An Exploratory Analysis of Occupational Skin Disease Among Latino Migrant and Seasonal Farmworkers in North Carolina

T. A. Arcury, S. A. Quandt, B. G. Mellen

ABSTRACT. *Occupational skin disease is highly prevalent among all agricultural workers. However, few data exist on risk factors for occupational skin disease among migrant and seasonal farmworkers. The goal of this analysis was to further document the prevalence of occupational skin disease among Latino farmworkers and delineate risk factors. This exploratory analysis used data collected in repeated survey interviews with Latino farmworkers in North Carolina in June and July (early season) and in August and September (late season), 1999. Respondents were largely male (95%) and from Mexico (95%), with about one–third each age 18–24, 25–34, and 35 and older. About half were in the U.S. on work contracts. Independent variables included the physical environment (crops worked), the social environment (having received pesticide safety training, having a work contract), and behavior and individual characteristics (re–wearing work clothes, showering after work, age). The dependent measures were reporting having had itching or burning skin or a skin rash in the two months prior to each interview; 24% of the respondents in the early season, and 37% in the late season reported skin disease signs and symptoms during the previous two months. Those reporting signs and symptoms in the early season were more likely to report them in late season. Significant independent risk factors for skin signs and symptoms in early season were re–wearing work clothes, showering after work, and being age 35 or older. In late season, those who had not received pesticide safety training had lower odds of reporting skin disease signs and symptoms, after adjusting for other potential risk factors. This exploratory study indicates that Latino migrant and seasonal farmworkers experience a high incidence of occupational skin disease. Further research is required with improved measurement of skin disease signs and symptoms, diagnosis of specific skin disease, and improved measurement of risk factors.*

Keywords. *Agriculture, Dermatology, Health disparities, Health beliefs, Latino/Hispanic, Migrant and seasonal farmworkers, Minority, Occupational illness.*

Occupational skin disease is highly prevalent among all agricultural workers, including farmers, farm managers, full–time farm employees, as well as migrant and seasonal farmworkers (Hogan and Lane, 1986; O'Malley and Mathias, 1988; Villarejo and Baron, 1999). Villarejo and Baron (1999, p. 626) found that agricultural workers had the highest incidence of skin disorders of all industrial

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classifications, with an annual incidence of 27.6 per 10,000 workers in 1996 for all agricultural production, as compared to 6.9 per 10,000 workers for all private industry and 14.1 per 10,000 workers for manufacturing. Investigators note that the probable causes of occupational skin disease among agricultural workers are diverse, and include "pesticides and other chemical substances, sensitivity to plant materials, and infectious agents" (Villarejo and Baron, 1999, p. 626), or "a wide variety of chemical, biologic, and physical hazards at work" (Hogan and Lane, 1986, p. 285).

Specifically among migrant and seasonal farmworkers, few data exist on the prevalence of occupational skin disease and occupational skin disease risk factors (Hogan and Lane, 1986; Schenker and McCurdy, 1990). Villarejo and Baron (1999, p. 627) conclude, "Besides case reports, few studies have looked at the prevalence and etiology of dermatitis in hired farm workers." Case reports of skin disease include investigations of acute pesticide exposure (Schuman and Dobson, 1985) and reactions to specific plants, such as cucumbers (Zachariae, 2000).

There have been two cross–sectional examination and questionnaire studies of occupational skin disease among migrant and seasonal farmworkers. McCurdy et al., (1989) collected questionnaire data and conducted a "waist–up" examination of 183 grape workers and 43 tomato workers in California. They found that 46% of the workers reported a skin rash lasting two days or more within the past three months, but only 19% sought medical attention. On physical examination, fewer than 3% of the farmworkers had an apparent irritant or contact dermatitis. Gamsky et al. (1992) estimated the prevalence of dermatitis and risk factors for skin disease in California farmworkers with a sample of 759 workers (355 workers in tomato crops, 166 in citrus crops, and 238 in grape crops) using questionnaire and "waist–up" skin examination data. Twelve percent of participants reported having a rash lasting more than two days in the past 12 months. Of those, only 21% reported seeking medical assistance for the rash. Most (78%) noticed that the rash improved during days off work. The type of crop, gender (female), and history of hay fever were found to be significantly associated with an increased prevalence of reported rash.

In addition to these cross–sectional studies, insight into the causes of occupational skin disease among agricultural workers is available through reports of specific disease outbreaks. For example, Schuman and Dobson (1985) reported an outbreak of contact dermatitis among 14 of 26 migrant farmworkers resulting from their exposure to a pesticide. Saunders et al. (1987) found that exposure to a specific pesticide (Omite–CR) resulted in dermatitis among 114 of 198 orange pickers. Cole et al. (1997) also found that pesticide exposure was the cause of increased dermatitis among potato farmworkers in northern Ecuador. Rademaker and Yung (2000) reported contact dermatitis in an asparagus worker that may have resulted from contact with a growth inhibitor. Penagos (2002) found high rates of dermatitis among Panamanian banana workers with the primary cause being exposure to fungicides.

In summary, the limited evidence indicates that occupational skin disease is widespread among migrant and seasonal farmworkers. The possible environmental risk factors for occupational skin disease among farmworkers are diverse and include chemicals and plants in the work environment, as well as factors in the home environment. There are few epidemiological data on occupational skin disease among farmworkers or of exact risk factors. The two epidemiological studies of occupational skin disease among farmworkers were conducted in California.

In this article, we further document the self–assessed prevalence of occupational skin disease among migrant and seasonal farmworkers and delineate risk factors. This exploratory analysis uses data collected in survey interviews completed in North Carolina in 1999. We examine early season data collected in June and July, and late

season data collected in August and September. We estimate the proportion at each time who reported skin disease signs and symptoms for the previous two–month period, and explore potential risk factors for the presence of these signs and symptoms. The risk factors considered in this analysis are based on a model of environmental health disparities that examines characteristics of the social environment as well as those of the physical environment and of individual behavior for analysis and intervention of occupational illness (Wallerstein, 1992; Wallerstein and Rubenstein, 1993; Wallerstein and Baker, 1994).

Who Are Farmworkers?

Using the definitions found in federal statutes governing migrant health funds, a "migrant farmworker" is an individual whose principal employment is in agriculture on a seasonal basis and who, for purposes of employment, establishes a temporary home (HRSA, 1990). The migration may be from farm to farm within a state, interstate, or international. A "seasonal farmworker" is an individual whose principal employment is in agriculture on a seasonal basis and who does not migrate. In both cases, the definition extends to employment within the past 24 months.

There are an estimated 4.2 million seasonal and migrant farmworkers and their dependents in the U.S., with 1.6 million classified as migrant (HRSA, 1990). Migrant and seasonal farmworkers work in at least 42 of the 50 states. North Carolina ranks fifth nationally in the size of its farmworker population. Estimates of farmworkers in North Carolina vary. Larson (2000) placed the number at 100,000. However, this figure is considered low by many. It is not based on actual counts of workers but on counts of worker hours, without taking into account the in– and out–migration of farmworkers and the usual hours actually worked (Quandt et al., 2002). During the growing season, the North Carolina Employment Security Commission (1995) estimates that there are over 140,000 migrant farmworkers and dependents in the state, with approximately twice this number of seasonal farmworkers.

National Agricultural Workers Survey (NAWS) survey data show that the national farmworker population has become increasingly Latino and Mexican during the past decade. In 1995, 90% of all migrant and seasonal farmworkers in the U.S. were Latino, and 70% of all U.S. farmworkers were born in Mexico (Mehta et al., 2000; Mines et al., 1997). In North Carolina, 90% of all migrant and seasonal farmworkers are Latino. It is still possible to find camps in which all or most of the workers are African–American or Afro–Caribbean, but these are rare and located in very specific regions of the state (e.g., in far northeast North Carolina, African–American workers from Virginia pick watermelons). In a 1998 survey of 270 farmworkers in central North Carolina, 265 (98%) were born in Mexico, with 230 (86%) from states in southern Mexico that include large numbers of indigenous peoples (Arcury et al., 1999b).

Materials and Methods

Data were collected as part of the PACE (Preventing Agricultural Chemical Exposure among North Carolina Farmworkers) Project. The PACE project was a community–based participatory research project designed to reduce farmworker pesticide exposure by developing, implementing, and disseminating a culturally appropriate safety education program (Arcury et al., 1999a; Quandt et al., 2001). The North Carolina Farmworkers' Project (NCFP), a community–based farmworker

advocacy organization, was a partner in PACE, participating in all research activities. The PACE project was based in an eight–county region of eastern North Carolina with the state's highest concentrations of farmworkers.

Farmworkers were interviewed twice in 1999 (Arcury et al., 2000). Methods for interviewer training, data collection, and quality control are described elsewhere (Arcury et al., 2001). The early–season interviews were completed in late June and early July, while the late season interviews were completed in late August and early September. Both interviews focused on factors related to perceived pesticide exposure risk, pesticide safety training received, and pesticide safety knowledge and behaviors. The interviews included questions on the experience of occupational skin disease, as well as risk factors associated with occupational skin disease. These data are used in this exploratory analysis.

Sample

Early season interviews were conducted with 293 Latino farmworkers. Late season interviews were completed with 197 of the original farmworker participants who could be located. There was no available sampling frame of farmworkers in North Carolina. We therefore implemented a two–stage procedure to locate and recruit participants (Arcury et al., 2001), based on the need to maximize the representativeness of the sample, while taking into account the exigencies of working with a largely undocumented, relatively "invisible," and highly mobile population. We knew that workers could be located in a variety of residential sites, including on–farm labor camps, trailer parks, old farm houses, and apartments. The first stage of the sampling plan was intended to maximize representativeness of the sample by selecting a broad range of sites. A site was defined as a residential locale in which all or most residents were farmworkers and their families. Community representatives created a list of potential sites based on their knowledge as area residents, by community reconnaissance, by interviewing farmers, and by talking with farmworker service providers. Each site was visited to ascertain whether the farmworkers present would be willing to participate in the study, if asked. Community members were hired and accompanied the project staff on site visits. The PACE staff then selected a mix of sites from those visited, including large and small labor camps, trailer parks, and rental housing.

Thirty–six sites were included in the first stage of the sample. One site originally selected for the study was dropped and replaced when the farmer who owned the site refused to have his employees participate. In the second sampling stage, farmworkers were recruited at each site. All site residents were asked to participate in the 33 sites with fewer than 10 resident workers. In the other three sites, the interview team leader identified workers to be interviewed by first selecting any women present, and then selecting a range of ages from those present. Using this system of multiple contacts leading up to recruitment familiarized farmworkers with the project; there were very few refusals at the stage of actual recruitment.

For the late season survey, interview teams returned to each of the sites and located 197 of the participants of the original 293 workers. This constitutes 92% of the available sample of farmworkers (Quandt et al., 2002). Twenty–two were not interviewed but were still in residence (12 refusals, and 10 who could not be located). The remaining 74 had left the communities: 36 had returned to Mexico, 20 had gone to other states, 6 were elsewhere in North Carolina, and 12 had left for unknown destinations. For this analysis, we include 259 early season and 163 late season

participants for whom there were no missing data on the dependent or any of the independent variables.

Data Collection

The interview questionnaire was developed in English and Spanish. A professional service translated items into Spanish; these items were edited by native Spanish speakers. The entire questionnaire was pre–tested with farmworkers residing in the study area. Interviewers were fluent in Spanish. All attended two 3–hour training sessions. Interviews took approximately 25 minutes to complete. Participants were given information about the study and interview, and asked for their consent. At the end of the interview, participants were given a tee–shirt printed with a safety message. No mention was made of the incentives before the interview to ensure that they were not inducements to participate. Early season interviews were conducted during late June and early July 1999. Late season interviews were conducted during late August and early September 1999. The protocol for this study was approved by the Institutional Review Boards of Wake Forest University School of Medicine and the University of North Carolina at Chapel Hill.

Measurement

The dependent measures in this analysis are reporting having had itching or burning skin or a skin rash in the two months prior to the early season interview and in the two months prior to late season interview. These questions were asked in a list of signs and symptoms that the participants might have experienced in the previous two months. The signs and symptoms listed included headache; dizziness; blurred, cloudy, or double vision; and nausea or vomiting, as well as itching or burning skin or a skin rash.

The independent variables for this analysis include measures of the physical environment, the social environment, and individual characteristics and behaviors. For the physical environment, workers were asked whether or not they had worked in cucumbers, tomatoes, oranges, blueberries, and tobacco in the previous 12 months for the early season interview. At the late season interview, workers were asked whether or not they had worked in cucumbers, tomatoes, and tobacco in the previous two months. Oranges and blueberries were not included in the late season interview, as participants would not have had the opportunity to work in these crops during the two months prior to the interview. Tobacco was not included in the analysis, as virtually all had worked in tobacco; 93% of those interviewed in the late season had worked in tobacco in the previous two months.

Two components of the social environment are considered. First, participants were asked if they had received pesticide safety training with three response categories: no, training more than one year ago, and training in the past year. These responses were converted into dichotomous measures: no training, and training more than one year ago, with training in the past year as the reference category. Second, whether the particpant was in the U.S. on a work contract or with an H2A visa was a dichotomous measure. Another component of the social environment, living on employer's farm, was not included in the analysis, as there was very little variability in this characteristic.

Behaviors include whether or not participants wore work clothes for more than one day (re–wear clothes), and whether participants did not shower everyday after work (no shower). Farmworker age was measured in years and grouped into three

categories: <25, 25–34, and 35 and older. Age was converted into dichotomous measures: age <25 years, and age 25–34 years, with age 35 and older as the reference category. Several other participant background characteristics, including gender, ethnicity, and ability to speak English, were not included in the analysis, as there was little variability in these measures.

Statistical Analysis

Odds ratios (ORs) and 95% confidence intervals (CIs) were calculated to evaluate associations between binary variables (e.g., the presence of skin signs or symptoms at early and late season interviews). Generalized estimating equation models were used to account for correlated outcomes within sites. Multiple regression models were used to predict the binary skin outcome measures from possible risk factors. No interaction terms were included in these models. ORs and CIs from these analyses were used to evaluate associations between outcome measures and potential predictors, adjusting for other predictors in the model. A p–value less than 0.05 (two–sided) was defined as statistically significant. SAS software (SAS Institute Inc., Cary, N.C.) was used for all statistical analyses.

Results

Characteristics of the study participants are given in table 1. There are no substantial differences between the early and late season participants included in this analysis. They are overwhelmingly men from Mexico. About one–third each is age under 25 years, 25 to 34 years, and 35 years or older. About 60% of the respondents understand only some English, with the other 40% understanding no English at all. For almost 60%, 1999 was there first or second year working in U.S. agriculture. Almost 90% live on their employer's farm, and about half have a labor contract. The only substantial difference between the participants included in this analysis and those in the total sample is that fewer (71%) of the total sample live in housing on their employers' farms (distributions of total sample characteristics reported in Arcury et al., 2002).

The distributions of the risk variables are given in table 2. There are substantial differences in the proportions of early and late season participants for some of the risk measures. Fewer participants had worked in cucumbers and tomatoes in the two months prior to the late season interview than in the 12 months prior to the early season interview. The proportion of participants who reported re–wearing work clothes decreased from 24% to 6%, and the proportion who reported not showering after work declined from 17% to 10%.

The presence of itching or burning skin, or a skin rash, during the past two months was reported by 63 participants (24%) at the early season interview, and by 61 participants (37%) at the late season interview. The presence of skin signs or symptoms at the early season interview predicts skin signs or symptoms at the late season interview. Of the 163 farmworkers who completed the late season interview, 89 (55%) reported no skin disease signs or symptoms for the two months prior to either interview, whereas 27 (17%) reported skin disease signs or symptoms for the two months prior to both interviews. Thirteen (8%) who reported signs or symptoms at the early season interview did not report them for the two months prior to the late season interview, while 34 (21%) reported signs or symptoms at the late season but not the early season interview. The odds ratio of having a skin disease sign or symptom

Table 1. Study participant characteristics.[a]

Characteristic	Participants at Early Season Interview (N = 259)		Participants at Late Season Interview (N = 163)	
	N	%	N	%
Male	245	95	154	94
Country of origin				
Mexico	246	95	155	95
Other Latin American	12	5	8	5
Age				
<20 years	28	11	18	11
20–24 years	65	25	40	25
25–29 years	57	22	36	22
30–34 years	30	12	19	12
>34 years	79	31	50	31
Understands some English	156	60	106	65
U.S. agriculture experience				
1–2 years	152	59	91	56
3–4 years	49	19	34	21
>4 years	57	22	37	23
Migrant	165	64	95	59
Lives on employer's farm	227	89	138	86
No work contract	132	51	74	45

[a] All data collected at early season interview.

Table 2. Frequency of possible risk factors for occupational skin disease.

Risk Factor	Participants at Early season Interview (N = 259)		Participants at Late season Interview (N = 163)	
	N	%	N	%
Physical environment[a]				
Cucumber work	118	46	37	23
Tomato work	70	27	20	12
Orange work	44	17	—	—
Blueberry work	59	23	—	—
Social environment				
No training[b]	115	44	39	24
Training >1 year ago[b]	22	8	10	6
No work contract	132	51	74	45
Behavior and individual characteristics				
Re–wear clothes	61	24	9	6
No shower	45	17	17	10
Age <25 (years)	93	36	58	36
Age 25–34 (years)	87	34	55	34

[a] Crop–work responses were recorded at the early season interview for the previous 12 months and at the late season interview for the previous two months.

[b] Early season responses for previous training were categorized as: (a) no training, (b) training >1 year ago, or (c) training within one year. Late season responses were combined with early season responses and were categorized as: (d) no training, (e) training >1 year before intervention, or (f) training since one year before intervention.

reported at the late season interview, given a sign or symptom versus no sign or symptom reported at the early season interview, was 5.4 (95% CI: 2.7, 11).

Several of the potential predictors of the presence of itching or burning skin or a skin rash during the two months before the early season interview were statistically significant (table 3). These include blueberry work (unadjusted OR = 1.8; 95% CI: 1.0, 3.2), no work contract (unadjusted OR = 1.9; 95% CI: 1.1, 3.3), no shower after work (unadjusted OR = 0.37; 95% CI: 0.15, 0.94), and age 25–34 versus >34 years (unadjusted OR = 0.41; 95% CI: 0.22, 0.78). Three predictors were statistically significant after adjusting for other potential predictors in the model: re–wearing clothes (OR = 2.1; 95% CI: 1.1, 4.2), no shower after work (OR = 0.26; 95% CI: 0.13, 0.56), and age 25–34 versus >34 years (OR = 0.47; 95% CI: 0.22, 1.0).

Table 3. Models to predict skin symptoms during two months before early season interview (N = 259).

Risk Factor	Odds Ratio (unadjusted)	95% CI	p–Value	Odds Ratio (adjusted)	95% CI	p–Value
Physical environment						
Cucumber work[a]	1.6	(0.93, 2.7)	0.089	1.3	(0.72, 2.5)	0.35
Tomato work[a]	1.6	(0.77, 3.2)	0.21	1.1	(0.52, 2.2)	0.85
Orange work[a]	1.9	(0.90, 3.8)	0.095	2.0	(0.94, 4.1)	0.072
Blueberry work[a]	1.8	(1.0, 3.2)	0.048	1.5	(0.79, 3.0)	0.20
Social environment						
No training	1.5	(0.81, 2.9)	0.19	1.2	(0.60, 2.4)	0.61
Training >1 year ago	1.4	(0.43, 4.8)	0.55	0.76	(0.15, 3.9)	0.75
No work contract	1.9	(1.1, 3.3)	0.020	1.7	(0.87, 3.2)	0.13
Behavior and individual characteristics						
Re–wear clothes	1.8	(0.97, 3.4)	0.063	2.1	(1.1, 4.2)	0.031
No shower	0.37	(0.15, 0.94)	0.036	0.26	(0.13, 0.56)	0.0005
Age <25 (years)	0.57	(0.31, 1.1)	0.078	0.58	(0.32, 1.1)	0.083
Age 25–34 (years)	0.41	(0.22, 0.78)	0.0061	0.47	(0.22, 1.0)	0.050

[a] During previous 12 months.

Table 4. Models to predict skin symptoms during two months before late season interview (N = 163).

Risk Factor	Odds Ratio (unadjusted)	95% CI	p–Value	Odds Ratio (adjusted)	95% CI	p–Value
Physical environment						
Cucumber work[a]	1.1	(0.55, 2.2)	0.80	0.75	(0.33, 1.7)	0.51
Tomato work[a]	1.7	(0.50, 6.0)	0.38	1.5	(0.42, 5.7)	0.52
Social environment						
No training	0.71	(0.34, 1.5)	0.36	0.47	(0.23, 0.98)	0.044
Training >1 year ago	2.1	(0.59, 7.7)	0.25	1.3	(0.38, 4.7)	0.65
No work contract	1.9	(1.0, 3.7)	0.043	1.8	(0.86, 3.9)	0.11
Behavior and individual characteristics						
Re–wear clothes	0.38	(0.048, 3.0)	0.36	0.22	(0.017, 2.7)	0.24
No shower	2.3	(0.81, 6.9)	0.12	2.7	(0.75, 9.6)	0.13
Age <25 (years)	1.1	(0.54, 2.3)	0.79	0.83	(0.38, 1.8)	0.65
Age 25–34 (years)	0.69	(0.35, 1.4)	0.28	0.58	(0.29, 1.2)	0.14

[a] During previous two months.

At the late season interview, only no work contract was a statistically significant predictor of the presence of itching or burning skin (unadjusted OR = 1.9; 95% CI: 1.0, 3.7) (table 4). After adjusting for other potential predictors, only no training versus training within one year was statistically significant (OR = 0.47; 95% CI: 0.23, 0.98).

Conclusions

A high percentage of Latino migrant and seasonal farmworkers interviewed for this study reported a sign or symptom of skin disease. Early in the season, 24% reported that the signs or symptoms of skin disease occurred in the previous two months. Late in the season, 37% reported having a skin disease sign or symptom in the previous two months. These results are substantially higher than national data gathered in the NHANES (National Center for Health Statistics, 2003). In the NHANES, 10.4% of all persons surveyed reported rash, dermatitis, and eczema in the last year, and 5.3% reported they currently had rash, dermatitis, and eczema. This suggests that the high levels result at least in part from occupational exposures. Our figures for skin disease signs and symptoms are also much higher than the 28.1 per 10,000 agricultural workers reported by Villarejo and Baron (1999) for national data that includes farmers and managers as well as all employees. However, they are comparable to the 46% of grape and tomato farmworkers from California who reported a skin rash over the previous three months to McCurdy et al. (1989), and the 12% of California farmworkers who reported having a rash in the previous 12 months to Gamsky et al. (1992).

This analysis adds further insight to the results of earlier studies into risk factors for occupational skin disease among migrant and seasonal farmworkers. One of the most important factors predicting skin disease among farmworkers is reporting skin disease at an earlier time. Of those who reported signs or symptoms at the beginning of the season, 42.4% also reported them late in the season, whereas only 17.1% of those who did not report a sign or symptom at the beginning of the season reported them late in the season. This suggests that there are certain individuals with a predisposition to skin disease. Whether this predisposition results from individual characteristics (e.g., genetic, allergy, behavior), characteristics in the social environment (e.g., access to showers), or characteristics of the physical environment (e.g., working with specific crops, clean living conditions) deserves further investigation.

Analysis of risk factors for those reporting early season signs or symptoms indicates individual characteristics and behavior, social environment, and physical environment each play a role. Considering only the adjusted odds ratios, those who re–wore work clothes (behavioral factor) had 2.1 the odds of reporting signs or symptoms than those who did not. Younger workers (compared to those aged 35 and older) had a lower odds of reporting signs or symptoms.

That those early in the season who reported not showering after work had lower odds of reporting signs or symptoms is surprising, as we would expect the opposite result. Those who had skin disease may shower more often in an effort to seek relief. The only risk factor significantly associated with skin disease in the late season was receiving pesticide safety training, with those reporting no training having a lower odds of reporting these signs or symptoms. Again, this result is contrary to expectations.

This exploratory analysis raises a number of questions about the incidence and risk factors for occupational skin disease among migrant and seasonal farmworkers. The first of these questions is the skin diseases that these signs and symptoms represent. There have been no measures of occupational skin disease among this population based on clinical diagnosis. A second set of questions surrounds the most proximate causes of these signs and symptoms. Anecdotal reports from clinicians serving this population suggest that workers suffer from allergic reactions to poison ivy and oak, as well as contact dermatitis due to contact with plants and agricultural chemicals. However, direct measurement has not been attempted. While the clinicians who provide these anecdotal suggestions can provide a great deal of insight into the health of farmworkers, more systematic diagnosis of the entire farmworker population is necessary, as we have no information on how many farmworkers actually seek medical care for skin symptoms.

This is an exploratory analysis and has important limitations in sampling and measurement. The sample used for this analysis is representative of east–central North Carolina. It may differ from farmworker populations in other areas of the Southeast U.S. It is not a strictly random sample but was selected for participation in a pesticide safety education program. This selection may have introduced some biases in the sample. The dependent measures are based on self–reported, retrospective data. While most individuals would remember significant itching, burning, or rash over a two–month period, specific individuals may forget one instance of such signs or symptoms or include symptoms that occurred more than two months previously. Measures of some of the independent measures, such as crops in which the participants reported that they worked in the previous 12 months, may also be subject to recall bias.

However, this analysis adds to the small number of studies that address the incidence and risk factors of occupational skin disease among migrant and seasonal farmworkers. Similar to earlier cross–sectional studies, this analysis found a high percentage of self–reported skin disease signs and symptoms among workers. This analysis provides the first longitudinal data on skin disease signs and symptoms among workers and shows that those with skin disease early in the season are more likely than others to report skin disease late in the season. It is also the first examination of occupational skin disease among migrant and seasonal farmworkers in the Southeast U.S. – a region in which Latinos have become the major group doing farm work.

Using a model that considers factors in the social and physical environmental factors as well as behavior, we completed separate analyses in the early and late season to differentiate risk factors for occupational skin disease. However, similar to earlier studies, we found few risk factors that have a consistent relationship to skin disease signs and symptoms.

There are high levels of occupational skin among migrant and seasonal farmworkers that must be reduced. There is a clear need for more and better research so that we can develop programs that correctly address the risk factors for this occupational illness. This research needs to include better measures of skin disease signs and symptoms and of possible risk factors, and it needs to use a prospective design.

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