

APPENDIX I

STATES WITH THE HIGHEST NUMBER OF FARMS

STATE	NUMBER OF FARMS
UNITED STATES	2,063,010
Texas	205,000
Missouri	104,000
Iowa	98,000
Kentucky	88,000
Minnesota	87,000

National Agricultural Statistics Services, Agriculture Statistics Board—July 1996.

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**Occupational Agricultural Injury  
Surveillance in California: Preliminary  
Results from the Nurses Using Rural Sentinel  
Events (NURSE) Project**

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**SUMMARY.** The objective of the California Nurses Using Rural Sentinel Events (NURSE) is to prevent occupational agricultural in-

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injuries. This active surveillance and health education project obtains incident reports of injuries from sources in two California counties. Over 5000 of these reports are in a database, coded by cause and nature of injury using the International Classification of Diseases-9-CM. From these, 35 illustrative incidents have been investigated and summarized in widely disseminated prevention strategy reports. Health and safety education outreach is provided by bilingual field staff several times monthly. The NURSE project has developed valuable database and educational resources for research and promotion of safety in agriculture. [Article copies available for a fee from The Haworth Document Delivery Service: 1-800-342-9678. E-mail address: [gettinfo@haworth.com](mailto:gettinfo@haworth.com)]

**KEYWORDS.** Farm, agriculture, injury, surveillance, health, education, nurse, bilingual

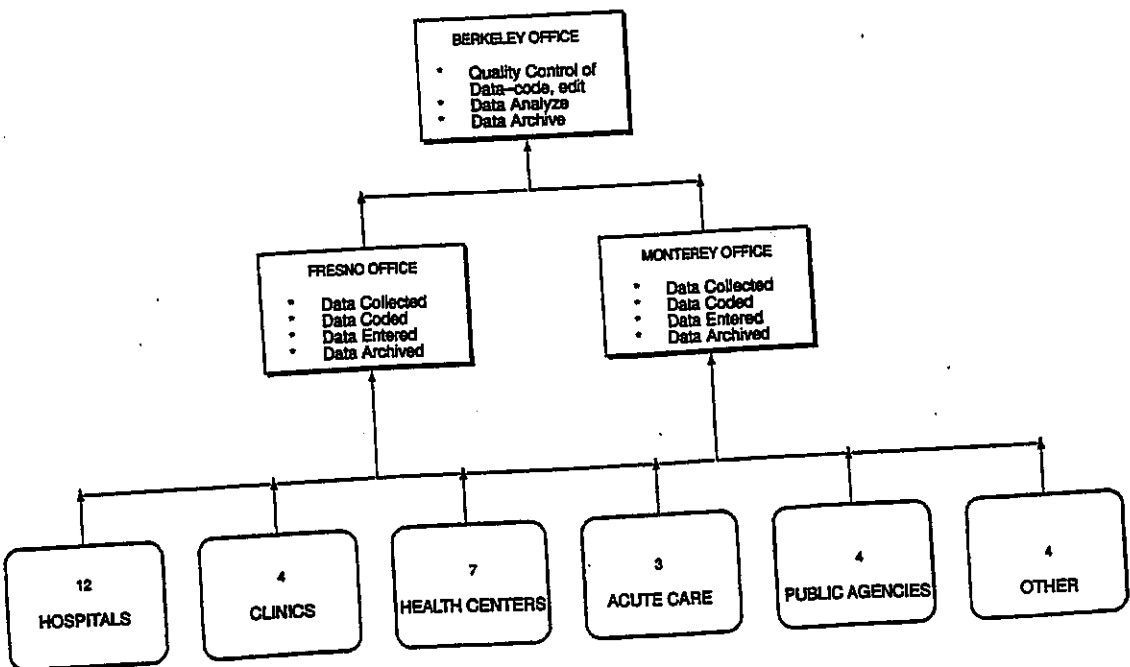
**INTRODUCTION**

The California Nurses Using Rural Sentinel Events (NURSE) project has been conducting active surveillance and health education since 1991. NURSE in California is part of the national study Occupational Health Nurses in Agricultural Communities (OHNAC) funded by the National Institute for Occupational Safety and Health. The OHNAC study is being conducted in ten states nation-wide: California, Georgia, Iowa, Kentucky, Maine, Minnesota, New York, North Carolina, North Dakota, and Ohio. NURSE is partially funded by the National Institute for Occupational Safety and Health (NIOSH) and is complementary to a second NIOSH funded project, the Farm Family Health and Hazard Surveillance Project. The OHNAC programs are ending in September 1996 and will be publishing their results subsequently.

The main objective of NURSE is to prevent occupational agricultural injuries. The NURSE project obtains current incident reports of agricultural occupational injuries from a variety of sources (Figure 1). These are coded by nature and cause using the International Classification of Diseases-9-CM,<sup>1</sup> and entered into a computerized database. Second, health education outreach is designed and implemented using the surveillance results. The surveillance and the outreach are targeted on the same agricultural populations.

Fresno and Monterey counties are the focus of the California NURSE project. Although the counties differ in terms of commodities, agriculture in both relies to a major extent on migrant workers. Both counties rank

FIGURE 1. Data Collection and Management Flow for California Nurses Using Rural Sentinel Events Project (NURSE)



high in measures of agricultural production in California and nation-wide. In 1992, Fresno county<sup>2</sup> had 7,021 farms and nearly six times as many as the 1,245 in Monterey. In 1992, there were 12,273 farm-related injuries and 38 fatalities in California.

### METHODS

The NURSE project maintains three office bases. Project coordination headquarters are in Berkeley, California. A field office in Salinas, Monterey County, is maintained by a Community Health Outreach Worker. The Salinas office was inactive for over a year. A second base in Fresno, California is maintained by a Nurse Educator and a safety specialist. Both the Outreach Worker and Nurse Educator are knowledgeable about health, agriculture, and farm worker culture. Both are bilingual in English and Spanish.

California mandated Doctor's First Reports<sup>3</sup> of all occupational injuries provides a unique source of agricultural injury incident data for Fresno and Monterey counties. The Doctor's First Reports of Occupational Injury and Illness (DFRIs) are required to be completed by health care providers within five days of identifying a work-related injury or illness (including agricultural injuries and pesticide poisonings), and are submitted to the California Department of Industrial Relations' Division of Labor Statistics and Research. These forms are currently being used by the Occupational Health Branch, DHS, in the surveillance of occupational TB, asthma, and violence cases, farm-related injuries and workplace fatalities. In California, the Occupational Health Branch has the right of entry to worksites and access to company records as established by Health and Safety Code legislation. Furthermore, there is a general powers authority by which a public health medical officer in the course of investigating a public health problem has unrestricted access to medical records.

Each month the project staff obtains injury reports from selected clinics, hospitals, health centers newspapers, and various agencies which maintain injury data which have agreed voluntarily to contribute to this study (Table 1). Reports selected for the database must meet the case definition of being occupational, agricultural and an injury (Figure 2). All incidents are coded with regard to cause and nature of injury using the standard ICD-9-CM system (International Classification of Diseases, 9th revision, Clinical Modification). The identity of the sources, and of the individuals involved in the incidents, is kept strictly confidential.

Case reports are reviewed for relevance and importance. A limited number of cases involving fatalities, common, and serious injuries are

TABLE 1. Number<sup>a</sup> of California NURSE Project Data Providers by County and Type

CALIFORNIA NURSE PROJECT DATA PROVIDER PROFILE 1991-1995			
TYPE	FRESNO COUNTY	MONTEREY COUNTY	TOTAL
Hospitals	7	5	12
Clinics	1	3	4
Health Centers	6	1	7
Acute Care	0	3	3
Public Agencies	2	2	4
Other	2	2	4
Total	18	16	34

<sup>a</sup>These figures are preliminary and may change as new cases are added to the database, and the data are cleaned and edited.

investigated by local staff. The protocol for field investigations specifies appropriate initial contacts and subsequent interviews with the injured person, co-workers, and supervisors. These are conducted as soon as possible after the injury event by a nurse and a safety specialist. In addition, an on-site engineering inspection of equipment and premises involved is conducted. Other agencies, such as the coroner's office, may also be contacted. Normally, medical records and other reports will be reviewed. These materials are then reviewed by the combined staff. The focus is to determine factors which led or contributed to the accident and to construct and recommend prevention strategies in a NURSE<sup>4</sup> report.

### RESULTS

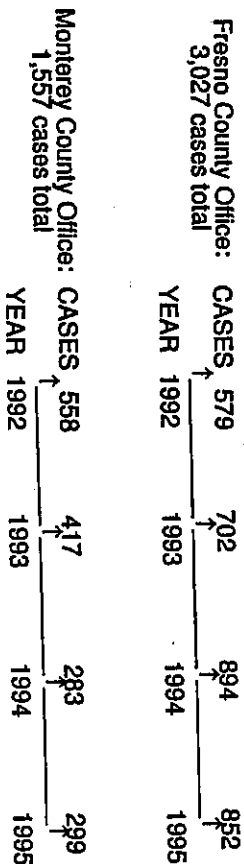
The project has been successful in obtaining large numbers of cases over a period of more than four years (Figure 3). There was a small number of cases collected in 1991 in the start-up phase, not included in Figure 3. A substantial number of cases from 1996 is not available in computerized form. This continuity of data collection increases the like-

FIGURE 2. Case Definition

CASE DEFINITION. Cases must meet the following three criteria to be included in the California NURSE project surveillance system:

- 1) OCCUPATIONAL. The injury is defined as occupational if it: (a) occurred at an agricultural site where the person was working (whether paid or unpaid), or (b) occurred during a task associated with agricultural production or services, or (c) resulted from using or being exposed to farm machinery or other agricultural hazards.
- 2) AGRICULTURAL. Injuries may be included if they occur in industries with Standard Industrial Classification (SIC) codes in Division A: Agriculture, Forestry, and Fishing under major groups 01-Agricultural Production-Crops, 02-Agricultural Production-Livestock and Animal Specialties, or 07-Agricultural Services; 08-Forestry and 09-Fishing, Hunting, and Trapping are excluded. An agricultural injury is one that occurs at a farm, dairy, packing shed, food processing plant, or similar site, and is related to agricultural production or services.
- 3) INJURY. The case must involve an injury. Examples of injuries include fractures, lacerations, burns, strains, insect bites, and effects of exposure to chemical agents.

FIGURE 3. Timeline. Number<sup>a</sup> of Cases of Agricultural Occupational Injuries Received by the California NURSE Project Field Offices, by County and Year



<sup>a</sup>These figures are preliminary and may change as cases are added to the database, and the data are cleaned and edited. Excluded are 2 cases received in 1991, the project start-up year, and cases recently added to the database in 1996.

hood that the most frequent injury types are represented. There were 34 voluntary data sources recruited, including 12 hospitals, and a total of 11 clinics and health care centers (Table 1).

**DEMOGRAPHICS OF SAMPLE**

There were more males than females in the sample from each county (Table 2). However, the percent of females in the Monterey sample was almost double that in the Fresno sample. In both counties, more than 80% of the injured workers were Hispanic/Latino (Table 3). About a third of the injured workers from each county were aged 26 to 35 years (Table 4). More than half were between the ages of 18 and 45. More than 90 percent were between the ages of 18 and 55. Only two per cent in Fresno, and less than one per cent in Monterey were 18 years of age or younger.

**NATURE OF INJURY**

For the four year period, 1991-1995, the ten most frequent types of injury reflect the nature of agricultural work. In both Fresno (Table 5) and in Monterey (Table 6) the most frequent nature of injury was open wound of the finger (Table 5 and 6). Back strains also were common in both counties. Sprains, fractures, open wounds, and contusions were common. Foreign body in the eye was common in Fresno, but not as common in

TABLE 2. Occupational Agricultural Injury Cases Received by the California NURSE Project Field Offices in 1995, Percent<sup>a</sup> by County and Gender

OCCUPATIONAL AGRICULTURAL INJURY CASES			
GENDER	FRESNO COUNTY Field Office (percent)	MONTEREY COUNTY Field Office (percent)	Total
Male	87.7	71.2	
Female	12.3	28.8	
Total	100.0	100.0	

<sup>a</sup>These figures are preliminary and may change as new cases are added to the database, and the data are cleaned and edited.

TABLE 3. Occupational Agricultural Injury Cases Received by the California NURSE Project Field Offices in 1995, Percent<sup>a</sup> by County and Hispanic Ethnicity

OCCUPATIONAL AGRICULTURAL INJURY CASES			
INJURED WORKERS IS HISPANIC	FRESNO COUNTY Field Office (percent)	MONTEREY COUNTY Field Office (percent)	
Yes	89.9	81.0	
No	5.7	7.8	
Unknown	4.3	11.1	
Total	99.9 <sup>b</sup>	99.9 <sup>b</sup>	

<sup>a</sup>These figures are preliminary and may change as new cases are added to the database, and the data are cleaned and edited.  
<sup>b</sup>Percents do not sum to 100 due to rounding error.

Monterey. There were numerous toxic effects from carbon monoxide in Monterey but not in Fresno.

#### CAUSE OF INJURY

The ten most frequent causes of injury were similar in Fresno (Table 7) and Monterey (Table 8) counties. The most frequent cause in both counties was overexertion. Machinery was the second most frequent cause in Fresno, and third in Monterey. Cutting/piercing objects and tools were third in Fresno and second in Monterey. Being struck by an object was fourth most common in each county, followed by falls at the same level. Other common causes included foreign body in eye, being struck by a falling object, and being caught between objects. Accidental poisoning by agricultural chemicals was ninth most frequent in Fresno, and this will be the focus of future studies. Gases and vapors, including carbon monoxide, were common causes in Monterey.

#### HEALTH EDUCATION

Health and safety outreach has been conducted in Spanish and English by bi-lingual field staff who disseminate culturally appropriate outreach

TABLE 4. Occupational Agricultural Injury Cases Received by the California NURSE Project Field Offices in 1995, Percent<sup>a</sup> by County and Age

OCCUPATIONAL AGRICULTURAL INJURY CASES			
AGE (years)	FRESNO COUNTY Field Office (percent)	MONTEREY COUNTY Field Office (percent)	
< 18	2.0	0.7	
18-25	24.2	23.2	
26-35	30.5	36.6	
36-45	24.4	21.9	
46-55	12.0	11.8	
56-65	5.1	4.6	
66-75	1.0	0.0	
Unknown	0.8	1.3	
Total	100.0	100.1 <sup>b</sup>	

<sup>a</sup>These figures are preliminary and may change as new cases are added to the database, and the data are cleaned and edited.  
<sup>b</sup>Percents do not sum to 100 due to rounding error.

materials on safety and health to farm workers. The safety education messages, developed to target high risk groups, emphasize the seriousness and potentially preventable nature of farm injuries. Large quantities of free caps, drinking cups, T-shirts, coloring books, and plastic water bottles with safety messages and logos in English or Spanish were distributed during outreach.

Responses obtained from an evaluation form introduced in 1995 in outreach suggest a high level of appreciation in both counties. In 1995-1996, an attempt has been made to obtain feedback from health care and agricultural occupational safety professionals as well as farm workers. In 1995, a full-time health educator was added to the staff and has initiated both process and impact evaluation measures to assess health and safety outreach activities.

Outreach activities take place in both Fresno and Monterey counties. In

TABLE 5. Ten Leading Types of Agricultural Occupational Injuries in Cases Received by the California NURSE Project Field Office, Fresno County, 1991-1995, by N Code

CASES (Total)	N CODE (ICD-9-CM)	NATURE OF INJURY Rank Ordered by Number of Cases*
258	N883	Open wound of finger(s)
189	N846	Sprains and strains of sacroiliac region
143	N930	Foreign body on external eye
121	N873	Other open wound of head
103	N924	Contusion of lower limb and of other and unspecified sites
101	N847	Sprains and strains of other and unspecified parts of back
98	N692	Contact dermatitis and other eczema
78	N724	Other and unspecified disorders of back
77	N882	Open wound of hand except finger(s) alone
76	N845	Sprains and strains of ankle and foot
76	N918	Superficial injury of eye and adnexa

\*Additional data have been collected in both counties and are not included in this table.

Fresno in 1994, documented outreach included conferences (5), fairs (11), seminars (4), school presentations (2), health and safety organization meetings (26), and telephone communications (39), with various agricultural health and safety groups. These events span from the national level, to local health and safety events and organizational meetings, to county-based fairs and other community events. A network of community ties has been established with local clinics, hospitals, and other health care providers, as well as with leaders in agribusiness, farm workers, and local agencies and institutions interested in agricultural or migrant health and safety.

TABLE 6. Ten Leading Types of Agricultural Occupational Injuries in Cases Received by the California NURSE Project Field Office, Monterey County, 1991-1995, by N Code

CASES (Total)	N CODE (ICD-9-CM)	NATURE OF INJURY Rank Ordered by Number of Cases*
164	N883	Open wound of finger(s)
112	N847	Sprains and strains of other and unspecified parts of back
85	N924	Contusion of lower limb and of other and unspecified sites
74	N846	Sprains and strains of sacroiliac region
68	N986	Toxic effect of carbon monoxide
60	N923	Contusions of upper limb
51	N873	Other open wound of head
49	N918	Superficial injury of eye and adnexa
45	N816	Fracture of one or more phalanges of hand
42	N882	Open wound of hand except finger(s) alone

\*Additional data have been collected in both counties and are not included in this table.

Some of these events were (by month):

*February:* County Farm Show, Mini-Conference for Migrant Parents.

*March:* Migrant Education Conference, Migrant Parent Conference, Childhood Injury Control Conference.

*April:* Welcome Back Day for Agricultural Workers (Dia de Bienvenida para Trabajadores Agrícolas), School Health and Safety Fair, Family Community Gathering (Encuentro Comunitario Familiar), Impacto Health Fair, County Health and Safety Fair.

*June:* Elementary School Agricultural Days, Farmworker Transportation (Ratero) Informational Seminar, Family Day (Dia de la Familia).

*July:* Summer School Migrant Education Program, Family Day (Dia de La Familia).

*August:* Family Day (Dia de La Familia).

*October:* Migrant Parent Conference, Labor Law and Safety Update, Migrant HeadStart Health Fair, Farm Worker Transportation Safety Seminar.

*November:* First on Scene Seminar, County Agricultural Fair.

TABLE 7. Ten Leading Causes of Agricultural Occupational Injuries in Cases Received by the California NURSE Project Field Office, Fresno County, 1991-1995, by E Code

CASES (Total)	E CODE (ICD-9-CM)	EXTERNAL CAUSE OF INJURY Rank Ordered by Number of Cases*
386	E927	Overexertion and strenuous movements
300	E919	Accidents caused by machinery
297	E920	Accidents caused by cutting and piercing instruments or objects (includes powered hand tools, knives, hand implements)
238	E917	Striking against or struck accidentally by objects or persons
237	E885	Fall on same level from slipping, tripping, or stumbling
179	E914	Foreign body accidentally entering eye and adnexa
156	E916	Struck accidentally by falling object
151	E918	Caught accidentally in or between objects
117	E863	Accidental poisoning by agricultural and horticultural chemicals (excludes fertilizers)
99	E884	Other fall from one level to another

\*Additional data have been collected in both counties and are not included in this table.

TABLE 8. Ten Leading Causes of Agricultural Occupational Injuries in Cases Received by the California NURSE Project Field Office, Monterey County, 1991-1995, by E Code

CASES (Total)	E CODE (ICD-9-CM)	EXTERNAL CAUSE OF INJURY Rank Ordered by Number of Cases*
215	E927	Overexertion and strenuous movements
191	E920	Accidents caused by cutting and piercing instruments or objects (includes powered hand tools, knives, hand implements)
177	E919	Accidents caused by machinery
157	E917	Striking against or struck accidentally by objects or persons
130	E885	Fall on same level from slipping, tripping, or stumbling
98	E918	Caught accidentally in or between objects
75	E914	Foreign body accidentally entering eye and adnexa
72	E916	Struck accidentally by falling object
66	E869	Accidental poisoning by other gases and vapors
44	E868	Accidental poisoning by other utility gas and other carbon monoxide

\*Additional data have been collected in both counties and are not included in this table.

#### NURSE REPORTS

Fatal, serious, common, and unusual injuries are investigated. Many of the more than 5000 specific incidents have been investigated in detail by interviews, record reviews, and on-site inspections. Of these, 35 have been the basis for NURSE reports specifically developed and disseminated to promote safety and injury prevention. Each report contains a description of the incident and suggestions for prevention of similar injuries. Each report is accompanied by a single page Spanish summary, which is easily

used in educational outreach. Over 400 sets of the NURSE reports have been provided free of charge to insurance companies, farm owners, farm workers, health and safety professionals, universities, and various government agencies. NURSE reports have described incidents common to agriculture in which workers were struck or crushed by objects, injured by a fall, or affected by heat. Other reports have described less common injury events, such as electrocutions, spider bites, scalding and amputations by equipment, and death from lightning.

Since 1995, all health education has been based on prepared objectives tailored to the situation and audience. Typical topics have covered heat exhaustion, roll-over protective structures (ROPS), and avoidance of tractor power take-off (PTO) injuries. Some repetition of agricultural injury events has been observed in the data. For example, accidents involving riding on bin trailers is a relatively common event in the grape industry during certain times of the year. We are preparing a health education document on this issue.

### DISCUSSION

The project has been successful in assembling a large database which will provide useful information for planning agricultural injury prevention activities. The similarities and differences observed in the frequency of various injuries by Nature (N code) are reflected naturally in the listing of Causes (E code), and may reflect differences in commodities in the two counties. This will be examined in the analysis. To date it has not been possible to show a direct impact on the reduction of incidence or prevalence of agricultural occupational injuries. However, the project has been successful in providing agricultural safety information to diverse audiences on many occasions. The project was also successful in providing outreach to a wide audience in the farm communities of the two counties.

### CONCLUSION

The NURSE incident database is a valuable resource for research and policy. The numbers of cases (over 5000), providers (over 30), and months (over 48), of data represented are sufficient for an interesting analysis of external cause and nature of agricultural occupational injury.

The NURSE project has been successful in obtaining data, conducting outreach, and identifying areas for future agricultural health and safety research and education. The full five year analysis and associated report are being developed and will be available in 1997.

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