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California Farm Survey of Occupational Injuries and Hazards

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Abstract

It has been well-recognized that farm workers are at very high risk for occupational injuries. Due to the unique composition of the California agricultural industry and workforce, especially the migrant farm worker population, a survey of farms in two agricultural counties was conducted. The primary goal of the survey is to evaluate commodity-specific farm injuries and hazards in two highly agricultural regions in California with a high proportion of migrant farm labor, Fresno and Monterey Counties. The specific aim was to evaluate a total of 350 farms randomly selected after stratification for commodity and farm size. Each farm evaluation consisted of a farm owner/operator interview, seven randomly selected worker interviews, and a standardized health and safety walk-though survey. From 1992 through 1996, field visits and data collection have been completed for 357 farms (representing over 2000 worker interviews and 157 walk-through evaluations). Preliminary results indicate a work force of mostly Hispanic men (approximately 89%) with a mean age of 38. There were high prevalences of musculoskeletal problems in the lower back (24%), upper back (19%) and wrist (18%) regions of the body. During the past year, 29% of the workers reported occupational injuries associated with farm work, farm equipment or transportation. Among the injured workers, 20% reported multiple incidents, 27% missed at least one day of work, 46% saw a licensed medical care provider, and 22% knew of a workers compensation report being filed. Only 70% of the injured workers reported received training on the work task that was associated with their injury. The final California Farm Survey will allow a unique view of the farming industry in the State from the concurrent perspective of the owner/operator, the farm worker and the study walk-through evaluator.

Keywords. Agricultural health, California, Farm worker, Occupational injuries, Farm hazards.

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The U.S. Public Health Service has highlighted workplace injuries as one of the occupational health end-points for the Year 2000 National Disease Prevention Objectives. In particular, farm workers are cited as a high-risk group needing special attention (U.S. DHHS, 1991). In 1987, there were approximately twofold increases in the fatal injury rate and non-fatal injury among the farm worker group as compared to the general workforce: 14.0 work-related injury deaths per 100,000 full time farm workers and 12.4 work-related non-fatal injuries per 100 full time farm workers versus 6.0 and 7.7, respectively, for all types of workers. More recent year estimates in 1992 continue to show an elevated rate among farm workers of 24.0 fatal injuries/100,000 full time workers and 11.0/100 full time workers.

The California Farm Survey of occupational injuries and hazards is based in two highly agricultural counties in the State (table 1). Both Fresno and Monterey Counties tend to have a higher percentage of Hispanic residents, rural area, and unemployment than the State as a whole. Also, Fresno County has nearly double the percentage of residents living below the poverty level as compared to the entire State.

During the years 1989 through 1991, the U.S. Department of Labor conducted the California portion of the National Agricultural Workers Survey (NAWS). In California, the NAWS collected interview data from 1,844 randomly selected seasonal agricultural workers in nine counties: Fresno, Kern, Kings, Imperial, Monterey, Sonoma, Tulare, Riverside and Yolo (U.S. DOL, 1993). The California NAWS provided a profile of the farm worker population that is reflective of the target population for our survey: 90% of the workers surveyed were Hispanic, 75% were men, 60% lived with a spouse, child or parent while employed, 2% were less than 18 years of age, half were involved in harvest work, 86% worked with fruits, nuts or vegetables, one third were employed by labor contractors, and 32% reported having health insurance coverage.

The distribution of farm ownership type in California is different from that of the rest of the nation. Using 1991 estimates for the 77,669 farms in California, one finds 9.0% of the farms located in Fresno County (n = 7021) and 1.6% in Monterey

Table 1. Demographic profile for Fresno and Monterey Counties, and California (CDHS, 1996)*

	Fresno County	Monterey County	California
Total population (% of state population)		375,680 (1)	
Percent working age population (18-64 yr)		60	62
Ethnic/racial population (%):			
white, non-hispanic	47	50	54
hispanic	39	37	29
asian	10	8	11
black	5	6	7
Percent rural area	17	17	
Percent below poverty level	21	12	13
Percent unemployed	14	13	8

* All figures are for 1994 except rural area (year 1990) and unemployment (year 1995).

County (n = 1245), (U.S. BOC, 1995a,b). Approximately one third of all farms in California and in each of the target counties, Fresno and Monterey, are non-family owned as opposed to only 14% for the U.S. Corporate farming poses different challenges in the prevention and detection of occupational injuries and hazards.

Furthermore, the two counties selected for the California Farm Survey are agriculturally very diverse and highly productive: (1) For 1992, Fresno County was the top county nationwide for number of farms (7,021), dollar value of crops sold ($1.42 billion) and acreage in the following commodities: fruits, nuts, berries, cotton, tomatoes, orchard crops, and grapes; and (2) For 1992, Monterey County was the third leading county nationwide for dollar value of crops ($1.16 billion) and the top county for acreage in the following commodities: vegetables, sweet corn and melons, lettuce and romaine, vegetables harvested for sale, and strawberries (U.S. BOC 1995c). Because of the known high risk for occupational injuries among agricultural workers, especially migrant farm workers, and the unique composition of the California agricultural industry, it was decided to conduct a population-based survey of farms in two agricultural regions within the state that have a high proportion of migrant farm labor.

Methods

The primary goal of the California Farm Survey is to evaluate commodity-specific farm-related injuries and hazards in Fresno and Monterey Counties. In order to conduct this evaluation, a pilot model project to obtain farm owner/operator, field worker, and health and safety walk-through survey information was developed.

It was determined that 350 farms were needed to achieve adequate statistical power. After informed consent was obtained from the farm owner/operator and each of the participating farm employees, the following activities were performed: (1) a standardized personal interview with the farm owner/operator; (2) a standardized personal interview in English or Spanish (as preferred by the interviewee) with seven randomly selected farmworkers; and (3) a standardized health and safety walk-through evaluation of the farm. The California Farm Survey began field collection activities in June 1991 and all farm survey activities have been completed as of October of this year.

After a master list of all Fresno and Monterey County farms was created, target farms were selected using a sampling scheme stratified by commodity and farm size. There have been two farm samples selected during the course of this project. (1) The first sample was derived from the 1992 census. Recruitment of farm owner participants included an introductory letter, follow-up telephone call and initial farm visit. On a subsequent visit, the owner/operator and worker interviews were conducted with 50% of the farms receiving a concurrent walk-through evaluation. The initial sample list became outdated because of the delays in data collection in the early years of the project. (2) The second sample was created from the 1994 census. At this time, the recruitment protocol was slightly changed to maximize the potential for participation and to minimize the time needed to complete the needed farm activities. Instead of scheduling a single on-site visit for both the farm interviews and the walk-through evaluation, separate field visits were scheduled. By January 1997, a walk-through evaluation was attempted on all farms. Initial attempts at recruiting farm owner/operator participants was relatively poor compared to the latter phase of the project when modified protocols greatly improved the participation rate for both the interview and walk-through portions of the survey.

Similar to the time sequence noted above for the sample frame changes, there were modifications of the farmworker selection protocol. In the first phase of the project, the worker selection protocol included a convenience sample at each farm of one supervisor and six direct employees for interviews. Based on the cursory review of the early questionnaires and the experience in the field, it was felt that a better way to ensure diversity of work task and worker type was needed. Thus, the second phase of the project included a worker convenience sample that attempted to obtain the following distribution of individuals: one supervisor, one tractor driver, one irrigator, one mechanic/shop employee, three direct employees, and three farm labor contract employees. Obviously, not all farms had this variety of workers but this was the ideal that the project field staff was asked to consider in selecting workers for interviews.

Initial data entry employed Epi-Info software. Later, SPSS was used for both data entry and analytical purposes. Although the farm data collection has been completed, data entry and quality control activities are still on-going. Therefore, a preliminary descriptive analysis limited to the farm interviews from the first phase of the project will be presented.

Results

There have been 357 farm visits which have resulted in 357 owner/operator questionnaires, over 2,000 field worker questionnaires, and 157 walk-through evaluation forms. Survey participation for the first phase farms involved 172 target farms (80% in Fresno County and 20% in Monterey County). In the first phase, 66 out of 172 target farm owner/operators agreed to participate (38.4% participation rate). Of the 66 participating farms, three farm owners/operators subsequently refused to allow worker interviews (adjusted participation rate of 37.2%). For the final 64 survey farms, 24 (38%) had concurrent walk-through evaluations.

Aside from a single pilot farm in 1992, the first phase farms resulted in interviews conducted primarily from 1994 through 1996 (table 2). The number of workers interviewed per farm included: 1.6% of all farms with one worker per farm; 3.1% with two workers; 7.8% with four workers; 1.6% with five workers; 75.0% with six workers; 6.3% with seven workers; 1.6% with eight workers, and two farms with missing information. The method used in the selection of workers for interviews involved owner/operator choice in 46.9% of the farms, crew boss choice in 39.1%, project field staff choice in 1.6%, and other types of selection in 12.5%. The participating farms were associated with a variety of commodities and services: 2 berry farms, 1 cattle ranch, 4 citrus farms, 3 cotton farms, 1 dairy farm, 12 fresh vegetables farm, 10 grape farms, 3 horticultural entities, 1 nursery, 8 processed vegetables entities, 6 agricultural services businesses, and 13 stone fruit farms.

Table 2. Distribution of survey farm participation by type of interviews and year conducted for the first-phase farms

	Owner/operator Interviews		Worker Interviews	
Year	No. Farms	% Total	No. Workers	% Total
	64	100.0	443	100.0

The owner/operator responses indicated that 25 (39.1%) of the individuals lived on the farm, 10 (15.6%) on another farm, 28 (43.8%) elsewhere, and one (1.6%) individual did not respond. Sixty-one percent of the first-phase farms used less than 200 people in the prior year to assist in farm operations while 9.4% used over 1,000 individuals (table 3). Furthermore, 56.2% of the farms stated that they used workers from a farm labor contractor. The number of acres of cropland per farm ranged from not currently using any cropland to over 7,000 acres (table 3). Among the farm owner/operators reporting cropland use, 62.5% stated that they have 3,000 acres or less of cropland.

The owner/operator questionnaire included questions about the health of the current workforce. Forty-three percent of the owner/operators stated that someone had sustained a tractor injury: 7 tractor runovers, 1 tractor rollover, and 20 with other types of tractor injury situations. In the past year, only one owner/operator reported a farmwork fatality. With respect to occupational health and safety training, 78.1% reported that someone on the farm had received illness training, 14.1% reported someone with injury training, 3.1% reported no one on the farm had training, 3.1 % reported not knowing because they only used labor contractors, and 1.6% were missing information.

From 1992 through 1996, there were 443 farm worker interviews associated with the 64 first-phase farms (table 4a). Among the workers, the overwhelming majority are men (89.4%) of Hispanic (89.6%) descent. The mean age for both genders is similar (36 to 38 years).

The most prevalent regions for musculoskeletal problems among the injured workers were lower back (24%), upper back (19%), and wrist (18%). During the past year, 127 workers (29%) stated that they had been injured while working on the farm, using farm equipment or travelling to or from work (table 4b). In the preliminary analysis, the 127 reported injuries reflect an injured population that was 90% male, 96% White, and 90% Hispanic with a rate of 28.7 injuries per 100 workers. Among these injured workers, 24 workers (20%) reported sustaining more than one injury during the past year, 89 (70.1%) received some sort of safety training for the associated work task prior to the injury, 58 (46%) saw a licensed medical person for treatment, and 28 (22.0%) definitely knew of a workers'

Table 3. Farm owner/operator responses for the first-phase farms (n = 64)

	N	%
Number of people assisting in farm operation in last year		
1-200	39	60.9
201-400	9	14.1
401-600	5	7.8
601-800	4	6.3
801-1000	1	1.6
1001 +	6	9.4
Number of acres of cropland per farm		
0	6	9.4
1-1000	21	32.8
1001-2000	6	9.4
2001-3000	13	20.3
3001-4000	3	4.7
4001-5000	5	7.8
5001-6000	4	6.3
6001-7000		1.6
7001-8000	2	3.1
Unknown	3	4.7

Table 4a. Worker responses for the first phase farms (443 farmworkers among 64 participating farms)

	N	%
Gender		
Number of female workers	46	10.4
Number of male workers	396	89.4
Unknown	1	0.2
Race		
White	424	95.7
Black	2	0.5
Asian	3	0.7
American Indian	14	3.2
Hispanic	397	89.6
Age, years		
Female workers	37.9	18-60
Male workers	35.6	17-77

Table 4b. Worker responses for the first phase farms – representing the 127 workers reporting occupational injuries during the past year

Among all 443 farmworkers	N	%
Prevalence of musculoskeletal conditions lasting at least 3 months (excluding acute trauma, categories not mutually exclusive)		
Neck	55	12.4
Shoulder	62	14.0
Elbow	23	5.2
Wrist	81	18.3
Upper back	86	19.4
Lower back	105	23.7
Hip	36	8.1
Knee	56	12.6
Ankle	33	7.4
Among 127 farmworkers reporting an occupational injury during the past year		
During the last year, number of times injured		
1	92	72.4
2	14	11.0
3	6	4.7
4	2	1.6
5	1	0.8
12	1	0.8
Missing information	11	8.7
Number of workers receiving safety training for work activity prior to injury	89	70.1
Person seen for injury care		
Medical person	58	45.7
Non-medically licensed person	1	0.8
Self, family or friend	8	6.3
No person seen	60	47.2
Injury reported to workers' compensation		
Yes by the worker	7	5.5
Yes by the owner/operator	21	16.5
Never heard of workers' compensation	1	0.8
No or unsure	98	77.2

compensation report being filed (table 4b). For the 127 injured workers, 34 (26.8%) reported missing at least one day of work due to the injury with 11 individuals (8.7%) missing two or more weeks.

Another part of the worker questionnaire briefly dealt with pesticide exposure and health insurance (table 4c). Self-reported pesticide illness occurred in 13% of the workers with 5% receiving medical treatment and 2% reporting a physician-confirmed diagnosis. Finally, only 287 (65%) of the farm workers reported having health insurance.

Discussion

The preliminary results presented for the first-phase farms are not necessarily a representative sample of the farms in the two counties of interest but do illustrate interesting characteristics that will be explored when the entire data set is analyzed. Furthermore, all the farm owners/operators voluntarily participated in this survey so that one may be viewing only the farms with a better health and safety experience in which the farmer owner/operator does not mind undergoing an outside evaluation. The comparison of the information provided by the owner/operator, the workers and the independent walk-though evaluation will help to distinguish any inconsistencies with respect to information source.

The recently completed Traumatic Injury Surveillance of Farmers (TISF) report provides an interesting contrast to the California Farm Survey (Myers, 1997). TISF summarizes non-fatal lost-time injury estimates for the agricultural production industry for 1993. This nationwide mail survey used a sampling scheme to obtain adequate geographical and farm type representation. All information in the survey is self-reported by farm owners. There are differences in the methods employed by TISF and the California Farm Survey: injuries are restricted to those associated with at least a half-day of lost work time, all reports are from farm owners and mail questionnaires are used in TISF, in contrast to including all injuries, worker reporting, and personal interviews found in our survey. Nonetheless, the results of TISF can be used as a rough comparison to the California Farm Survey.

Of the 72,000 farm injuries identified by TISF, the injured population was 90% male, 76% White, and 22% Hispanic with an estimated rate of 5.5 injuries per 100 full-time workers. For the California Farm Survey preliminary analysis, the 127 reported injuries reflected an injured population that was 90% male, 96% White, and 90% Hispanic with a rate of 28.7 injuries per 100 workers. In looking at the subgroup of only hired farm workers from TISF, one finds an injured population that is 96% male and 56% Hispanic. The most prevalent injured body part was the back (21%) with the hand and wrist less common (10%) among the hired farm workers in TISF. While the California Farm Survey also showed the highest percentage for the back (24% lower back and 19% upper back), the wrist was the

Table 4c. Worker responses for the first phase farms (443 farmworkers among 64 participating farms)

	N	%
Any illness from exposure to pesticides*		13.3
Received medical treatment for pesticide illness		5.0
Doctor diagnosed pesticide illness		2.5
Any health insurance plan		64.8

* 3 workers (1%) with missing information.

second highest region (18%). Finally, one can compare medical access factors among the hired farm workers from TISF and the California Farm Survey: 86% seeking professional medical care for TISF, in comparison to 46% for our survey.

There are potential limitations to the survey which need to be considered in the interpretation of the final results. The long period of data collection (from 1992 through October 1997) has introduced certain factors that may make interpretation of the final complete data set problematic. There has been increasing use of farm labor contractors in California. The NAWS indicated 33% employment by labor contractors in 1991 and this preliminary survey shows a 56% use of labor contractors by the first phase farm owners/operators. Thus, the nature of the labor-management relationship has potentially changed. Agriculture in California is a dynamic and very competitive industry. During the course of the survey, increased farm turnover has required a repeat sampling of the target farms. Thus, the composition of the farm commodity and geographical mix might have changed during the survey period. The prolonged data collection because of both logistical challenges and bureaucratic barriers has resulted in the change of project staff. Every effort was made to maintain a high level of adherence to established survey protocol but there may be differences in the field survey techniques in the early years of the project when compared to the completely different field staff in the latter years.

Three key regulatory activities have come into play approximately midway into the course of this project which possibly have influenced the way farming and worker protection is conducted in the State: (1) the California OSHA worker standard which requires an illness and injury prevention plan to be in place at all worksites including farms; (2) the California Department of Industrial Relations based Targeted Industries Partnership Program which conducts unannounced visits to farms for possible employer violations; and (3) the EPA Worker Protection Program regulation which attempts to ensure adequate training and protection against pesticide poisoning among farm workers but which also has potentially increased awareness of worker safety issues in general. Lastly, there have been increased labor organizing activities within the farmworker community within the last few years.

Conclusions

Although the preliminary analysis of the California Farm Survey is not a representative sample of the Fresno and Monterey counties under study, the interesting descriptive findings will be useful for the final study analysis. Various farm characteristics indicate the different type of agriculture in California: the relatively low percentage of farm owners/operators living on the farm (59%), the high frequency of farm labor contractor use (56%), and the wide range in employment of hired farmworkers (from a few workers to over 1,000 per year). The farm owners/operators reported a high percentage (43%) of farms that had employees who sustained tractor-related injuries, and a high percentage (92%) of the farms that had personnel with illness and/or injury training. There were a few farms (3%) with an owner/operator that did not know whether or not a health and safety trained person was present because they only used farm labor contractors. This could be symptomatic of the disconnect that may occur when the owner/employer relationship begins to blur.

The workers interviewed for the California Farm Survey were mostly Hispanic men (approximately 89%) with a mean age of 38. There were high prevalences of musculoskeletal problems in the lower back (24%), upper back (19%), and wrist

(18%) regions of the body. During the past year, 29% of the workers reported occupational injuries associated with farm work, farm equipment or transportation. Among the injured workers, 20% reported multiple incidents, 27% missed at least one day of work, 46% saw a licensed medical care provider, and 22% knew of a workers compensation report being filed. Interestingly, only 70% of the injured workers reported received training on the work task that was associated with their injury.

The TISF provided an interesting national comparison for some of the findings of the California Farm Survey. The California results showed a similarly predominately male workforce that is composed of a much higher proportion of Hispanics than that found in the national survey. The injury rate of 5.5 injuries per 100 full-time workers is much less than the 28.7 rate derived from the California survey but this may be partially explained by the different survey methodologies. For both surveys, the back was the most prevalent injured body part yet the wrist was the second leading area only in the California survey. Differences in medical care access and injury severity may partially account for the difference in the percentage of injured workers seeking professional medical care: 86% seeking professional medical care for TISF and 46% for our survey.

There are important factors that have changed during the course of this survey and that will need to be considered in the final interpretation of the California Farm Survey: increased farm labor contracting, farm turnover, project staff turnover, regulatory activities, and labor organizing activities. Despite the limitations already mentioned about the California Farm Survey, the survey will allow a unique view of the farming industry with the concurrent perspective of the owner/operator, the farmworker and an independent evaluator of the farm hazards.

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