181–270 days	0.801	(0.596, 1.078)	1.129	(0.631, 2.020)	0.985	(0.537, 1.808)	0.476	(0.193, 1.177)
	271–366 days	0.893	(0.534, 1.492)	1.330	(0.569, 3.105)	0.562	(0.202, 1.564)	0.623	(0.226, 1.712)
<b>Load, Mix, Apply pesticides</b>	No	1.000		1.000		1.000		1.000	
	Yes	0.465	(0.187, 1.156)	0.582	(0.259, 1.306)	0.689	(0.155, 3.072)	<b>0.078</b>	<b>(0.019, 0.324)</b>
<b>Hand washing facilities**</b>	No	1.000		1.000		1.000		1.000	
	Yes	0.357	(0.105, 1.212)	0.324	(0.092, 1.137)	0.349	(0.066, 1.853)	0.356	(0.052, 2.429)
<b>Cloth gloves**</b>	No			1.000					
	Yes			0.467	(0.118, 1.850)				
<b>Thin rubber gloves**</b>	No			1.000					
	Yes			0.352	(0.100, 1.239)				
<b>Thick rubber gloves**</b>	No			1.000					
	Yes			1.356	(0.593, 3.098)				
<b>Years of farm work</b>	<1 year	1.432	(0.738, 2.781)	0.798	(0.226, 2.817)	1.448	(0.428, 4.893)	2.133	(0.721, 6.310)
	1 year	<b>2.488</b>	<b>(1.377, 4.495)</b>	1.694	(0.655, 4.383)	1.569	(0.495, 4.978)	<b>3.413</b>	<b>(1.08, 10.749)</b>
	2–5 years	1.406	(0.956, 2.067)	<b>2.111</b>	<b>(1.350, 3.302)</b>	1.242	(0.694, 2.222)	0.934	(0.451, 1.752)
	6–15 years	1.000		1.000		1.000		1.000	
	16–25 years	1.200	(0.655, 2.198)	1.061	(0.430, 2.614)	1.520	(0.703, 3.282)	1.667	(0.847, 2.505)
	26+ years	<b>2.275</b>	<b>(1.033, 5.010)</b>	1.345	(0.451, 4.015)	<b>3.311</b>	<b>(1.172, 9.354)</b>	1.627	(0.183, 6.024)

\*\*Data only available for first year of data collection (1999).



**Table 4.5. Prevalence of dermatitis in hired farmworkers  
in specific crops, NAWS 1999–2003**

<b>Crop</b>	<b>Worked in crop &gt;14 days in last 12 months</b>		<b>Worked in crop ≤14 days in last 12 months</b>		<b>P-value diff.</b>
	<b>Freq.</b>	<b>Derm. %</b>	<b>Freq.</b>	<b>Derm. %</b>	
Apples	1,687	8.0%	15,258	8.1%	0.941
Bedding plants	519	5.8%	16,426	8.2%	0.320
Blueberries	299	9.6%	16,646	8.1%	0.303
Cherries	424	10.9%	16,521	8.1%	0.425
Corn	435	8.3%	16,510	8.1%	0.908
Cotton/cottonseed	1,008	9.2%	15,937	8.1%	0.524
Cucumbers	410	7.3%	16,535	8.2%	0.597
Cut flowers	337	8.2%	16,608	8.1%	0.989
Grapes, raisin	368	9.7%	16,577	8.1%	0.502
Grapes, table	2,268	7.9%	14,677	8.2%	0.879
Grapes, wine	618	10.8%	16,327	8.0%	0.280
Lettuce	722	7.3%	16,223	8.2%	0.553
Nursery products	2,856	8.0%	14,089	8.2%	0.898
Onions	725	7.9%	16,220	8.1%	0.905
Oranges	1,343	7.3%	15,602	8.2%	0.653
Peaches	659	10.3%	16,286	8.0%	0.048
Strawberries	727	9.2%	16,218	8.1%	0.541
Tobacco	666	11.8%	16,279	8.0%	0.179
Tomatoes	601	7.5%	16,344	8.2%	0.671

## REFERENCES

1. Abraham NF, Feldman SR, Vallejos Q, Whalley LE, Brooks T, Cabral G, Earp P, Fleischer Jr AB, Quandt SA, Arcury TA. 2007. Contact dermatitis in tobacco farmworkers. *Contact Dermatitis*. 57:40–43.
2. Arcury TA, Quandt SA, Austin CK, Preisser J, Cabrera LF. 1999. Implementation of EPA's Worker Protection Standard Training for agricultural laborers: An Evaluation Using North Carolina Data. *Public Health Rep*. 114:459–468.
3. Arcury TA, Quandt SA, Cravey AJ, Elmore RC, Russell GB. 2001. Farmworker reports of pesticide safety and sanitation in the work environment. *Am J Ind Med*. 39(5):487–498.
4. Behrens V, Seligman P, Cameron L, Mathias T, Fine L. 1994. The prevalence of back pain hand discomfort, and dermatitis in the US working population. *Am J Public Health*. 84:1780–1785.
5. Burke WA. 1997. Skin diseases in farmers. In Langley RL, McLymore RL, Meggs WJ, Roberson GT, eds. *Safety and Health in Agriculture, Forestry, and Fishing*. Rockville, MD: Government Institutes. 321–352.
6. Cameron L, Lalich N, Bauer S, Booker V, Bogue HO, Samuels S, Steege AL. 2006. Occupational health survey of farm workers by camp health aides. *J Agric Saf Health*. 12(2):139–153.
7. Earle–Richardson G, Jenkins PL, Slingerland DT, Mason C, Miles M, May JJ. 2003. Occupational injury and illness among migrant and seasonal farmworkers in New York state and Pennsylvania, 1997–1999: Pilot study of a new surveillance method. *Am J Ind Med*. 44:37–45.
8. Early J, Davis SW, Quandt SA, Rao P, Snively BM, Arcury TA. 2006. Housing characteristics of farmworker families in North Carolina. *J Immigr Minor Health*. 8(2):173–84.
9. Gamsky TE, McCurdy SA, Wiggins P, Samuels SJ, Berman B, Schenker MB. 1992. Epidemiology of dermatitis among California farm workers. *J Occup Med*. 34(3):304–310.
10. Hogan DJ, Lane P. 1986. Dermatologic disorders in agriculture. *Occup Med*. 1(2):285–300.
11. Housing Assistance Council. 2001. *No Refuge from the Fields: Findings from a Survey of Farmworker Housing Conditions in the United States*. Washington, DC: Housing Assistance Council. Available at: <http://www.ruralhome.org/> (Accessed July 10, 2008).

12. Kaufman JD, Cohen MA, Sama SR, Shields JW, Kalat J. 1998. Occupational skin diseases in Washington state, 1989 through 1993: Using Workers' Compensation data to identify cutaneous hazards. *Am J Public Health.* 88:1047–1051.
13. Krejci–Manwaring J, Schulz MR, Feldman SR, Vallejos QM, Quandt SA, Rapp SR, Arcury TA. 2006. Skin disease among Latino farmworkers in North Carolina. *J Agric Saf Health.* 12(2):155–163.
14. NIOSH. 2004. *Worker Health Chartbook.* NIOSH: Cincinnati OH DHHS (NIOSH) Publication No. 2004–146;180–192.
15. O'Malley M. 1997. Skin Reactions to pesticides. *Occup Med.* 12:327–345.
16. Schenker MB, McCurdy SA. 1990. Occupational Health among Migrant and Seasonal Farmworkers: the Specific Case of Dermatitis. *Am J Ind Med.* 18:345–351.
17. Schuman SH, Dobson RL. 1985. An outbreak of contact dermatitis in farm workers. *J Am Acad Dermatol.* 13(2):220–223.
18. Sherman J, Villarejo D, Garcia A, et al. 1997. *Finding invisible farmworkers: the Parlier Survey.* Davis, CA: The California Institute for Rural Studies.
19. Spiewak R Gora A, Dutkiewicz J. 2001. Work–related skin symptoms and type I allergy among eastern–Polish farmers growing hops and other crops. *Ann Agric Environ Med.* 8:51–56.
20. USDA Economic Research Service. 1998. *Hired Farm Labor in U.S. Agriculture. Agricultural Outlook.*  
[www.ers.usda.gov/Publications/Agoutlook/oct1998/ao255f.pdf](http://www.ers.usda.gov/Publications/Agoutlook/oct1998/ao255f.pdf) (Accessed October 21, 2007).
21. U.S. Department of Labor (DOL), Employment and Training Administration. 2005. [www.doleta.gov/agworker/statmethods.cfm](http://www.doleta.gov/agworker/statmethods.cfm). (Accessed October 21, 2007).
22. Villarejo D, Lighthall D, Williams D, Souter A, Mines R, Bade B, Samuels S, McCurdy SA. 2000. *Suffering in Silence: A Report on the Health of California's Agricultural Workers.* Davis, CA:California Institute for Rural Studies.
23. Villarejo D, McCurdy SA, Bade B, Samuels S, Lighthall D, Williams DA. In Press. The health of California's immigrant farm laborers. *Am J Ind Med.*
24. Washington State Department of Health. *Migrant Farmworker Housing.* Available at: [www.doh.wa.gov/hsqa/fsl/arcs/mfh/default.htm](http://www.doh.wa.gov/hsqa/fsl/arcs/mfh/default.htm) (Accessed August 1, 2008).
25. Zug KA, Marks JG. 1999. Plants and Woods. In:Adams RM: *Occupational skin disease 3<sup>rd</sup> Edition.* Philadelphia, PA: Saunders. 567–59

## **CHAPTER V**

### **Conclusions and Future Directions**

#### **CONCLUSIONS**

Agriculture is known to be one of the most dangerous U.S. industries yet few studies of the health of hired farmworkers have been undertaken. Health hazards include chemicals, plants, machinery, exposure to the elements, as well as the variability in work practices and exposure conditions of the agricultural workplace settings that make it difficult to control hazards. Farmworkers are often hired to work on manually intensive tasks with little control over their work pace or work practices, potentially causing more sustained contact with plants and with chemicals on plants and awkward working postures for extended periods of time. The organization of work may contribute to health disparities between farmworkers and other U.S. workers, including seasonal unstable employment, need to travel to find work, and working through labor intermediaries. In addition, conditions related to work but not explicitly work conditions may also have a negative impact on farmworkers' health. These conditions include low standard of living, substandard housing, cultural differences with the majority population, discrimination, family separation, and rural isolation.

The objective of this dissertation was to describe how employment and lifestyle factors affect the health of hired farmworkers. This objective was achieved by focusing on three outcomes and four domains. The outcomes were use of health care, alcohol consumption, and dermatitis. The domains were cultural integration, economic status, social support, and employment characteristics.

This analysis was possible due to the availability of the National Agricultural Workers Survey (NAWS) data and data from an Occupational Health Supplement that was added to the survey from 1999 to 2004. The NAWS is the only nationally representative survey of hired farmworkers and it addresses methodological issues that

make hired farmworker inclusion in other surveys unlikely. Farmworkers have many characteristics that preclude them from being easily identified and enumerated, such as the sporadic nature and changing location of their work; temporary housing that may consist of tents, cars, labor camps, and storage sheds; poverty; and uncertain immigration status. By identifying farmworkers at their job sites, the NAWS takes advantage of data sources that quantify the size of the labor workforce in different geographic areas and seasons to obtain a sample that is representative of farmworkers who are currently working in agriculture. In addition, due to the ongoing status of this national labor force survey, multiple years of data can be aggregated to obtain a substantive sample size. Thus, outcomes that occur infrequently can be evaluated in this dataset—a problem commonly confronted in studies that are smaller. Care is taken to ensure the confidence of farmworkers as is evident in the high percentage of respondents who are classified as undocumented when asked about immigration status. Interviewers are selected based on their knowledge of the population and language of farmworkers. Farmworkers are interviewed directly in face-to-face interviews.

## **STUDY FINDINGS**

Workers were predominantly Hispanic, male, and young. Approximately one-fifth worked for farm labor contractors (FLCs) and seven in ten workers had only one employer in the last year. We found a large proportion of farmworkers who had not utilized health care in the last two years: men, those who had few economic resources, those who had fewer English speaking skills, and those who worked for farm labor contractors were the least likely to receive care. Prevalences of alcohol consumption and binge drinking in farmworkers were much higher in men than in women and much higher in non-Hispanic women than in Hispanic women. Workers with higher wages were more likely to drink and to drink larger quantities. Cultural factors, including location of education and English speaking ability, were influential in farmworkers' decisions on alcohol consumption. Women were more likely to report dermatitis with almost twice the prevalence as men. For women, higher hourly wages were associated with lower odds of dermatitis.

### **Health Care Utilization**

Fewer than half of farmworkers (43%) reported use of any type of U.S. health care services in the last two years. Hispanic farmworkers had 70% lower odds of utilizing health care compared with non-Hispanic farmworkers. Controlling for gender, age, and year interviewed, the odds of receiving health care were lower for those who had no assets (Prevalence Odds Ratio (POR)=0.34) or only one asset (POR=0.66), compared to those with two or more assets and for those who worked for a FLC (POR=0.73) compared to those who worked for a grower. Higher hourly wages predicted higher odds of utilizing U.S. health care. The odds of utilizing health care for Hispanic farmworkers who did not speak English “at all” were half (POR=0.55) that of non-Hispanic farmworkers. Those who spoke English “some” had one-fourth (POR=0.77) lower odds of utilizing U.S. health care compared to those who spoke English “well.” In contrast, for U.S.-born non-Hispanic farmworkers only higher wages predicted increased odds of utilizing U.S. health care (POR=1.08) adjusting for age and gender.

### **Alcohol Use**

As was expected, men were significantly more likely to consume alcohol than women; however, Hispanic and non-Hispanic male farmworkers’ drinking habits were remarkably similar (58.6% versus 57.3% reported alcohol consumption in the last month and 22.6% and 22.4% reported binge drinking in the last month, respectively). In contrast, Hispanic female farmworkers were significantly less likely to consume alcohol or to binge drink than non-Hispanic female farmworkers (10.9% versus 35.2% for alcohol consumption and 3.0% versus 13.0% for binge drinking, respectively). For all males and for Hispanic males, the odds of alcohol consumption increased with increasing hourly wage. Controlling for age, other factors associated with binge drinking for men included working on farms with fewer than 150 employees and working directly for growers. For male Hispanic farmworkers, intermediate English speaking ability was associated with binge drinking compared with those who spoke English “well” and those who did not speak English at all. Female Hispanic farmworkers with fewer than seven years or 12 or more years of education abroad, or seven or more years of U.S. education had higher odds of drinking compared to Hispanic women with seven to 11 years of education

abroad. Those Hispanic women who were undocumented and settled had one-third lower odds of consuming alcohol compared to other female Hispanic farmworkers, both controlled for age and years of farm work.

### **Dermatitis**

This dissertation provides the first national estimates of dermatitis prevalence in this population. Prevalence of dermatitis on any body part was significantly higher for women than men (11.8% versus 6.7%, respectively). Women also reported significantly higher prevalence of dermatitis on their hands and their faces than men. For women, the prevalence of reported facial dermatitis was significantly higher for Hispanic women than non-Hispanic women (5.4% versus 0.7%, respectively), but similar ethnic differences were not observed for other body parts. Young and old age, higher education, fewer assets, high wages (more than \$9.55 per hour), and working with pesticides were associated with lower odds of facial dermatitis for Hispanic women. For all women, having wages over \$9.55 per hour, compared to having wages \$6.75 to \$7.74 per hour, was protective for any (POR=0.26), hand (POR=0.28), and arm (POR=0.07) dermatitis in the last 12 months. For all farmworkers, prevalence of dermatitis ranged from 5.8% in farmworkers who worked in bedding plants to 11.8% in farmworkers who worked in tobacco plants, although only farmworkers who worked in peach crops had a significantly higher prevalence of dermatitis compared to those who did not work in peach crops, 11.8% versus 8.2%, respectively.

### **Economic Status**

Of the four domains that were used for analysis, economic status was the only domain that was associated with all three outcomes. Both more assets and higher wages predicted more utilization of health care. Wages, but not assets, were associated with consuming alcohol and binge drinking. Male farmworkers with lower hourly wages had lower odds of drinking alcohol, while male farmworkers earning higher hourly wages had higher odds of binge drinking. For dermatitis, higher hourly wages, but not assets, were associated with lower odds of dermatitis for women but not for men.

### **Cultural Integration and Social Support Factors**

Cultural integration factors were associated with both health care utilization and alcohol consumption. For Hispanic workers, those who spoke English “some” and “not at all” had lower odds of utilizing health care. Farmworkers who were undocumented or had a green card and were mobile had lower odds of utilizing health care than those who were citizens or had a green card but were settled. Alcohol consumption was also associated with English speaking ability. For Hispanic men, farmworkers with “some” English speaking skills had higher odds of binge drinking than those who spoke English “well” and “not at all.” Social support was not associated with alcohol use or dermatitis. Social support was not included in analysis of health care utilization.

### **Employment Factors**

The strongest employment predictor of both health care utilization and alcohol use was working for a farm labor contractor. Farmworkers who worked for farm labor contractors were less likely to utilize health care and less likely to be binge drinkers. Number of employees working on a farm was also associated with binge drinking. Those who worked on farms with fewer than 151 workers were twice as likely to report binge drinking as those who worked on farms with more employees.

### **METHODOLOGICAL ISSUES AND STUDY LIMITATIONS**

The NAWS response rate consists of two parts: the grower participation and the farmworker participation. Grower participation is crucial and only requires the grower to allow the interviewer to enter the work site and invite the farmworkers to participate in the survey. The Department of Labor reports that 75% of growers who are asked to participate agree. This level of participation is acceptable but does introduce the possibility of bias. It is possible that those growers with worse employment conditions, or more dependence on undocumented workers, would be less willing to allow interviewers to talk to their workers. If this is true, our estimates would understate the problems that exist. Farmworker participation is high; the Department of Labor reports a 90% response rate based on 2003 data.



In order to be eligible for the survey, farmworkers had to have worked in farm work within the last 15 days. Workers who were ill or injured and could not work, possibly due to dermatitis, a drinking problem, or another illness, would not have been included in the sample. The NAWS is representative only of working farmworkers, and not of recently or currently ill individuals, which may introduce bias related to the healthy worker effect; that is, populations that are currently employed are likely to be healthier than a population that includes both employed and unemployed workers.

Data were self-reported and were not validated using medical or other private/government records due to the vulnerability of the population surveyed. Personal identifiers were not available to either the Department of Labor or to the National Institute for Occupational Safety and Health. We attempted to limit the potential impact of recall bias by limiting most of the reporting periods to the last 12 months, or in the case of alcohol consumption to the last 30 days. Some of the questions that ask about health care access were part of the core NAWS questionnaire dating from before the Occupational Health Supplement was added. In order to examine the trend in these variables starting in the early 1990s, the Department of Labor required us to maintain their original two-year time frame for questions about health care utilization. Thus, we found it necessary to limit our analysis to only those farmworkers in the sample who were in the U.S. for at least two years. This criteria could have excluded from the analysis those workers who are in the most vulnerable circumstances and who may feel most intimidated at the prospect of seeking medical care, such as those who are undocumented, making the lowest wages, and those who are living in the most crowded, lowest quality housing.

Legal status, the most sensitive topic in the questionnaire for persons who are not documented, was asked last. Also undocumented status can be inferred from questions related to how they achieved their status if they do not report that they were born in the U.S. Data from previous years support the veracity of the information on migrant status as the proportion of undocumented workers has risen gradually and steadily since the survey began three years after the 1986 Immigration Reform and Control Act (IRCA). IRCA legalized a large proportion of agricultural workers.

Finally, the survey does not exhaustively cover all topics, and some topics were not included in every year of the survey. The questions used to assess dermatitis were framed broadly to ensure that they could be asked by non-medical interviewers without need for extensive clarification. Since the questionnaire covered many topics, and since the specific dermatitis question was a general question, we could not explore dermatitis with the level of specificity that may have allowed us to differentiate type of dermatitis. Physical exams and patch testing were beyond the scope of this survey, thus self-reported dermatitis could not be objectively confirmed.

## **PUBLIC HEALTH IMPLICATIONS**

The NAWS provides an example of a method of documenting the employment and health characteristics of a population where many impediments exist to achieving success in enumerating, contacting, and surveying the population. The NAWS is a unique dataset that provides an in-depth understanding of the living and working conditions of farmworkers in combination with information about their health status and exposure to hazards that has heretofore been unavailable. It is the only nationally representative survey that was designed specifically for the purpose of collecting data on farmworkers, adjusting for seasonal and geographic considerations as well as cultural characteristics necessary to gain the workers' confidence and understanding.

The population-based sample allows us to calculate baseline prevalences for this population, which can be compared to local surveys or to other national datasets. The NAWS is also one of the few surveys that documents immigration status and permits evaluation of status with health indicators.

Low health care utilization in this working population demonstrates that the poorest and least empowered are falling through the cracks of our health care system despite a network of government funded health clinics that exist solely to serve farmworkers. Economic circumstances play a key role in the deficit in this population with both more assets and higher hourly wages each independently predicting more access. Although these findings were not surprising, they do indicate a need for more and better strategies for providing support for these workers. Improving health care access is especially relevant for Hispanic workers where English speaking skills and immigration

status may exacerbate problems of access. As farmworkers who worked for farm labor contractors were less likely to utilize health care, outreach programs that focus on these workers is needed. Further research to explicate the reasons for reduced utilization among those who worked for farm labor contractors is also needed.

Binge drinking prevalence in this survey was similar to national estimates of binge drinking in the U.S. population, but it was quite high, with one in five farmworker men and more than one in ten non-Hispanic farmworker women so classified. For both all men and for Hispanic men, those who worked for a farm labor contractor had lower odds of drinking and those who worked on farms with 150 or fewer workers had almost twice the odds of binge drinking. These findings may suggest approaches to target interventions to specific segments of the population, although more information is needed to understand why these two employment characteristics are associated with binge drinking. Resources for those with an alcohol-related problem should be offered, taking culture and geographic isolation into consideration.

Dermatitis is a known problem in agricultural occupations, however there is reason to assume that it may be more of a problem in hired farmworkers given their increased opportunity for direct contact with plants and exposure to chemicals and the elements. The prevalence in this survey was 12% for women and 7% for men. Women with the highest wages had lower odds of dermatitis. Higher wages may be an indication of a better living standard. It is not clear why this is the case for women but not for men. This topic demonstrates the difficulty of looking at an outcome with many possible etiologies in a population of farmworkers who may each have numerous potential exposures due to having many jobs and the variety of each. In future supplements, we may want to follow up the question about dermatitis in the last year by asking more specific exposure questions about their dermatitis in the last month to improve recall and limit the number of potential exposures.

## **FUTURE DIRECTIONS**

The National Agricultural Workers Survey (NAWS) is an invaluable source of data on this difficult-to-survey population. In the 20 years of surveying farmworkers, many lessons have been learned. Continuing this survey and including health and occupational

health questions on a regular basis should be a priority to enable tracking of working conditions and health of these workers. Fluctuations in the economy and U.S. immigration policy are likely to impact farmworkers due to their immigration status and already low socioeconomic position. Increasing unemployment in the U.S. may also cause a shift in the composition of the agricultural workforce. Such changes should be documented along with their health consequences.

Future NAWS Occupational Health Supplements could go in one of two directions depending on whether its intended purpose is purely as a surveillance tool covering a wide variety of topics but with little depth, or whether it should cover fewer topics but in greater depth to gain a better understanding of the topics included. This is particularly relevant to the question of dermatitis where many exposures may have been involved; follow-up questions such as a more detailed explanation of the task they were working on at the time they developed their condition may be helpful. In addition to the topic covered here, the OHS included the topics of field sanitation, respiratory symptoms, and musculoskeletal conditions that have yet to be analyzed. A supplement on work organization and psychosocial issues is currently being administered as part of the 2009 NAWS. These data will provide important information on the emotional toll that farmworker lifestyle is taking.

We found that farmworkers who worked for farm labor contractors had lower odds of utilizing health care and also lower odds of binge drinking in men. Conditions of work for those who work for a farm labor contractor are important to understand. There has been a trend toward more widespread use of farm labor contractors, especially in California. Speculation is that this has been done to avoid regulatory obligations. In-depth analysis of this issue should be done to gain a greater understanding of the impact of this trend.

One segment of the farmworker population that is not included in the NAWS is H2a farmworkers. Because the NAWS came about as a result of the Immigration Reform and Control Act of 1986, it is focused on non-H2a hired crop farmworkers. There is not a source of data, such as the NAWS, that surveys H2a workers and little is known about their occupational safety and health. The future of these workers will depend on immigration reform and current legislation that is currently being considered.

We were fortunate to have three to four years of data on the topics included in this dissertation. Even with these large samples, we had few respondents in some sub-populations such as non-Hispanic female farmworkers. Plans for future Occupational Health Supplements should consider including questions over several years to optimize sample size.

In conclusion, until now little nationally representative information on the health of hired farmworkers has been available. Surveys carried out during narrow time periods, surveys using conventional addresses for sampling, or surveys using land-based telephone methodology likely underrepresent farmworkers who do not have work year-round, may not have a permanent address, or do not have personal telephones. There are also reasons that farmworkers may be less likely to report health problems to their employer, such as temporary work status, not recognizing their problem as occupational, fear of job loss, worries about immigration status, or other reasons.

In this dissertation, we provide the first nationally representative data on the health of hired farmworkers. We provide quantitative evidence of a nationwide gap in utilization of health care among this working population. We provide baseline prevalences of self-reported dermatitis as well as alcohol use and binge drinking. Although it was widely reported anecdotally that alcohol use was a major problem in this population, our representative data show that patterns of drinking are similar to the general population according to CDC's Behavioral Risk Factor Surveillance Study. Farmworkers, though, may have less access to resources for dealing with alcohol problems. Findings from this study provide avenues for intervention suggesting that outreach efforts should focus on workers with the lowest wages as well as farmworkers who lack English language skills. Future research can look to this baseline data to gauge the progress made toward improvement in farmworker health or, conversely, whether more attention is needed.

## **APPENDIX 1**

## Appendix 1. Unadjusted Odds Ratios for Alcohol Use and Binge Drinking for All Farmworkers, NAWS 1999–2001

	Variable Categories	Drink (Y/N)		Binge drinker (Y/N)	
		POR	95% CI	POR	95% CI
<b>DEMOGRAPHIC CHARACTERISTICS</b>					
<b>Hispanic</b>	No	1.000		1.000	
	Yes	0.901	(0.669,1.211)	0.917	(0.580,1.448)
<b>Gender</b>	Male	<b>8.942</b>	<b>(6.393,12.506)</b>	<b>6.661</b>	<b>(3.796,11.688)</b>
	Female	1.000		1.000	
<b>Age (4 GPS)</b>	14-17	<b>0.102</b>	<b>(0.053,0.197)</b>	<b>0.152</b>	<b>(0.054,0.431)</b>
	18-20	<b>0.598</b>	<b>(0.457,0.784)</b>	<b>0.573</b>	<b>(0.436,0.753)</b>
	21-49	1.000		1.000	
	50+	0.900	(0.703,1.152)	<b>0.575</b>	<b>(0.419,0.789)</b>
<b>Highest grade &amp; location</b>	<7th grade	<b>1.251</b>	<b>(1.026,1.526)</b>	1.007	(0.746,1.358)
	7-11th grade (Abroad)	1.000		1.000	
	12+ grade (Abroad)	1.488	(0.956,2.316)	0.876	(0.494,1.554)
	7-11th grade (US)	0.738	(0.505,1.079)	0.970	(0.637,1.479)
	12+ grade (US)	1.139	(0.862,1.507)	1.066	(0.666,1.706)
<b>INTEGRATION FACTORS</b>					
<b>Speak English</b>	Well	1.000		1.000	
	Some	<b>1.710</b>	<b>(1.320,2.216)</b>	<b>1.488</b>	<b>(1.058,2.092)</b>
	Not at all	<b>1.321</b>	<b>(1.040,1.678)</b>	0.888	(0.601,1.311)
<b>Years in US</b>	<1 year	0.731	(0.568,0.942)	<b>0.549</b>	<b>(0.380,0.793)</b>
	1 year	0.750	(0.557,1.009)	0.639	(0.399,1.025)
	2-5 years	0.855	(0.639,1.145)	0.885	(0.651,1.203)
	6-15 years	1.000		1.000	
	16-25 years	1.428	(1.081,1.888)	1.283	(0.990,1.663)
	26+ years	1.198	(0.907,1.583)	0.924	(0.684,1.250)
	Born in US	0.821	(0.588,1.147)	0.882	(0.598,1.301)
	<b>Born in US</b>	No	1.000		1.000
	Yes	0.916	(0.694,1.210)	1.081	(0.733,1.597)
<b>Itinerancy &amp; immigration status</b>	Undocumented & Mobile	0.997	(0.748,1.329)	0.824	(0.511,1.329)
	Undocumented & Settled	0.850	(0.619,1.168)	1.024	(0.755,1.387)
	Green Card/other & Mobile	1.118	(0.693,1.804)	0.825	(0.535,1.272)
	Green Card/other & Settled	1.023	(0.718,1.457)	0.948	(0.607,1.479)
	Citizen & Mobile	0.625	(0.398,0.982)	1.041	(0.669,1.621)
	Citizen & Settled	1.000			
<b>ECONOMIC FACTORS</b>					
<b># Assets US</b>	No assets	1.105	(0.819,1.490)	1.216	(0.840,1.759)
	1 asset	1.187	(0.925,1.524)	1.355	(0.941,1.952)
	2+ assets	1.000		1.000	
<b>Hourly wage</b>	<\$5.26	<b>0.713</b>	<b>(0.550,0.926)</b>	1.125	(0.777,1.631)
	\$5.26-\$7.74	1.000		1.000	
	\$7.75-\$9.55	<b>1.452</b>	<b>(1.246,1.692)</b>	1.178	(0.909,1.525)
	>\$9.55	<b>1.421</b>	<b>(1.047,1.928)</b>	<b>1.922</b>	<b>(1.426,2.591)</b>
<b>SUPPORT FACTORS</b>					
<b>Married</b>	No	1.000		1.000	
	Yes	1.217	(0.980,1.511)	1.146	(0.925,1.420)
<b>Family members in house hold</b>	No	1.000		1.000	
	Yes	<b>0.654</b>	<b>(0.537,0.797)</b>	0.826	(0.653,1.045)
<b>Stream</b>	Eastern	0.974	(0.697,1.360)	<b>0.659</b>	<b>(0.494,0.880)</b>
	Midwestern	1.000		1.000	
	Western	1.107	(0.885,1.386)	<b>0.485</b>	<b>(0.270,0.870)</b>

(continued on next page)

**Appendix 1. Unadjusted Prevalence Odds Ratios for Alcohol Use and Binge Drinking for All Farmworkers, NAWS 1999–2001 (continued)**

<b>WORK FACTORS</b>					
<b>Employer</b>	Grower	1.000		1.000	
	Farm Labor Contractor	0.873	(0.733,1.039)	<b>0.510</b>	<b>(0.362,0.718)</b>
<b># Employees (mean=142.2)</b>	1-10	0.990	(0.724,1.354)	1.214	(0.862,1.709)
	11-150	1.000		1.000	
	151+	0.910	(0.778,1.066)	<b>0.422</b>	<b>(0.267,0.668)</b>
<b>Days worked in FW in last year</b>	<31 days	<b>0.639</b>	<b>(0.443,0.922)</b>	0.822	(0.563,1.201)
	31-90 days	<b>0.716</b>	<b>(0.564,0.910)</b>	0.725	(0.512,1.025)
	91-270 days	1.000		1.000	
	271-366 days	<b>1.278</b>	<b>(1.043,1.568)</b>	<b>1.506</b>	<b>(1.155,1.964)</b>
<b>Days worked in FW in last year Crop at time of interview</b>	continuous	<b>1.003</b>	<b>(1.002,1.004)</b>	<b>1.003</b>	<b>(1.001,1.004)</b>
	Field crops	1.409	(0.978,2.031)	<b>1.341</b>	<b>(1.012,1.778)</b>
	Fruit and Nut crops	1.343	(0.998,1.807)	0.770	(0.450,1.318)
	Nursery & Floriculture	1.000		1.000	
	Vegetables	1.139	(0.903,1.438)	0.922	(0.561,1.515)
	Miscellaneous	1.410	(0.850,2.339)	<b>1.603</b>	<b>(1.051,2.445)</b>
<b>Years of farm work</b>	<1 year	<b>0.626</b>	<b>(0.493,0.794)</b>	<b>0.603</b>	<b>(0.432,0.842)</b>
	1 year	<b>0.712</b>	<b>(0.569,0.892)</b>	0.768	(0.502,1.176)
	2-5 years	<b>0.709</b>	<b>(0.552,0.910)</b>	0.891	(0.689,1.151)
	6-15 years	1.000		1.000	
	16-25 years	<b>1.279</b>	<b>(1.002,1.634)</b>	<b>1.374</b>	<b>(1.096,1.722)</b>
	26+ years	1.015	(0.766,1.344)	0.812	(0.615,1.071)
<b>Years of farm work</b>	continuous (cent at 6 yrs)	<b>1.017</b>	<b>(1.009,1.025)</b>	<b>1.009</b>	<b>(1.001,1.018)</b>



## **APPENDIX 2**

Rev. 6/15/99 English Ver. 2  
Cycle 34, Summer 1999  
OMB 1225-0044

<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
COUNTY					FARMWORKER ID				
[FOR OFFICE USE ONLY]									

## NATIONAL AGRICULTURAL WORKERS SURVEY 1999

CS2 DATE:  /  /

CS5 CROP:

CS6 TASK:

[FOR OFFICE USE ONLY]
CROP CODE
<input type="text"/> <input type="text"/> <input type="text"/>
TASK CODE
<input type="text"/> <input type="text"/> <input type="text"/>

**WORKER IS ACTUALLY EMPLOYED BY:**

- GROWER    CONTRACTOR    NURSERY    PACKING HOUSE    OTHER

GN: \_\_\_\_\_

ID:

From List?    Yes    No

FARMWORKER'S NAME:

LOCAL STREET ADDRESS:

MAILING ADDRESS:

PHONE NUMBER:

HOME:

MESSAGE:

NAME OF INTERVIEWER:

CS9 INTERVIEWER ID:

CP5 TIME BEGAN:

:

AM

PM

CP6 TIME ENDED:

:

AM

PM

Public reporting burden for the collection of information is estimated to average 1 hour (or 60 minutes) per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Persons are not required to respond to the collection of information unless it displays a currently valid OMB control number. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the Office of Information Management, Department of Labor, Room N-1301, 200 Constitution Avenue, N.W., Washington, D.C. 20210; and to the Office of Information and Regulatory Affairs, Office of Management and Budget, Washington, D.C. 20503.

# HOUSEHOLD GRID

REFER TO QUESTIONS IN SECTION A:

County \_\_\_\_\_ Farmworker ID \_\_\_\_\_

A1 NAME	A2 REL ATIO N	A3 SEX	A4 DOES HE/SHE LIVE WITH YOU NOW? IF NOT WHERE?	A5 MARI TAL STAT US	A6 BIRTH DATE MM/YY	A7 PLACE OF BIRTH	A8 YEAR ENTERED U.S.	A9 HIGHEST GRADE	A10 COUNTRY SCHOOL	A11 ANY U.S. SCHOOL LAST 12 MONTHS?	A11a ANY SCHOOL NOW?	A12 WORK	A13 ANY U.S. FARM WORK LAST 12 MONTHS?
(FARMWORKER) DATE OF MARRIAGE/UNION (MM/YY) ( / )		M F		S M O						Y N N/A	Y N N/A		Y N N/A
		M F	Y N	S M O						Y N N/A	Y N N/A	FW NF NW	Y N N/A
		M F	Y N	S M O						Y N N/A	Y N N/A	FW NF NW	Y N N/A
		M F	Y N	S M O						Y N N/A	Y N N/A	FW NF NW	Y N N/A
		M F	Y N	S M O						Y N N/A	Y N N/A	FW NF NW	Y N N/A
		M F	Y N	S M O						Y N N/A	Y N N/A	FW NF NW	Y N N/A
		M F	Y N	S M O						Y N N/A	Y N N/A	FW NF NW	Y N N/A
		M F	Y N	S M O						Y N N/A	Y N N/A	FW NF NW	Y N N/A

**CODES FOR A2:**  
 1 = Spouse/common law spouse  
 2 = Own child  
 3 = Sibling  
 4 = Parent  
 5 = Grandchild  
 6 = Other relative (cousins, uncles, etc.)  
 7 = Other:

**A10:**  
 1= U.S.A.  
 2= Puerto Rico  
 3= Mexico  
 4= Central America  
 5= South America  
 6= Caribbean  
 7= Southeast Asia (Indonesia, Cambodia, Vietnam, Laos, Thailand)  
 8= Pacific Islands (The Philippines, Guam, Fiji, etc.)  
 9= Asia (China, Japan, Korea, etc.)

**(COUNTRY CODES) FOR A7 AND**

# HOUSEHOLD GRID

REFER TO QUESTIONS IN SECTION A:

County Farmworker ID

A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A11a	A12	A13
NAME	RELATION	SEX	DOES HE/SHE LIVE WITH YOU NOW? IF NOT WHERE?	MARITAL STATUS US	BIRTH DATE MM/YY	PLACE OF BIRTH	YEAR ENTERED U.S.	HIGHEST GRADE	COUNTRY SCHOOL	ANY U.S. SCHOOL LAST 12 MONTHS?	ANY SCHOOL NOW?	WORK	ANY U.S. FARM WORK LAST 12 MONTHS?
		M F	Y N	S M O						Y N N/A	Y N N/A	FW NF NW	Y N N/A
		M F	Y N	S M O						Y N N/A	Y N N/A	FW NF NW	Y N N/A
		M F	Y N	S M O						Y N N/A	Y N N/A	FW NF NW	Y N N/A
		M F	Y N	S M O						Y N N/A	Y N N/A	FW NF NW	Y N N/A
		M F	Y N	S M O						Y N N/A	Y N N/A	FW NF NW	Y N N/A
		M F	Y N	S M O						Y N N/A	Y N N/A	FW NF NW	Y N N/A
		M F	Y N	S M O						Y N N/A	Y N N/A	FW NF NW	Y N N/A

**CODES FOR A2:**  
 1 = Spouse/common law spouse  
 2 = Own child    3 = Sibling  
 4 = Parent  
 5 = Grandchild  
 6 = Other relative (cousins, uncles, etc.)  
 7 = Other

**(COUNTRY CODES) FOR A7 AND A10:**  
 1 = U.S.A.  
 2 = Puerto Rico  
 3 = Mexico  
 4 = Central America  
 5 = South America  
 6 = Caribbean  
 7 = Southeast Asia (Indonesia, Cambodia, Vietnam, Laos, Thailand)  
 8 = Pacific Islands (The Philippines, Guam, etc.)  
 9 = Asia (China, Japan, Korea, etc.)  
 97 = Other

99 = Not answered

Please answer the following questions regarding other individuals who live with you, are not your relatives and were not mentioned earlier.

A15 Other than those you have already mentioned, how many people live with you now?

[Total]

[A15] Out of those How many are.....? [WRITE TOTAL BELOW]	<input type="text"/> <input type="text"/>	[A16] # doing FW	[A17] # doing NF	[A18] # doing NW
a. Adults: 18 years or older	<input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/>
b. Children: 17 years old or younger	<input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/>
c. Don't Know Age	<input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/>

**[ONLY FOR THOSE WHO WORK IN BORDER CITIES (WITH MEXICO)]**

A19. Do you commute across the border for your FW days?

0 No     1 Yes

B4 In the last 2 YEARS, has anyone in your home, (from "Family Grid") excluding yourself, attended special classes or school in the U.S.? [READ CHOICES. MARK ALL THAT APPLY.]

- a. English
  - b. Citizenship
  - c. Literacy
  - d. Job training: Note:
  - e. Primary (elementary)/Secondary
  - f. GED, (High School Equivalency)
  - g. College or University
  - h. Adult Basic Education
  - i. Even Start
  - j. Migrant Education
  - k. Head Start
  - l. Migrant Head Start
  - m. Special Education
  - n. Other:
- Don't know

G4 In the last 2 YEARS, has anyone in your household received benefits or used the services of any of the following social programs? [READ CHOICES. MARK ALL THAT APPLY.]

- p. (TANF) Temporary assistance for needy families
  - b. Food Stamps
  - c. Disability insurance
  - d. Unemployment insurance
  - e. Social Security
  - f. Veteran's pay
  - g. General assistance/welfare
  - h. Low income housing
  - i. Public Health Clinic
  - j. Medicaid
  - k. WIC
  - l. Disaster Relief
  - m. Legal Services
  - n. Other:
- Don't know

G5 In the last 12 MONTHS, have YOU received support (e.g. money, food, free legal counsel, etc.) from any of the following? [READ CHOICES. MARK ALL THAT APPLY.]

- h. Church, charity or community organizations
- i. Family or friends
- j. Other:
- None

G6 Do YOU own or are YOU buying any of the following items in the U.S.? [READ CHOICES. MARK ALL THAT APPLY.]

- a. A plot of land
- b. A house
- c. A mobile home
- d. A car/truck
- e. A business
- f. Other:
- None

G7 [ONLY FOR THOSE BORN OUTSIDE THE U.S.] Do you own or are you buying any of the following items in your home country? [READ CHOICES. MARK ALL THAT APPLY.]

- a. A plot of land
- b. A house
- c. A mobile home
- d. A car/truck
- e. A business
- f. Other:
- None

[THE FOLLOWING QUESTIONS ARE SOLELY FOR THE INTERVIEWEE.]

B1 Which of the following describes you? [READ CHOICES. MARK ONE RESPONSE.]

1 Mexican-American

2 Mexican

3 Chicano

5 Puerto Rican

4 Other Hispanic:

7 Not Hispanic or Latino

9 Not answered

B2 Which of the following do you consider yourself? [READ CHOICES. MARK ONE RESPONSE.]

1 White

2 Black or African American

4 American Indian, Alaskan Native, (Indigenous)

5 Asian

6 Native Hawaiian or Pacific Islander

7 Other:

9 Not answered

B3 Have you attended any of the following special classes or school in the U.S.? [READ CHOICES. MARK ALL THAT APPLY.]

a. English

b. Citizenship

c. Literacy

d. Job training: Note:

e. GED, (High School Equivalency)

f. College or University

g. Adult Basic Education

h. Even Start

i. Migrant Education

j. Other:

None

Not answered

B5 What is your first or primary language? [DO NOT READ CHOICES. MARK ONE RESPONSE. IF RESPONDENT IS CONFUSED, PROMPT with: "What language do you speak at home?"]

1 English

2 Spanish

3 French

4 Creole

5 Laotian

6 Hmong

7 Vietnamese

8 Cambodian

9 Tagalog/Ilocano

10 Mixtec

11 Kanjobal

97 Other:

99 Not answered

B6 [IF PRIMARY LANGUAGE IS NOT ENGLISH] How well do you read in your primary language? [IF THE LANGUAGE DOES NOT HAVE A WRITTEN FORM, ASK ABOUT LANGUAGE USED IN SCHOOL.]

1 Not at all

2 A little

3 Somewhat

4 Well

B7 How well do you speak English? [READ CHOICES. MARK ONE RESPONSE.]

1 Not at all

2 A little

3 Somewhat

4 Well

B8 How well do you read English? [READ CHOICES. MARK ONE RESPONSE.]

1 Not at all

2 A little

3 Somewhat

4 Well

6

B10 In what year did you first do any farm work in the U.S.?

1	9		
---	---	--	--

B11 Approximately how many years have you done FARM WORK in the U.S.? [COUNT ANY YEAR IN WHICH 15 DAYS OR MORE WERE WORKED.]

--	--

 years

B12 Approximately how many years have you done NON-FARM WORK in the U.S.? [COUNT ANY YEAR IN WHICH 15 DAYS OR MORE WERE WORKED.]

--	--

 years

B13 When was the last time your parents did farm work in the U.S.?

- 0 Never
- 1 Now/within last year
- 2 One to five years ago
- 3 Six to ten years ago
- 4 Over 11 years ago
- 7 Don't know

B14 [ASK ALL] What state do you consider to be your permanent residence (i.e. home)? [IF IT IS IN A FOREIGN COUNTRY, ENTER STATE, DEPARTMENT, OR PROVINCE. IF NO PERMANENT HOME, WRITE "NONE".]

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

B15 Before coming to this state [name of state], in what state did you live? (In the U.S.)

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

B16 [IF FOREIGN BORN] When you lived in your country (outside the U.S.), did you work in ... ? [READ CHOICES. MARK ONE RESPONSE.]

- 1 Agriculture
- 2 Non-agriculture (NF)
- 3 Part farm and part non farm
- 5 Never worked
- 7 Other:
- 8 Not applicable (Only for those born in the U.S.)
- 9 Not answered

B17 [IF FOREIGN BORN] In what country (outside of the U.S.) did you live before coming to the U.S.?

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

B18 [IF FOREIGN BORN] Before coming to the United States, in what state/department/province did you live?

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--



**Work Grid**

REFER TO QUESTIONS IN THE FOLLOWING SECTION

**[C1-C2 FOR OFFICE USE ONLY]** REPORT ONLY FROM FIRST PERIOD COVERING JUNE 1, 1998 TO PRESENT

County \_\_\_\_\_ Farmworker ID \_\_\_\_\_

C1-C2	C15	C3	C4	C5	C6	C8	C9	C10	C11	C12	C13	C7	C16
PER. AND SUB PER. NO.	GR CO DK NA	EMPLOYER (FARM WORK OR NON-FARM JOB)	CROP	ACTIVITY/TASK, WHILE FW OR *NW	FW NF NW AB	UNEMPLOYMENT BENEFITS	DATES FOR PERIODS OF FW,NF, NW, AB  FROM: TO:	FW AND NF DAYS PER WEEK	CITY	COUNTY	STATE/COUNTRY	**FW AND NF WHY LEFT?	DID YOUR SPOUSE & KIDS MOVE WITH YOU
	GR CO DK NA				FW NF NW AB	Y N							SPOUSE CHILDREN ALL NO N/A
	GR CO DK NA				FW NF NW AB	Y N							SPOUSE CHILDREN ALL NO N/A
	GR CO DK NA				FW NF NW AB	Y N							SPOUSE CHILDREN ALL NO N/A
	GR CO DK NA				FW NF NW AB	Y N							SPOUSE CHILDREN ALL NO N/A
	GR CO DK NA				FW NF NW AB	Y N							SPOUSE CHILDREN ALL NO N/A

**\*C-5 CODES: ONLY FOR ACTIVITY WHILE NOT WORKING (Write activity for FW and NF)**  
 201 = LOOKING FOR FARMWORK  
 202 = LOOKING FOR FARM WORK  
 203 = LOOKING FOR NON-FARM WORK  
 204 = WAITING FOR RECALL NOTICE (AFTER LAYOFF)  
 205 = WAITING FOR START OF SEASON  
 206 = FAMILY RESPONSIBILITIES/WORK IN HOME  
 207 = IN SCHOOL  
 208 = LAID UP DUE TO INJURY  
 209 = IN-TRANSIT BETWEEN JOBS  
 210 = VACATION  
 211 = DID NOT LOOK FOR WORK  
 212 = OTHER (SPECIFY IN BOX)

**\*\*CODES FOR C-7**  
 1 = LAID OFF/END OF SEASON  
 2 = FIRED  
 3 = FAMILY RESPONSIBILITIES  
 4 = SCHOOL  
 5 = MOVED  
 6 = HEALTH REASON  
 7 = VACATION  
 8 = RETIRED  
 9 = OTHER (SPECIFY)  
 10 = QUIT  
 11 = CHANGE JOBS

Pages 9 through 11 same as page 8

D1 [SHOW CALENDAR]

In the year before last, [THE YEAR BEFORE THE ONE COVERED IN THE WORK GRID] how many months did you do (FW) in the U.S.? [1 DAY OR MORE PER MONTH EQUALS 1 MONTH.]

Months

D2 [IF NON-FARM JOB LISTED ON WORK GRID:] For your most recent non-farm (NF) employer, how many hours per week did you work on average?

Hours

D3 [IF NON-FARM JOB LISTED:] For your most recent non-farm employer, how much were you paid per week on average?

\$

"CURRENT FARM"

Now I am going to ask you some questions about the crop/task you are CURRENTLY performing for the EMPLOYER through whom we contacted you [Grower list employer]. [IF RESPONDENT INDICATES MORE THAN ONE CROP/TASK, ASK FOR THE ONE HE,SHE DOES THE MOST.]

D4 How many hours did you work last week at your current farm job?

Hours

D9 You already told me that the crop you are currently working is:

Grid for crop selection

D10 You already told me that the task you are currently doing is:

Grid for task selection

[D5 TO D8: IF HE,SHE HAS NOT RECEIVED PAYMENT YET FOR CURRENT CROP, ASK FOR ESTIMATES.] Can you tell me how you were paid and the amount your employer paid you on your last pay day?

D5 After taxes:

\$

D6 Before taxes:

\$

D61 Are you paid by: [READ CHOICES. MARK ONE RESPONSE.]

- 1 Payroll Check, 2 Personal check, 3 Cash and check, 4 Other check, 5 Cash, 6 Other:

D62 Did you get a receipt?

- 1 Yes, 0 No

D7 For what time period was that payment?

- 1 One day, 2 One week, 3 Two weeks, 4 One month, 7 Other:

D8 How many hours did you work during that period (in D7)?

Hours

D11 Are you paid:

- 1 By the hour?, 2 By the piece?, 3 Combination hourly wage and piece rate?, 4 Salary or other?

D12 [IF PAID BY THE HOUR:] How much per hour (to nearest cent)?

\$   .

D13 [IF PAID BY THE PIECE:] Are you paid as an individual or by the crew? [IF THE ANSWER IS "CREW", ASK QUESTIONS D14to D18 CONSISTENTLY IN REFERENCE TO THE CREW.]

- 1 Individual (SKIP TO D15)
- 2 Crew

D14 [IF CREW PIECE RATE:] How many people are in your crew? [ONE IS NOT A POSSIBLE ANSWER.]

D15 [IF BY PIECE:] How do they pay you/your crew? [i.e., UNIT OF MEASURES SUCH AS BOX, BIN, BUCKET, ETC.]

D16 [IF BY PIECE:] How many of these (boxes, bins, buckets, etc.) do you/your crew do in an average day?

D17 [IF BY PIECE:] How many hours per day do you/your crew work on average at this task?

Hours

D18 [IF BY PIECE:] How much do they pay you/your crew on average for each box bin, bucket, etc. (in D15)?

\$  ,     .

D19 [IF PAID BY SALARY, OR OTHER:] Explain fully how and how much you are paid (salary or other). Explain thoroughly the method and amount of payment.

D20 Aside from your wages, do you receive any other money bonus from your employer?

- 0 No [SKIP TO D22]
- 1 Yes
- 7 Don't know [SKIP TO D22]
- 9 Not answered [SKIP TO D22]

D21 [IF PAID A BONUS:] How and when do you receive the bonus? [READ CHOICES. MARK ALL THAT APPLY.]

- a. Holiday bonus
- b. Incentive bonus (rewards)
- c. Dependent on grower profit
- d. End of season bonus
- e. Money for transportation
- f. Other

D63 How much were you given (TOTAL)?

\$  ,     .

D22 If you are injured AT WORK or get sick as a result of your work, does your employer provide health insurance or pay for your health care?

- 0 No
- 1 Yes
- 7 Don't Know
- 9 Not answered

D23 If you are injured AT WORK or get sick as a result of your work, do you get any payment while you are recuperating (i.e., workers' compensation)?

- 0 No
- 1 Yes
- 7 Don't Know
- 9 Not answered

D24 If you are injured or get sick OFF THE JOB (e.g., at home), does your employer provide health insurance or pay for your health care?

- 0 No
- 1 Yes
- 7 Don't Know
- 9 Not answered

D26 Are you covered by unemployment insurance if you lose this job?

- 0 No
- 1 Yes
- 7 Don't Know
- 9 Not answered

D27 How many years have you worked for this employer? [ONE DAY/PER YEAR=ONE YEAR]

--	--

D29 [IF WORKED ON A SEASONAL BASIS AND LAID OFF WHEN THE SEASON ENDED] Does this employer keep in contact with you about future employment? [READ CHOICES. MARK ALL THAT APPLY.]

- a. Yes, before leaving at the end of the season
- b. Yes, by letter (written message)
- c. Yes, by phone/in person
- d. Yes, by someone else
- e. No, I contact employer
- f. Other:
- Don't know

D30 How did you get this job(the first time)? [DO NOT READ CHOICES. MARK ONE RESPONSE.]

- 1 I applied for the job on my own
- 4 I was recruited by a grower or his foreman
- 5 I was recruited by farm labor contractor or his foreman
- 6 I was referred by the employment services
- 7 I was referred by the welfare office
- 8 I was referred by relative/friend/workmate
- 9 I was referred by labor union
- 10 Day Laborer/Picked up at Shape Up
- 97 Other:
- 99 Not answered

D33a While you are working for this grower/ contractor, what type of arrangement do you have for your living quarters? [DO NOT READ CHOICES. MARK ONLY ONE RESPONSE.]

- 01 I receive free housing from my employer. I PAY NO RENT (pay only a nominal fee for utilities not counted as rent)
- 02 MY FAMILY AND I receive free housing from my employer. I PAY NO RENT (I pay only a nominal fee for utilities not counted as rent)
- 03 I pay for housing provided by my employer. I pay directly or through wage deduction.
- 04 I receive free housing provided by the government, a charity, or other non-work related institution. [I PAY NO RENT]. I pay only a nominal fee for utilities.)
- 05 I pay for housing provided by the government, a charity, or other non-work related institution.
- 06 I (or a family member) own the house.
- 07 I rent from non-employer
- 097 Other:

D34 In what type of living quarters do you live now (at this location)? [READ CHOICES. MARK ONLY ONE RESPONSE.]

- 01 House
- 02 Flat or apartment
- 03 Room in hotel, motel, etc.
- 04 Room /bed in rooming/dormitory/boarding house
- 05 Mobile home or trailer (fixed/trailer parks)
- 06 Vehicle (recreational vehicle - RV/camper)
- 07 Homeless (lives outdoors, in a car, tent, lean-to, under bridge or elsewhere with no fixed shelter) [SKIP TOD36a]
- 097 Other:

D35 Where are your living quarters located? READ CHOICES. MARK ONLY ONE RESPONSE.]

- 01 Off farm (property not owned/administered by present employer)
- 02 Off farm (property owned/administered by present employer)
- 03 On farm of the grower I currently work for
- 07 Other:

D50 At this location how much do YOU pay for housing (including housing for your family, if they live with you)?

- 01
  - \$ per week  
 ,    .
  - \$ per month  
 ,    .
  - \$ per day  
 ,    .
- 02 Don't know, taken out of my paycheck
- 03 Don't know/don't remember, but NOT taken out of my paycheck
- 08 Free housing
- 07 Other:

D51 How much is the rent for the entire house/apt/trailer?

- 01
  - \$ per week  
 ,    .
  - \$ per month  
 ,    .
  - \$ per day  
 ,    .
- 02 Don't know, taken out of my paycheck
- 03 Don't know/don't remember, but NOT taken out of my paycheck
- 08 Free housing
- 07 Other:

D53 In your current living quarters, how many rooms are used for sleeping?

--	--

D52 How many people total sleep in these rooms?

--	--	--

D36a [FOR PARENTS OF CHILDREN AGE 12 OR UNDER] During the past 12 MONTHS, where have your children, 12 and under, been while you work in U.S. farm work? [CHECK ALL THAT APPLY.]

- 01 They've stayed home alone, at least sometimes
- 03 With my spouse, other family
- 04 With a neighbor/babysitter, Migrant Head Start, With Head Start, Migrant Education, daycare center etc.
- 011 With me in the fields
- 012 Other:

D36c [FOR PARENTS OF CHILDREN AGE 12 OR YOUNGER] In the last 12 MONTHS, have any of your children under 12 years old, accompanied you in the fields as you work in the U.S.? [INCLUDE "SOMETIMES" AND MARK ALL THAT APPLY.]

- 00 No, never
- 01 Yes, under age 5
- 02 Yes, between ages 5 and 12
- 08 Not applicable

D37a How far is your current job from your current residence?

- 01 I'm located at the job
- 02 Within 9 miles
- 03 10-24 miles
- 04 25-49 miles
- 05 50-74 miles
- 06 75 miles or more

D37 At your current job, how do you usually get to work? [READ CHOICES. MARK ONE RESPONSE.]

- 01 Drive car [SKIP TO D39a]
- 02 Walk [SKIP TO D39a]
- 04 Ride with others
- 05 Public transportation (bus, train) [SKIP TO D39a]
- 06 Labor bus/truck/van
- 07 Other:
- 08 "Raitero"

D38a Do you have to use the (transport in D37)? (IS IT OBLIGATORY)?

- 00 No
- 01 Yes
- 07 Don't Know
- 09 Not answered

D38 Do you pay a fee to (responsible in D37), "raiteros" for rides to work?

- 0 No [SKIP TO D39a]
- 1 Yes
- 2 Yes, just for gas
- 7 Don't know [SKIP TO D39a]
- 9 Not answered [SKIP TO D39a]

D38b [ASK ONLY IF THE ANSWER IS "YES" ON D38:]  
How much do you pay per day or per week?

Per day \$    .

Per week \$    .

D39a At your current job, who pays for the tools you use at work? [READ CHOICES. MARK ONE RESPONSE.]

- 1 I don't need any tools [SKIP TO E1]
- 2 I pay all
- 3 The grower/contractor [SKIP TO E1]
- 5 A friend/relative
- 6 I pay some
- 10 I pay only for replacement of damaged tools
- 97 Other:

D39b How much was paid for equipment at current job, or if you have been at your current job more than 1 year, how much was paid in the last 12 months?

\$  ,    .

E1 At any time in the last two years in the U.S.A., were you covered by a union contract while doing farm work?

- 0 No
- 1 Yes
- 7 Don't Know
- 9 Not answered

E2 How long do you expect to continue doing farm work in the U.S.A.? [READ CHOICES. MARK ONE RESPONSE.]

- 1 Less than one year
- 2 One to three years
- 3 Four to five years
- 4 Over five years
- 5 Over five years and as long as I am able
- 7 Other:
- 9 Not answered

E3 Do you have any relatives/close friends who work in non-farm work in the U.S.A.?

- 0 No
- 1 Yes
- 7 I don't know
- 9 Not answered

E4 Could you get a U.S.A. NON-FARM JOB within a month? [READ CHOICES. MARK ONE RESPONSE.]

- 0 No
- 1 Yes
- 7 I don't know
- 9 Not answered



G1 What was your TOTAL INCOME last year in U.S. dollars (U.S. earnings only)? [READ/SHOW CHOICES. MARK ONE RESPONSE.]

- 1 Under than 500
- 2 500 a 999
- 3 1,000 a 2,499
- 4 2,500 a 4,999
- 5 5,000 a 7,499
- 6 7,500 a 9,999
- 7 10,000 a 12,499
- 8 12,500 a 14,999
- 9 15,000 a 17,499
- 10 17,500 a 19,999
- 11 20,000 a 24,999
- 12 25,000 a 29,999
- 13 30,000 a 34,999
- 14 35,000 a 39,999
- 15 Over 40,000
- 99 Not answered

G2 How much of that income was from AGRICULTURAL EMPLOYMENT (U.S. earnings only)? [READ/SHOW CHOICES. MARK ONE RESPONSE.]

- 1 Under 500
- 2 500 a 999
- 3 1,000 a 2,499
- 4 2,500 a 4,999
- 5 5,000 a 7,499
- 6 7,500 a 9,999
- 7 10,000 a 12,499
- 8 12,500 a 14,999
- 9 15,000 a 17,499
- 10 17,500 a 19,999
- 11 20,000 a 24,999
- 12 25,000 a 29,999
- 13 30,000 a 34,999
- 14 35,000 a 39,999
- 15 Over 40,000
- 99 Not answered

G3 What was your FAMILY'S TOTAL INCOME last year in U.S. dollars (U.S. earnings only)? [READ/SHOW CHOICES. MARK ONE RESPONSE.]

- 1 Under 500
- 2 500 a 999
- 3 1,000 a 2,499
- 4 2,500 a 4,999
- 5 5,000 a 7,499
- 6 7,500 a 9,999
- 7 10,000 a 12,499
- 8 12,500 a 14,999
- 9 15,000 a 17,499
- 10 17,500 a 19,999
- 11 20,000 a 24,999
- 12 25,000 a 29,999
- 13 30,000 a 34,999
- 14 35,000 a 39,999
- 15 Over 40,000
- 99 Not answered

**PROTECTIVE EQUIPMENT**

NT1 In the last 12 months, with your current (FW) employer, have you used any of the following protective equipment? [SHOW LAMINATED SHEET. CHECK ALL THAT APPLY.]

- a. None
- b. Gloves type 1 (cloth)
- c. Gloves type 2 (thin/light rubber)
- d. Gloves type 3 (thick/heavy rubber)
- e. Sleeves
- f. Suit
- g. Boots
- h. Respirator
- i. Hard hat
- j. Goggles
- k. Paper mask
- l. Bandana/Handkerchief
- m. Other:

**TRAINING OR INSTRUCTIONS**

NT2 Has anyone given you training or instructions in the safe use of pesticides through: video, audio cassette, classroom lecture, written material, informal talks or by any other means?

a. ...in the last 12 MONTHS, while working for your current employer?

- 0 No
- 1 Yes [SKIP TO NT3]

b. ...in the last 12 MONTHS, other than with your current employer?

- 0 No
- 1 Yes [SKIP TO NT3]

c. ...in the last 5 YEARS (but not the last 12 months)?

- 0 No [SKIP TO NT8]
- 1 Yes
- 7 Don't know [SKIP TO NT8]
- 9 Not answered [SKIP TO NT8]

NT3 How was the training or instructions delivered? [READ OPTIONS AND CHECK ALL THAT APPLY.]

- a. By video
- b. By audio-cassette
- c. Through a (formal) class/lecture
- d. Through written information/materials
- e. Informal instructions out in the field
- f. Other:

NT4 How long did the training or instructions last? [READ ALL CHOICES.]

- 0 Less than one - half hour
- 1 Half hour - one hour
- 2 >1 to 3 hours
- 3 >3 hours
- 7 Don't know
- 9 Not answered

NT5 Who trained or instructed you? [CHECK ALL THAT APPLY.]

- a. Grower/foreman/crew leader
- b. Contractor or staff
- c. "Government agency"
- d. "Insurance agency"
- e. "Union"
- f. Community organization
- g. Other:

NT6 In what language(s) was the training/instructions delivered? [CHECK ALL THAT APPLY.]

- a. English
- b. Spanish
- c. French
- d. Creole
- e. Laotian
- f. Hmong
- g. Vietnamese
- h. Cambodian
- i. Tagalog/Ilocano
- j. Mixtec
- k. Kanjobal
- l. Other:

NT7 [READ QUESTIONS. MARK ONE RESPONSE PER QUESTION.]

Did the training or instructions cover...

a. ...how soon could you enter a field treated with pesticides?

- 0 No
- 1 Yes
- 7 Don't know
- 9 Not answered

b. ...illnesses or injuries due to pesticides?

- 0 No
- 1 Yes
- 7 Don't know
- 9 Not answered

c. ...where to go or who to contact for emergency medical care?

- 0 No
- 1 Yes
- 7 Don't know
- 9 Not answered

NT8 Have you ever received a certification card for training or instructions in the safe use of pesticides?

- 0 No [SKIP TO NT10]
- 1 Yes
- 7 Don't know [SKIP TO NT10]
- 9 Not answered [SKIP TO NT10]

NT9 When did you receive this card?

(Month) (Year)  
  /

NT10 In the last 12 months, with your current (FW) employer, how do you find out the appropriate time to return to the field after it has been sprayed with pesticides? [CHECK ALL THAT APPLY.]

- a. Signs are removed
- b. Another worker informs me
- c. Employer/supervisor informs me
- d. Other (specify):

NT11 In the last 12 months, with your current (FW) employer, has a supervisor ever told you to enter into a field sprayed by pesticides before it was time?

- 0 No
- 1 Yes
- 7 Don't know
- 9 Not answered

## HANDLING PESTICIDES IN THE U.S.A.

- NP1 Working in the U.S. (in FW), have you loaded, mixed, or applied pesticides...
- a. ...in the last 12 months, working with your current employer?
- 0 No
- 1 Yes [SKIP TO NP2]
- b. ...in the last 12 months (but not with your current employer)?
- 0 No
- 1 Yes [SKIP TO NP2]
- c. ...in the last 5 years (but not in the last year with any employer)?
- 0 No [SKIP TO NP6]
- 1 Yes
- 7 Don't know [SKIP TO NP6]
- 9 Not answered [PASE NP6]
- NP2 The last time you did this (NP1), did you use any of the following protective equipment? [SHOW LAMINATED SHEET. CHECK ALL THAT APPLY.]
- a. None
- b. Gloves type 1 (cloth)
- c. Gloves type 2 (thin/light rubber)
- d. Gloves type 3 (thick/heavy rubber)
- e. Sleeves
- f. Suit
- g. Boots
- h. Respirator
- i. Hard hat
- j. Goggles
- k. Paper mask
- l. Bandana/Handkerchief
- m. Other:

- NP3 Did you become sick or have any reaction because of this work (in NP1)?
- 0 No [SKIP TO NP6]
- 1 Yes
- 7 Don't know [SKIP TO NP6]
- 9 Not answered [SKIP TO NP6]
- NP4 What problems did you have? (How did it make you sick?) [CHECK ALL THAT APPLY.]
- a. Skin problems
- b. Eye problems
- c. Nausea/vomiting
- d. Headache
- e. Numbness/Tingling
- f. Other:
- NP5 Were you sick enough to miss 4 hours (or more) of work?
- 0 No
- 1 Yes
- 7 Don't know
- 9 Not answered
- NP6 Besides what I asked you already, in the last 12 months, have you ever come in contact with pesticides by (having/being)....
- a. ...sprayed or blown by the wind on you?
- 0 No  7 Don't know
- 1 Yes  9 Not answered
- b. ...spilled on you?
- 0 No  7 Don't know
- 1 Yes  9 Not answered
- c. ...cleaning or repairing containers or equipment used for applying or storing pesticides?
- 0 No  7 Don't know
- 1 Yes  9 Not answered

**[ASK NP7 TO NP9 ONLY IF THERE IS AT LEAST ONE "YES" IN NP6]**

NP7 Did you become sick or have any reaction because of this incident?

- 0 No [SKIP TO NP9]
- 1 Yes
  - It occurred in...  a. NP6a?
  - b. NP6b?
  - c. NP6c?
- 7 Don't know [SKIP TO NP9]
- 9 Not answered [SKIP TO NP9]

NP8 What sickness or reaction did you have? (How did it make you sick?) [CHECK ALL THAT APPLY.]

- a. Skin problems
- b. Eye problems
- c. Nausea/vomiting
- d. Headache
- e. Numbness/Tingling
- f. Other:

NP9 Because of this reaction, were you sick enough to miss 4 hours (or more) of work?

- 0 No
- 1 Yes
- 7 Don't know
- 9 Not answered

NP10 Since [MONTH] of [YEAR] until NOW, [MONTH] of [YEAR] (In the last 12 months), have you received any medical attention by a doctor or nurse due to pesticide exposure?

- 0 No
- 1 Yes
  - a. When?:

		/	1	9		
--	--	---	---	---	--	--
  - b. Crop?:
  - c. Task?:
  - d. What physical problem(s)?  
[CHECK ALL THAT APPLY.]
    - a. Skin problems
    - b. Eye problems
    - c. Nausea/vomiting
    - d. Headache
    - e. Numbness/Tingling
    - f. Other:
- 7 Don't know
- 9 Not answered

**SANITATION SECTION**

The following questions refer to sanitation at your job with your CURRENT (FW) EMPLOYER.

Does your current employer provide...(EVERY DAY)

NS1 ... clean drinking water and disposable drinking cups?

- 0 No water, no cups [SKIP TO NS4]
- 1 Yes, water only
- 2 Yes, water and disposable cups
- 7 Don't know [SKIP TO NS4]
- 9 Not answered [SKIP TO NS4]

NS2 Do you drink it?

- 0 No
- 1 Yes [SKIP TO NS4]
- 7 Don't know [SKIP TO NS4]
- 9 Not answered [SKIP TO NS4]

NS3 Why don't you drink it? [IF ANSWER IS "I BRING MY OWN," ASK WHY? AND ENTER RESPONSE IN OTHER\*.]

[CHECK ALL THAT APPLY.]

- a. Too far away
- b. Dirty
- c. Other:
- d. Taste bad

NS4 ...a toilet (EVERY DAY)?

- 0 No [SKIP TO NS9]
- 1 Yes
- 7 Don't know [SKIP TO NS9]
- 9 Not answered [SKIP TO NS9]

NS5 Do you use it?

- 0 No
- 1 Yes [SKIP TO NS8]
- 7 Don't know [SKIP TO NS8]
- 9 Not answered [SKIP TO NS8]

NS6 Why don't you use it?

- a. Too far away
- b. Too dirty
- c. Other:

NS8 ...(provide) toilet paper EVERY DAY?

- 0 No
- 1 Yes
- 2 Yes, but insufficient supply for the day
- 7 Don't know
- 9 Not answered

NS16 With your current employer, Have you ever had to "go to" use "the bathroom" in the field/"open air"?

- 0 No [SKIP TO NS9]
- 1 Yes
- 9 Not answered [SKIP TO NS9]

NS17 Why did you have "to do it" in the field/"open air"? [CHECK ALL THAT APPLY.]

- a. "Bathroom" is too far away
- b. Other:

NS9 ...(provide) water to wash hands EVERY DAY?

- 0 No [SKIP TO NL1]
- 1 Yes
- 7 Don't know [SKIP TO NL1]
- 9 Not answered [SKIP TO NL1]

NS10 Do you use it?

- 0 No
- 1 Yes [SKIP TO NS12]
- 7 Don't know [SKIP TO NS13]
- 9 Not answered [SKIP TO NS13]

NS11 Why don't you use it? [CHECK ANSWER(S) AND SKIP TO NS13.]

- a. Too far away
- b. Other:

NS12 (If "Yes" in NS10) When do you use it? [CHECK ALL THAT APPLY.]

- a. Before using toilet
- b. After using toilet
- c. Before eating
- d. Before beginning work
- e. Before leaving work
- f. Other:

NS13 [ASK ONLY IF THERE IS A TOILET AND A PLACE TO WASH HANDS, ASK:] Is the place to wash your hands close or far from the toilet?

- 1 Close
- 2 Far
- 3 Other:
- 7 Don't know
- 9 Not answered

NS14 ...(provide) soap to wash your hands EVERY DAY?

- 0 No
- 1 Yes
- 7 Don't know
- 9 Not answered

NS15 ...(provide) towels to dry your hands EVERY DAY?

- 0 No
- 1 Yes
- 7 Don't know
- 9 Not answered

## NL INJURY or ACCIDENTS Section

3	4				
---	---	--	--	--	--

[Interviewer:] I would like to ask you some questions about injuries or accidents that you may have had in the last 12 months. As you know, we all get minor injuries when we are doing work, but there are times when these injuries are more serious. I would like you to think about any injuries you may have had while on a farm in the US, or traveling to or from a farm in the US, in the past 12 months. I am interested in any of these injuries that caused you to do one or more of the following: unable to work for at least 4 hours; unable able to work as hard as you normally do for at least 4 hours; had to seek medical treatment; or made you take strong medicine to allow you to keep working. [INTERVIEWER:] by strong medicine, we mean something other than over the counter medications). Do you understand, or have any questions about what I am asking?

[INTERVIEWER: If the response is "no", ask for each injury or accident listed in the **Injury List** to make sure no injury occurred. If the response continues to be "no" injury, skip to NLc Section "Children Injury"]

NL1 Have you had any injuries that were like what I just described to you?  No ↓  Yes → How many injuries or accidents? 

--	--

 ↓

→ (Codes) Injury List:

- |   |  |   |
|---|--|---|
| <input type="checkbox"/> a. scrape/abrasion                               | <input type="checkbox"/> e. broken bone/fracture/crushed/mangled | <input type="checkbox"/> i. insect bite/sting                                 |
| <input type="checkbox"/> b. bruise/contusion                              | <input type="checkbox"/> f. dislocation                          | <input type="checkbox"/> j. other: <input style="width: 100px;" type="text"/> |
| <input type="checkbox"/> c. amputation/lost body part                     | <input type="checkbox"/> g. cut/laceration/puncture/stab/jab     |   |
| <input type="checkbox"/> d. sprain/strain/torn ligament/traumatic rupture | <input type="checkbox"/> h. burn/blister/scald                   |   |

Now, I would like you to describe for me what happened when you were injured? [INTERVIEWER: In the next section, you must first write the injury incident number in case there is more than one. You must ask and record answers for questions NL3 through NL15.

TAKE DOWN THE INFORMATION FIRST AS A NARRATIVE AND PROBE FOR DETAILS . TO DO THE NARRATIVE: ASK PROMPT QUESTIONS AND MARK THE CHECK LIST ABOVE THE NARRATIVE SECTION TO MAKE SURE YOU HAVE NOT MISSED ANYTHING. AFTER THE NARRATIVE, ASK (IF NECESSARY) AND ENTER RESPONSES FOR QUESTIONS NL4 TO NL15 AT THE BOTTOM OF THE NARRATIVE SECTION.

You should probe for detailed responses that lead to the injury including: When did it happen? (month/year); what they were doing? (tasks involved); how did it happen? (e.g., fell from a ladder, struck by something, lifting objects, etc.); where did it happen? (e.g. field, work shed, roadway); and any other details that can help us understand what caused the injury (e.g., others involved in the injury?, etc.). Write these responses in the narrative section.

[As a reminder, after asking each prompt for the narrative, check corresponding box. Use a different form and repeat all questions for each injury incident. If you need more space use back of page.]

Use these codes for questions NL13, NL14, and NL15:

NL13 1 Community health center 2 Private medical doctor's office/private clinic 3 Healer/"curandero" 4 Hospital 5 Emergency room	6 Migrant health clinic 7 Chiropractor or naturopath's office 8 First aid at scene 9 Dentist 10 Went to home country	11 Other: <input style="width: 100px;" type="text"/> 97 Don't know 99 Not answered
NL14 1 Paid out of my own pocket 2 Medicaid/medicare 3 Public clinic (did not charge)	4 Employer provided health plan 5 Self or family bought health plan 6 Other: <input style="width: 100px;" type="text"/>	7 Combination of: <input style="width: 100px;" type="text"/> 8 Billed/did not pay 9 Worker's Compensation 97 Don't know 99 Not answered
NL15 1 Can work normally now 2 Still cannot work at full capacity	3 Still receiving treatment 4 Other: <input style="width: 100px;" type="text"/>	

## 25 Instructions

3	4				
---	---	--	--	--	--











MUSCULOSKELETAL [INTERVIEWER: FIRST, ASK ALL QUESTIONS IN FIRST COLUMN.]

During last 12 MONTHS, [From (MONTH) of (YEAR) until now, (MONTH) of (YEAR), have you had pain or discomfort in your... (NMS1-6) ↓	What type of activity were you doing when this pain/discomfort began?	Did you have this pain/discomfort every day for a week or more?	How severe was this pain/discomfort? [SHOW SCALE BELOW]	Were you able to work normally? IF "No", ASK: How long were you unable to work normally due to this pain/discomfort?
	a.	b.	c.	d.
NMS1. BACK? <input type="checkbox"/> 1 Yes → <input type="checkbox"/> 0 No	<input type="checkbox"/> FW <input type="checkbox"/> NF <input type="checkbox"/> NW	<input type="checkbox"/> 0 No <input type="checkbox"/> 1 Yes →	<input type="checkbox"/> 1 A little <input type="checkbox"/> 2 A lot <input type="checkbox"/> 3 Unbearable	<input type="checkbox"/> less than 1 day <input type="checkbox"/> days <input type="checkbox"/> weeks <input type="checkbox"/> months <input type="checkbox"/> don't know
NMS2. SHOULDER? <input type="checkbox"/> 1 Yes → <input type="checkbox"/> 0 No	<input type="checkbox"/> FW <input type="checkbox"/> NF <input type="checkbox"/> NW	<input type="checkbox"/> 0 No <input type="checkbox"/> 1 Yes →	<input type="checkbox"/> 1 A little <input type="checkbox"/> 2 A lot <input type="checkbox"/> 3 Unbearable	<input type="checkbox"/> less than 1 day <input type="checkbox"/> days <input type="checkbox"/> weeks <input type="checkbox"/> months <input type="checkbox"/> don't know
NMS3. ELBOW/ARM? <input type="checkbox"/> 1 Yes → <input type="checkbox"/> 0 No	<input type="checkbox"/> FW <input type="checkbox"/> NF <input type="checkbox"/> NW	<input type="checkbox"/> 0 No <input type="checkbox"/> 1 Yes →	<input type="checkbox"/> 1 A little <input type="checkbox"/> 2 A lot <input type="checkbox"/> 3 Unbearable	<input type="checkbox"/> less than 1 day <input type="checkbox"/> days <input type="checkbox"/> weeks <input type="checkbox"/> months <input type="checkbox"/> don't know
NMS4. HAND/WRIST? <input type="checkbox"/> 1 Yes → <input type="checkbox"/> 0 No	<input type="checkbox"/> FW <input type="checkbox"/> NF <input type="checkbox"/> NW	<input type="checkbox"/> 0 No <input type="checkbox"/> 1 Yes →	<input type="checkbox"/> 1 A little <input type="checkbox"/> 2 A lot <input type="checkbox"/> 3 Unbearable	<input type="checkbox"/> less than 1 day <input type="checkbox"/> days <input type="checkbox"/> weeks <input type="checkbox"/> months <input type="checkbox"/> don't know
NMS5. LEGS/FEET (Lower extremities)? <input type="checkbox"/> 1 Yes → <input type="checkbox"/> 0 No	<input type="checkbox"/> FW <input type="checkbox"/> NF <input type="checkbox"/> NW	<input type="checkbox"/> 0 No <input type="checkbox"/> 1 Yes →	<input type="checkbox"/> 1 A little <input type="checkbox"/> 2 A lot <input type="checkbox"/> 3 Unbearable	<input type="checkbox"/> less than 1 day <input type="checkbox"/> days <input type="checkbox"/> weeks <input type="checkbox"/> months <input type="checkbox"/> don't know
NMS6. OTHER?: <input type="text"/> <input type="checkbox"/> 1 Yes → <input type="checkbox"/> 0 No	<input type="checkbox"/> FW <input type="checkbox"/> NF <input type="checkbox"/> NW	<input type="checkbox"/> 0 No <input type="checkbox"/> 1 Yes →	<input type="checkbox"/> 1 A little <input type="checkbox"/> 2 A lot <input type="checkbox"/> 3 Unbearable	<input type="checkbox"/> less than 1 day <input type="checkbox"/> days <input type="checkbox"/> weeks <input type="checkbox"/> months <input type="checkbox"/> don't know



**RESPIRATORY**

[INTERVIEWER]: The following questions refer to the last 12 MONTHS, from (MONTH) of (YEAR) until now, (MONTH) of (YEAR).

NR1 [From (MONTH) of (YEAR) until now, (MONTH) of (YEAR)],... have you had wheezing or whistling in your chest at any time?

0 No

1 Yes:

Number of episodes in the last 12 months.

--	--	--

7 Don't know

9 Not answered

NR2 [From (MONTH) of (YEAR) until now, (MONTH) of (YEAR)], have you had episodes when your nose was runny or stuffy?

0 No

1 Yes:

Number of episodes in the last 12 months.

--	--	--

2 Yes, always

7 Don't know

9 Not answered

NR3 [From (MONTH) of (YEAR) until now, (MONTH) of (YEAR)], have you had episodes of watery or itchy eyes?

0 Never

1 Yes:

Number of episodes in the last 12 months.

--	--	--

2 Yes, always

7 Don't know

9 Not answered

**[ASK ONLY IF THERE IS A "YES" IN NR2/NR3]**

NR4 Is there any season or type of crop/task when this condition [stuffy/runny nose, watery/ itchy eyes] worsens? [MARK ALL THAT APPLY.]

0 No, same as usual

1 Yes, stuffy/runny nose or watery/itchy eyes:

[CHECK ALL THAT APPLY.]

What Season?  a. Spring

b. Summer

c. Fall

d. Winter

What Crop?

What Task?

7 Don't know

9 Not answered

NR5 Have you coughed on most days for at least three months?

0 No

1 Yes

7 Don't know

9 Not answered

NR6 Have you brought (coughed) up phlegm on most days for at least three months?

0 No

1 Yes

7 Don't know

9 Not answered

SKIN (HIS)/OCCUPATIONAL HEALTH SURVEY

[INTERVIEWER: FIRST ASK ALL QUESTIONS IN FIRST COLUMN.]

The following questions regarding skin problems refer to the last 12 MONTHS, from (MONTH) of (YEAR) until now (MONTH) of (YEAR)...  
(DOCUMENT ONLY "Dermatitis" related problems)

(In the last 12 MONTHS) Have you had any skin problems such as redness, inflammation, discoloration, or rash on your...	a. What caused it? (e.g., Poison Ivy/oak, chemicals, etc.)	b. The last time you had this skin problem, what were you working on?			c. The last time you had this skin problem, were you using any protective equipment? [SHOW LAMINATED CARD]							
		1. crop? (FW)	2. task? (FW)	3. activity? (NF) (NW)	1. Cloth gloves	2. Thin rubber gloves	3. Thick rubber gloves	4. Sleeve	5. Suit	6. Boots	7. Other:	8. None
NSK1 ..hands? <input type="checkbox"/> 0 No ↓ <input type="checkbox"/> 1 Yes →					<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
NSK2 ..arms? <input type="checkbox"/> 0 No ↓ <input type="checkbox"/> 1 Yes →					<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
NSK3 ...face? <input type="checkbox"/> 0 No ↓ <input type="checkbox"/> 1 Yes →					<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
NSK4 ...any other part of your body: <input type="text"/> <input type="checkbox"/> 0 No ↓ <input type="checkbox"/> 1 Yes →					<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
NSK5...any other part of your body: <input type="text"/> <input type="checkbox"/> 0 No ↓ <input type="checkbox"/> 1 Yes →					<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### INFECTIONS

NI1 [In the last 12 MONTHS, from (MONTH) of (YEAR) until now, (MONTH) of (YEAR)],... have you ever had diarrhea for more than three consecutive days?

- 0 No [SKIP TO NN1]
- 1 Yes
- 7 Don't know [SKIP TO NN1]
- 9 Not answered [SKIP TO NN1]

NI2 In what month did you last have diarrhea?

Month

NI3 How many days did the diarrhea last?

days (or fractions of days)

NI4 How many days did the diarrhea cause you to miss work for four hours or more?

days (or fractions of days)

NI5 Did you continue to do FW while you had the diarrhea?

- 0 No
- 1 Yes
- 7 Don't know
- 9 Not answered

NI6 Did you go to a medical doctor or medical clinic because of this diarrhea?

- 0 No
- 1 Yes
- 7 Don't know
- 9 Not answered

### NEUROLOGICAL

[INTERVIEWER]: The following questions refer to the last 12 MONTHS, from (MONTH) of (YEAR) until NOW, (MONTH) of (YEAR)...have you had...

NN1 headaches regularly (i.e., more than just once in a while)?

- 0 No
- 1 Yes: How many times?  
  - a. Per week
  - or
  - b. Per month
- 7 Don't know
- 9 Not answered

NN2 ...blurred vision for more than one day?

- 0 No
- 1 Yes, always
- 2 Yes, sometimes:
  - How many times?
  - NN2a  0 Per week
  - 1 Per Month
  - 2 Per year
  - 7 Don't know
  - 9 Not answered

- 7 Don't know
- 9 Not answered

NN3 ...difficulty concentrating or trouble remembering?

- 0 No
- 1 Yes
- 7 Don't know
- 9 Not answered



INDIVIDUAL PERSONAL HEALTH HISTORY (LIFETIME)			
[INTERVIEWER: FIRST ASK ALL QUESTIONS IN FIRST COLUMN.]			
Have you ever in your whole life been told by a doctor or nurse that you have the following conditions...?	a.	b. Are you currently taking medication for this condition? [INTERVIEWER: IF "b" IS "YES", SPECIFY MEDICATION.]	c. Have you seen a doctor or nurse in the last 12 months for this condition (NH1-11)?
NH1 ...asthma?	<input type="checkbox"/> No ↓ <input type="checkbox"/> Yes →	<input type="checkbox"/> No → <input type="checkbox"/> Yes <input type="text"/> →	<input type="checkbox"/> No <input type="checkbox"/> Yes
NH2 ...diabetes?	<input type="checkbox"/> No ↓ <input type="checkbox"/> Yes →	<input type="checkbox"/> No → <input type="checkbox"/> Yes <input type="text"/> →	<input type="checkbox"/> No <input type="checkbox"/> Yes
NH3 ...high blood pressure?	<input type="checkbox"/> No ↓ <input type="checkbox"/> Yes →	<input type="checkbox"/> No → <input type="checkbox"/> Yes <input type="text"/> →	<input type="checkbox"/> No <input type="checkbox"/> Yes
NH4 ...tuberculosis?	<input type="checkbox"/> No ↓ <input type="checkbox"/> Yes →	<input type="checkbox"/> No → <input type="checkbox"/> Yes <input type="text"/> →	<input type="checkbox"/> No <input type="checkbox"/> Yes
NH5 ...heart disease?	<input type="checkbox"/> No ↓ <input type="checkbox"/> Yes →	<input type="checkbox"/> No → <input type="checkbox"/> Yes <input type="text"/> →	<input type="checkbox"/> No <input type="checkbox"/> Yes
NH6 ...urinary tract infections?	<input type="checkbox"/> No ↓ <input type="checkbox"/> Yes →	<input type="checkbox"/> No → <input type="checkbox"/> Yes <input type="text"/> →	<input type="checkbox"/> No <input type="checkbox"/> Yes
NH7 ...thyroid disease?	<input type="checkbox"/> No ↓ <input type="checkbox"/> Yes →	<input type="checkbox"/> No → <input type="checkbox"/> Yes <input type="text"/> →	<input type="checkbox"/> No <input type="checkbox"/> Yes
NH8 ...cancer? Specify: <input type="text"/>	<input type="checkbox"/> No ↓ <input type="checkbox"/> Yes →	<input type="checkbox"/> No → <input type="checkbox"/> Yes <input type="text"/> →	<input type="checkbox"/> No <input type="checkbox"/> Yes
NH9 ...hepatitis?	<input type="checkbox"/> No ↓ <input type="checkbox"/> Yes →	<input type="checkbox"/> No → <input type="checkbox"/> Yes <input type="text"/> →	<input type="checkbox"/> No <input type="checkbox"/> Yes
NH10 ...other: <input type="text"/>	<input type="checkbox"/> No ↓ <input type="checkbox"/> Yes →	<input type="checkbox"/> No → <input type="checkbox"/> Yes <input type="text"/> →	<input type="checkbox"/> No <input type="checkbox"/> Yes
NH11 ...other: <input type="text"/>	<input type="checkbox"/> No ↓ <input type="checkbox"/> Yes →	<input type="checkbox"/> No → <input type="checkbox"/> Yes <input type="text"/> →	<input type="checkbox"/> No <input type="checkbox"/> Yes

### CIGARETTES

NC1 Have you smoked at least 100 cigarettes in your entire life?

- 0 No (SKIP TO NA1)
- 1 Yes
- 2 Don't know (SKIP TO NA1)
- 9 Not answered (SKIP TO NA1)

NC2 About how old were you when you started smoking cigarettes fairly regularly?

- 0 Never smoked regularly (SKIP TO NA1)
- 1 Years old
- 2 Other:

NC3 When did you last smoke cigarettes regularly?

(MONTH)                      (YEAR)  
 /

NC4 On average, about how many cigarettes did/do you smoke a day? [1 pack = 20 cigarettes]

- 0 Less than 1 a day
- 1 Cigarettes per day

### ALCOHOL CONSUMPTION

These next few questions are about the use of beer, wine, wine coolers, cocktails, or liquor, such as tequila, vodka, gin, rum, or whiskey--all kinds of alcoholic beverages people drink at meals, special occasions, or when just relaxing.

NA1 IN THE LAST MONTH, how many days per week or per month did you drink any alcoholic beverages, on average?

- 0 None [SKIP TO NV1]
- 1 Days per week
- 2 Days per month
- 3 Other:
- 7 Don't know/not sure
- 9 Not answered

NA2 A drink is 1 can or bottle of beer, 1 glass of wine, 1 can or bottle of wine cooler, 1 cocktail, or 1 shot of liquor. On the days when you drank [FROM NA1], about how many drinks did you drink on average?

- 1 (number of) drinks
- 2 Other:
- 7 Don't know
- 9 Not answered

**VIOLENCE**

From (MONTH) of (YEAR) until now (MONTH) of (YEAR)... (In the last 12 months)

NV1 [DO NOT ASK THIS QUESTION, IF INTERVIEWEE IS UNDER 18 YEARS OLD] Have you been the victim of any act of violence such as being hit, slapped, pushed, shoved, punched, threatened with a weapon, assaulted, or robbed?

- 0 No [SKIP TO NQ1]
- 1 Yes
- 7 Don't know [SKIP TO NQ1]
- 9 Not answered [SKIP TO NQ1]

Please explain how it happened:-----  
-----  
-----  
-----

NV2 Where?:  1 at work  
 2 home  
 3 other:

NV3 By whom?:  1 Co-worker  
 2 Relative/"Family"  
 3 Unknown  
 4 Other:

**QUALITY OF AND ACCESS TO HEALTH CARE SECTION**

[INTERVIEWER]: I would like to ask you a few final questions about health care services in general (in the U.S.). You may have given me some of this information already, but I would like to make sure it is correct...

NQ1 In the last TWO YEARS have you used any type of health care services from doctors, nurses, dentists, clinics, or hospitals in the U.S.?  
  
 0 No [SKIP TO NQ6]  
 1 Yes  
 7 Don't know [SKIPTO NQ6]  
 9 Not answered [SKIP TO NQ6]

NQ2 The last time...was it related to your job? ("FW" or "NF")?  
  
 0 No  
 1 Yes, "FW"  
 2 Yes, "NF"  
 7 Don't know  
 9 Not answered

NQ3 The last time you got attention from a health care provider, where did you go (what kind of place was it)?  
  
 1 Community health center  
 2 Private medical doctor's office/private clinic  
 3 Healer/"curandero"  
 4 Hospital  
 5 Emergency room  
 6 Migrant health clinic  
 7 Chiropractor or naturopath's office  
 8 Dentist  
 9 Went to home country  
 10 Other:   
 97 Don't know  
 99 Not answered

NQ4 The last time you got attention from a health care provider, how did you find out about the provider?  
  
 1 Outreach worker  
 2 Friend/relative  
 3 Newspaper/radio/television  
 4 School  
 5 Community Center  
 6 Other:   
 7 Don't know  
 9 Not answered

NQ5 The last time you got attention from a health care provider, who paid the majority of the cost?

- 1 I paid the bill out of my own pocket
- 2 Medicaid/Medicare
- 3 Public clinic (did not charge)
- 4 Employer provided health plan
- 5 Self or family bought individual health plan
- 6 Other plan:
- 7 Combination of:
- 8 Billed/did not pay
- 9 Workers' Compensation
- 97 Don't know
- 99 Not answered

NQ6 When was the last time you had dental care ("saw a dentist")?

0 Never

1 Date: 

(MONTH)			(YEAR)		
			1	9	

 / 

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a. USA

Where:

b. Abroad

7 Don't know

99 Not answered

NQ7 [INTERVIEWER:] I would like you to think about access to medical attention in the U.S. In general, is it easy or difficult for you to get the health care you need in the U.S.?

1 Easy

2 Dificult

7 Don't know

NQ8 When you want to get health care in the U.S., what are the main difficulties you face? [CHECK ALL THAT APPLY.]

- a. No transportation, too far away
- b. Don't know where services are available
- c. Health center not open when needed
- d. They don't provide the services I need
- e. They don't speak my language
- f. They don't treat me with respect/I don't feel welcomed
- g. They don't understand my problems
- h. I'll lose my job
- i. Too expensive
- j. Other:

NQ9 If you get sick or injured, where would you go to get health care? [CHECK ALL THAT APPLY.]

- a. Community health center
- b. Private medical doctor's office/private clinic
- c. Healer/"curandero"
- d. Hospital
- e. Emergency room
- f. Migrant health clinic
- g. Chiropractor or naturopath's office
- h. Would go to home country
- i. Other:

## ENGLISH VERSION

We are interested in knowing whether any of the following apply to you. Please be assured that no one besides us will know your response. [READ "NL1" CHOICES IF NECESSARY]

<p><b>L1 What is your current residence status?:</b></p> <p><input type="radio"/> 1 I am a U.S. citizen by birth [SKIP TO E41]</p> <p><input type="radio"/> 2 I am a naturalized U.S.A. citizen. [Ask: Before becoming a naturalized U.S.A. citizen, in what program did you apply to obtain your permanent residence? Possible answers in "L2": 1-9, 97. THEN ASK L4#1, L4#2, AND L4#3]</p> <p><input type="radio"/> 3 Permanent resident. "Green Card" (right to reside and work in the U.S.A.) [Ask "L2": Under which program did you apply? Possible answers in "L2": 1-9, 97. THEN ASK L3, L4#1 AND L4#2]</p> <p><input type="radio"/> 4 I have a border crossing card (right to cross the border.) [Ask "L2": Under which program did you apply? Possible answers in "L2": 1-9, 97. THEN ASK L3, L4#1 AND L4#2]</p> <p><input type="radio"/> 5 Pending Status (with out documents, applied, but waiting upon an oficial decision) [Ask "L2": Under which program did you apply? Possible answers in "L2": 1-9, 97. THEN ASK L3, L4#1]</p> <p><input type="radio"/> 6 Undocumented (application denied/did not apply in any programs) [Possible answers: NONE. SKIP TO E41]</p> <p><input type="radio"/> 7 Temporary resident-Non-Immigrant Visa, (Only for a temporary time) [Ask "L2": Under which program did you apply? Possible answers 10-97. THEN ASK L3, L4 #1]</p> <p><input type="radio"/> 8 None of the above [Ask L2, L3, L4 #1, L4#1, and L4 #2 only if it is relevent. THEN SKIP TO E41]</p>	<p style="text-align: center;"><b>L2 PROGRAMS</b> <b>[DO NOT READ OPTIONS]</b></p> <p><input type="radio"/> 1 Amnesty under 5 year program</p> <p><input type="radio"/> 2 Amnesty under SAW (90 day) program</p> <p><input type="radio"/> 3 Cuban/Haitian entrant</p> <p><input type="radio"/> 4 Spousal petition program/Family unity</p> <p><input type="radio"/> 5 Labor certification program</p> <p><input type="radio"/> 6 Registry Program</p> <p><input type="radio"/> 7 Political asylum</p> <p><input type="radio"/> 8 Refugee</p> <p><input type="radio"/> 9 Protective status (temporary)</p> <p><input type="radio"/> 10 Guestworker (H2A) program</p> <p><input type="radio"/> 11 Student</p> <p><input type="radio"/> 12 Tourist</p> <p><input type="radio"/> 13 Border crossing card/"passport"</p> <p><input type="radio"/> 97 Other. Explain: <input style="width: 150px; height: 20px;" type="text"/></p> <p><input type="radio"/> 99 Not Ansewred</p>
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L3 Doyouhavegeneralworkauthorization?     0 No     1 Yes     7 Don't know     9 Not answered

**L4 Date that status became effective:**

<p>1. When did you apply for (the program in "L2"? :</p> <p>(MONTH)                      (YEAR)</p> <p style="text-align: center;"> <input style="width: 30px; height: 20px;" type="text"/> <input style="width: 30px; height: 20px;" type="text"/>         /         <input style="width: 30px; height: 20px;" type="text"/> <input style="width: 30px; height: 20px;" type="text"/> <input style="width: 30px; height: 20px;" type="text"/> <input style="width: 30px; height: 20px;" type="text"/> </p>	<p>2. [Only for those that responded to "2,3, and 4" in "L1"] When did you obtain your legal status?</p> <p>(MONTH)                      (YEAR)</p> <p style="text-align: center;"> <input style="width: 30px; height: 20px;" type="text"/> <input style="width: 30px; height: 20px;" type="text"/>         /         <input style="width: 30px; height: 20px;" type="text"/> <input style="width: 30px; height: 20px;" type="text"/> <input style="width: 30px; height: 20px;" type="text"/> <input style="width: 30px; height: 20px;" type="text"/> </p>	<p>3. [Only for those that responded to "2" in "L1"] When did you obtain your naturalization/ became a citizen? :</p> <p>(MONTH)                      (YEAR)</p> <p style="text-align: center;"> <input style="width: 30px; height: 20px;" type="text"/> <input style="width: 30px; height: 20px;" type="text"/>         /         <input style="width: 30px; height: 20px;" type="text"/> <input style="width: 30px; height: 20px;" type="text"/> <input style="width: 30px; height: 20px;" type="text"/> <input style="width: 30px; height: 20px;" type="text"/> </p>
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