

The Health of California's Immigrant Hired Farmworkers

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Background *Hispanic immigrant workers dominate California's hired farm workforce. Little is known about their health status; even less is known about those lacking employment authorization.*

Methods *The California Agricultural Workers Health Survey (CAWHS) was a statewide cross-sectional household survey conducted in 1999. Six hundred fifty-four workers completed in-person interviews, comprehensive physical examinations, and personal risk behavior interviews.*

Results *The CAWHS PE Sample is comprised mostly of young Mexican men who lack health insurance and present elevated prevalence of indicators of chronic disease: overweight, obesity, high blood pressure, and high serum cholesterol. The self-reported, cumulative, farm work career incidence of paid claims for occupational injury under workers compensation was 27% for males and 11% for females.*

Conclusions *The survey finds elevated prevalence of indicators of chronic disease but lack of health care access. Participants without employment authorization reported a greater prevalence of high-risk behaviors, such as binge drinking, and were less knowledgeable about workplace protections.* Am. J. Ind. Med. 53:387–397, 2010.

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INTRODUCTION

Agriculture is widely recognized as among the most hazardous industries for hired workers as well as for farm operators and unpaid family workers [Schenker, 1996; Villarejo and Baron, 1999; McCurdy and Carroll, 2000; Das et al., 2001; Zahm and Blair, 2001; Hansen and Donohoe, 2003; Villarejo, 2003; McCauley, 2005; Arcury et al., 2006; Mills et al., 2006; Villarejo and Schenker, 2007; National Research Council, 2008]. The agricultural industry is also characterized by heavy reliance on foreign-born workers. According to the Bureau of Labor Statistics (BLS), immigrants were an estimated 37% of all workers in U.S. farming, fishing, and forestry occupations during 2007 [U.S. DoL/BLS, 2008], exceeding the corresponding foreign-born shares in every other major occupational category. A 2006 BLS study reported a similar share of foreign-born workers among hired farm laborers [Kandel, 2008].

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The proportion of immigrants is even greater among hired crop farm laborers. The National Agricultural Workers Survey (NAWS) of the Department of Labor found that 78% of hired crop workers in U.S. agriculture were foreign-born during the 2-year period FY 2001–FY 2002 [U.S. DoL, 2005]. The foreign-born share of hired crop workers has been steadily increasing since the first NAWS survey in FY 1989 found 62% were immigrants [U.S. DoL, 1991].

Reliance on foreign-born workers is even greater in California than nationally. NAWS interviews in California during FY 2003–FY 2004 found that 95% of the state's crop farm laborers were foreign-born [Aguirre, 2005]. Just 40 years earlier, about half of California's farm laborers were U.S.-born [California, 1969]. Moreover, the NAWS findings indicate the California share of all U.S. hired crop workers has been increasing in recent years, from 25% in FY 1989–FY 1990 to 36% in FY 2003–FY 2004 [Aguirre, 2005].

Mexican immigrants are the overwhelming majority of the nation's crop workers. This is especially true in California, where 91% were Mexican-born, 4% were born in Central America, and 5% were U.S. natives [Aguirre, 2005].

Several surveys in California have examined the health of subgroups of agricultural workers within a county or an otherwise limited geographic area, and some of these included physical examinations [Mines and Kearney, 1982; McCurdy et al., 1997, 2003]. Yet there is to our knowledge no previous statewide or national cross-sectional survey specifically addressing farm worker health. Nor is there much research based on objective, third-party physical examinations that also evaluates the relationship between immigration status and occupational or general health.

We present here results from the California Agricultural Workers Health Survey (CAWHS), a comprehensive health survey of a statewide sample of 970 California Hispanic hired farm workers conducted during 1999 [Villarejo et al., 2000; Villarejo and McCurdy, 2008]. Although 10 years post-facto, the present report provides, for the first time, a thorough, detailed analysis of findings for a large subset of survey participants (N=654) for whom comprehensive health information was obtained by third-party medical professionals (CAWHS PE Sample). There has been no comparable survey of the health of farm laborers conducted to date, which suggests that these findings comprise "benchmark" data.

This report addresses the occupational and general health of the subset of men (n=416) and women (n=238) who participated in the physical and laboratory examination components of the CAWHS, and who also completed a comprehensive risk behavior interview following the medical examination. Findings regarding sexually transmitted diseases (STD) and sexually related risk behaviors from the CAWHS PE Sample have been reported elsewhere [Brammeier et al., 2008].

METHODS

California Agricultural Worker Health Survey (CAWHS)

The CAWHS was a statewide, cross-sectional health survey conducted in 1999. The CAWHS was a household-based survey that included a voluntary comprehensive physical and laboratory examination administered by third-party medical professionals.

The multi-stage sampling strategy, described in detail elsewhere [Villarejo et al., 2000; Villarejo and McCurdy, 2008], selected seven representative communities within all six of California's agricultural regions (Arbuckle, Calistoga, Cutler, Firebaugh, Gonzales, Mecca, and Vista). Investigators enumerated all potential dwellings in the target areas, both formal dwellings and informal ones (such as campsites, sheds, garages, abandoned vehicles, run-down trailers, and jerry-rigged shacks). A random sample of dwellings was drawn in each area, and residents were contacted in-person by interviewers. In dwellings where residents agreed to cooperate, the interviewer enumerated all eligible workers residing there at that time. Eligibility was limited to those age 18 years or older who had performed hired labor on a U.S. farm within the prior 12 months. One or more eligible residents was randomly selected and asked to participate in the CAWHS. Women were over-represented in the CAWHS Sample due to a stratified sampling scheme favoring their selection to assure adequate numbers for subgroup analyses of women. Findings for men and women are reported separately.

Study candidates were provided with a written and oral description of the survey and with a detailed explanation of their rights as human subjects, including the right to decline participation in any portion of the survey. All survey materials were reviewed and approved by the Institutional Review Board of the University of California at Davis. Persons agreeing to participate signed approved consent forms.

Survey Elements

The CAWHS included three components: (a) a main interview concerning family composition, personal demographics, health insurance status, utilization of health care services, use of traditional healers, use of home remedies, self-reported health conditions, clinically determined health conditions, work history, income and living conditions, workplace health conditions, experience with protective equipment and training, working with pesticides in the U.S., field sanitation, workplace injuries, and immigration status; (b) a comprehensive physical examination conducted by clinic staff (nurse practitioners or physician assistants), including biometrics, dentition, skin, chest, heart, abdomen,

genitalia, and breasts (women only); and (c) a risk behavior interview, including personal health habits, use of drugs, reproductive health (women only), experience of personal threats or violence, sexual activity, mental or psychological illnesses, experience with Workers' Compensation insurance, and workplace safety. Alcohol risk behavior was measured in several ways, including whether the participant currently consumes alcohol and how many drinks were typically consumed each episode and each month. Laboratory examinations included glucose, cholesterol, complete blood count (CBC), and syphilis testing; women receiving a pelvic examination also received a Pap smear and were tested for *Chlamydia* and gonorrhea.

The main survey instrument was administered in person by trained, hired interviewers. Each copy of the blank instrument was coded in advance with a unique number in order to maintain confidentiality of participants during subsequent handling and data processing. Interviewers filled out paper copies of the instrument at the time of the interview, sometimes supplemented by notes added later.

We contacted 2,989 households, of which 1,174 had eligible residents. Of these, 940 households agreed to cooperate in the survey. These cooperating households yielded a total of 1,643 eligible residents in the combined participant enumeration lists: 1,121 men and 522 women. From these, the participants were randomly selected. The final sample included 627 men and 343 women. Physical examination was performed on 416 men and 238 women. It is these 654 participants (hereinafter described as the "CAWHS PE Sample") who are the basis of this report. Twenty-one men and nine women refused the blood draw.

Six hundred thirty-two participants in the physical examination and risk behavior interview (97% of the total of 654) chose to respond to the main survey instrument in Spanish, their preferred or sole language. Twenty-one participants chose to respond in English. Interviewers were bilingual as well as biliterate (Spanish-English), and most were also bicultural. One interviewer was bilingual in Mixtec and Spanish and administered the main instrument to one Mixtec Mexican participant who preferred to respond in the Mixteco language.

The physical examination and risk behavior interview were conducted at a local clinic in the community or other suitable nearby medical office. The examination and interview were scheduled by appointment, at the convenience of the CAWHS participants, typically after regular clinic hours. Project staff provided transportation to and from the clinic. A post-survey follow-up consultation between participants and a medical professional was provided to review the findings of the physical examination and give referrals, when appropriate. After the consultation, each participant was presented with a \$30 cash honorarium in consideration of their time.

Biological specimens collected from participants were processed by commercial laboratories: Unilab (Sacramento, CA; Tarzana, CA; San Jose, CA) for six CAWHS sites and Laboratory Corporation of America (San Diego, CA) for the remaining site (Mecca). There were minor differences in testing contents from the Unilab locations; for example, total iron was not included in reports from their Tarzana and San Jose facilities.

Hard copies of physical examination and CBC reports were furnished to the staff of the STD branch of the California Department of Health Services (since reorganized and renamed the California Department of Public Health (CDPH)). An article based on the STD and sexual risk behavior findings of the CAWHS has been published [Brammeier et al., 2008].

Data from the main instrument were keyed into appropriate files by a professional data entry firm. A double-entry protocol and standard data-cleaning procedures were followed to ensure accuracy. Data from the main instrument, physical examination, and risk behavior instrument for the seven CAWHS sites were merged into a single metafile, later divided into two metafiles, one each for male and female participants, and analyzed for the present report using SPSS Base 16.0 for Windows (SPSS, Inc., Chicago, IL).

RESULTS

The CAWHS PE Sample was overwhelmingly comprised of immigrants: 91% of males and 89% of females said they were born in Mexico, and a slightly larger share said they were Hispanic, choosing one or another of the generally accepted Hispanic descriptors (Mexican, Mexican-American, Hispanic, Latino, etc.) (Table I). Twenty-seven percent of males and 23% of females said they lacked authorization for U.S. employment.

With respect to racial classification, 93% of both males and females chose "Some other race." Importantly, 12% of male and 5% of female CAWHS PE participants identified as "Indigenous—Mexican origin" based on responses to probe questions concerning their Hispanic ethnicity. The qualifying responses included "Indígena," "Indio" and "Indigenous." However, additional participants indicated they spoke the Mixtec language or another indigenous language at home.

The sample was also predominately young and married. Male (252) and female (196) participants were accompanied by at least one member of their immediate or extended family while working in the U.S. Family incomes in the year prior to the survey were low: the median for males was in the \$12,500–\$15,000 category; for females it was in the \$10,000–\$12,500 category.

Educational attainment was also low: the median number of school years completed was in the category "4th, 5th, or 6th Grade." Additionally, just two-thirds of the

TABLE I. Demographic and Personal Characteristics

Characteristic	Males (N = 416)	Females (N = 238)
Age (years, median)	36	34
Years in U.S. (median)	14	9
Years of U.S. hired farm work (median)	13	7
Educational attainment (median category)	4th, 5th, or 6th grade	4th, 5th, or 6th grade
Median family income category in 1998 ^a	\$12,500–\$14,999	\$10,000–\$12,499
	n (%)	n (%)
Birthplace Mexico	380 (91)	212 (89)
Birthplace U.S.	18 (4)	18 (8)
Race, census category "some other race"	386 (93)	221 (93)
Hispanic ethnicity	388 (93)	223 (94)
Indigenous (Mexican origin)	51 (12)	11 (5)
Married	270 (65)	141 (59)
Not authorized for U.S. employment	111 (27)	54 (23)
Unaccompanied by any family members (*)	164 (39)	42 (18)
Reads Spanish well or very well	288 (69)	160 (67)
Reads English well or very well	28 (7)	23 (10)
Lacks any form of health insurance	302 (73)	165 (69)
Clinic visit in U.S.—"never" (*)	104 (25)	30 (13)

Hired Farm Workers California, 1999, CAWHS PE Sample, N = 654.

*Characteristics indicated by "" demonstrate a statistically significant difference ($P < 0.05$) in the reported values for male and female participants.

^aExcludes 64 males and 44 females who reported no U.S. farm work income in 1998; nearly all were persons who entered the U.S. for the first time during 1998 or 1999.

participants said they could read Spanish well or very well, suggesting that a large share of the CAWHS PE participants can be described as low literacy or non-literate.

Most of the men had been in the U.S. for more than a dozen years; among women, most had immigrated less than a decade before the interview. Men had typically been working as farm laborers in the U.S. for a longer period than the women: median values were 13 years versus 7 years, respectively. Approximately 14% of the sample were relatively recent immigrants, having been in the U.S. for four or fewer years.

With respect to health insurance, 73% of males and 69% of females lacked any form of coverage. When asked about medical or clinic visits, 25% of the men and 13% of the women said they had never had a medical or clinic visit.

Baseline Health Status: Chronic Health Conditions

A summary of the CAWHS PE findings regarding baseline, or chronic, health status is indicated in Table II. Overweight (body mass index (BMI) > 25.0) prevalence among the men was 79% and was nearly as high among women, 74%. Among males, the prevalence of obesity (BMI > 30) was 29% and, among females, it was 38%. The difference in obesity prevalence between men and

women was statistically significant ($P < 0.05$, chi-squared test).

There were substantial differences between male and female participants with respect to prevalence of high serum cholesterol and high blood pressure. The prevalence among males for elevated cholesterol (> 240 mg/dl) and elevated blood pressure ($> 140/90$) were 17% and 27%, respectively, whereas the prevalence among women for these conditions was only 4% and 4%, respectively. The difference in prevalence for both of these conditions between men and women was statistically significant ($P < 0.05$, chi-squared test).

Three percent of females and 5% of male participants presented evidence of "higher diabetes risk," indicated by non-fasting blood serum glucose levels ≥ 200 mg/dl. Additionally, more than 10% of females and about 5% of males presented evidence of anemia, as measured by both low blood serum hemoglobin (< 13.5 mg/dl, M; < 12.0 mg/dl, F) and low hematocrit ($< 40\%$, M; $< 36\%$, F).

Associations were found between obesity and other adverse chronic health outcomes among male workers. Obese male participants were over 1.5 times more likely to present high blood pressure as compared with non-obese workers (OR = 1.68, 95% CI 1.06–2.68). Obese male participants were three times more likely than non-obese males to present higher diabetes risk (non-fasting blood glucose ≥ 200 mg/dl) (OR = 3.09; 95% CI 1.19–8.04) and

TABLE II. Selected Health Outcomes

Health outcome	Males (N = 416) n (%)	Females (N = 238) n (%)
Overweight (BMI > 25.0)	328 (79)	177 (74)
Obese (BMI > 30.0) (*)	121 (29)	91 (38)
High cholesterol (>240 mg/dl) (*)	71 (17)	10 (4)
High blood pressure (>140/90) (*)	113 (27)	10 (4)
Diabetes risk, higher risk (non-fasting blood glucose >200 mg/dl)	20 (5)	8 (3)
Anemia risk (hematocrit < 40%, M; < 36%, F)	25 (6)	42 (18)
Anemia risk (hemoglobin < 13.5 mg/dl, M; < 12.0 mg/dl, F)	20 (5)	26 (11)
Dermatitis	45 (11)	11 (5)
Decayed teeth	151 (36)	70 (29)
Missing/broken teeth	125 (30)	89 (37)
Gingivitis	76 (18)	17 (7)
Depression (physician diagnosis—ever) (*)	9 (2)	30 (13)
Thoughts of suicide (last 12 months) ^a	9 of 361 (2)	7 of 199 (4)

Hired farm workers California, 1999, CAWHS PE Sample, N = 654.

Characteristics indicated by "" demonstrate a statistically significant difference ($P < 0.05$) in the reported values for male and female participants.

^aThe inquiry regarding whether participant had thoughts of suicide during previous twelve months was not included in the Mecca risk behavior interviews but was added for the other six sites.

over five times more likely to have told the CAWHS interviewer they had previously received a physician diagnosis of diabetes (OR = 5.68; 95% CI 1.71–18.87).

There were only a few cases of high blood pressure or of higher diabetes risk among women participants, precluding the determination of statistically reliable associations with obesity among female hired farm workers.

The skin examination revealed that 11% of men and 5% of women participants were likely afflicted with dermatitis. The difference of the prevalence of dermatitis was not statistically significant between male and female participants.

Dental health was poor among both male and female participants. Among males, we observed elevated prevalence of dental caries (36%), missing or broken teeth (30%), and gingivitis (18%). Correspondingly, there were also elevated prevalence among women of dental caries (29%), missing or broken teeth (37%), and gingivitis (7%).

Mental health conditions were reported in the Risk Behavior Instrument based on (1) a physician report (ever) of any one of three clinical mental health outcomes (depression, schizophrenia, or mania), or (2) a participant self-report of thoughts of suicide within the previous 12 months. About 13% of females reported they had received a clinical diagnosis of depression at some point in the past, and 4% said they had thoughts of suicide in the previous year. The prevalence of both conditions was lower among male participants: just 2% said they been diagnosed with clinical depression, and 2% admitted to thoughts of suicide within the past 12 months. Only for the reported clinical diagnosis of depression was there a statistically significant difference in

prevalence between female and male participants ($P < 0.05$, chi-squared test).

The female participants in the CAWHS PE Sample present an association between a clinical diagnosis of depression and self-reported persistent pain in a body part. Those women experiencing persistent pain were more than twice as likely to have received a clinical depression diagnosis than women who did not report pain (OR = 2.26; 95% CI 1.03–4.93).

No statistically significant associations were found between participants of indigenous Mexican origin in the CAWHS as compared with non-indigenous participants for any of the above-described measures of health status.

Farm Workplace Injuries and Behavioral Risks

The prevalence of paid claims for occupational injuries under Workers' Compensation insurance and other measures of workplace risks are summarized in Table III. The cumulative incidence over the farm work career for paid claims for occupational injury under Workers' Compensation was 27% for men and 11% for women ($P < 0.05$, chi-squared test).

The longer these workers were employed in U.S. farm jobs, the greater was the likelihood they experienced an on-the-job injury that resulted in a paid claim under Workers' Compensation Insurance. For males, this association, as measured by Spearman's rho, was 0.292 ($P < 0.01$). For females, this association, also measured by Spearman's rho, was 0.309 ($P < 0.01$).

TABLE III. Farm Workplace Injuries and Behavioral Risks

Type of occupational injury or risk	Males (N = 361) n (%)	Females (N = 199) n (%)
Threatened while working	9 (2)	8 (4)
Victim of workplace violence (12 months) ^a	3 of 416 (1)	0 of 238 (0)
Drink alcohol while working (12 months)	30 (8)	4 (2)
Afraid to disclose workplace injury	10 (3)	7 (4)
Workers' compensation paid claim (ever)	99 (27)	22 (11)
Pay <i>Raïtero</i> for transport (at current job) (*)	112 (31)	113 (57)

Hired Farm Workers California, 1999, CAWHS PE Sample, N = 560.

Characteristics indicated by "" demonstrate a statistically significant difference ($P < 0.05$) in the reported values for male and female participants.

^aInterview question asked in six sites plus Mecca. All other interview questions in this table were not asked in Mecca.

Both male and female participants reported several workplace risks, including use of alcohol while working, directly experiencing threats, having been a victim of workplace violence, and being afraid to disclose a workplace injury (Table III). Reliance on *raïteros* (i.e., informal hired transportation to and from worksites) was reported by 31% of males and 57% of females and this difference was statistically significant ($P < 0.05$, chi-squared test).

Personal Risk Behaviors or Exposures

The most prevalent personal risk behavior was alcohol consumption (Table IV). Among males, nearly two-thirds of participants (64%), but just one-eighth (13%) of female participants said they regularly consumed alcohol. Self-reported binge drinking (five or more drinks per episode) was reported by 28% of men and only 1% of women, a statistically significant difference ($P < 0.05$, chi-squared test).

Forty-five percent of males and 10% of women reported ever having smoked at least 100 cigarettes (lifetime). Twenty-eight percent of males said they were either current smokers or had smoked at least one cigarette

during the months of 1999 prior to the interview. Among females, just 5% were either current smokers or had smoked in 1999. For both of these findings, the difference in the prevalence between males and females was statistically significant.

Among males, 23% said they had tried or used illicit drugs, and 8% said they had used illicit drugs within "... the past few months." The prevalence of drug use was lower among females: only 2% reported having ever tried or used drugs, and none reported drug use in the previous several months. For both findings, the difference in the prevalence between males and females was statistically significant ($P < 0.05$, chi-squared test).

Participants were also asked if they had been victims of personal violence within the previous 12 months. For both males and females, the reported prevalence was identical (5%), but there was a substantial difference regarding where the violence had transpired. Among males, most violent incidents were reported to have occurred away from home or the workplace, mostly in public settings. However, among females, the majority of incidents (10 out of 12 self-reported cases) occurred in the home and had resulted from domestic violence.

TABLE IV. Personal Risk Behaviors or Exposures

Type of risk	Males (N = 416) n (%)	Females (N = 238) n (%)
Regular alcohol consumption (*)	267 (64)	30 (13)
Binge drinking (5 drinks or more/episode) (*)	115 (28)	2 (1)
Smoked 100 cigarettes or more (lifetime) (*)	186 (45)	23 (10)
Ever try or use illicit drugs (lifetime) (*)	95 (23)	4 (2)
Use illicit drugs during "past few months" (*)	33 (8)	0 (0)
Victim of violence (last 12 months)	20 (5)	12 (5)
Among persons reporting alcohol consumption	Males (n = 267)	Females (n = 30)
Days/month of alcohol consumption (mean)	9	4
Days/month of alcohol consumption (median)	4	2

Hired Farm Workers California, 1999, CAWHS PE Sample, N = 654.

Characteristics indicated by "" demonstrate a statistically significant difference ($P < 0.05$) in the reported values for male and female participants.

Eligibility for Employment (Immigrant Documentation Status) and Health

Immigrant authorization for U.S. employment (documentation status) was related to several factors. Recently arrived immigrant workers were more likely to be undocumented as compared with farm laborers who had a long history of employment in California agriculture. A very large share of workers who had 10 years or less of U.S. hired farm work said they were undocumented: 60% of men and 39% of women. Of those who had more than 10 years of U.S. hired farm work, just 8% of men and 7% of women said they were undocumented. Additionally, a somewhat larger share of both male and female workers who said they lacked authorization for U.S. employment also reported that their employer was a farm labor contractor, not a grower, as compared with other workers.

A particularly sensitive question is the reliability of CAWHS PE Sample participant responses to inquiries regarding authorization for U.S. employment. Additional analyses of participant responses were undertaken to further examine this issue. First, participants were asked if they had a Social Security card. Among males who said they lacked authorization for U.S. employment, 53% said they did not have a Social Security card. Among documented male workers, only 3% said they lacked a Social Security card. Among females who said they lacked authorization for U.S. employment, 70% said they did not have a Social Security card. Among documented female workers, just 7% lacked a Social Security card.

Second, participants were asked if they had ever used another person's Social Security card for employment authorization purposes. Among undocumented males, 52% said they had done so, while 64% of undocumented females said they had borrowed another person's card for this purpose. Among documented workers, 29% men and 20% of women admitted having engaged in this practice.

The study finds an association between immigration status and knowledge about California's Workers' Compensation insurance programs. Among men who were documented, 70% said they aware of the provision of California Workers' Compensation insurance that can provide payments to an individual who becomes sick or injured while working (indemnity payments). Among men who were undocumented, less than half (40%), said they knew about this feature of the program.

Knowledge about Workers' Compensation insurance was found to be associated with success in filing a claim for an on-the-job injury or illness. While 46% of men who said they were aware of the program had successfully filed a claim for workplace injury, just 20% of men who were unaware of the program had filed such a claim.

Use of *rateros* to travel to and from work was found to be associated with immigration status. Among undocu-

mented female workers, about two-thirds (67%) said they relied on *rateros* for transportation to and from worksites, but nearly as many (56%) of documented female workers also used *rateros*. Some 64% of undocumented men said they used this informal transportation system, while just 25% of documented men used *rateros*.

Working with pesticides and safety training

Twenty-eight percent of documented male participants said they had ever mixed, loaded, or applied pesticides while working on U.S. farms, but only 14% of undocumented male workers had done this type of work. Few female workers report ever having mixed, loaded, or applied pesticides while working on U.S. farms. However, 60% of documented female workers said they had been trained in pesticide safety as compared with 46% of undocumented female workers.

Health insurance

While 30% of documented male workers said they had some form of health insurance, only half that fraction of undocumented men (15%) had such insurance. In large part, this difference reflects the fact that just 5% of undocumented males had health insurance through their employer, whereas 17% of documented male workers in the study said they had employer-provided insurance. Among women, 36% of those who were documented had health insurance, but only 11% of the undocumented had coverage. Just 1% of undocumented female workers had health insurance through their employer, as compared with 13% for documented female workers.

Medical or clinic visits

Thirty-eight percent of undocumented men said they had never visited a doctor or clinic in the U.S. In contrast, 23% of documented men had not had a doctor or clinic visit.

Undocumented female workers were equally as likely as documented female workers to have had a recent medical or clinic visit. California's Emergency Medi-Cal and WIC programs, both of which serve qualifying undocumented women, are important in linking female farm laborers to the state's health care system. However, 58% of undocumented female workers reported never having a dental visit as compared with 37% among documented female workers. California's DentiCal does not serve undocumented workers.

Accompaniment status

Some 68% of male workers who said they lacked authorization for U.S. employment were unaccompanied by any member of their immediate or extended family while

working in the U.S., whereas just 27% of documented male workers were unaccompanied.

High-risk personal health behaviors

Sixty percent of male workers who said they were undocumented and who regularly consumed alcohol said they consumed five or more drinks per episode (binge drinking). Among documented men who regularly drank alcoholic beverages, just 36% engaged in binge drinking.

Illicit drug use (ever) was reported by 37% of undocumented male workers but by just 18% documented male workers. As discussed under Results Section, few women said they had ever used illicit drugs.

Regarding personal needs and hygiene in the workplace, male workers who said they were undocumented reported they had greater access to toilets, fresh drinking water, and wash water than did documented male workers in the study. Nine percent of undocumented male workers said neither water nor disposable cups were provided everyday by their employer, whereas 21% of documented male workers in the study said they had neither everyday. Seven percent of undocumented male workers said toilets were not available everyday, but 18% of documented male workers reported lack of toilets everyday. Nine percent of undocumented male workers said wash water was not provided daily, but 21% of documented male workers indicated they did not have access to wash water everyday.

Asked if they ever had "to go or use the bathroom" in the field or "open air," 17% of male undocumented workers said they had done so, but nearly twice as large a share of documented male workers in the study (32%) reported having found it necessary.

DISCUSSION

We conducted the CAWHS to assess the occupational and general health of California's farm worker population, which is heavily immigrant and Hispanic in character. In terms of physical health, despite their youth and ability to engage in heavy manual labor, among the participants in the CAWHS PE Sample there was high prevalence of indicators of chronic health problems: overweight, obesity, high serum cholesterol (males only), high blood pressure (males only), poor dentition, diabetes risk, and anemia risk.

A representative sample of all U.S. workers differs greatly in nearly all demographic characteristics from our study sample—nativity, race/ethnicity, age, immigration status, language, educational attainment, poverty status—such that any comparisons must be undertaken with caution. Similarly, a representative sample of Hispanic workers in the U.S. may also present difficulties for comparison because a large proportion of such workers are not of Mexican

origin—rather, they include Puerto Ricans, Cubans, Central Americans, South Americans, and "other Hispanics" [U.S. Census, 2001]. Nevertheless, comparisons will be sought with other sample panels to provide a better understanding of the findings of the CAWHS PE Sample.

The prevalence of overweight in the CAWHS PE Sample is high. In the age group 20–34, the prevalence was greater among both male and female participants than in the general U.S. population. This age group comprises 44% of the entire sample. Among males in the age group 20–34, the prevalence of being overweight in the CAWHS PE Sample was 76% (95% CI 70–83%). The prevalence of overweight among female CAWHS PE Sample participants in the age group 20–34 was 72% (95% CI 64–81%). Among the general U.S. population, the corresponding prevalence in the same age group during 1999–2000 is reported among men at 58.0% (95% CI 53–63%) and among women at 51.5% (95% CI 48.7–54.3%) [U.S., CDC/National Center for Health Statistics, 2003].

Indigenous groups who speak little or no Spanish present special challenges [Bade, 1994b; Holmes, 2006]. It is possible that workers among these Mexican migrants may have been disproportionately represented among the 30 CAWHS PE Sample participants who refused the blood draw. A folk belief among some Mexican immigrants is that blood drawn from the body is irreplaceable and that drawing it leads to fatigue and other adverse health outcomes. Some indigenous Mexican workers further believe that the blood taken can be used against them or can be sold for malicious purposes [Bade, 1994a,b].

While it is of interest to analyze possible associations of health outcomes with either self-reported exposures or risk behaviors among indigenous migrants of Mexican origin, it is likely that some of these participants did not identify themselves as such during the main interview. The absence of self-identification among an unknown portion of these participants might confound such an analysis. In fact, eight persons who did not self-identify as indigenous said they spoke the Mixtec language at home, not Spanish or English, and another 29 persons said they spoke yet a different language than those three. Presumably, some of these 37 persons may have actually been indigenous Mexicans who chose to identify as Mexican or Latino, in some cases possibly out of fear of identification as indigenous. Some indigenous Mexican migrant workers have experienced incidents of racism, even from non-indigenous Mexican immigrants [Zabin et al., 1993].

We observed that persons with fewer than 10 years of hired farm work were much more likely to lack authorization for U.S. employment than those with at least 10 years of hired farm work. This substantial difference reflects the changes in U.S. immigration policy implemented during the early 1990s. It is likely that immigrants who had 10 or fewer years of U.S. hired farm work and who were interviewed in 1999,

the year of the CAWHS survey, were unable to qualify for the various programs of the 1986 Immigration Reform and Control Act (IRCA) that were intended to adjust the immigration status of previously undocumented agricultural workers. On the other hand, a substantial share of those who had more than 10 years of U.S. hired farm work were individuals who had qualified for the Special Agricultural Worker visa program of IRCA.

The high prevalence of paid claims for Workers' Compensation insurance for both men (27%) and women (11%) underscores the serious risk of injury faced by a great many hired farm laborers. As previously reported [Villarejo and McCurdy, 2008], the lower prevalence of workplace injuries among women could be attributed to less total hours of farm career exposure and possibly to continuing employment discrimination preventing women from securing jobs perceived to be more dangerous.

A few of the CAWHS PE Sample findings can be directly compared with newly reported occupational health findings among a national cross-section of hired crop farm workers who participated in the NAWS in 1999 [U.S., CDC/NIOSH, 2009]. Self-reported dermatitis among participants in the NAWS 1999 occupational health supplement had a prevalence of 7%, which compares with a prevalence of 11% among males and 5% among females, as directly determined by clinic staff, in the CAWHS PE Sample. The self-reported prevalence of alcohol consumption during the 1-month period prior to the interview among participants in the NAWS survey was 50%. The self-reported prevalence of regular alcohol consumption in the CAWHS PE Sample was 64% among males and 13% among females.

The study found significant relationships between work authorization and knowledge of the Worker's Compensation Insurance System. As reported in the Results section, men who said they were undocumented were more likely than other males to be unaware of the provisions of California's Worker's Compensation Insurance program.

Although there was some evidence that workers not authorized for U.S. employment had experienced somewhat more beneficial workplace conditions, with greater availability of drinking water, toilets and wash water, workers who were not authorized for U.S. employment showed an increased prevalence of occupational and behavioral risks to health. This curious and unexpected result may reflect increased enforcement activity in California during the period prior to 1999. As previously noted in the present study, undocumented workers were more likely to have been employed by farm labor contractors. The stepped up enforcement of field sanitation standards in the state during the 1990s by both Federal and State agencies was primarily focused on farm labor contractors.

The study finds evidence that some workers experience threats at the workplace as well as being afraid of disclosing workplace injuries. Further, use of alcohol while working

(8% among men, 2% among women) indicates increased risk of occupational injury. The relationship between high-risk personal health behaviors and worker documentation status is significant as well, with undocumented male workers being more likely than documented workers to engage in binge drinking, and more likely to have ever tried illicit drugs. It is noteworthy in this context that there was a significant difference in the age distribution of undocumented male workers as compared with those who had employment authorization. The median age of undocumented male workers was 27 years versus 40 years for documented men.

Farm laborer mental health has been difficult to quantify. However, some results of the study indicate that hired farm workers do suffer from varying degrees of mental hardship, including depression. The finding of an association between persistent body pain and a clinical diagnosis of depression among female participants, for example, is consistent with a previous report that depression among farm laborers is associated with working conditions [Hiott et al., 2008]. We found there was no statistically significant association between a clinical diagnosis of depression with the absence of accompanying family members for both male and female participants.

The associations reported here between lack of authorization for U.S. employment and various occupational health risks deserve serious policy consideration. The CAWHS PE Sample finding of a comparative lack of knowledge of the Workers' Compensation system among workers not authorized for U.S. employment as compared with other workers would likely contribute to a lack of willingness to file such a claim even though California law provides the same coverage for undocumented workers as for all others.

Similarly, restrictions against issuing driver's licenses to persons who lack authorization for U.S. employment have a largely unrecognized workplace risk. Undoubtedly, this restriction in California makes it less likely that undocumented workers can either own or operate a vehicle themselves. In turn, this makes undocumented workers more reliant on the services of untrained, for-profit *rateros* (31% for males, 57% for females). The continuing loss of life among hired farm laborers who rely on this form of transportation to and from worksites is still a major occupational risk, despite the legislation requiring registration and inspection of labor vans with more than nine passenger seats.

California's agriculture industry and its population rely heavily on Spanish-speaking, immigrant hired farm laborers. Whereas their youth and ability to engage in long hours of strenuous manual labor suggest a healthy group, we found elevated prevalence of risk factors or indicators of chronic disease. These findings are all the more concerning in the face of the poverty and low levels of health insurance characteristic of farm laborers [Arcury and Quandt, 2007].

The relative success of some of California's public health programs, such as WIC and Emergency Medi-Cal, among undocumented women farm laborers is supported in the present report by the remarkably similar prevalence of medical visits in this group as compared with documented women workers. This finding suggests that effective public health programs could be developed to reach male farm laborers, a group that has been largely ignored to date. Such a program could serve all workers, irrespective of immigration status.

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