

Sexually Transmitted Diseases and Risk Behaviors Among California Farmworkers: Results From a Population-Based Survey

Monique Brammeier, MS;¹ Joan M. Chow, DrPH;¹ Michael C. Samuel, DrPH;¹ Kurt C. Organista, PhD;² Jamie Miller, MPH;¹ and Gail Bolan, MD¹

ABSTRACT: *Context: The prevalence of sexually transmitted diseases and associated risk behaviors among California farmworkers is not well described. Purpose: To estimate the prevalence of sexually transmitted diseases (STDs) and associated risk behaviors among California farmworkers. Methods: Cross-sectional analysis of population-based survey data from 6 California agricultural regions was performed for participants tested for Chlamydia trachomatis (CT), Neisseria gonorrhoea (GC), and syphilis, and who completed an interviewer-administered behavioral risk factor survey. Findings: Among the 403 males and 234 females examined and interviewed, males (29.3%) were more likely than females (9.6%) to have had 2 or more sex partners in the past 5 years. Forty-two percent of males ever had sex with a commercial sex worker; unmarried males were more likely than married males to report sex with a commercial sex worker in the past 2 years. Twelve percent of males and 5% of females reported ever having had an STD. Most participants did not report any methods to protect against STDs. Of 192 males and 178 females tested for CT, 3 males and no females were positive. No cases of GC were found. Of 387 males and 194 females tested for syphilis, 4 males and 1 female had positive rapid plasma reagin (RPR) and Treponema pallidum particle agglutination (TPPA) results. Conclusions: In this population-based survey among agricultural workers, there was low STD prevalence but high prevalence of sexual risk behaviors, particularly among males.*

Little information is available about the prevalence of sexually transmitted diseases (STDs), including HIV, and associated risk behaviors among agricultural workers in California. The available data sampling the general migrant worker population indicate low rates of STDs and HIV.^{1,2} Other studies have described commercial sex work, low condom use, and alcohol

abuse as risk factors for STD/HIV acquisition (Organista, 2004).^{3,4}

Because agricultural workers have poor access to health care, relying on clinic-based studies may underestimate the STD burden in this population. Thus, population-based studies may provide a more accurate health assessment in this group. The California Agricultural Workers Health Survey (CAWHS) is the largest population-based survey of health conditions in a cross-sectional sample of adult male and female agricultural workers residing in communities representing 6 major agricultural regions in the state.⁵ The CAWHS identified limited access in this population to comprehensive health care, including reproductive care, acute medical care, and preventive health care, a finding consistent with other studies reporting limited access to care among US migrant workers.⁶ With respect to STD prevention, these barriers would also limit agricultural worker access to STD screening to identify asymptomatic bacterial STDs, as well as access to STD risk reduction counseling to decrease the risk of acquiring and transmitting STDs.

¹Sexually Transmitted Disease Control Branch, Division of Communicable Disease Control, California Department of Public Health, Richmond, Calif.

²School of Social Welfare, University of California, Berkeley, Calif.

The authors wish to thank Dr. David Lighthall, Dr. Don Villarejo, Ron Stochlic, and staff at the California Institute for Rural Studies for access to the California Agricultural Worker Survey data. This project was supported in part by a grant from the California Endowment and the Centers for Disease Control and Prevention (Comprehensive STD Prevention Systems and infertility Prevention Project Grant #H25/CCH904362). For further information, contact: Joan M. Chow, MPH, DrPH, CA DHS-Sexually Transmitted Disease Control Branch, 850 Marina Bay Parkway, Building P, 2nd Floor, Richmond, CA 94804-6403; e-mail joan.chow@cdph.ca.gov.

All these factors could lead to increased rates of STDs and increased STD-related adverse outcomes, including adverse reproductive health outcomes and HIV acquisition. Using the CAWHS, we evaluated the prevalence of STDs and associated risk behaviors among California agricultural workers.

Methods

Survey Sample. The CAWHS is a population-based household survey utilizing a multi-stage sampling strategy among agricultural workers in California. A detailed description of the multi-stage sampling methodology has been previously described.⁵ Briefly, 6 California agricultural regions defined by the California Department of Employment Development formed the initial sampling frame for selecting communities and included Central Coast, Desert, North Coast, Sacramento Valley, San Joaquin Valley, and South Coast regions. Randomly selected agricultural worker communities within each of these regions were identified based on sampling within 24 Medical Service Study Areas (MSSA) defined by the California Office of Health Planning and Research with at least 5% of MSSA total employment being devoted to agriculture. The communities included Arbuckle, Calistoga, Gonzales, Cutler, and Vista. In addition, Mecca, the pilot site, and Firebaugh were purposively selected communities. Firebaugh was included to add diversity of crop type and county and is located in a region that accounts for approximately 50% of all California agricultural worker employment.

All dwellings within the selected communities were enumerated with unique identification numbers and a random sample was selected using a table of random numbers. In each selected dwelling, residents at least 18 years of age and who had been employed in agricultural work for any length of time within the last year were eligible. There were no exclusions to participation based on injury or inability to work at the time of the survey; additionally, there were no exclusions based on type of agricultural work. One participant within each dwelling was then selected using a table of random numbers, with over-sampling for females; if a dwelling had 7 or more residents, 2 persons were recruited. A full-disclosure human subject permission form was presented to participants and read aloud to them in their preferred language. If the subject agreed to participate, a signature was requested and the interviewer proceeded with the interview. Participants were interviewed in their preferred language, either Spanish or English. A financial incentive of \$30 was offered to all participants further agreeing to a basic physical assessment and a second

interview assessing risk behaviors. The entire set of survey materials and study protocol was submitted to and approved by the Human Subjects Committee of the University of California, Davis.

Measures. Data were collected in the household survey on demographics, medical history, health care utilization, work history, and occupational safety. Additional data were collected from the sub-sample of participants who completed the physical examination, STD testing, and risk behavior survey.

The risk behavior survey included the following topics of relevance to STD risk: sexual behaviors, reproductive health (females only), and drug and alcohol use. Sexual risk behavior questions included information about age at first sex, number of partners in past 5 years, sex with commercial sex workers, and lifetime history of STD. Respondents were asked about their use of "something to protect yourself from disease" during sexual intercourse. "Protection from disease" was asked separately from use of contraception, which was determined by whether the respondent uses "something to prevent yourself from getting pregnant." Drug use was determined for "ever" and "last time of use" including type of drugs during these time frames. There were 3 alcohol use variables including average days per month of drinking alcohol, average days per week of drinking alcohol, and average number of drinks. These were combined into a single alcohol use variable coded as: Heavy (drinking >4 days per month and >5 drinks per drinking day or >8 drinks per drinking day regardless of number of drinking days); Moderate (drinking >4 days per month and >2 drinks per drinking day); Light (any alcohol consumption but not "Heavy" or "Moderate"); None (no alcohol use reported).

Specimen Collection and STD Testing. Medical personnel reviewed medical history, conducted a physical exam (dental, skin, breast, palpation, and respiratory function), a pelvic exam for females and collected cervical, urine, and blood specimens. Urine specimens were evaluated for *Chlamydia trachomatis* (CT) and *Neisseria gonorrhoeae* (GC) by ligase chain reaction (LCx, Abbott Laboratories, Abbott Park, Ill). Blood specimens were tested by rapid plasma reagin (RPR) for syphilis and sero-reactive specimens were confirmed by *Treponema pallidum* particle agglutination (TPPA). Participants with reactive RPR and TPPA results were considered positive for syphilis. Persons found positive for reportable bacterial STDs were referred to local health departments for follow-up.

Data Analysis. Data analyses were conducted in Statistical Package for the Social Sciences for Windows, release 10.0.5 (SPSS Inc., Chicago, Ill). The Fisher exact test was used to assess differences in proportions between groups. Ninety-five percent confidence intervals around proportions were based on the exact binomial distribution and were calculated with Intercooled Stata 7.0 (StataCorp LP, College Station, Tex).

Results

Demographic Characteristics. Of the 11,876 households identified within the communities, 2,989 households were successfully contacted. Of these sampled households, 1,174 eligible individuals were randomly selected to participate. Of those 1,174 eligible participants, 970 agreed to participate in the initial household survey, yielding an 82.6% response rate. Participation rates varied by community (67% in Mecca to 93% in Gonzales). Due to missing household survey data for 2 participants, 968 participants (621 males and 347 females) were included in the final study sample for analysis. Of the 970 participants who took the household survey, 403 males and 234 females agreed to

secondary data collection including the physical exam and risk behavior interview. Reasons for refusals included conflicts with work schedules, and lack of adequate compensation from the study as compared with work wages. Over 96% of the interviews were conducted in Spanish.

Participants in the overall household sample were predominantly male, Hispanic ethnicity, married, foreign born (primarily Mexico and Central America), resided in the United States more than 4 years, documented worker in the United States, and lacked health insurance. Nearly half of males had never been to a health care provider (Table 1).

Of the 968 household survey participants, 637 (65.8%) participated in the behavioral risk survey yielding a 54.2% response rate of the initial eligibles identified. Of the 637 with household and risk behavior survey data, 370 participants were tested for CT and GC and 239 participants were tested for syphilis. Table 1 shows the comparison of participants who only had household survey data versus participants with risk behavior survey data; it additionally compares risk behavior survey participants who were tested for STDs with risk behavior survey participants who were not

Table 1. Demographic Characteristics and Access to Care for Agricultural Farmworkers in a Population-Based Survey of 6 Agricultural Regions in California, 1999 (N = 968)

	Household Survey Only	Household-Risk Behavior Survey and Not Tested for Chlamydia and Gonorrhea	Household-Risk Behavior Survey and Tested for Chlamydia and Gonorrhea	P Value†	P Value‡
Total	331	267	370		
Proportion males	66%	79%	52%	<.001	.44
<i>Males</i>	218	211	192		
Mean age (years ± SD)	34.2 ± 11.3	39.0 ± 12.2	34.5 ± 12.0	<.001	.007
Married	53.0%	66.7%	65.2%	.83	.002
Born in US	8.3%	6.2%	2.6%	.1	.07
In US ≤ 4 Yrs	16.2%	12.3%	24.5%	.003	.64
Undocumented Worker	35.5%	22.8%	37.1%	.003	.18
No health insurance	78.8%	73.4%	76.2%	.56	.32
Never been to health care clinic or doctor	43.8%	24.4%	28.4%	.42	<.0001
<i>Females</i>	113	56	178		
Mean age (years ± SD)	34.9 ± 10.4	33.1 ± 11.4	35.9 ± 9.8	.08	.80
Married	59.3%	48.2%	64.0%	.04	.91
Born in US	6.2%	16.1%	5.1%	.02	.82
In US ≤ 4 Yrs	18.3%	27.1%	16.7%	.14	1.00
Undocumented worker	22.2%	28.3%	24.7%	.59	.57
No health insurance	79.6%	56.4%	75.6%	.01	.09
Never been to health care clinic or doctor	9.0%	16.1%	12.8%	.51	.29

†P value for comparison of chlamydia/gonorrhea tested-risk behavior survey group with non-tested risk behavior survey group.

‡P value for comparison of household survey only group with combined risk behavior survey groups.

Table 2. Sexual Risk Behaviors and Sexually Transmitted Diseases Among Agricultural Farmworkers in a Population-Based Survey of 6 Agricultural Regions in California, 1999 (N = 637)

Sexual Risk Behaviors	Males (n = 403)		Females (n = 234)	
	%	n/N	%	n/N
Median age at first sex (years, inter-quartile range)	17	(15 to 19)	18	(16 to 20)
Number of sex partners in past 5 years				
0	4.7%	(18/381)	9.2%	(21/229)
1	65.9%	(251/381)	81.2%	(186/229)
2-5	22.8%	(87/381)	9.6%	(22/229)
>5	6.6%	(25/381)	0.0%	(0/229)
<i>Males only:</i>				
Ever sex with males	1.9%	(7/365)	—	—
Ever sex with commercial sex worker	41.8%	(157/376)	—	—
Sex with commercial sex worker \leq 2 years	13.6%	(48/354)	—	—
Among married males	7.3%	(17/233)	—	—
Among unmarried males	27.4%	(31/113)	—	—
Ever sex with IV drug user	4.7%	(15/322)	4.2%	(8/189)
No protection during sex to prevent disease	61.4%	(102/166)	85.7%	(108/126)
<i>STD history</i>				
Ever any STD diagnosis	12.4%	(48/386)	5.2%	(11/212)
Ever gonorrhea diagnosis	7.5%	(29/386)	0.0%	(0/212)
Ever chlamydia diagnosis	0.3%	(1/386)	0.9%	(2/212)
Ever genital/warts diagnosis	0.0%	(0/386)	0.5%	(1/212)

tested. Males were more likely to participate only in the household survey than in the household survey plus risk behavior survey and STD testing ($P < .001$). Among participants with risk behavior survey data, males who were tested for CT and GC were more likely to be younger, in the United States \leq 4 years, and have undocumented residency status than males who were not tested; males who had completed the risk survey were more likely to be married and to have accessed health care than males who only completed the household survey. Females who were tested were more likely to be married, foreign-born, and without health insurance than those who were not tested; no significant differences were found between females who had completed the risk survey and those who had only completed the household survey.

Sexual Risk Behaviors. Median age at first intercourse was 17 years for males and 18 years for females (Table 2). Most males (65.9%) and females (81.2%) reported 1 sex partner in the last 5 years. Only males (6.6%) reported greater than 5 partners, and males were more likely than females to report having 2 or more partners in the past 5 years. Few males reported ever having sex with males. Among males, 41.8% reported ever having sex with a commercial sex worker, and 13.6% of all males reported having sex with a commercial sex worker within the past 2 years. Unmarried males (27.4%) were more likely than

married males (7.3%) to report sex with a commercial sex worker in the past 2 years ($P < .001$). Also, multiple partners in the past 5 years were associated with sex with a commercial sex worker in the past 2 years ($P < .001$). Sex with an IV drug user was infrequent and did not differ by gender.

The majority of males (61.4%) and females (85.7%) reported not using any methods to “protect against disease” during sexual intercourse (Table 2). The most common reasons reported by males for not using “protection” included being “married/in a permanent relationship” and “don’t like it,” whereas the most common reasons reported by females included they or their partner “don’t like it.” Married males (77.6%) were more likely than unmarried males (22.4%) to not use protection; similarly, married females (67.6%) were more likely than unmarried females (32.6%) to not use protection. For the remaining respondents who did report a method to protect against disease acquisition, almost all indicated condoms as the method.

Self-reported history of ever being diagnosed with an STD was more commonly reported by males than females ($P < .01$). The most commonly reported STD was gonorrhea, indicated by 7.5% of males and no females. No participants reported a previous diagnosis of syphilis, AIDS, or HIV.

Over a third (37.5%) of females aged 18 to 44 years reported using no contraception (as distinct from disease “protection”). Reasons for not using

contraception included “don’t want to [prevent pregnancy],” “don’t like it,” and “partner doesn’t like it.” Use of oral contraceptive pills was the most commonly reported method (20%) among respondents who reported using “something to prevent pregnancy”; females also reported using condoms, tubal ligation, Depo Provera injections, and withdrawal.

Drug and Alcohol Use. Males were much more likely than females to report ever having used drugs (23.9% vs 1.7%). Of males with past drug use, nearly half used drugs within the last year. Among the males reporting a history of drug use, the most commonly reported drugs were marijuana (56.8%), cocaine (52.6%), and methamphetamines (10.5%).

Males and females also differed significantly with respect to alcohol use. Two thirds of 392 males with alcohol data reported alcohol use within the last month as compared with 13.1% of 229 females with alcohol data. Among males with recent alcohol use, 58.6% were light drinkers, 15.0% were moderate drinkers, and 26.3% were heavy drinkers. Among women with recent alcohol use, almost all (96.7%) were light drinkers. Many of the heavy drinkers reported 6 or 12 drinks per episode.

STD Prevalence. Three of 192 males tested positive for CT (1.6%, 95% CI 0.3%-4.5%) and none of 178 females tested positive for CT (0.0%, 95% CI 0.0%-2.1%). None of the 370 respondents tested positive for GC. Of the 387 male and 194 female respondents tested for syphilis, 4 males (1.0%; ages 36-63 years) and 1 female (0.5%; age 51) were infected with syphilis. Because the syphilis data did not include personal identifiers, the stage of syphilis could not be determined from state surveillance case registries for these sero-positive respondents none of whom reported a past history of syphilis.

Discussion

The CAWHS is the largest cross-sectional population-based data source for STDs and related risk behaviors among agricultural workers in California. In this survey of predominantly Hispanic farmworkers, we found few STD infections, consistent with other studies.¹⁻² Despite the low STD prevalence, high levels of reported risk behaviors were found in this population-based sample. Males in particular reported substantial levels of risk behaviors that have previously been associated with STD acquisition in other studies of migrant laborers, such as multiple sex partners, sex with commercial sex workers, and previous STD history.^{3,5,6} No reliable assessment of the association of

these behavioral risk factors and STD prevalence was possible in this report because of the small numbers of STD infections in this study.

Because of the high prevalence of sexual risk behaviors such as multiple partners and sex with commercial sex workers, particularly among unmarried male participants in this study, the potential to transmit STDs to female partners is substantial and of concern. Low levels of condom use and concurrent and multiple partners including commercial sex workers have also been reported by other investigators to be significant risk factors in similar samples of migrant farmworkers.⁷⁻¹⁰

This study also demonstrated that use of methods to protect against STD acquisition was uncommon, particularly among female respondents. One factor that likely places female sex partners of migrant men at risk is the prevalence of traditional gender roles in which sexual topics are not frequently discussed, let alone negotiated; consequently, these roles may be associated with inconsistent or infrequent use of safer sex practices. A study of 100 rural women in Mexico, who were the wives of Mexican migrants working in the United States, found that two thirds did not practice safer sex when having sex with husbands during their visits to Mexico, despite being knowledgeable about HIV transmission, and despite feeling at risk because of known or suspected infidelity on the part of their husbands.¹¹ A follow-up study indicated a clear acculturation trend in that US-based migrant wives reported more lifetime sex partners and sexual behaviors, greater condom use during last sexual episode with husbands, and a higher frequency of asking husbands to use condoms than Mexican-based wives.¹² These results suggest that safer sex negotiation may be associated with acculturation to the United States for wives of migrant men and can be incorporated into prevention strategies for women. Such prevention strategies should address other psychosocial barriers to safer sex. For example, Salgado de Snyder and colleagues noted that the majority of women in all of the above studies perceived little risk of contracting HIV because they perceived their marital relationships as faithful ones.¹³

There were limitations to this survey. Generalization of risk questionnaire and physical exam results to the agricultural worker population could be limited because of the 54% participation rate in this phase of the study. Reasons for refusals related mostly to lack of time available away from work may have resulted in a sample with lower risk behaviors for STDs. This is supported by our findings that risk survey participants were more likely to be married and to have seen a health care provider than those

participating in the household questionnaire only. Significant differences were also found between those tested and those not tested such that those who may be most likely to be infected (younger and single) were less likely to be tested. As a result, STD prevalence may have been underestimated due to these differences in the final sample and may not be generalizable to other agricultural communities. As with any survey conducted about sensitive topics, participants may have been reluctant to disclose risk behaviors. There may have also been some bias arising from misclassification of current risk behaviors since some questionnaire items did not specify the time frame of behaviors. Thus, the relationship of risk behaviors within a specific time frame could not be determined. Lack of STD awareness and low educational levels in some communities may have hindered participants' ability to understand and respond accurately to some of the risk behavior questions despite efforts to pilot the survey instruments.

Despite the low prevalence of STDs in this population, the high prevalence of reported sexual risk behaviors clearly warrants further behavioral surveillance in the farmworker population. Both continued behavioral and STD surveillance are also necessary for the design of behavioral interventions to reduce STD risk behaviors and for evaluating the impact of these interventions in protecting community-wide sexual and reproductive health.

References

1. Ruiz J, Da Valle L, Jungkeit M, Platek G, Mobed K, Lopez R. *Seroprevalence of HIV and Syphilis and Assessment of Risk Behaviors Among Migrant and Seasonal Farmworkers in Northern California*. Sacramento, Calif: California Department of Health Services–Office of AIDS; 1997.
2. Wong W, Tambis JA, Hernandez MT, Chaw JK, Klausner JD. Prevalence of sexually transmitted diseases among Latino immigrant day laborers in an urban setting–San Francisco. *Sex Transm Dis*. 2003;30(8):661-663.
3. Organista KC, Carrillo, Ayala. *JAIDS*. 2004;37(suppl 4): S227-S239.
4. Levy V, Page-Shafer K, Evans J, et al. HIV-related risk behavior among Hispanic immigrant men in a population-based household survey in low-income neighborhoods of northern California. *Sex Transm Dis*. 2005;32(8):487-490.
5. Villarejo D, Lighthall D, Williams D, et al. California Institute for Rural Studies. *Suffering in Silence: A Report on the Health of California's Agricultural Workers*; 2000.
6. Holmes, SK. An ethnographic study of the social context of migrant health in the United States. *PLoS Medicine*. 2006;3(10): e448.
7. CDC. HIV infection, syphilis, and tuberculosis screening among migrant farmworkers–Florida, 1992. *MMWR*. 1992; 41(39):723-725. Available at: <http://www.cdc.gov/mmwr/preview/mmwrhtml/00017692.htm>. Accessed June 22, 2001.
8. Organista KC, Balls Organista, P, Garcia de Alba GJE, Castillo Moran MA, Ureta Carrillo LE. Survey of condom-related beliefs, behaviors, and perceived social norms in Mexican migrant laborers. *J Comm Health*. 1997;22(3):185-198.
9. Blackmore CA, Limpakarnjanarat K, Rigau-Perez JG, Albritton, WL, Greenwood JR. An outbreak of chancroid in Orange County, California: descriptive epidemiology and disease-control measures. *J Infect Dis*. 1985;151(5):840-844.
10. Viadro CI, Earp JL. The sexual behavior of married Mexican immigrant men in North Carolina. *Soc Sci Med*. 2000;50:723-735.
11. Salgado de Snyder VN, Diaz Perez M de J, Maldonado M. AIDS: risk behaviors among rural Mexican women married to migrant workers in the United States. *AIDS Ed Prev*. 1996;8(2):134-142.
12. Salgado de Snyder VN, Acevedo A, Diaz-Perez MJ, Saldivar-Garduno A. Understanding the sexuality of Mexican-born women and their risk for HIV/AIDS. *Psych Women's Quart*. 2000;24:100-109.
13. Hirsch JS, Higgins J, Bentley ME, Nathanson CA. The Social Construction of Sexuality: marital infidelity and sexually transmitted disease–HIV risk in a Mexican migrant community. *Am J Pub Health*. 2000;92:1227-1237.